PETROLEUM REFINERY
INFORMATION COLLECTION REQUEST (ICR)
EMISSIONS TEST REPORT

for

BP-Husky Refining LLC
Delayed Coking Unit 3
Oregon, Lucas County, Ohio

October 2011

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CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, that all data required and provided are true and correct, with respect to the test procedures used.

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1.0 INTRODUCTION

The Unites States Environmental Protection Agency (U.S. EPA) recently issued an “Information Collection Request” (ICR) request to the Office of Management and Budget (OMB) in an effort to obtain information necessary to identify and categorize refinery process units potentially subject to the MACT standards that the Agency intends to develop pursuant to section 112(d) of the Clean Air Act (CAA). The ICR request listed approximately 88 refinery sources that were required to perform extensive fuel and/or source sampling. The ICR is divided into four (4) components as follows:

- Component 1 (Questionnaire)
- Component 2 (Emission Inventory)
- Component 3 (Distillation Feed Sampling)
- Component 4 (Testing and ERT reporting)

On March 31, 2011, U.S. EPA sent a Section 114 letter to the BP-Husky Refining Company in Oregon, Ohio stating that the facility was subject to the ICR and that certain information would need to be submitted by the facility to satisfy U.S. EPA’s ICR. More specifically, EPA requested that one of the facility’s Delayed Coking Units be tested for various pollutants, and that the test data obtained during the test program be submitted under the ICR. BP-Husky selected the Delayed Coking Unit 3 (DCU 3) for testing.

“Component 4” of the ICR specifies the testing and reporting requirements for the Refinery ICR. The purpose of this submittal is to satisfy the “Component 4” requirement. This test report summarizes the test data that was obtained, the procedures that were followed, the test methods that were used, and any EPA-approved deviations from the procedures of the prescribed test methods. In addition, this test report includes the Electronic Reporting Tool (ERT) and Refining Testing Supplement (RTS) printouts of the ICR emissions test data, where applicable. The ERT and RTS data were also submitted in U.S. EPA’s required electronic format as part of this test report submittal.

2.0 BACKGROUND

The emissions testing and fuel sampling requirements in the Refinery ICR are specific to each source and depend on process type, fuel type, and emissions control device(s). For delayed coking units, the emissions test requirements include: multiple metals, speciated volatile organic compound hazardous air pollutants (VOC HAPs); speciated semi-volatile organic HAPs (SVOC HAPs); total hydrocarbons (THC); aldehydes (formaldehyde, acetaldehyde, and propanal); methane and ethane (CH_4 and C_2H_6); carbon monoxide (CO); sulfur dioxide (SO_2); nitrogen oxides (NO_x); hydrogen chloride, chlorine, and hydrogen fluoride (HCl, Cl_2, and HF); hydrogen cyanide (HF); hydrogen sulfide, carbonyl sulfide, and carbon disulfide (H_2S, COS, and CS_2); total reduced sulfur compounds (TRS); total filterable and condensible particulate matter (PM and $PM_{2.5}$-CON); mercury compounds (Hg^{tp}, Hg^0, and Hg^{2+}); oxygen and carbon dioxide (O_2 and CO_2); moisture (H_2O); and the flow rate of the vent gas tested.

The source sampling for this project required the use of numerous air emissions testing methods. For this ICR data collection project, and based upon engineering judgment and experience, the following list of methods were used as recommended (or permitted) by U.S. EPA as a primary or alternative test method in Refinery ICR "Component 4 – Part VIII:" *Test Procedures, Methods and Reporting Requirements for the Information Collection Request for Petroleum Refineries*:

- EPA Method 1 – Selection of Sampling Points
- EPA Method 2 – Stack Gas Velocity and Flow Rate
- EPA Method 3/3A – O_2 and CO_2
- EPA Method 4 – H_2O
- EPA Method 5 – PM
- EPA Method 6C – SO_2
- EPA Method 7E - NO_x
- EPA Method 15A – TRS
- EPA Method 18 – H_2S, COS, and CS2; CH_4 and C_2H_6; and VOC HAPs
- EPA Method 25A - THC
- EPA Method 26A – HCl, Cl_2, and HF
- EPA Method 29 – Metals

- EPA Method 202 – $PM_{2.5}$-CON
- EPA Method 308 – Methanol
- EPA Method 320 – Aldehydes and Carbon Monoxide
- EPA Method 0010 – SVOC HAPs
- Other Test Method (OTM) 29 – HCN
- ASTM D6784-02 (aka the “Ontario-Hydro Method”) – Hg^{tp}, Hg^0, and Hg^{2+}

Due to the nature and complexity of the testing, all of the pollutants in the above list could not be sampled simultaneously. In recognition of this, Refinery ICR “Component 4 – Part VIII,” §1.1.2 specifies the pollutant types that must be sampled simultaneously, at a minimum, by utilizing a pre-designated lettering system for each pollutant. For example, one set of test runs must include all of the pollutants designated with an “A,” and another set includes all pollutants marked with a “B,” etc. Further, for situations where simultaneous sampling by letter may not be possible due to sampling port or duct diameter constraints, etc., each test run set could be performed on a “subset” basis utilizing a pre-designated letter and number. For example, one set of test runs must include all of the pollutants designated with an “A1,” and another set includes all pollutants marked with an “A2,” etc.

Table 2-1 of this test report summarizes the letter and number designations for the pollutants required to be tested on delayed coking units, as prescribed by “Component 4” of the Refinery ICR:

Table 2-1. Pollutant Letter and Number Designation Matrix

Group A	**Group B**	**Group C**	**Group D**	**All Groups**
Al = VOC, Aldehydes A2 = SVOC A3 = THC, CO, and CH_4/C_2H_6	*Not Required for Delayed Coking Units*	C1 = $HCl/Cl_2/HF$ and HCN C2 = $H_2S/COS/CS_2$ and TRS	Dl = Metals and $PM/PM_{2.5}$-CON D2 = $Hg^{tp}/Hg^0/Hg^{2+}$ *D3 = Not Required* D4 = SO_2 and NO_x	Gas Flow Rate, O_2/CO_2, and H_2O

The ICR required that three (3) runs per pollutant must be performed at normal operating conditions on DCU 3. Table 2-2 summarizes in detail the prescribed sample groups, pollutants, test methods, and analytical methods for this test program, as well as the targeted run times and sample volumes for each sample run. The analytical laboratory is also presented for each target analyte.

Table 2-2. ICR Test Matrix – BP Husky DCU 3

Total Test Runs	Sample Group	Pollutant	Test Method	Target Run Length	Target Sample Volume	Analytical Method (Technique)	Analytical Laboratory
3	A1	VOC HAP (Low)	EPA Method 18	70-min	<10 L	EPA Method 18 (GC/FID-Bag)	URS On-site
3	A1	VOC HAP (High)	EPA Method 18	70-min	≥35 L	EPA Method 18 (GC/FID-Sorbent)	Enthalpy Analytical, Inc
3	A1	Methanol	EPA Method 308	70-min	≥35 L	EPA Method 308 (GC/FID-Sorbent)	Enthalpy Analytical, Inc
3	A1	Aldehydes	EPA Method 320	70-min	N/A	EPA Method 320 (FTIR)	URS On-site
3	A2	SVOC HAP	SW-846 Method 0010	70-min	>0.05 m^3	SW-846 Methods 3542/8270D (GC/MS)	TestAmerica Laboratories, Inc
3	A3	THC	EPA Method 25A	70-min	N/A	U.S. Method 25A (FID)	URS On-site
3	A3	Methane, Ethane	EPA Method 18	70-min	<10 L	EPA Method 18 (GC/FID-Bag)	URS On-site
3	A3	CO	EPA Method 320	70-min	N/A	EPA Method 320 (FTIR)	URS On-site
3	C1	HCl, Cl_2, HF	EPA Method 26A	70-min	>0.05 m^3	EPA Method 26A (IC)	Enthalpy Analytical, Inc
3	C1	HCN	OTM-29	70-min	>0.05 m^3	U.S. OTM-29 (IC)	Enthalpy Analytical, Inc
3	C2	H_2S, COS, CS_2	EPA Method 18	70-min	<10 L	EPA Method 18 (GC/FPD-Bag)	URS On-site
3	C2	TRS	EPA Method 15A	70-min	<10 L	EPA Method 6	URS On-site
3	D1	Metals	EPA Method 29	70-min	>0.05 m^3	SW-846 Method 6020A (ICAP/MS)	TestAmerica Laboratories, Inc
3	D1	PM	EPA Method 5	70-min	>0.05 m^3	EPA Method 5 (Gravimetric)	Enthalpy Analytical, Inc
3	D1	$PM_{2.5}$-CON	EPA Method 202	70-min	>0.05 m^3	EPA Method 202 (Gravimetric)	Enthalpy Analytical, Inc
3	D2	Hg^{tp}, Hg^0, Hg^{2+}	ASTM D6784-02	70-min	>0.05 m^3	SW-846 Method 7470A (CVAAS)	TestAmerica Laboratories, Inc
3	D4	NO_x	EPA Method 7E	70-min	N/A	EPA Method 7E (Chemiluminescence)	URS On-site
3	D4	SO_2	EPA Method 6C	70-min	N/A	EPA Method 6C (UV)	URS On-site
All	A/C/D	Moisture	EPA Method 4	70-min	>0.05 m^3	EPA Method 4 (Gravimetric)	URS On-site
All	A/C/D	O_2 and CO_2	EPA Method 3A	70-min	N/A	EPA Method 3A (Parametric/IR)	URS On-site
All	A/C/D	Flow Rate	EPA Methods 2/3A/4	70-min	N/A	EPA Methods 2/3A/4	URS On-site

Notes

1. “Component 4” of the ICR requires sampling during the entire venting cycle, and the venting cycle of DCU 3 was expected to last approximately 70 minutes at the time of drafting the *Test Plan* for this project. However, during the actual test program, if the venting cycle lasted longer (or shorter) than 70 minutes, then the length of the test run was adjusted to reflect the actual duration of the venting cycle, where practicable.

2. The target dry gas sample volume of >0.05 m^3 (which corresponds to 1.77 ft^3) and a wet gas sample volume of >5 m^3 (which corresponds to 176.6 ft^3) is appropriate for isokinetic and EPA Method 4 sampling trains operated during this measurement program; however, per “Component 4” of the ICR, no sampling volume requirement is associated with any EPA test method performed on a DCU Vent.

3.0 SUMMARY OF ICR TESTING RESULTS

Table 3-1 summarizes the source test parameters, the test methods used, and the reporting tool format (i.e., either ERT or RTS) used for the source test data obtained for the ICR test program. Note that for other ICR projects, EPA has required that all of the data be submitted in the ERT format. However, for DCU sources, it was realized during the report-writing phase of this project that the ERT software is not fully compatible with the data that is required to be reported under the ICR. For these instances, the data is alternatively being submitted in the RTS format via Excel spreadsheets.

Table 3-2 summarizes the results (based upon the 3-run averages) of this testing program for each of the general pollutants tested. Tables 3-3 through 3-6 summarize the results (based upon the 3-run averages) of this testing program for each of the individual non-methane/non-ethane (NMNE) VOCs, semi-VOCs, aldehydes, and metals measured, respectively. For tables 3-2 through 3-6, the tables list the pollutant concentration in the units required by the ICR as well as the mass emission rates of the pollutants on a lbs/hr (as tested), lbs/hr (annualized), lbs/cycle (i.e., lbs per venting event), and tons per year (tpy) basis. The final concentration and emission rate data summarized in Tables 3-2 through 3-6 have also been dilution corrected and represent the “true” measured value obtained during the ICR test program for that pollutant.

Appendix 1 of this test report contains the more detailed and comprehensive run-by-run results printed in the applicable spreadsheet format required by EPA. In addition, the ERT (and RTS) data will also be submitted to EPA electronically as part of this test report submittal. Appendix 3 of this test report includes the full laboratory analytical reports for each of the applicable pollutants tested.

Table 3-1. ICR Test Results – Reporting Tool Format

Parameter	Test Method	Reporting Tool Format
Stack Gas Flow Rate	EPA Methods 1/2/3A	ERT
O_2 and CO_2	EPA Method 3A	ERT
H_2O	EPA Method 4	ERT
PM and $PM_{2.5\text{-CON}}$	EPA Method 5/202	ERT
SO_2	EPA Method 6C	ERT
NO_x	EPA Method 7E	ERT
CO	EPA Method 10 (via 320)	ERT
THC	EPA Method 25A	ERT
HCl, Cl_2, and HF	EPA Method 26A	ERT
Metals	EPA Method 29	ERT
TRS	EPA Method 15A	RTS
H_2S, COS, and CS_2	EPA Method 18	RTS
Methane and Ethane	EPA Method 18	RTS
VOC	EPA Method 18	RTS
Methanol	EPA Method 308	RTS
Aldehydes	EPA Method 320	RTS
SVOC	Method 0010	RTS
HCN	OTM 29	RTS
Hg	ASTM D6784-02 (O-H)	RTS

Table 3-2. ICR Test Results – BP Husky DCU 3

Run Names	Pollutant	Test Method	Average Run Length	Average Sample Volume	Average Concentration (varies)	Average Emission Rate (lbs/cycle)	Average Emission Rate $(lbs/hour)_{actual}$	Average Emission Rate $(lbs/hour)_{annual}$	Average Emission Rate (tons/year)
A-2*, A-3, A-4	VOC HAP (Low)	EPA Method 18	82-min	N/A	See Table 3-2 for individual VOC data (via bag)				
A-2*, A-3, A-4	VOC HAP (High)	EPA Method 18	82-min	34.5 L	See Table 3-2 for individual VOC data (via sorbent)				
A-2*, A-3, A-4	Methanol	EPA Method 308	82-min	35.9 L	<1,100,000 µg/dscm	<0.29	<0.19	<0.017	<0.076
A-2*, A-3, A-4	Aldehydes	EPA Method 320	95-min	N/A	See Table 3-4 for individual aldehyde data				
A-2*, A-3, A-4	SVOC HAP	SW-846 Method 0010	82-min	3.51 dscf	See Table 3-3 for individual SVOC data				
A-2*, A-3, A-4	THC (as C_3H_8)	EPA Method 25A	95-min	N/A	437,000 ppmd	377	236	22.8	100
A-2*, A-3, A-4	Methane	EPA Method 18	95-min	N/A	911,333 ppmd	321	198	19.5	85.2
A-2*, A-3, A-4	Ethane	EPA Method 18			91,433 ppmd	54.9	34.4	3.33	14.6
A-2*, A-3, A-4	CO	EPA Method 320	95-min	N/A	4,273 ppmd	1.67	1.03	0.101	0.443
C-1, C-2, C-3*	HCl	EPA Method 26A	76-min	1.31 dscf	3,800 mg/dscm	<0.1500	<0.2000	<0.00910	<0.04000
C-1, C-2, C-3*	Cl_2	EPA Method 26A			<4.4 mg/dscm	<0.0004	<0.0003	<0.00003	<0.00012
C-1, C-2, C-3*	HF	EPA Method 26A			<46 mg/dscm	<0.0036	<0.0029	<0.00022	<0.00095
C-1, C-2, C-3*	HCN	OTM-29	59-min	1.15 dscf	<36,000 µg/dscm	<0.0023	<0.0023	<0.00014	<0.00061
C-1, C-2, C-3*	H_2S	EPA Method 18	79-min	N/A	54,800 ppmd	7.14	5.77	0.433	1.90
C-1, C-2, C-3*	COS	EPA Method 18			<5,433 ppmd	<1.2	<0.88	<0.074	<0.32
C-1, C-2, C-3*	CS_2	EPA Method 18			<5,900 ppmd	<1.7	<1.2	<0.100	<0.45
C-1, C-2, C-3*	TRS (as SO_2)	EPA Method 15A	~55-min	110 L	71,000 ppmd	–	–	–	–
D-2, D-4*, D-5	Metals	EPA Method 29	124-min	2.59 dscf	See Table 3-5 for individual metals data				
D-2, D-4*, D-5	PM	EPA Method 5	126-min	3.02 dscf	1.69 gr/dscf	0.999	0.465	0.061	0.265
D-2, D-4*, D-5	$PM_{2.5}$-$CON_{organic}$	EPA Method 202			0.79 gr/dscf	0.494	0.235	0.030	0.131
D-2, D-4*, D-5	$PM_{2.5}$-$CON_{inorganic}$	EPA Method 202			1.32 gr/dscf	0.883	0.419	0.054	0.234
D-2, D-4*, D-5	PM-TOTAL	EPA Method 5/202			3.81 gr/dscf	2.38	1.12	0.144	0.631
D-2, D-4*, D-5	Hg^{tp}	ASTM D6784-02	87-min	1.63 dscf	–	–	–	–	–
D-2, D-4*, D-5	Hg^0-Elemental	ASTM D6784-02			<4.5 µg/dscm	<0.0000009	<0.0000006	<0.00000005	<0.0000002
D-2, D-4*, D-5	Hg^{2+}-Oxidized	ASTM D6784-02			<21 µg/dscm	<0.0000042	<0.0000029	<0.00000025	<0.0000011
D-2, D-4*, D-5	Hg-TOTAL	ASTM D6784-02			<25 µg/dscm	<0.0000050	<0.0000036	<0.00000031	<0.0000013
D-2, D-4*, D-5	NO_x	EPA Method 7E	117-min	N/A	~0 ppmd	Pollutant was not observed in any run. See Section 3.1 of this report.			
D-2, D-4*, D-5	SO_2	EPA Method 6C			~0 ppmd	Pollutant was not observed in any run. See Section 3.1 of this report.			
All Runs	Moisture	EPA Method 4	Varied	Varied	H_2O contents ranged from 97.8-99.8%				
	O_2	EPA Method 3A	Varied	N/A	O_2 contents for all test runs was 0.0%				
	CO_2	EPA Method 3A	Varied	N/A	CO_2 contents for all test runs was 0.0%				
	Flow Rate	EPA Methods 2/3A/4	Varied	N/A	Stack gas flow rates ranged from 12.0-129.6 dscfm; Stack gas velocities ranged from 182.7-480.3 fps and 124.6-327.5 MPH				

Table 3-3. ICR Test Results for Individual VOC HAPs (Method 18)

VOC HAP (Bag Samples)	Average Concentration (ppm)	Average Emission Rate (lbs/cycle)	Average Emission Rate (lbs/hour)$_{actual}$	Average Emission Rate (lbs/hour)$_{annual}$	Average Emission Rate (tons/year)
Acetone	<0.41	<0.82	<0.49	<0.05	<0.22
Acrolein	<0.34	<0.66	<0.40	<0.04	<0.18
Acrylonitrile	<0.32	<0.58	<0.35	<0.04	<0.15
Benzene	<0.75	<1.9	<1.1	<0.11	<0.49
1,3-Butadiene	<0.25	<0.47	<0.28	<0.03	<0.13
Carbon disulfide	<0.05	<0.12	<0.07	<0.01	<0.03
1,2-Dibromoethane	<0.26	<1.7	<1.0	<0.10	<0.44
Hexane	<0.24	<0.70	<0.42	<0.04	<0.18
Methylene chloride	<2.0	<4.4	<3.3	<0.27	<1.2
Pentane	<0.28	<0.68	<.42	<0..04	<0.18
Tetrachloroethene	<0.29	<1.7	<1.0	<0.10	<0.44
Trichloroethene	<0.38	<1.7	<1.0	<0.10	<0.46
Toluene	<2.5	<6.8	<4.3	<0.41	<1.8
VOC HAP (Sorbent Samples)	**Average Concentration (µg/dscm)**	**Average Emission Rate (lbs/cycle)**	**Average Emission Rate (lbs/hour)$_{actual}$**	**Average Emission Rate (lbs/hour)$_{annual}$**	**Average Emission Rate (tons/year)**
Acetonitrile	<0.0000017	<0.66	<0.36	<0.040	<0.180
Acrylonitrile	<0.0000990	<0.33	<0.20	<0.020	<0.088
Chlorobenzene	<0.0000780	<0.29	<0.16	<0.017	<0.077
Cumene	<0.0000460	<0.16	<0.09	<0.010	<0.043
Ethylbenzene	<0.0000015	<0.57	<0.30	<0.034	<0.150
Methyl Isobutyl Ketone	<0.0000310	<0.10	<0.06	<0.006	<0.028
Methyl t-Butyl Ether	<0.0000310	<0.11	<0.06	<0.007	<0.028
2-Nitropropane	<0.0000012	<0.43	<0.25	<0.026	<0.110
Styrene	<0.0000520	<0.18	<0.10	<0.011	<0.047
2,2,4-Trimethylpentane	<0.0000290	<0.10	<0.06	<0.062	<0.027
o-Xylene	<0.0000034	<1.3	<0.67	<0.077	<0.340
p-Xylene	<0.0000067	<2.7	<1.4	<0.160	<0.710

Table 3-4. ICR Test Results for Individual SVOC HAPs (Method 0010)

VOC HAP	Average Concentration (µg/dscm)	Average Emission Rate (lbs/cycle)	Average Emission Rate $(lbs/hour)_{actual}$	Average Emission Rate $(lbs/hour)_{annual}$	Average Emission Rate (tons/year)
Acenaphthene	37,900	0.0150	0.0101	0.00089	0.0040
Acenaphthylene	7,760	0.0029	0.0020	0.00017	0.0008
Aniline	<37,000	<0.0130	<0.0091	<0.00081	<0.0036
Anthracene	180,000	0.0600	0.0042	0.00364	0.0159
Benzidine	<260,000	<0.0940	<0.0640	<0.00570	<0.0250
Benz[a]anthracene	25,200	0.0051	0.0040	0.00031	0.0014
Benzo[b]fluoranthene	<11,000	<0.0037	<0.0026	<0.00022	<0.0001
Benzo[k]fluoranthene	<11,000	<0.0048	<0.0032	<0.00029	<0.0013
Benzo[g,h,i]perylene	17,300	0.0032	0.0026	0.00019	0.0008
Benzo[a]pyrene	26,900	0.0050	0.0040	0.00030	0.0013
Benzo[e]pyrene	15,200	0.0029	0.0023	0.00017	0.0008
Biphenyl	48,100	0.0200	0.0133	0.00119	0.0052
Chrysene	31,700	0.0067	0.0051	0.00040	0.0018
Cresols (total)	143,000	0.0454	0.0314	0.00275	0.0120
Dibenz[a,h]anthracene	<6,300	<0.0012	<0.0009	<0.00007	<0.0003
Dibenzofuran	44,900	0.0177	0.0121	0.00108	0.0047
Dibenzo[a,e]pyrene	<9,700	<0.0019	<0.0015	<0.00011	<0.0005
Dimethoxybenzidine	<60,000	<0.0220	<0.0150	<0.00130	<0.0058
Dimethylaminobenzene	<18,000	<0.0060	<0.0041	<0.00036	<0.0016
Dimethylbenz[a]anthracene	<10,000	<0.0037	<0.0025	<0.00023	<0.0010
3,3-Dimethylbenzidine	<78,000	<0.0280	<0.0190	<0.00170	<0.0075
Dimethylphenethylamine	<36,000	<0.013	<0.0089	<0.00079	<0.0035
2,4-Dimethylphenol	61,900	0.0203	0.0141	0.00123	0.0054
Fluoranthene	30,100	0.0073	0.0054	0.00044	0.0019
Fluorene	137,000	0.0496	0.0343	0.00301	0.0132
Indeno[1,2,3-cd]pyrene	5,000	0.0009	0.0007	0.00006	0.0002
Isophorone	<12,000	<0.0044	<0.0030	<0.00027	<0.0012
3-Methylcholanthrene	<16,000	<0.0059	<0.0040	<0.00036	<0.0016
2-Methylnaphthalene	1,820,000	0.7270	0.0496	0.04410	0.1930
Naphthalene	987,000	0.0407	0.0277	0.02470	0.1080
Nitrobenzene	<12,000	<0.0044	<0.0030	<0.00027	<0.0012
Perylene	<2,000	<0.0005	<0.0004	<0.00003	<0.0001
Phenanthrene	447,000	0.1460	0.1020	0.00884	0.0387
Phenol	56,500	0.0179	0.0123	0.00108	0.0047
1,4-Phenylenediamine	<100,000	<0.0380	<0.0260	<0.00230	<0.0100
Pyrene	114,000	0.0274	0.0203	0.00166	0.0073
o-Toluidine	19,900	0.0067	0.0046	0.00040	0.0018
POM	3,940,000	1.49	1.02	0.090	0.395

Table 3-5. ICR Test Results for Individual Aldehydes (Method 320)

Aldehyde	Average Concentration (µg/dscm)	Average Emission Rate (lbs/cycle)	Average Emission Rate (lbs/hour)$_{actual}$	Average Emission Rate (lbs/hour)$_{annual}$	Average Emission Rate (tons/year)
Acetaldehyde (C_2H_4O)	<3,000,000	<0.71	<0.48	<0.043	<0.19
Formaldehyde (CH_2O)	<500,000	<0.12	<0.08	<0.007	<0.03
Propanal (C_3H_6O)	<5,300,000	<1.3	<0.86	<0.077	<0.34

Table 3-6. ICR Test Results for Individual Metals (Method 29)

Metal	Average Concentration (mg/dscm)	Average Emission Rate (lbs/cycle)	Average Emission Rate (lbs/hour)$_{actual}$	Average Emission Rate (lbs/hour)$_{annual}$	Average Emission Rate (tons/year)
Antimony (Sb)	<0.008	<0.0000022	<0.0000010	0.00000013	<0.00000057
Arsenic (As)	<0.016	<0.0000052	<0.0000024	<0.00000031	<0.00000140
Beryllium (Be)	<0.001	<0.0000003	<0.0000002	<0.00000002	<0.00000009
Cadmium (Cd)	<0.004	<0.0000011	<0.0000005	<0.00000007	<0.00000029
Chromium (Cr)	<0.120	<0.0000340	<0.0000170	<0.00000210	<0.00000910
Cobalt (Co)	0.015	<0.0000044	<0.0000021	<0.00000027	<0.00000120
Lead (Pb)	0.474	0.0001350	0.0000623	0.00000820	0.00003590
Manganese (Mn)	0.345	0.0000969	0.0000470	0.00000588	0.00002570
Nickel (Ni)	0.473	0.0001780	0.0000800	0.00001080	0.00004730
Selenium (Se)	<0.130	<0.0000490	<0.0000220	<0.00000300	<0.00001300

In order to convert the pollutant mass emission rate from lbs/hour (actual, as measured during the testing), the test data were first converted to a lbs/cycle basis as follows:

$$MER * (T_c/60) = MER_c$$

Where: MER = Average pollutant mass emission rate (lbs/hr)
T_c = Total length of the test run or cycle (minutes)
60 = Minutes per hour
MER_c= Average pollutant mass emission rate (lbs/cycle)

In order to convert the pollutant mass emission rate from lbs/cycle to tons per year (tpy), the following equation was used:

$$MER_c * (518/2{,}000) = TPY$$

Where: MER_c= Average pollutant mass emission rate (lbs/cycle)
518 = # of vent cycles per year emitted from DCU 3 (see Section 4.2 of this report)
2,000 = lbs per ton
TPY = Average pollutant mass emission rate (tons per year)

In order to convert the pollutant mass emission rate from tons per year to an annualized lbs/hour value, the following equation was used:

$$TPY * (2{,}000/8{,}760) = MER_a$$

Where: TPY = Average pollutant mass emission rate (tons per year)
2,000 = lbs per ton
8,760 = Hours per year
MER_a = Annualized pollutant mass emission rate (lbs/hr)

For clarity, Tables 3-7 and 3-8 summarize the run layouts for this project in both the order that each test runs were actually performed, and on a pollutant sample group basis, respectively. As can be seen, as the need was identified for additional testing, the schedule was adapted to accommodate additional runs. Subsequently, these tables also indicate the runs which were not used for the data evaluation and reporting, as well as the runs in which sludge was injected into the tested coke drum (see Section 7.2 of this report).

As an additional clarification, BP-Husky notes that there is a difference in the naming conventions between the “Sample Group Names” in Table 2-2 versus the “Run Names” in Tables 3-2, 3-7, and 3-8. For example, Sample Group Name “A3” represents the subset of pollutants in Group A that were required to be tested simultaneously – CO, THC, methane, and ethane. However, in Tables 3-2, 3-7, and 3-8, Run Name “A-3” represents the third sample run for the pollutants that were categorized under Group A.

Table 3-7. BP Husky ICR Test Program – Test Run Matrix by Time Performed

Overall Run No.	Run Name	Date	Time	DCU 3 Vent
1	PRELIM	07/14/11	0800-0950	East
2	D-1 (Not Used)	07/15/11	0220-0410	West
3	D-2	07/15/11	1939-2125	East
4	D-3 (Not Used)	07/16/11	1322-1518	West
5	D-4 (Sludge Inj.)	07/18/11	0220-0332	West
6	C-1	07/18/11	2029-2236	East
7	C-2	07/19/11	1423-1520	West
8	C-3 (Sludge Inj.)	07/20/11	0905-0950	East
9	A-1 (Not Used)	07/21/11	0215-0356	West
10	A-2 (Sludge Inj.)	07/21/11	2057-2231	East
11	A-3	07/24/11	1955-2125	East
12	A-4	07/25/11	1440-1543	West
13	D-5	07/27/11	0128-0339	West

Table 3-8. BP Husky ICR Test Program – Test Run Matrix by Pollutant Sample Group

Overall Run No.	Run Name	Date	Time	DCU 3 Vent
1	PRELIM	07/14/11	0800-0950	East
9	A-1 (Not Used)	07/21/11	0215-0356	West
10	A-2 (Sludge Inj.)	07/21/11	2057-2231	East
11	A-3	07/24/11	1955-2125	East
12	A-4	07/25/11	1440-1543	West
6	C-1	07/18/11	2029-2236	East
7	C-2	07/19/11	1423-1520	West
8	C-3 (Sludge Inj.)	07/20/11	0905-0950	East
2	D-1 (Not Used)	07/15/11	0220-0410	West
3	D-2	07/15/11	1939-2125	East
4	D-3 (Not Used)	07/16/11	1322-1518	West
5	D-4 (Sludge Inj.)	07/18/11	0220-0332	West
13	D-5	07/27/11	0128-0339	West

3.1 Determination of ICR Testing Results

The summary results presented in Section 3.0 of this report as well as the submitted spreadsheets are calculated from multiple inputs. These include analytical results as well as the measured and calculated gas flow parameters. The following conventions were used in the development and determination of the ICR test results:

- Results are reported and used down to the laboratory reported method detection limit (MDL). Results between the MDL and low calibration standard are included.
- Multiple analytical results relating to a single sample are summed to develop a single value for the sample. In this case, all results below the laboratory reported MDL are treated as the MDL. This is a conservative approach to estimate the pollutant concentrations and emissions.
- In the determination of the velocity of the DCU 3 vent gas (and therefore flow rate), the dry gas was presumed to be nitrogen. This result is only used to develop the molecular weight of the emissions gas. As the emissions gas is greater than 97% water in all cases, any error from assuming nitrogen as the dry gas is negligible.
- Results for multiple analytes are summed to develop a single result for polycyclic organic matter (POM). In this case, any results below the detection limit are treated as zero.
- Samples from the SW-846 M0010 sampling train for semi-volatile organics were analyzed multiple times, giving multiple results for the same analyte from the same sampling train. The reported value was selected as follows:
    - The sample result must be within the calibration curve. If the result was above the calibration curve, a result from a diluted sample was reported. This occurred with full-scan analysis.
    - If the sample result for full-scan analysis was below the lowest calibration standard, and if there was an alternate result from specific ion monitoring (SIM), the SIM result was reported.
- No results are reported for both NO_x and SO_2. These analytes were required to be to be measured, and the measurement was attempted. However, neither analyte was observed in any of the runs. Due to the matrix and the need for high dilution of the gas before it reached the instrument, the results were well below the calibration curve of the instrument.

3.2 Data Limitations

The results presented in this report should be considered estimates of true emissions from the DCU 3 vent. There are numerous specific issues and situations associated with testing any coker vent, and many of these compromises and issues has some impact on data quality and usability. These include:

- *Process Operations*
    - A delayed coker unit is the very last unit in a refinery. The feed to a coker unit is what remains of refinery feedstock after all the other processing steps. This is not a well-characterized or controlled material.
    - It follows that any change in any upstream processing step may have a change in coker feed material, and therefore in coker operations and emissions.
    - Delayed coker operations are batch in nature. By their very nature, batch processes are not as repeatable or controlled as continuous processes.
    - Within the coker itself, a significant activity is the cracking and fracturing process. There is no approach to repeatability and control relative to what the actual cracking activity might be. As a result, there can be void spaces, hot spots, uncracked areas, and bigger and smaller chunks of coke.
    - To some extent, coker operations are manual. By their very nature, manual process are subject to greater variability than automated processes.
- *Sample Collection*
    - Coker emissions gas is almost pure steam. The standard methods for sampling gas condense the moisture from the gas stream, and then control and measure the dry gas remaining. On a coker, there is very little dry gas remaining, and therefore the standard methods of controlling a sampling system are not applicable.
    - Sampling trains must be significantly modified to accommodate all the condensed water. Standard trains that have 4 or 5 impingers might require 12 or more impingers.
    - Since the volume of dry gas is so low, the actual sampling rate of the dry gas is also very low. This rate is outside the normal operations of the sampling equipment, and requires adaptation in sampling equipment calibration.
    - The dry gas from a coker is mostly hydrocarbons, with high levels of reduced sulfur species. The standard gas measurement methods presume that the dry gas is inert, and primarily nitrogen, oxygen and carbon dioxide. Measures must be taken to modify and adapt the methods to this very challenging matrix. These measures include sampling dilution systems and the modification of impinger contents to address interferences and to protect the sampling equipment.
    - Frequently, as the coker emissions gas is condensed, a non-miscible organic layer is observed. Sample train recovery procedures may have to be modified to deal with this organic condensate.
    - The sampling of steam and the condensation of water vapor and organic condensate in the sampling train raises a number of chemistry issues. The overall dilution of the contents of the impingers could affect the absorbance and

  reactivity. Any chemically active species condensed might react with the impinger contents in an unexpected way. Finally, the addition of condensed species may have some impact on sample preservation.
  - The gas flow rate can be very high (in excess of 200 miles per hour). As such, the velocity measurement equipment must be adapted and modified.
  - The presence of large amounts of steam can also result in the presence of condensed steam at any cold point in any part of the sampling system. This also occurs in the pitot tubes used to measure velocity, and requires that these lines be flushed with condensed air on a regular basis.
  - The presence of large amounts of steam and the potential for condensed water raises issues with maintaining and controlling temperatures throughout the sampling train.
  - The cutting deck and coker deck area are inhospitable locations. Sampling staff and equipment must be protected from the environment. To this end, much of the sampling equipment must be shut down completely between runs, and all of it must be covered and protected.
  - The instrumentation used for continuous measurements works best in a controlled environment. This kind of environment is not available on a coker deck. As a result, there are frequently issues with instrument drift and proper function. In particular, it can be very difficult to keep the flame lit on the hydrocarbon analyzer.
  - The coke cutting process, which follows the coke venting process is considered very hazardous, and sampling staff must be off the cutting deck before cutting can start. This results in a very short window after the completion of venting operations to perform all requisite post-sampling activities (e.g., sample train recovery, leak checks, post-test calibrations).
- *Sample Analysis*
  - The large amount of steam means that the condensate samples are very large. The laboratory must modify and adapt their procedures as well, to accommodate the sheer volume of sample.
  - As noted, the matrix is not the standard background of nitrogen, oxygen and carbon dioxide. As a result, the impinger samples received by the laboratory may have different properties than more typical stack samples. Again, laboratory procedures and methodology must be adapted.
  - The large amounts of hydrocarbon and reduced sulfur species in the gas stream require adaptation to sample preparation methods and may require dilution to have the analytes within the instrument calibration curves.
  - The presence of the organic condensate described above may require method modification and adaptation to prepare the collected sample for analysis.
  - The bulk of the sample is condensed moisture. As such, many analytical fractions recovered from sampling trains *might be more appropriately treated as water*

samples. In many of these cases, these samples will contain incompatible reactive species (e.g., H_2S and HCN).

As a result of the limitations and issues detailed above, and the specific issues highlighted at various other locations in this report, **the emissions data from coker testing should be considered to be an estimate**. These data have unquantifiable (although identified) biases and uncertainties, and might best be treated as “order-of-magnitude” results.

4.0 FACILITY AND PROCESS DESCRIPTION

4.1 Facility Location

BP-Husky operates a petroleum refinery in Oregon, Ohio. The BP-Husky Refinery is a highly automated petroleum refinery with the capacity to convert approximately 131,000 barrels of a mix of crude oils per calendar day (bbl/cd) into finished products. The BP-Husky Refinery currently operates under Title V Operating Permit No. 04-48-02-0007, dated October 13, 2004. DCU 3, commissioned in 1999, is one of several manufacturing processes operating under the Title V permit.

4.2 Source and Process Description

DCU 3 converts heavy oil into more valuable products and feed stocks. It has an operating feed capacity of 27,000 barrels per calendar day (bbl/cd) and produces approximately 1,600 tons per day (584,000 tons per year) of high-sulfur coke (fuel grade) which is sold as solid fuel to Toledo Edison or on the open market. A brief description of DCU 3's operation is presented in this section.

DCU 3 is equipped with one process heater. This equipment combusts refinery fuel gas (RFG) or natural gas to provide heat for the delayed coking process. The process heater is upstream of two (2) coke drums and each coke drum has both a dedicated atmospheric depressurization vent (i.e., the main DCU vent) and an ejector vent. DCU 3's two (2) coke drums, each with a height of 78 feet (tangent to tangent) and an internal diameter of 27 feet, are designated as the west drum and the east drum. DCU 3's two (2) depressurization vents are designated as the west vent and the east vent. The two (2) ejector vents are designated as the west ejector vent and the east ejector vent. The DCU 3 drums and, subsequently, the vents, operate on an alternating basis. Hence, for this test program, either the west or east vent was tested for each test run.

DCU 3 converts, via thermal cracking, residual oil from the vacuum or crude unit into light products, distillate, naphtha, fuel gases and petroleum (pet) coke. The volatile constituents are driven out of the coke drum and into the fractionator, while the petroleum coke remains in the drum. After an "on-line" coke drum is filled with pet coke, it becomes "off-line" and any residual volatile compounds are recovered from the pet coke via steaming to the fractionator and then to the blowdown system. The entire DCU 3 operates in a continuous series of cycles where the off-line coke drum is steam stripped, cooled, emptied of pet coke and warmed, while the on-line coke drum is filled with coke via heated feedstock, and vice versa. A DCU 3 process flow diagram is included in Appendix 2 of this test report.

Steam and quench water are applied to the off-line coke drum to reduce the volatile hydrocarbon content and lower the temperature of the pet coke prior to removal (i.e., coke-cutting). DCU 3 quench and cutting water is contained in a single open tank prior to use. The quench and coke-cutting water is captured and recycled from the coke pit to the maze pit, fines pit, and hydrocyclones for clarification. Quench and coke-cutting water is recycled to DCU 3 and used during subsequent operating cycles. During approximately one (1) out of three (3) single coke drum operating cycles, sludge (belt-pressed refinery sewer solids) is also injected into the coke drum during the initial water quench, while the coke drum is still hot.

Following the quenching cycle and prior to the removal of the coke drum’s top and bottom Delta valves (automated slide valves) to allow for the coke-cutting process, a vent opens to depressurize a coke drum directly to atmosphere (i.e., venting cycle) and to allow adequate draining of the remaining quench water. This depressurized exhaust is what was tested for the ICR. Quench water may be added to the coke drum during the venting cycle if required for cooling. During the emissions test, atmospheric venting occurred at or below a coke drum internal pressure of five (5) pounds per square inch gauge (psig) and a temperature at or below 400°F. Additionally, interlocks controlled by a failsafe controller (FSC) do not allow the main DCU vent or ejector vent motor operated valves (MOV) to open automatically without meeting these conditions.

Each vent is comprised of a single 8” pipe that releases gas (>98% steam) from a coke drum to atmosphere typically between 40 to 160 minutes during a normal venting cycle. During normal operations of DCU 3 the ejector vent pipe, separate from the main DCU vent pipe, is also activated during the venting cycle. The ejector vent uses a source of pressurized steam to create a low-pressure zone in the head space of the coke drum (i.e., Venturi effect) and expel steam and coke drum effluent vapor from the outlet of the ejector vent to atmosphere. This procedure is used to shorten the length of the venting cycle and to provide improved visibility of the top head of the coke drum during drilling of the coke.

During the ICR test program, BP-Husky eliminated the use of the ejector vent during each venting cycle. This was done to ensure that all emissions were captured at a single source, and to minimize the potential calculation errors associated with the summation of emissions from multiple sources. By eliminating the use of the ejector vent, the typical venting cycle duration was estimated to increase from 55 to 70 minutes (on average). Note that all phases of coker operations were the same during the testing as they are during normal operations, with the only difference being that the emissions were routed to a single emission source and not the two vents used during normal operation. However, the total amount of mass emissions measured over each test run (via the main DCU vent) is representative of what would normally be emitted via the main DCU vent and ejector vent during a typical venting event.

During the emissions test, when the coke drum reached an internal pressure of 0.5 psig during the venting cycle, the coke drum was drained of quench water and the top and bottom Delta valves were opened to remove the coke from the drum. (Occasionally, the bottom Delta valve is opened prior to all the water being drained, but the intention is to have the water drained out of the drum prior to opening the heads.) The FSC also contains interlocks for these automated de-heading devices. Once the heads are opened, coke is cut out of the coke drum with a high-pressure water nozzle that is lowered through the top flange. The pet coke drains from the coke drum through the bottom Delta valve into the coke pit where water is separated from the coke and recycled. The pet coke is then transferred to a crusher and conveyer system for distribution and transport out of the refinery.

A single coke drum is typically operated on a 16-17 hour operating cycle with a total batch process duration of 32-34 hours. Subsequently, <u>each venting cycle “should” occur at a 16.5 hour interval (on average), with an approximate venting duration of 1.1 hours per interval.</u> The “batch process duration” is the period of time that includes the operating cycle as well as coke drum post-cutting procedures such as steaming, re-heading, pressure-testing and back-warming. Table 4-1 lists the approximate durations of key DCU 3 operational cycles. For the purposes of this report, at an average venting cycle of approximately every 16.5 hours, DCU 3 currently operates with an annual potential of **531** batch cycles (i.e., venting events) from the two (2) coke drums combined.

Table 4-1. Approximate DCU 3 Operating Cycle Durations
(as listed in "Component 1" of the ICR)

Operational Cycle	Duration (hours)
Coke drum feed	16.3
Steam to fractionator	1.6
Steam to blowdown quench tower	0.8
Quenching + Draining	6.6
Venting	**1.1**
De-heading, coke-cutting, and re-heading	2.4
Pressure-testing + Preheating	4.6
Total Batch Process Duration	32.6

4.3 Process Operations

According to "Component 4" of the ICR, DCU 3 must be operated at normal and representative conditions during the ICR test program. Normal and representative operation of DCU 3 is approximately >90% of the operating feed capacity of 27,000 bbl/cd. However, as described in Section 4.2 of this test report, the ejector vent will not be activated until the venting cycle is complete. The following target operating parameters were defined for the ICR test program:

- A quenching time of ≥four (4) hours;
- A quench water volume of at least 160,000 gallons;
- A coke drum overhead temperature at or below 400°F prior to atmospheric depressurization;
- Ejector vents inactive during the venting cycle.

For the ICR test program, the following operating parameters were recorded during a 30-day period that included ICR test program:

- Coke produced from the coke drum (tons/batch cycle);
- Quench water volume per batch cycle for the coke drum (gal);
- Duration of atmospheric venting cycle per batch cycle for the coke drum (hr);
- Internal pressure of the coke drum during the operating cycle until the end of the venting cycle (psig), in one-minute intervals.

4.4 Test Methods Sampling Locations

BP-Husky has installed five (5) sampling ports on both the west vent and the east vent to allow for the sequential sampling of both emission sources during the ICR test program. The West Vent and the East Vent are identical in design and have diameters of eight (8) inches. There were ports installed on four (4) separate locations, or measurement planes, of each DCU 3 vent. There was a single sampling port (P1), with a diameter of three (3) inches, on the first measurement plane and closest to the outlet of DCU 3 vent pipe. The EPA Method 1A/2 sampling train was operated at this location during the ICR test program and was used to measure the DCU 3 vent gas velocity. There were two (2) sampling ports (P2a and P2b) with diameters of four (3) inches on a second measurement plane. Various isokinetic sampling trains and/or dilution sampling systems were operated at P2a and P2b. There were two (2) sampling ports (P3a and P3b) with diameters of four (4) inches on a third measurement plane. Various isokinetic sampling trains and/or dilution sampling systems were also operated at P3a and P3b. Finally, there was a single sampling port (P4), with a diameter of two (2) inches, on a fourth measurement plane. Only the dilution sampling system was operated at P4. Appendix 2 of this test report presents both a side-view schematic and cross-section schematic of either DCU 3 vent. Note that for this sampling port configuration, while the sampling occurred at multiple test ports with varying diameters as described above, all of the vent sampling occurred over the 8" diameter of the vent(s) itself. Each applicable sampling port was located in compliance with EPA Method 1A, "*Sample and Velocity Traverses for Stationary Sources*."

This sampling port configuration allowed for the simultaneous sampling for all target compounds within each individual Group. That is, for this test program, all Group A pollutants were sampled simultaneously, all Group C pollutants were sampled simultaneously, and all Group D pollutants were sampled simultaneously. In addition, flow, O_2, CO_2, and H_2O data were also obtained during each test run.

Table 4-2 presents the variables used to describe the dimensions of the isokinetic sampling probes and nozzles, the 10% central area of the cross-section of the DCU 3 vent, and the sampling points allowed per EPA Method 1. The isokinetic sampling probes and nozzles used during the ICR test program were designed to reduce their obstruction of the cross-sectional area below 5%. As a results, two (2) isokinetic sampling probes and nozzles could be inserted into sampling ports on the same measurement plane and placed at least 1" apart without obstructing 5% or more of the cross-sectional area. An obstruction of less than 5% of the cross-sectional area was not considered a disturbance to the gas flow measurements. Therefore, up to four (4) isokinetic sampling trains could be operated simultaneously in P2a, P2b, P3a and P3b during the venting cycle(s).

Table 4-2. DCU 3 Vent Cross-section Dimensions

Variable	Description	Value	Units
D	Diameter	8.00	in
$D_{10\%}$	10% Diameter	2.53	in
A	Area	50.3	in^2
$A_{10\%}$	10% Area	5.03	in^2
$A_{5\%}$	5% Area	2.51	in^2
W_P	Width of probe sheath	1.00	in
L_P	Length of probe sheath	0.235	in
A_P	Area of probe sheath	0.235	in^2
W_N	Width of nozzle	0.375	in
L_N	Length of nozzle	2.50	in
A_N	Area of nozzle	0.938	in^2
A_{P+N}	Area of probe sheath and nozzle	1.17	in^2
$2A_{P+N}$	Area of probe sheath and nozzle (X2)	2.35	in^2
P_M	Minimum distance to sampling point	2.74	in
X	Distance from sampling point to centroid of duct	1.26	in
Y	Distance from sampling point to centroid of duct	1.26	in
Z	Distance between sampling points	2.34	in
β	Angle	22.5	degrees
θ	Angle	135	degrees

5.0 EPA METHOD ICR TESTING PROCEDURES

This section includes a discussion of the test methods that were used for sampling and analysis for the BP-Husky DCU 3 ICR test program.

Note that the prescribed test methods described in this section were not originally intended for, nor are they typically used on, DCU vent sources. Hence, numerous, significant modifications were applied to several of the test methods in order to complete the ICR test project. Section 7.0 of this test report provides in more detail the proposed revisions, modifications, and discussions made between URS and U.S. EPA with regards to the testing methodologies utilized during this test program. Where these proposed method modifications were known in advance, any deviations from the standard procedures were noted in the *Test Plan* (i.e., protocol) that was previously submitted. A copy of the final submitted *Test Plan* is included as Appendix 9 of this test report.

The following subsections describe the test methods that were used for this test program in more detail, on a method-by-method basis. Unless stated otherwise in Sections 5 and 7 of this test report, all stack sampling was performed in accordance with the applicable test methods as prescribed in "Component 4, Part VIII" of the Refinery ICR.

During the ICR test program, the process data was electronically logged by the DCU Distributed Control System (DCS). The process data is presented in Appendix 4 of this test report.

5.1 Sample Run Durations

According to "Component 4" of the ICR, sampling should be conducted over the duration of the venting cycle. A venting cycle has been defined as the period of time between the activation of the DCU 3 vent (i.e., opening) and the optimal depressurization of the coke drum to atmosphere that is necessary before de-heading and the coke-cutting cycle can begin. During normal operations of DCU 3, optimal depressurization is defined as a coke drum pressure of 0.5 psig. Therefore, the venting cycle was considered complete when the coke drum reached 0.5 psig. The duration of the venting cycle was contingent upon the temperature and pressure of the coke drum and the volumes of quench water and steam used to cool the pet coke. For each test run performed, the sampling equipment began collecting samples within one (1) minute of opening the DCU 3 vent. The samples were collected until the venting cycle was complete (i.e., until the coke drum pressure reached 0.5 psig), or for as long as the sampling equipment remained operable within the acceptable performance ranges, or until health and safety limitations were encountered.[1]

5.2 Method 1A – Sampling Points

EPA Method 1A *"Sample and Velocity Traverses For Stationary Sources With Small Stacks or Ducts,"* was used to separate the velocity measurement location from the isokinetic sampling locations, and modified to allow the use of Type-S pitot tubes. This technique is explained in more detail in Sections 4.4, 7.5, and 7.6 of this test report.

5.3 Method 2 – Stack Gas Velocity and Flow Rate

The DCU 3 vent gas velocity and volumetric flow rate was measured according to EPA Method 2, "*Determination of Stack Gas Velocity and Flow Rate from Stationary Sources (Type-S Pitot Tube).*" A EPA Method 2 sampling train was performed throughout each complete venting cycle, and the gas velocity data obtained during the operation of this sampling train was used for the calculation of isokinetic sampling rates as well as vent gas velocity and volumetric flow rate.

This sampling system consisted of a sampling probe equipped with a Type-S pitot tube and instruments to measure the differential pressure, static pressure and temperature of the DCU 3 vent gas stream.

The DCU 3 vent gas differential pressure measurements were made with a gauge-oil manometer (or a digital manometer if the differential pressure exceeded 10 inches of H_2O). The vent gas static pressure was recorded using the EPA Method 2 sampling probe and a gauge-oil manometer (or magnehelic gauge if the static pressure exceeded 10 inches of H_2O). A calibration check was performed on the magnehelic gauges and digital manometers according to EPA Method 2, Section 6.2.1. The Type-S pitot tubes were leak-checked before and after each test run and the

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[1] The project-specific health and safety plan (HASP) dictated that sampling personnel end sampling activities and begin moving away from the DCU 3 vent sampling location(s) before the coke-cutting cycle begins.

manometer was ‘zeroed’ at least hourly during each test run. The vent gas differential pressure, static pressure and temperature readings were recorded at least every five (5) minutes during each test run. These data were collected on a data sheet. Due to the high velocity, high moisture concentration, and limited duration of the venting cycle, it was not practicable to check for the presence of cyclonic flow. EPA Method 2 was modified such that the extent of cyclonic flow was not determined as part of this measurement program.

All data measured by the EPA Method 2 sampling trains was recorded real-time and no samples were collected for recovery and analysis.

5.4 Method 3A – O_2 and CO_2

EPA Methods 2, 26A, 29, 5/202, Other Test Method 29, ASTM D6784-02, and SW-846 Method 0010 all require the measurement of the molecular weight (MW) of the dry fraction of the sample gas. The measured dry gas MW and the MW of water (18.0 g/g-mole) are then used to calculate the MW of the emissions gas on a wet basis, a parameter required for the quantification of isokinetic sampling rate and vent gas velocity and volumetric flow rate. EPA Method 3A, “*Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)*,” was performed during each test run and the O_2 and CO_2 concentration data were used to calculate the MW of the dry fraction of the DCU 3 vent exhaust gas. The remaining balance of the dry gas fraction was designated as methane, the most concentrated compound in the DCU 3 vent gas after water.

Samples of the DCU 3 vent gas stream were extracted using a dilution sampling system according to EPA Method 3A. The dilution sampling system used a glass critical orifice and a source of pressurized nitrogen to dilute the DCU 3 vent gas at a nominal dilution ratio (DR) of between 20:1 and 100:1. More specific dilution ratio information for this test method can be found in Appendix 3 – Section C of this report. A heated particulate filter was placed immediately downstream of the inlet to the stainless steel dilution sampling probe tip and upstream of the critical orifice. The diluted sample gas was routed through a heated Teflon sample line to the O_2 and CO_2 gas analyzers that quantify the target concentrations as parts per million by volume on a wet basis (ppmvw). O_2 and CO_2 concentrations were determined using a

Servomex Analyzer Series 1400 paramagnetic O_2 analyzer and a Servomex Analyzer Series 1400 infrared CO_2 analyzer, respectively. The O_2 and CO_2 gas analyzers used during the ICR test program met the interference specifications of EPA Method 7E. A schematic of the instrumental EPA Method (IRM) sampling system is presented in Appendix 2 of this test report.

An EPM Dilution Probe and CleanAir Engineering Exemplar Flow Panel was used to implement and operate the dilution sampling system. A stable dilution air pressure and critical orifice vacuum greater than 14.7” Hg (or manufacturer’s specification) was maintained through all calibrations as well as the sampling period for all test runs. It is important to note that with a DR of 100:1 during each test run, the moisture concentrations in the bag samples was <1%. All applicable dilution sampling system components were heated to approximately 300°F and the dew point of the sample gas was maintained lower than the operating temperature of the O_2 and CO_2 analyzers to minimize sample loss or interferences due to moisture.

EPA Method 3A requires that the O_2 and CO_2 gas analyzers be calibrated using three (3) calibration gas concentrations:

- A zero gas, such as high-purity nitrogen;
- A mid-level calibration gas, containing O_2 and CO_2 at a concentrations of 40-60% of the span value; and
- A high-level calibration gas, equivalent to the span value, containing O_2 and CO_2 concentrations of 80-100% of the measurement range of the analyzer.

Table 5-1 summarizes the analyzer spans and calibration gas values used for the Method 3A IRM measurements during this test program.

Table 5-1. IRM Analyzer Spans and Calibration Gas Values – Method 3A (O_2 and CO_2)

Analyzer	**Span**	**Calibration Gas Values (% of span)**			
		Zero-Level	**Low (<20%)**	**Mid (40–60%)**	**High (100%)**
O_2	23.5 %	See Low-Level	0.00 % (Zero N_2)	11.4 %	23.5 %
CO_2	19.5 %	See Low-Level	0.00 % (Zero N_2)	9.48 %	19.5 %

The 3-point system calibration error test of the O_2 and CO_2 gas analyzers was completed prior to each test run. During the calibration error test, an excess of each of the three (3) calibration gases was introduced upstream of the dilution sampling probe and heated Teflon line. The analyzer response (corrected to the average DR) to each of the calibration gases must be within ±2% of the certified concentration of the high-level calibration gas (i.e., span value). During the system calibration error test, the sampling system response time was documented for each gas analyzer. The dilution sampling system was leak-checked before each test run and placed at a single sampling point within the DCU 3 vent.

EPA Method 3A requires that a 2-point system calibration error test be performed immediately after each test run using two (2) calibration gas concentrations:

- A zero gas, such as high-purity nitrogen; and
- A mid-level (40-60% of the span value) calibration gas.

The drift between the pre-test run analyzer response and the post-test run analyzer response for the zero and mid-level gases must be $\leq$3% of the span value.

The O_2 and CO_2 concentrations in the sample gas were measured continuously during each test run, and the analog voltage output reading from each electronic gas analyzer was converted to a digital format and recorded by a data acquisition system every ten (10) seconds. O_2 and CO_2 concentrations were measured throughout the venting cycle as long as EPA Methods 2, 4, 26A, 29, 5/202, Other Test Method 29, ASTM D6784-02, or the SW-846 Methods 0010 sampling trains were operated. Since the instrument calibration was performed through the dilution sampling system, O_2 and CO_2 concentrations were not bias-corrected. During any given run, the average DRs for the dilution sampling system were developed as detailed in Section 8 of this report. The selected DR for the run was applied to the average measured concentration of O_2 or CO_2. The MDL for the O_2 and CO_2 analysis was expected to be approximately 0.2%. When multiplied by the nominal DR (100:1), the actual MDL was between 4 and 20%. More specific dilution ratio information for this test method can be found in Appendix 3 – Section C of this report. All O_2 and CO_2 concentration were determined in units of %.

Note that the DCU 3 coke drum is not considered an oxidizing environment and the concentration of O_2 in the actual or diluted DCU 3 vent gas stream was not expected to be >1% O_2. This fact was borne out by the test results.

5.5 Method 4 – H_2O

The average moisture concentration measured was determined by using EPA Method 4, "*Determination of Moisture Content in Stack Gases*," which was performed concurrently with each isokinetic sampling train. The moisture data was also used to develop the vent gas volumetric flow rates and target compound mass emission rates.

5.6 Method 5/202 – PM and $PM_{2.5}$

The procedures specified in EPA Method 5, "*Determination of Particulate Matter Emissions from Stationary Sources*," were used to measure total filterable PM concentrations in the DCU 3 vent gas stream. EPA Method 202, "*Determination of Condensible Particulate Emissions from Stationary Sources*," was used to measure the back-half condensable PM ($PM_{2.5}$-CON) concentrations in the DCU 3 vent gas stream. The principal components of the combined EPA Method 5/202 sampling train include a heated out-of-stack quartz-fiber filter, a series of dry impingers, and an un-heated out-of-stack Teflon-coated filter.

The combined EPA Methods 5/202 sampling train consisted of the following components:

- Stainless steel nozzle;
- Sampling probe with glass liner;
- Heated out-of-stack quartz-fiber filter;
- Teflon transfer line;
- Glass coiled condenser;

- One large glass impinger (3-liter), with knockout stem, empty, placed in a water bath maintained at ≤85°F;
- One large glass impinger (3-liter), with modified Greenburg-Smith stem, empty, placed in a water bath maintained at ≤85°F;
- Teflon-coated filter;
- Two (2) standard glass impingers, with knockout stems, empty;
- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;
- Dry gas meter; and
- Orifice.

EPA Method 202 (also referred to as the new “Dry Impinger Method”) includes several unique glassware preparation steps to ensure that the sampling train components are not contaminated with PM and organics that may interfere with the analysis. Prior to initial use, all glassware was rinsed with D.I. H_2O, acetone and hexane, then baked at 572°F for six (6) hours prior to use. Prior to each test run, the glassware was rinsed with HPLC H_2O.

EPA Method 1A and EPA Method 5/202 were modified to allow single-point sampling within the 10% centrally located area of the DCU 3 vent. The EPA Method 1A sampling train was placed at least two (2) diameters downstream from the EPA Method 5/202 sampling location. EPA Methods 1A and 2 were performed simultaneously with EPA Method 5/202 to determine the isokinetic sampling rate and to measure the DCU 3 vent gas stream velocity. EPA Method 4 was also performed in conjunction with the EPA Method 5/202 sampling train to determine the moisture concentration and dry gas volumetric flow rate. The sampling was conducted during the entire venting cycle.

The EPA Method 5/202 sampling train was leak-checked before and after each test run. Differential pressure across a Type-S pitot tube, temperature and static pressure measurements were recorded with the EPA Method 1A sampling train to determine the DCU 3 vent gas stream velocity and volumetric flow rate. All relevant sampling train operating data, such as dry gas volumes and sampling train component temperatures, were collected at least every five (5) minutes on a data sheet. The average isokinetic sampling rates were maintained ≤110%, to the extent practicable. Note that a target dry gas sample volume of ≥0.05 m^3 (≥5 m^3 wet gas sample volume) was selected for this measurement program; however, no sample volume requirement is associated with any EPA test method performed on a DCU Vent.

In addition, several temperatures must be maintained within specific ranges to comply with EPA Method 202. The measured temperature at the outlet of the out-of-stack Teflon-coated filter was maintained between 65°F and 85°F during each test run. The water bath containing the first two (2) impingers was maintained at a temperature ≤85°F during each test run.

Following each test run, the condenser and impingers were purged with pressurized nitrogen for one (1) hour at a rate of at least 14 liters per minute according to modified EPA Method 202. In addition, an inline filter was placed between the pressurized nitrogen source and the condenser. The condensate catch from the condenser was transferred to the second impinger prior to the purge. Also, the first knockout impinger stem was replaced with a modified Greenburg-Smith stem prior to the purge. During the purge, the condenser recirculation pump was operated and the water bath containing the backup impinger was maintained between 65 and 85°F.

The PM samples were recovered separately into the following components:

- Front-half (nozzle, probe liner and front-half of the filter holder) rinse with acetone; and
- Quartz-fiber filter.

The $PM_{2.5}$-CON samples were recovered separately into the following components:

- Teflon-coated filter;
- Contents of the first two (2) impingers, including a water rinse of the back-half of the quartz-fiber filter holder, the probe, the Teflon transfer line, the coiled condenser, the first two impingers, and the front-half of the Teflon-coated filter holder;
- An acetone rinse of the back-half of the quartz-fiber filter holder, the probe, the Teflon transfer line, the coiled condenser, the first two impingers, and the front-half of the Teflon-coated filter holder; and
- A hexane rinse of the back-half of the quartz-fiber filter holder, the probe, the Teflon transfer line, the coiled condenser, the first two impingers, and the front-half of the Teflon-coated filter holder.

The PM determinations were performed according to EPA Method 5. After delivery to the laboratory, the PM sample fractions were dried to constant weight. The concentration of $PM_{2.5}$-CON was determined according to EPA Method 202. According to EPA Method 202, the Teflon-coated filter may be extracted with both water and hexane if a final constant weight could not be obtained. The aqueous impinger catch and rinse was extracted with hexane, and the extract was added to the hexane rinse sample fraction. Both fractions (aqueous and hexane) were reduced to dryness, and the inorganic and organic weight gains were determined. The results of the analysis of the field train recovery blank for $PM_{2.5}$-CON was subtracted from each test run result, or 0.002 g, whichever was less. Both the PM and $PM_{2.5}$-CON concentrations are being reported in units of grains per dry standard cubic foot (gr/dscf) and the mass emission rates as pounds per hour (lbs/hr) and tons per year (tpy).

5.7 Method 6C – SO_2

EPA Method 6C, "*Determination of Sulfur Dioxide Emissions from Stationary Sources (Instrumental Analyzer Procedure)*," was performed to quantify the SO_2 concentrations in the DCU 3 vent exhaust gas.

Section 5.4 of this test report provides a detailed description of the IRM sampling system design, sampling system operation, sampling system calibration, and sample analysis procedures. The SO_2 concentrations (as ppmvw) were determined using an Ametek 921 SO_2 gas analyzer that measures the characteristic absorption of ultraviolet radiation by SO_2. The Ametek 921 gas analyzer meets the specifications of EPA Method 7E.

During any given run, the average DR for the dilution sampling system was developed as detailed in Section 8 of this report. The selected DR for the run was applied to the average measured concentration of SO_2. The MDL for the SO_2 analysis was expected to be approximately 1 ppmv. When multiplied by the nominal DR (100:1), the actual MDL ranged from 20 to 100 ppmv. More specific dilution ratio information for this test method is presented in Appendix 3 – Section F of this report. The SO_2 concentrations are being reported as ppmvd and the mass emission rates are being reported as lbs/hr and tpy.

Table 5-2 summarizes the analyzer span and calibration gas values used for the Method 6C IRM measurements during this test program.

Table 5-2. IRM Analyzer Spans and Calibration Gas Values – Method 6C (SO_2)

Analyzer	Span	Calibration Gas Values (% of span)			
		Zero-Level	Low (<20%)	Mid (40–60%)	High (100%)
SO_2	9,980 ppm	See Low-Level	0.00 ppm (Zero N_2)	5,060 ppm	9,980 ppm

5.8 Method 7E – NO_x

EPA Method 7E, "*Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure)*," was performed to quantify the NO_x concentrations in the DCU 3 vent exhaust gas.

Section 5.4 of this test report provides a detailed description of the IRM sampling system design, sampling system operation, sampling system calibration, and sample analysis procedures. The NO_x concentrations (as ppmvw) were determined using a Thermo Environmental Instruments (TEI) 42 Series gas analyzer that measures the chemiluminescence of NO_2 after the reaction of NO in the sample gas with a source of O_3. This instrument measures NO_2 in the sample gas by catalytically reducing the NO_2 to NO before sample gas is introduced to the reaction chamber. The Thermo 42 series gas analyzer meets the interference specification of EPA Method 7E.

During any given run, the average DR for the dilution sampling system was developed as detailed in Section 8 of this report. The selected DR for the run was applied to the average measured concentration of NO_x. The MDL for the NO_x analysis was expected to be approximately 1 ppmv. When multiplied by the nominal DR (100:1), the actual MDL ranged from 20 to 100 ppmv. More specific dilution ratio information for this test method is presented in Appendix 3 – Section G of this report. The NO_x concentrations are being reported as ppmvd and the mass emission rates are being reported as lbs/hr and tpy.

Table 5-3 summarizes the analyzer span and calibration gas values used for the Method 7E IRM measurements during this test program.

Table 5-3. IRM Analyzer Spans and Calibration Gas Values – Method 7E (NO_x)

Analyzer	**Span**	**Calibration Gas Values (% of span)**			
		Zero-Level	**Low (<20%)**	**Mid (40–60%)**	**High (100%)**
NO_x	9,910 ppm	See Low-Level	0.00 ppm (Zero N_2)	4,950 ppm	9,910 ppm

5.9 Method 15A – TRS

EPA Method 15A, "*Determination of Total Reduced Sulfur Emissions from Sulfur Recovery Plants in Petroleum Refineries*," was performed to quantify the TRS concentrations in the DCU 3 vent gas stream. A dilution sampling system was used to extract gas samples from the DCU 3 vent gas stream, and reduced sulfur compounds in the diluted sample gas were thermally oxidized to SO_2, which were then collected in a series of hydrogen peroxide absorbing solutions as sulfate ion and analyzed by barium-thorin titration according to EPA Method 6, "*Determination of Sulfur Dioxide Emissions from Stationary Sources*." Modifications to the EPA Method 15A sampling system are acceptable provided that the system performance check is met.

Section 5.4 of this test report provides a detailed description of the dilution sampling system design and operation. Samples of the DCU 3 vent gas stream for the analysis of reduced sulfur compounds were extracted continuously using a sampling system equipped with a glass critical orifice and diluted with high-purity nitrogen at a known DR between 20:1 and 100:1. The EPA Method 15A sampling train was modified such that a heated stainless steel dilution probe was used instead of a heated, non-diluting Teflon probe. In addition, the dimensions of the combustion tube may be modified from method specifications to interface with a commercially available combustion furnace; however, this modification is not expected to impact data quality.

Recall that the DCU 3 coke drum is not considered an oxidizing environment and the concentration of O_2 in the actual or diluted DCU 3 vent gas stream was not expected to be >1% O_2. Therefore, since significant SO_2 concentrations were not expected in the sample gas, SO_2 scrubbing impingers were not included upstream of the combustion furnace, and alternatively combustion air must be added at a known rate upstream of the combustion furnace.

The EPA Method 15A sampling train consisted of the following components:

- Dilution sampling system;
- Teflon "T" union and valve;
- Purified, zero-grade combustion air in compressed gas cylinder;
- Dry gas meter;
- Combustion furnace;
- Small glass impinger (30 mL), without bubbler stem, containing 20 mL 3% H_2O_2;
- Small glass impinger (30 mL), without bubbler stem, containing 20 mL of 3% H_2O_2;
- Small glass impinger (30 mL), without bubbler stem, empty;
- Small glass impinger (30 mL), without bubbler stem, containing approximately 20 g of silica gel dessicant;
- Air-tight sampling pump;
- Dry gas meter; and
- Orifice.

The dilution sampling system was leak-checked before each test run and the probe was placed at a single sampling point within the DCU 3 vent. The dilution sampling system was thoroughly flushed with calibration standards of propane, methane, ethane, and H_2S prior to each test run. However, since the target compound concentrations were expected to be highest during the first few minutes of the venting cycle, the dilution sampling system was not flushed with sample gas prior to beginning collection in the impinger train.

The combustion furnace was operated at a temperature of 2,012 ±90°F and the temperature was monitored throughout each test run. A combustion air flow rate of 0.5 ±0.05 liters per minute and a sample gas flow rate of 2.0 ±0.2 liters per minute was maintained throughout each test run. An O_2 concentration of approximately 5.0% was maintained in the combustion furnace to allow the complete oxidation of reduced sulfur compounds to SO_2. All relevant sampling train operating data, such as dry gas volumes, sampling rates and sampling train component temperatures, were collected at least every five (5) minutes. A target dry gas sample volume of 140 liters was applicable to this test program. The collection of 140 liters per sorbent sample required a sampling duration of approximately 70 minutes at a sampling rate of approximately 2.0 liters per minute. However, no sample volume requirement is associated with any EPA test method performed on a DCU Vent. A post-test purge was not necessary and was not performed.

A custom certified (±2% accuracy) calibration gas standard containing H_2S in a balance of nitrogen was used to perform a recovery study. EPA Method 15A was modified to allow the use of H_2S rather than COS as the recovery gas because H_2S is expected to compromise >90% of the TRS concentration, while COS was not expected to be measured in the DCU 3 vent gas stream above the applicable detection limits.

Due to time limitations following a complete venting cycle (i.e., URS personnel must evacuate the DCU 3 prior to de-heading and the coke-cutting cycle), it is not practicable to perform a post-test run recovery study per method specifications. EPA Method 15A was modified so that the H_2S calibration gas standard was introduced upstream of the dilution sampling probe for 30 minutes prior to each test run. The recovery study impinger train and the sample impinger train were analyzed using identical procedures.

EPA Method 15A was modified so that a sample recovery of 70-130%, rather than 80-120%, was demonstrated during each recovery study; however, the failure to demonstrate recovery within this criterion was not considered to invalidate the test run results. An expanded recovery study criterion was necessary due to the significant potential sample loss in the stainless steel dilution probe, the magnitude of the DR required to sample the DCU 3 vent gas stream, and the impracticality of using alternative, costly, non-reactive and heat-tolerant materials in the dilution sampling system. The test run results were not corrected to the recovery study results.

Following each test run, the contents of the first three impingers and the rinses of the impingers and connecting glassware with HPLC H_2O were composited as a single sample. A Barium-thorin titration was performed on the composited sample. Duplicate sample analyses must agree within 1% or 0.2 mL, whichever is larger. The MDL for TRS analysis was expected to be approximately 0.3 ppmv as SO_2. When multiplied by the maximum DR (100:1), the actual MDL was 30 ppmv as SO_2. More specific dilution ratio information for this test method can be found in Appendix 3 – Section H of this report. The TRS (as SO2) concentrations are being reported as ppmvd and the mass emission rates are being reported as lbs/hr and tpy.

5.10 Method 18 – H_2S, COS, and CS_2; CH_4 and C_2H_6; VOC HAPs

Methane (CH_4) , ethane (C_2H_6), selected VOC HAPS, H_2S, COS and CS_2 concentrations in the DCU 3 vent gas stream were measured according to EPA Method 18, "*Measurement of Gaseous Organic Compound Emissions by Gas Chromatography.*" Per "Component 4" of the ICR, EPA Method 18 may be used to measure H_2S, COS and CS_2 concentrations as an alternative to EPA Method 15, "*Determination of Hydrogen Sulfide, Carbonyl Sulfide, and Carbon Disulfide Emissions from Stationary Sources*." Due to the wide range of boiling points of the selected VOC HAPs that were measured as part of the ICR program, multiple sampling strategies were employed. A combination of two (2) separate sampling systems – via bag sampling and sorbent sampling - was utilized to collect methane, ethane and selected VOC HAP emissions data per EPA Method 18. EPA Method 18 is a performance-based sampling and analytical method that allows for some flexibility in sampling and analytical techniques provided that certain QA/QC criteria for instrument calibration and sample recovery criteria are achieved.

5.10.1 Bag Sampling

Generally, the bag sampling train was used to sample for methane, ethane, VOC HAPs (not including methanol) with boiling points <99°C (i.e., VOC HAP (Low)), and H_2S, COS and CS_2. Samples of the DCU 3 vent gas stream for the analysis of organics was extracted continuously using a sampling system equipped with a glass critical orifice and diluted with high-purity nitrogen at a known DR. Samples of the DCU 3 vent gas stream for the analysis of sulfur compounds were extracted at a known DR between 20:1 and 100:1. A heated particulate filter was placed immediately downstream of the inlet to the stainless steel dilution sampling probe tip and upstream of the glass critical orifice. The diluted sample gas passed from the glass critical orifice through a heated Teflon sampling line to a bag suitable for VOC and reduced sulfur sample collection and analysis (i.e., Flexfilm). Knockout impingers were not used to condense moisture prior to sample collection in the bag.

A flame ionization detector (FID) operates by ionizing organic compounds in the sample stream using the energy of a hydrogen flame. The flame oxidizes organic compounds to generate carbon dioxide and water, and in the process, ions are formed in an electrical field between a polarized jet and collector electrode. When negative ions migrate to the collector electrode, a current is produced proportional to the concentration of carbon atoms in the sample gas. Methane, ethane, and selected VOC HAP concentrations were measured using the GC/FID.

A flame photometric detector (FPD) operates by analyzing the spectrum of light emitted by the target compounds as they luminesce in the hydrogen-fueled flame. When target compounds are burned in the FPD flame, they emit photons of distinct wavelengths, and only those photons that are within the frequency range of the filter specifications can pass through the filter to the photomultiplier tube (PMT). The PMT converts the photons it detects to an analog signal. For sulfur-compound selective detection, the FPD uses a 394 nm band pass filter. A GC/FPD was used to quantify H_2S, COS and CS_2 concentrations.

An EPM Dilution Probe and CleanAir Engineering Exemplar Flow Panel was used to implement and operate the dilution sampling system. A stable dilution air pressure and critical orifice vacuum greater than 14.7” Hg (or manufacturer’s specification) was maintained throughout the sampling period for all test runs. It is important to note that with an approximate DR of 20:1 during each test run, the moisture concentrations in the bag samples were <5%. All applicable dilution sampling system components were heated to approximately 300°F and the dew point of the sample gas was maintained lower than the operating temperature of the GC/FID and GC/FPD analyzers to minimize sample loss or interferences due to moisture. The dilution sampling system was leak-checked before each test run and placed at a single sampling point within the 10% central area of the DCU 3 vent. The dilution sampling system was thoroughly flushed with calibration standards of propane, methane, ethane, and H_2S prior to each test run. However, since the target compound concentrations were expected to be highest during the first few minutes of the venting cycle, the dilution sampling system was not flushed with sample gas prior to beginning collection in the sample bag.

A target dry gas sample volume of approximately 6 liters per bag sample was applicable to this test program. The sampling rate was kept proportional to the DCU 3 vent gas stream velocity. The collection of approximately 6 liters per bag sample required sampling rates between 0.1 and 0.5 liters per minute. At least one (1) bag sample was collected during each respective single, complete venting cycle. The sample bags allowed for maximum gas volumes of at least 10 liters to allow for the expansion of gas during overnight air shipment to a subcontracted analytical laboratory, where required. No sample volume requirement is associated with any EPA test method performed on a DCU Vent. The bag samples were transported from the DCU 3 vent sampling location to a mobile laboratory for analysis by either a GC/FID or GC/FPD. To the extent practicable, URS made effort to perform all sample analyses within 24 hours of collection. The sample bag was protected from sunlight at all times until analysis.

The GC/FID and GC/FPD analyzers were calibrated using custom certified (±2% accuracy) calibration gas standards containing the target analytes in a balance of nitrogen. As allowed by EPA Method 18 and the program-specific guidance from EPA Method 205, "*Verification of Gas Dilution Systems for Field Instrument Calibrations,*" An Environics Series 4020 Dilution System may be used to dilute the high-level gas standards for use in instrument calibration. Where U.S. EPA Protocol gases are not commercially available, custom certified (±2% accuracy) calibration standards were considered suitable for the mid-level calibration gas required in Section 2.3 of

EPA Method 205 for the laboratory evaluation procedure. As an alternative, stainless steel or Teflon sample loops of various sizes may be used to inject target concentrations of calibration gas to the GC/FID and GC/FPD.

After all the DCU 3 vent gas sample analyses were completed, a calibration drift check was performed using calibration gas standards identical to the ones used during the pre-test run calibration. The following calibration and QA/QC procedures presented in EPA Method 18 were followed:

- The instrument was calibrated at three (3) points for each species before sample analyses;
- The analysis of each of three (3) consecutive calibration injections differed by ≤5% from the average result at each concentration level;
- The calibration drift of the instrument was determined at one (1) point (mid-level) after sample analyses; and
- The average analyses of the mid-level calibration standard before sample analyses and after sample analyses differed by ≤5% from their average, or a complete three-point post calibration was performed and all pre-test and post-test calibration results were used to develop a calibration curve to correct the results of each test run.

Sample bag analyses were either performed on-site by URS (methane, ethane, H_2S, COS, and CS_2), or by the off-site subcontracted analytical laboratory (VOC HAPs). Each bag sample was analyzed in triplicate and the final methane, ethane, selected VOC HAP, H_2S, COS and CS_2 concentration results were calculated as the average of all separate analyses of the sample(s). No specific precision criteria for sample analyses are defined by EPA Method 18. Target compound concentrations in the sample bags were measured as ppmvw due to the lack of a moisture knockout impinger in the dilution sampling system. The average DRs developed on a test run-by-test run basis throughout the operation of the dilution sampling system and the THC gas analyzers (see Section 5.11) was applied by the GC/FID and GC/FPD analyses. The target compound concentrations are being reported as ppmvd and the mass emission rates are being reported as lbs/hr and tpy.

Following each test run and after analysis, a recovery study was performed using certified calibration gas standards containing the specific VOC HAPs mandated in “Component 4” of the ICR, including methane, ethane and H_2S, as summarized in Table 5-4:

Table 5-4. Selected VOC HAPs for EPA Method 18 Recovery Study

VOC HAP	Bag Sampling	Sorbent Sampling
Acetone	✓	✓
Acetonitrile	✓	✓
Acrolein	✓	–
Acrylonitrile	✓	✓
Benzene	✓	✓
1,3-Butadiene	✓	–
Chlorobenzene	–	✓
Cumene	–	✓
1,2-Dibromoethane	–	✓
Ethylbenzene	–	✓
Hexane	✓	✓
Methanol	–	–
Methylene Chloride	✓	✓
Methyl Isobutyl Ketone	–	✓
Nitrobenzene	–	✓
Tetrachloroethene	–	✓
Toluene	–	✓
Trichloroethene	✓	✓
2,2,4-Trimethylpentane	–	✓

The recovery study was required to meet the following EPA Method 18 criteria, or sample analyses for those compounds (and target compounds of similar classes) for that test run were invalidated:

- One (1) bag sample out of three (3) must be spiked with the target compounds specified in “Component 4” of the ICR (methane, ethane and H_2S);

- The concentration of each spiked compound must be 40 to 60 percent of the average concentration measured in the three (3) bag samples collected over three (3) test runs (i.e., one [1] bag sample was collected per test run);
- If a target compound is not detected in the three (3) bag samples, the spiked concentration of that target compound must be 5X the MDL of the compound;
- After spiking, the bag samples must be stored for the same period of time as the bag samples collected in the field;
- The spiked bag must be analyzed in triplicate, and the average concentration results for each spiked compound were used to calculate a percent recovery for that compound;
- The average recovery for all spiked compounds must be ≥70% and ≤130%; and
- All sample analyses for the spiked compounds was corrected to the average percent recoveries achieved for each compound, and if a target compound is not spiked, the sample analyses for that compound were corrected to the percent recovery achieved for a spiked compound of a similar class.

Method detection limits (MDLs) were developed using the approach described in 40 CFR Part 136, Appendix B. According to this methodology, each low-level calibration standard was analyzed multiple times, and the MDL was defined as the standard deviation times the Student t-value at the 99% confidence limit. The MDL was developed at the instrument using the direct injection of calibration gas. The MDL for all of the GC/FID and GC/FPD analyses for the bag samples was approximately 0.5 ppmv. When multiplied by the nominal DR (20:1), the actual MDL for the target organic compounds was 10 ppmv. When multiplied by the maximum DR (100:1), the actual MDL for the target sulfur compounds was 50 ppmv. More specific dilution ratio information for this test method can be found in Appendix 3 – Sections I, J, and K of this report.

5.10.2 Sorbent Sampling

The EPA Method 18 sorbent sampling train is generally designed to sample for VOC HAPs with boiling points >99°C (i.e., VOC HAP (High)). The EPA Method 18 sorbent sampling train consists of the following components:

- Dilution sampling system;
- XAD-4 sorbent;
- Charcoal sorbent;
- Air-tight sampling pump;
- Dry gas meter; and
- Orifice.

The dilution sampling system was leak-checked before each test run and placed at a single sampling point within the DCU 3 vent. The sorbent sampling train was operated in duplicate during each test run and per program-specific guidance from U.S. EPA, both sorbent sampling trains (i.e., spiked and un-spiked) may be interfaced with a single dilution sampling system. All relevant sampling train operating data, such as dry gas volumes, sampling rates and sampling train component temperatures, was collected at least every five (5) minutes.

A target dry gas sample volume of 35 liters was applicable to this test program. The collection of 35 liters per sorbent sample required a sampling duration of approximately 70 minutes, at a sampling rate of approximately 0.5 liters per minute. However, no sample volume requirement is associated with any EPA test method performed on a DCU vent.

All sorbent samples were shipped to an off-site analytical laboratory. The sorbent samples were analyzed using solvent extraction. No specific precision criteria for sample analyses are defined by EPA Method 18. VOC HAPs in the sorbent samples were measured as micrograms per scm (μg/scm) due to the lack of moisture knockout impingers in the dilution sampling system. The average DRs developed on a test run-by-test run basis through the operation of the dilution sampling system and the THC gas analyzers was applied to the GC/FID analyses. The selected VOC HAP concentrations are being reported as μg/dscm and the mass emission rates are being reported as lbs/hr and tpy.

In addition, a pre-test run spiking procedure was performed on the duplicate sampling train sorbent media using specific VOC HAPs as listed in Table 5-4. Some target compounds for the bag sampling train were also spiked and analyzed with the sorbent sampling train to provide additional redundancy in the test program. A series of sorbent samples was collected during a preliminary survey of the DCU 3 vent gas stream, prior to the performance of any test runs, and shipped overnight to the off-site analytical laboratory for analyses. The off-site analytical laboratory expedited the analyses of the sorbent samples and immediately prepared and shipped overnight spiked sorbent media for use during each of the test runs.

The recovery study performed on the sorbent samples was required to meet the following EPA Method 18 criteria:

- Duplicate sorbent media must be spiked with at least the target compounds specified in “Component 4” of the ICR prior to each test run;
- The mass of each spiked compound must be 40 to 60 percent of the mass expected to be collected with the un-spiked sorbent sampling train;
- The vent gas was sampled by the spiked and un-spiked sorbent sampling trains simultaneously;
- The sorbent samples from the un-spiked and spiked sorbent sampling trains were analyzed using identical analytical procedures and instrumentation;
- If a target compound was not expected to be detected in the sorbent samples, the spiked concentration of that target compound must be 5 times the MDL of the compound;
- The average concentration results (i.e., the average of the three [3] test run results) for each spiked compound was used to calculate a percent recovery for that compound;
- The average percent recovery for all spiked compounds must be ≥70% and ≤130%; and
- All sample analyses for the spiked compounds were corrected to the average percent recoveries achieved for each compound, and if a target compound was not spiked, the sample analyses for that compound were corrected to the percent recovery achieved for a spiked compound of a similar class.

MDLs were developed using the approach described in 40 CFR Part 136, Appendix B. According to this methodology, each low-level calibration standard is analyzed multiple times, and the MDL is defined as the standard deviation times the Student t-value at the 99%

confidence limit. The MDL was developed at the instrument using the direct injection of calibration gas. MDLs for all species are included in the applicable laboratory reports.

5.11 Method 25A – THC

EPA Method 25A, "*Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer.*" was performed to quantify the THC concentrations in the DCU 3 vent exhaust gas. Alternatively, regarding the measurement of "total VOC," U.S. EPA defines VOCs in 40 CFR 51.100(s) as "any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions." 40 CFR 51.100(s)(1) also lists many organic compounds, in addition to methane and ethane, which have been determined to have negligible photochemical reactivity and may be excluded as VOC if accurately quantified. For this project, the actual VOC concentrations were determined by subtracting the average methane and ethane concentrations (see Section 5.10 of this test report) from the average THC concentration measured during a given sampling period.

Section 5.4 of this test report provides a detailed description of the IRM sampling system design, sampling system operation, sampling system calibration, and sample analysis procedures. The THC concentrations (as ppmvw) were determined using a Thermo 51 series gas analyzer that uses a FID. For this project, two (2) THC analyzers were used and separately calibrated (see Section 3.2.8 of this test report).

EPA Method 25A requires that a THC analyzer be calibrated using four calibration gas concentrations as follows:

- A zero gas, such as high-purity nitrogen;
- A low-level calibration gas, containing propane at a concentration of 25-35% of the span value;
- A mid-level calibration gas, containing propane at a concentration of 45-55% of the span value; and
- A high-level calibration gas, containing propane at a concentration of 80-90% of the span value.

Table 5-5 summarizes the analyzer span and calibration gas values used for the Method 25A IRM measurements during this test program.

Table 5-5. IRM Analyzer Spans and Calibration Gas Values – Method 25A (THC)

Analyzer	**Span (as C_3H_8)**	**Calibration Gas Values (% of span)**			
		Zero-Level	**Low (25–35%)**	**Mid (45–55%)**	**High (80–90%)**
THC 1 (Low Range)	10,000 ppm	0.00 ppm (Zero N_2)	3,020 ppm	5,010 ppm	8,000 ppm
THC 2 (High Range)	30,000 ppm	0.00 ppm (Zero N_2)	8,000 ppm	15,000 ppm	29,900 ppm

A 4-point calibration error test of each THC analyzer was completed prior to each test run. During the calibration error test for the low-range THC analyzer, an excess of each of the four (4) calibration gases was introduced to the sampling system upstream of the dilution sampling probe. The analyzer response to each of the calibration gases was within ±5% of the certified concentration of the calibration gas. EPA Method 25A also requires that the initial calibration error test be performed on a given THC analyzer within two (2) hours of the beginning of a test series. During the calibration error test, the system response time was also documented for the THC analyzer.

EPA Method 25A requires that a THC calibration drift be quantified at least hourly during each test run and immediately after each test run using two (2) calibration gas concentrations:

- A zero gas, such as high-purity nitrogen; and
- A low-level (25-35% of the span value) or mid-level (45-55% of the span value) calibration gas.

For this test program, since each test run was limited in time and in the best interests of acquiring as much data as possible, the Method 25A calibration checks was determined on a pre- versus post-test run basis instead of on an hourly basis as required by the method.

A zero gas and mid-level gas (or whichever calibration gas concentration was closest to the concentration measured during each test run) was reintroduced to the sampling system at a valve installed between the sampling probe and a heated sampling line to quantify the calibration drift. The analyzer response for each calibration gas is to be within ±5% of the certified concentration (the calibration error test criteria), and the drift between the pre-test run analyzer response and the hourly and post-test run analyzer response is specified to be ≤3% of the span.

The THC concentrations in the DCU 3 vent gas stream were measured continuously during each test run, and the analog voltage output reading from the electronic gas analyzer was converted to a digital format and recorded by a data acquisition system every ten (10) seconds. There is no minimum sampling duration for EPA Method 25A when applied to the DCU 3 vent gas stream.

When the instantaneous THC concentrations were within the scale of one of the defined measurement ranges during a test run, those “THC analyzer-specific” results were used in the calculation of the average THC concentration per sampling period. During any given run, the average DR for the dilution sampling system was developed as detailed in Section 8 of this report. The selected DR for the run was applied to the average measured concentration of THC. The selected DR was also applied to the target compound concentrations measured using modified EPA Method 18. The lower threshold for THC analysis was expected to be approximately 1 ppmv. When multiplied by the nominal DR (20:1), the actual measurement threshold was approximately 20 ppmv. More specific dilution ratio information for this test method can be found in Appendix 3 – Section L of this report.

Note also that the response factor (RF) per carbon atom in an FID is usually higher for methane and ethane than propane. Since the FID in the THC analyzer(s) was calibrated with standards of propane in air, the average RFs for methane (RF_M) and ethane (RF_E) were determined by directly introducing both a methane and ethane certified calibration standard (with a balance of nitrogen) to each THC analyzer once during the ICR test program. The methane and ethane RFs were calculated according to Equation 25Aap-1 in U.S. EPA Other Test Method (OTM) 12, “*Protocol for the ICR Test Program, Analysis, and Reporting of VOC Emissions from Hot Mix Asphalt Dryers*.” The average methane and ethane concentrations quantified through the use of the GC/FID (see Section 5.10 of this test report) were multiplied by the appropriate RF prior to the calculation of the average NMNE VOC concentrations. The THC and NMNE VOC concentrations are being reported as ppmvd and the mass emission rates are being reported as lbs/hr and tpy.

5.12 Method 26A – HCl, Cl_2, and HF

The procedures specified in EPA Method 26A, "*Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method*," were used to measure the HCl, Cl_2 and HF concentrations in the DCU 3 vent gas stream. HCl, Cl_2 and HF samples were extracted from the DCU 3 vent gas stream isokinetically at a single-point. Principal components of the EPA Method 26A sampling train include a Teflon-backed filter and a series of acidic and alkaline absorbing solutions.

The EPA Method 26A sampling train consisted of the following components:

- Stainless steel nozzle;
- Sampling probe with quartz liner;
- Heated Teflon-backed filter;
- Teflon transfer line;
- Glass coiled condenser;
- One large glass impinger (3-liter), with knockout stem, containing 200 mL 0.1N H_2SO_4;
- One large glass impinger (3-liter), with Greenburg-Smith stem, containing 200 mL 0.1N H_2SO_4;
- One standard glass impinger, with Greenburg-Smith stem, containing 100 mL 0.1N H_2SO_4;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 mL 0.1N NaOH;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 mL 0.1N NaOH;
- Two (2) standard glass impingers, with knockout stems, empty;

- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;
- Dry gas meter; and
- Orifice.

The EPA Method 26A sampling train was leak-checked before and after each test run. The differential pressure across a Type-S pitot tube, temperature and static pressure measurements were recorded with the concurrent EPA Method 1A sampling train to determine the DCU 3 vent gas stream velocity and volumetric flow rate. All relevant sampling train operating data, such as dry gas volumes and sampling train component temperatures, were collected at least every five (5) minutes. To the extent practicable, the average isokinetic sampling rates were maintained ≤110%. A post-test purge with conditioned ambient air was performed to recover any condensation in the front-half of the sampling train and to transfer any chlorine from the acidic impingers to the alkaline impingers. The target dry gas sample volume of ≥ 0.05 m^3 (≥ 5 m^3 wet gas sample volume) was selected for this measurement program; however, no sample volume requirement is associated with any EPA test method performed on a DCU Vent.

The HCl, Cl_2 and HF samples were recovered separately into the following components:

- Impinger catch from the three (3) acidic impingers and HPLC H_2O rinse of these impingers; and
- Impinger catch from the two (2) alkaline impingers and HPLC H_2O rinse of these impingers.

Per Section 8.2.4 of EPA Method 26A, sodium thiosulfate was added to the collected alkaline impinger sample. This was done in the analytical laboratory. An untreated aliquot of the alkaline impinger sample was retained for possible analysis if high sulfide concentrations posed any analytical interferences. EPA Method 26A was used for the analysis of HCl, Cl_2 and HF by ion chromatography (IC). According to EPA Method 26A, each sample was analyzed in duplicate. The HCl, Cl_2 and HF concentration results are being reported as milligrams per dscm (mg/dscm) and the HCl, Cl_2 and HF mass emission rates are being reported as lbs/hr and tpy.

5.13 Method 29 – Multiple Metals

EPA Method 29, "*Determination of Metals Emissions from Stationary Sources*," was used to measure the concentrations of selected metals (see Table 3-5) in the DCU 3 vent gas stream. Metals samples were extracted from the DCU 3 vent gas stream isokinetically at a single-point. The principal components of the EPA Method 29 sampling train include a quartz-fiber filter and a series of nitric acid/hydrogen peroxide absorbing solutions.

The EPA Method 29 sampling train consists of the following components:

- Stainless steel nozzle;
- Sampling probe with quartz liner;
- Heated quartz-fiber filter;
- Teflon transfer line;
- Glass coiled condenser;
- One large glass impinger (3-liter), with knockout stem, containing 200 mL 5% HNO_3/10% H_2O_2;
- One large glass impinger (3-liter), with a modified Greenburg-Smith stem, containing 200 mL 5% HNO_3/10% H_2O_2;
- One standard glass impinger, with a Greenburg-Smith stem, containing 100 mL 5% HNO_3/10% H_2O_2;
- Two (2) standard glass impingers, with knockout stems, empty;

- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with a modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;
- Dry gas meter; and
- Orifice.

EPA Method 29 includes several unique glassware preparation steps to ensure that the sampling train components are not contaminated with metals that may interfere with analysis. Prior to initial use, all glassware was soaked in a 10% HNO_3 solution for four (4) hours, rinsed with water, and rinsed with acetone.

The sampling train was operated in the same fashion as that of the other isokinetic sampling trains used in this project. Once each test run was completed, the selected metals samples were recovered separately into the following components:

- Front-half (nozzle, probe liner, and front-half of filter holder) rinse with 0.1N HNO_3;
- Quartz-fiber filter;
- Impinger catch from the three (3) 5% HNO_3/10%H_2O_2 impingers, a rinse of these impingers with 0.1N HNO_3., and a rinse of the back-half (back-half of the filter holder and Teflon transfer line) with 0.1N HNO_3.

Per EPA Method 29, specific volumes of 0.1N HNO_3 were used to recover the various sampling train fractions. These volumes were recorded on a data sheet, but were significantly larger than the method specifications, due to the increased volume of the impinger train(s) and the nature of the tar-like material collected in the front-half of the sampling train. The specific volumes of

0.1N HNO_3 were identical during each test run and were correlated with the volumes of 0.1N HNO_3 used with the field blank and reagent blanks. SW-846 Method 6020A, "*Inductively Coupled Plasma-Mass Spectrometry*," was used to determine trace metals in the solution. The quartz-fiber filter was combined with the front-half rinse and digested using HF, HCl and HNO_3 in a microwave-assisted process. The selected metals concentration results are being reported as mg/dscm and the mass emission rates are being reported as lbs/hr and tpy.

5.14 Method 308 – Methanol

Methanol concentrations in the DCU 3 vent gas stream were measured according to EPA Method 308, "*Procedure for Determination of Methanol Emissions from Stationary Sources.*"

The EPA Method 308 sorbent sampling train consisted of the following components:

- Dilution sampling system;
- Silica gel sorbent;
- Air-tight sampling pump;
- Dry gas meter; and
- Orifice.

In accordance with program-specific guidance from U.S. EPA, this sampling train was interfaced with a dilution sampling system. All relevant sampling train operating data, such as dry gas volumes, sampling rates and sampling train component temperatures, were collected at least every five (5) minutes on a data sheet.

A target dry gas sample volume of 35 liters was applicable to this test program. The collection of 35 liters per sorbent sample required a sampling duration of approximately 70 minutes, at a sampling rate of approximately 0.5 liters per minute. However, no sample volume requirement is associated with any EPA Method performed on a DCU Vent. In accordance with Method 308, the sampling rate demonstrated with the sampling system following each test run did not vary by more than 10% from the sampling rate achieved during each test run.

All sorbent samples were shipped to an off-site analytical laboratory. The sorbent samples were analyzed by GC/FID using solvent extraction (i.e., n-propanol). No specific precision criteria for sample analyses are defined by EPA Method 308. The methanol in the sorbent samples was measured as µg/scm due to the lack of moisture knockout impingers in the dilution sampling system. The average DRs developed on a test run-by-test run basis through the operation of the dilution sampling system and the THC gas analyzers was applied to the results of the GC/FID analyses. The Methanol concentrations are being reported as µg/dscm and the mass emission rates are being reported as lbs/hr and tpy.

MDLs were also developed for the Method 308 analyses. The MDL for all off-site GC/FID analyses for sorbent samples was expected to be approximately 0.1 ppmv. When multiplied by the nominal DR (20:1), the actual MDL for methanol was approximately 2 ppmv. More specific dilution ratio information for this test method can be found in Appendix 3 – Section O of this report.

5.15 Method 320 – Aldehydes; Carbon Monoxide

EPA Method 320, "*Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy*," was used to measure selected aldehyde (formaldehyde, acetaldehyde and propanal) and CO concentrations in the DCU 3 vent gas stream. These samples were extracted continuously from the DCU 3 vent gas stream at a constant rate using a dilution sampling system. EPA Method 320 is a "self-validating" method, and the sample results are valid provided that the quality assurance criteria defined in the method are met during the validation procedures and QA spikes.

The FTIR extractive system is comprised of a dilution sampling probe, a stainless steel spiking "T", a heated Teflon sample line, an MKS Instruments Model 2030 FTIR spectrometer complete with a heated (150 ºC) sample cell, a flow regulating valve and a sample pump. Sample flow was maintained at approximately one (1) standard liter per minute by a diaphragm pump connected to the outlet of the FTIR cell. Since the pump provides samples slightly below ambient pressures to the FTIR cell, pressure was continuously recorded during measurement periods using a pressure sensor calibrated over the 100 to 900 mm Hg range. These pressures are then used in the quantification of each spectrum.

FTIR is a near real-time instrument capable of simultaneous multi-component analysis providing data points every five (5) minutes or less. An infrared spectrum can be collected and analyzed in approximately one (1) second, but data are typically averaged over a 1- to 5-minute integration period to produce adequate signal-to-noise and parts per billion by volume (ppbv) level detection limits. An infrared spectrum analysis was performed by matching the features of an observed spectrum to those of reference standards. If more than one feature is present in the same region, a linear combination of references is used to match the compound features. The standards are scaled to match the observed band intensities; this scaling also matches the unknown concentrations.

The scaled references are added together to produce a composite that represents the best match with the sample. A classical least squares mathematical technique is used to match the standards' absorption profiles with those of the observed spectrum in specified spectral analysis regions. Compounds of interest and any known compounds expected to present spectral interference were included in the analysis region. Since the FTIR monitors unconditioned gas in this case, all aldehyde and CO concentrations are being reported on a wet basis in ppbvw.

Per "Component 4" of the ICR, all selected aldehyde compounds must be validated according to Section 13.0 of EPA Method 320 at a concentration within 2-5 times the measured concentration (nominally 1 ppmv). This validation run procedure is based upon EPA Method 301, "*Field Validation of Pollutant Measurement Methods from Various Waste Media*." The validation procedure consisted of at least 12 spiked and unspiked measurements. The results of the validation pairs were used to calculate a sampling/analytical bias using Equation 7 of EPA Method 320 and to statistically evaluate this bias to determine the possible need for a correction factor (CF).

As mandated by EPA Method 320, pre-test QA spikes were performed while sampling the DCU 3 vent gas stream. QA spikes were accomplished by injecting a known volume (using a mass flow controller) of a certified calibration gas standard into the extracted gas stream at a flow of up to 10% of the extracted sample flow. As stated in EPA Method 320, the spiked concentrations should approximate the native values. The previously mentioned spiking "T", placed upstream of the dilution probe, enables injection of the calibration gas standard directly into the extracted, undiluted sample gas stream. These spikes ensure the accuracy of the analysis and that the extractive system is inert towards these compounds. At a minimum, three independent QA spikes were performed before each 3-run test for the appropriate target compound. The criterion for an acceptable QA spike is a resulting concentration average within 0.7 to 1.3 times the expected concentration. The QA spike procedure demonstrated that the validation run conditions were duplicated. For the spiking validations, 1-minute averaged sample spectra were collected whereas 1- to 5-minute averaged spectra were collected during the sampling runs.

In addition to the target compound, the calibration gas standard also contains a spectroscopic tracer of either sulfur hexafluoride (SF_6) or tetrafluoromethane (CF_4). Common properties to all spectroscopic tracers are that they exhibit a broad absorption profile over a large concentration range and hence are chemically inert. The linear behavior of the spectroscopic tracer allows a precise measurement of the dilution ratio of the spiked gas to native gas. This dilution ratio is determined using SF_6 or CF_4 and applied to calculate the theoretical target compound (analyte) concentrations using the following equation:

$$Analyte_{Theoretical} = \left(\frac{Tracer_{sample}}{Tracer_{cylinder}}\right)\left(Analyte_{cylinder}\right) + \left[1 - \left(\frac{Tracer_{sample}}{Tracer_{cylinder}}\right)\right]\left(Analyte_{stack}\right)$$

Where:

$\text{Analyte}_{\text{Theoretical}}$ = Theoretical analyte concentration (ppmv)

$\text{Tracer}_{\text{sample}}$ = SF_6 or CF_4 tracer concentration (ppmv) as seen by the FTIR during spiking

$\text{Tracer}_{\text{cylinder}}$ = The concentration (ppmv) of SF_6 or CF_4 tracer in the certified gas standard as determined by direct injection into the FTIR gas analysis cell

$\text{Analyte}_{\text{cylinder}}$ = The concentration (ppmv) of analyte in the certified gas standard

Analyte_{stack} = The concentration (ppmv) of analyte present during stable operating conditions

As a test of FTIR stability, a calibration-transfer standard (CTS) was injected directly into the FTIR cell before and after each run. The CTS standard (Freon-22 in this case) was used to assess stability. By comparison of pre- and post-run analysis, the stability of the FTIR system for each test run was determined.

The sampling and analytical systems were leak-checked before each test run. The sampling and analytical systems were evacuated to terminal vacuum using the system pump and the flow monitored using a rotometer or mass flow meter (MFM) at the outlet of the FTIR upstream of the sample pump. Any leak less than or equal to 200 mL/min was considered acceptable.

The selected aldehyde and CO concentrations in the sample gas were measured continuously during each test run. The target sampling duration of 70 minutes was selected for this measurement program; however, no sample duration requirement is associated with any EPA test method performed on a DCU Vent.

By checking signal-to-noise ratios in specific regions, instrument sensitivity was assessed on a per compound basis. Often, Signal-to-Noise (SNR) data is then directly converted to a noise based minimum detection limit in parts-per-million (ppm). It is important to note that such noise-based MDLs are estimated considering instrumental noise levels without influences from major spectroscopic interferants (e.g., H_2O and process/by-product gases). When spectroscopic interferences are taken into account for those compounds that have overlapping absorption features, an increase in their MDLs is expected and therefore method-limited detection limits are employed whenever possible. For each set of spectra taken, a spectral subset containing no interfering spectral features (for each compound) was identified. During this time, it was assumed that the compound of interest was not present and that any reported concentration was a mathematical anomaly created by the interferences. Three times the standard deviation of this set of data was a typical approximation (99.7% confidence) for the method limited MDL and was subsequently reported.

5.16 Method 0010 – Semi VOC HAPs

SW-846 Method 0010, "*Modified Method 5 Sampling Train*," was used to measure speciated SVOC HAP concentrations in the DCU 3 vent gas stream. SVOCs are defined as compounds having boiling points >100°C (212°F). The SVOC HAP samples were extracted from the DCU 3 vent gas stream isokinetically as a single-point sample. Principal components of the sampling train included a quartz-fiber filter and a porous polymeric resin (XAD-2) sorbent trap used to adsorb SVOC HAPs. The Method 0010 sampling train consisted of the following components:

- Stainless steel nozzle;
- Sampling probe with quartz liner;
- Heated quartz-fiber filter;
- Heated Teflon transfer line;
- Glass coiled condenser;
- One large glass impinger (3 liters), with knockout stem, empty;
- XAD-2 sorbent trap;
- One large glass impinger (3 liters), with modified Greenburg-Smith stem, containing 200 mL HPLC H_2O;
- One standard glass impinger, with Greenburg-Smith stem, containing 100 mL HPLC H2O;
- Two (2) standard glass impingers, with knockout stems, empty;
- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;

- Dry gas meter; and
- Orifice.

SW-846 Method 0010 includes several unique glassware preparation steps to ensure that the sampling train components are not contaminated with organics that may interfere with analysis. The glassware, glass fiber filters, and XAD-2 resin were cleaned and the filters and XAD-2 resin were pre-screened for residues before they were packed and shipped to the sampling site using standard laboratory procedures.

Isotopically labeled SVOC HAPs were spiked onto the XAD-2 resin both before field sampling (surrogate standards) and into appropriate places after returning from the field. The recovery of these labeled compounds was then used to represent the overall recovery of the sample.

Following each test run, the SVOC samples were recovered separately into the following components:

- Front-half (nozzle, probe liner, and front-half of the filter holder) rinse with acetone;
- Front-half (nozzle, probe liner, and front-half of the filter holder) rinse with methylene chloride;
- Quartz-fiber filter;
- Contents of the single pre-XAD-2 knockout impinger;
- Mid-train (all glassware between the back-half of the filter and the inlet to the XAD-2 sorbent trap) rinse with acetone;
- Mid-train (all glassware between the back-half of the filter and the inlet to the XAD-2 sorbent trap) rinse with methylene chloride;
- XAD-2 sorbent trap;
- Contents of the first post-XAD-2 knockout impinger used to trap condensate;
- First post-XAD-2 knockout impinger rinse with acetone; and
- First post-XAD-2 knockout impinger rinse with methylene chloride.

The SVOC HAP samples were prepared in the laboratory for analysis using SW-846 Method 3542, "*Extraction of Semivolatile Analytes Collected Using Method 0010 (Modified Method 5 Sampling Train).*" Specific modifications to SW-846 Method 3542 were implemented by the analytical laboratory as follows:

- Rather than spiking the filter in a Petri-dish on the bench, the filter was transferred to the soxhlet extraction apparatus, and all spiking material was added there. *Adding surrogate spikes to the filter on the bench exposes the filter to atmosphere for a much greater period of time. During this time, the more volatile compounds can be lost.*
- For extraction of the probe and nozzle rinse, the laboratory had the flexibility to select whether to raise or lower the pH first. *The choice of whether to raise or lower pH has no direct effect on the extraction efficiency, but allows the laboratory more flexibility to manage foaming or other matrix effects.*
- The final extracts could potentially be concentrated to one milliliter before analysis, rather than the five milliliters specified in the method. *Concentration to a lower volume will improve detection limits. Any potential loss by the increased concentration is documented and mitigated by the recovery of surrogate spiking compounds.*

The analytical fractions were combined and analyzed as a single sample using GC/MS. Target SVOC HAPs were analyzed according to SW-846 Method 8270C, "*Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS).*" Further, selective ion mode (SIM) analysis was used for the 19 polycyclic aromatic hydrocarbons (PAH's) specified by U.S. EPA.

5.17 Method OTM-29 – HCN

Other Test Method (OTM) 29, "*Sampling and Analysis for Hydrogen Cyanide Emissions from Stationary Sources*," was used to measure the total gaseous cyanide (HCN and $[CN]_2$) concentrations in the DCU 3 vent gas stream as HCN. The HCN samples were extracted from the DCU 3 vent gas stream isokinetically at a single-point in the duct. The principal components of the U.S. EPA OTM-29 sampling train include a series of alkaline absorbing solutions maintained at a pH $\geq$12.

The OTM-29 sampling train consisted of the following components:

- Stainless steel nozzle;
- Sampling probe with quartz liner;
- Heated quartz-fiber filter;
- Teflon transfer line;
- Glass coiled condenser;
- One large glass impinger (3 liters), with modified Greenburg-Smith stem, containing 300 mL 10% lead acetate and acetic acid solution, maintained at a pH <4 during each test run;
- One standard glass impinger, with knockout stem, empty;
- Three (3) standard glass impingers, with Greenburg-Smith stems, each containing 100 mL 6.0N NaOH;
- Two (2) standard glass impingers, with knockout stems, empty;
- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;
- Dry gas meter; and
- Orifice.

OTM-29 includes several unique glassware preparation steps to ensure that the sampling train components are not contaminated with analytical interferents. All glassware was rinsed with 0.1N NaOH, HPLC H_2O and acetone prior to use.

OTM-29 sampling train was operated in the same fashion as that of the other isokinetic sampling trains used in this project. In addition, the pH of the last alkaline impinger solution was kept ≥12 during each test run. Alizarin-Yellow pH indicator was added to each NaOH impinger as needed.

Following each test run, the condenser and impingers were purged with pressurized nitrogen for 30 minutes at a rate of at least 10 liters per minute. An inline filter was also placed between the pressurized nitrogen source and the condenser. The nozzle, probe and Teflon transfer line were disconnected from the condenser prior to the purge.

The HCN samples were recovered separately into the following components:

- Impinger catch from the lead acetate/acetic acid impinger and subsequent knockout impinger, a rinse of these impingers with 0.1N NaOH, and a rinse of the Teflon transfer line (the back-half of the filter holder will not be rinsed) with 0.1N NaOH;
- Impinger catch from the first two (2) NaOH impingers and a rinse of these impingers with 0.1N NaOH,; and
- Impinger catch from the final NaOH impinger and a rinse of this impinger with 0.1N NaOH.

The pH of the absorbing solution in each impinger was measured prior to sample recovery and recorded on a data sheet. If the pH of the absorbing solution in the first NaOH impinger was less than 12, 10 mL of 6.0N NaOH was added sequentially until the pH of the absorbing solution had a pH equal to or greater than 12. This procedure was duplicated for the second NaOH impinger. If the pH of the last NaOH impinger was <12, the sample was declared invalid. In addition, the presence of oxidizing agents in the impinger solutions were tested according to Section 4.3 of U.S. EPA OTM-29.

Per Section 9.2.5 of OTM-29, a field spike was performed by introducing 2 mL of a field spike standard into a single impinger containing 100 mL of 6.0N NaOH to assess the field handling and recovery procedures. This single impinger was not part of the sampling trains used during each test run.

OTM-29 was used for the analysis of HCN by ion chromatography (IC). There is no available information on the use of OTM-29 on DCU Vent gas matrices. Therefore, an additional qualitative technique (ion-selective electrode) was used to provide qualitative confirmation of the sample results. One (1) out of 10 samples was analyzed in duplicate. Per Section 6.1.7.1 of OTM-29, the concentration of HCN in the final NaOH impinger must be <5% of the total mass of cyanide captured to validate the sample. Additional NaOH impingers or increased NaOH solution volumes may also be used to achieve this breakthrough requirement. The HCN concentration results are being reported as µg/dscm and the HCN mass emission rates are being reported as lbs/hr and tpy.

5.18 Method ASTM D6784-02 – Hg^{tp}, Hg^0, Hg^{2+}

ASTM D6784-02, "*Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)*," (also referred to as the "Ontario-Hydro Method") was used to measure Hg^{tp}, Hg^0 and Hg^{2+} concentrations in the DCU 3 vent gas stream. The Hg samples were extracted from the DCU 3 vent gas stream isokinetically as a single-point sample. The principal components of the ASTM D6784-02 sampling train included a quartz-fiber filter and a series of potassium chloride, nitric acid/hydrogen peroxide, and acidified potassium permanganate absorbing solutions.

The ASTM D6784-02 sampling train consisted of the following components:

- Stainless steel nozzle;
- Sampling probe with quartz liner;
- Heated quartz-fiber filter;
- Heated Teflon transfer line;
- Glass coiled condenser;
- One large glass impinger (3 liters), with knockout stem, containing 200 mL 1N KCl;

- One large glass impinger (3 liters), with modified Greenburg-Smith stem, containing 200 mL 1N KCl;
- One standard glass impinger, with Greenburg-Smith stem, containing 100 mL 1N KCl;
- One standard glass impinger, with Greenburg-Smith stem, containing 100 mL 1N KCl;
- One standard glass impinger, with a modified Greenburg-Smith stem, containing 100 mL 5% HNO_3/10% H_2O_2;
- One standard glass impinger, with a modified Greenburg-Smith stem, containing 100 mL 4% $KMnO_4$/10% H_2SO_4;
- One standard glass impinger, with a modified Greenburg-Smith stem, containing 100 mL 4% $KMnO_4$/10% H_2SO_4;
- One standard glass impinger, with a Greenburg-Smith stem, containing 100 mL 4% $KMnO_4$/10% H_2SO_4;
- Two (2) standard glass impingers, with knockout stems, empty;
- Two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution;
- One standard glass impinger, with knockout stem, empty;
- One standard glass impinger, with modified Greenburg-Smith stem, containing approximately 300 g of silica gel desiccant;
- Air-tight sample pump;
- Dry gas meter; and
- Orifice.

The ASTM D6784-02 Method includes several unique glassware preparation steps to ensure that the sampling train components are not contaminated with metals that may interfere with analysis. Prior to initial use, all glassware was soaked in a 10% HNO_3 solution for four (4) hours, rinsed with water, and rinsed with acetone.

The sampling train was operated in the same fashion as that of the other isokinetic sampling trains used in this project. Following each test run, the condenser and impingers were purged with pressurized nitrogen for 30 minutes at a rate of at least 10 liters per minute to distribute the oxidized and elemental Hg to the appropriate absorbing solutions. An inline filter was also placed between the pressurized nitrogen source and the condenser. The nozzle, probe and Teflon transfer line were disconnected from the condenser prior to the purge. The speciated Hg samples were recovered separately into the following components:

- Hg^{tp} (particle bound Hg) – Front-half (nozzle, probe liner, and front-half of filter holder) rinse with 0.1N HNO_3;
- Hg^{tp} (particle bound Hg) – Quartz-fiber filter;
- Hg^{2+} (oxidized Hg) – Impinger catch from the three (3) KCl impingers with post-test 5% $KMnO_4$ addition, a rinse of these impingers with 10% HNO_3, a rinse of these impingers with 0.1N HNO_3, and a rinse of the back-half (back-half of the filter holder and heated Teflon transfer line) with 0.1N HNO_3;
- Hg^0 (elemental Hg) – Impinger catch from the one (1) 5% HNO_3/10% H_2O_2 impinger and a rinse of the impinger with 0.1N HNO_3; and
- Hg^0 (elemental Hg) – Impinger catch from the three (3) 4% $KMnO_4$/10% H_2SO_4 impingers, a rinse of these impingers with 0.1N HNO_3, and a rinse of these impingers with several drops of 10% hydroxylamine solution.

Per ASTM D6784-02, 1 mL of 5% dichromate solution was added to the 4% $KMnO_4$/10% H_2SO_4 sample fraction as a preservative. Cold-vapor atomic absorption (CVAAS) was used to determine the Hg concentrations in solution per SW-846 Method 7470, "*Mercury in Liquid Waste (Manual Cold- Vapor Technique)*," and Method 7471, "*Mercury in Semisolid or Solid Waste (Manual Cold-Vapor Technique).*" The quartz-fiber filter was combined with the front-half rinse and digested using HF, HCl and HNO_3 in a microwave-assisted process. All samples were analyzed in duplicate. The Hg^{tp}, Hg^0 and Hg^{2+} concentration results are being reported as µg/dscm and the mass emission rates are being reported as lbs/hr and tpy.

6.0 OTHER ICR TESTING REQUIREMENTS

In addition to the emissions testing requirements of the Refinery ICR, BP Husky was also required to compile 30 days worth of relevant process data for DCU 3, in which the test program occurred within the 30-day "process data period." The relevant DCU 3 process data is included in Appendix 4 of this test report.

For delayed coking units, collecting refinery fuel gas (RFG) samples for analysis was not required.

7.0 MODIFICATIONS AND DEVIATIONS FROM THE TEST METHODS

As stated throughout Section 5 of this test report, the prescribed test methods for this project were not originally intended for, nor are they typically used on, DCU vent sources. Hence, numerous, significant modifications were applied to several of the test methods in order to complete the ICR test project. *It should be noted that, in some cases, even the modified versions of the standard source sampling methods proved to be inadequate to produce quality-assured measurements.* This section details these modifications in more detail, and also provides a summary overview of the communications made between URS and U.S. EPA regarding this test project.

7.1 Justification for Modifications and Deviations

The average moisture concentration in the DCU 3 vent gas stream was anticipated to be extremely high (>95% by volume). This type of wet gas stream differs greatly from the types of combustion exhaust gas streams (i.e., streams with <30% water vapor) for which the EPA test methods were developed. This section specifies the use of specialized glassware and equipment for the efficient condensation of moisture in the applicable sampling trains. Specific issues related to high moisture, PM, hydrocarbon and H_2S concentrations in the DCU 3 vent gas stream are also described below. Several process designs and operating conditions critical to the performance of the ICR test program are also discussed.

Further details regarding Project-Specific communication between URS and U.S. EPA to modifying the technical approach of various methods are found in more detail in Appendix 7 of this test report, where applicable.

7.2 Identical Emissions

The West Coke Drum and the East Coke Drum on DCU 3 are identical and operated in the same manner with the same feedstock; therefore, the assumption is made that emissions from the west vent and the east vent are identical. The Refinery FAQ website maintained by U.S. EPA describes several acceptable test method modifications for use on DCU vent sources. Specifically, sequential sampling on multiple coke drums is allowed as if the coke drums were a single source, provided that the design and feed to the multiple coke drums and vents are identical. This sequential sampling approach was followed during the ICR test program of the DCU 3 allowed for the performance of a test run approximately once every 16-18 hours.

7.3 Sludge Injection

The Refinery FAQ website maintained by U.S. EPA describes several acceptable test method modifications for use on various sources. Specifically, U.S. EPA maintains that normal operations of the applicable process unit should be conducted during the ICR test program. FAQ Test-020 provides guidance for conducting emissions measurements during a periodic soot-blowing event for an unidentified process unit:

> *"…it is recommended that since soot-blowing occurs every 6 hours and the three test runs will cover that same period of time, the testing could be scheduled such that the soot-blowing in its entirety occurs during one of each test runs. This would be most representative of normal conditions."*

During approximately one (1) out of three (3) single coke drum operating cycles, sludge (belt-pressed refinery sewer solids) is injected into the coke drum at the initial water quench, while the coke drum is still hot. Based upon U.S. EPA's guidance above, the ICR test program of the DCU 3 was conducted such that during one (1) out of every three (3) test runs for each target parameter, sludge was injected into the tested coke drum. For this test program, sludge was injected into the DCU 3 coke drum during Runs A-2, C-3, and D-4.

7.4 Ejector Vent

The Refinery FAQ website maintained by U.S. EPA describes several acceptable method modifications for use on various sources. Specifically, U.S. EPA maintains that normal operations should be conducted on a regular basis during the ICR test program. However, the use of the ejector vent (see Section 4.2 of this test report) would complicate the performance of the ICR test program by introducing a separate emissions point during the venting cycle. In addition, the matrix of the ejector vent pipe gas stream may vary significantly from the vent gas stream. Therefore, the normal operations of the DCU 3 were modified and the ejector vent was not used during the venting cycle. The DCU 3 coke drum was depressurized to 0.5 psig through the vent pipe only. The ejector vent was activated only after the venting cycle was complete and the sampling was concluded. BP-Husky estimated that by eliminating the use of the ejector vent during the venting cycle, the typical venting cycle duration of 55 minutes was increased to approximately 70 minutes.

7.5 Single-Point Sampling

The DCU 3 vent gas stream is pressurized and hazardous to sampling personnel. The Refinery FAQ website maintained by U.S. EPA describes several acceptable test method modifications for use on DCU Vent sources. Specifically, single-point sampling of DCU Vents is allowed for isokinetic sampling trains and velocity measurements when safety is a potential issue, as was the case during the sampling of the DCU 3 vent at the BP-Husky Toledo refinery. In addition, U.S. EPA allows single-point sampling within the central 10% of the DCU Vent cross-sectional area. Note also that since single-point sampling is the only sampling alternative for this test project, by default neither stratification testing nor cyclonic flow checks could be performed.

7.6 Type-S Pitots

The high level of moisture in the DCU 3 vent gas stream can lead to water condensation in the Type-S pitots and associated sample lines, which interferes with the accurate measurement of gas stream velocity. The tubing connecting a sampling train's pitot tubes and differential pressure gauge were periodically flushed with compressed air to remove condensed water. EPA Method 1A was modified to allow the use of Type-S pitots instead of a standard pitot to mitigate blockage due to high water and PM concentrations.

7.7 Sampling Probe and Filter Temperatures

The sampling probe and filter temperature range of 248±25°F specified in many of the EPA test methods is insufficient to prevent condensation in the heated components of the isokinetic sampling trains while sampling a gas stream composed almost entirely of water. Condensation in these components can lead to sampling train filter-blinding or clogging in a short period of time. The use of a stable operating temperature of approximately 300±25°F at the sampling probe and inside the filter enclosure helps to minimize condensation and blinding in the sampling trains. URS's design of an efficient moisture condensation system downstream of the filter and sampling probe allowed for the maintenance of a constant sampling rate through the entire sampling train for the duration of the sampling period. The use of a relatively low and constant sampling rate on the high-moisture source also increased the stability of the operating temperatures of the sampling train components during condensation of the sample gas.

7.8 Isokinetic Sampling Rate

Per "Component 4" of the ICR, the measurement of the SVOC HAP, $HCl/Cl_2/HF$, HCN, speciated Hg, metals, and $PM/PM_{2.5}$-CON concentrations required that the sampling be within ±20% of 100% isokinetic. However, as moisture concentrations in the sample gas increase, errors in the assumed moisture fraction have a greater impact on the sampler's ability to maintain an isokinetic sampling rate within ±20%. For example, if a vent gas stream is assumed to be 97% moisture during sampling and the result calculated at the conclusion of sampling indicates that the moisture fraction in the vent gas stream was actually 96%, then the sampling rate was 25% lower than 100% isokinetic sampling (75% isokinetic) which does not meet the U.S. EPA criterion of 80-120% isokinetic for DCUs during the Refinery ICR program.

Isokinetic sampling systems that provide real-time moisture concentration data during a sampling period and are suitable for use on a DCU Vent source are not commercially available. URS sampling personnel had no method of accurately measuring the moisture concentration of the DCU 3 vent gas during the sampling period, and therefore were not able to make any meaningful adjustment to the sampling train design or operation during the sampling period to obtain isokinetic sampling rates within ±20% of 100% isokinetic. Mathematically, the moisture concentration of the DCU 3 vent gas stream would have had to have been guessed correctly to within approximately ±0.2% moisture prior to each test run to meet U.S. EPA's criteria.

It is difficult to estimate the degree of bias associated with the measurement of target compound concentrations when achieving isokinetic sampling rates outside the criterion of 80-120% without conducting further research and testing on high-moisture, high-velocity DCU Vent sources. Generally, isokinetic sampling rates >100% have been suggested to bias the pollutant concentration results low because the gas velocity at the sampling train nozzle orifice exceeds the velocity of the gas stream and a greater than representative number of small particles, aerosols, or droplets, which follow the gas flow pattern into the nozzle orifice, are collected in the sampling train.

URS realizes the importance and significance of the data collected during the ICR program with respect to how the data will be used to develop emission standards for various refinery sources, and that certain QA/QC standards must be met. However, the data gathered must also adhere to achievable QA/QC standards that are reflective of the source being tested. Where possible, every effort was made by the URS test team to ensure that the ICR test program of the DCU 3 vent gas complied with an alternative isokinetic sampling criterion due to the unpredictable profile of the sample gas from test run-to-test run. Isokinetic sampling train operating parameters such as the sampling nozzle orifice size were determined during preliminary project activities to achieve **isokinetic sampling percentages ≤ 110% during the ICR test program, where practicable**. An isokinetic rate of ≤ 110% could be ensured by using a nozzle with a large enough orifice diameter such that the velocity of the sample gas through the nozzle orifice would always be less than the velocity of the vent gas stream. This criterion is based upon guidance in Attachment A to Rule 1189, "*ICR test program Protocol for VOC Emissions from High Moisture Hydrogen Plant Process Vents*," developed by California's South Coast Air Quality Management District (SCAQMD) and applicable to high-moisture gas streams.

7.9 Total Hydrocarbon Analyzer Calibration

Based upon prior sampling experience on this type of source, it was presumed that the concentrations of total hydrocarbon (THC) in the DCU 3 vent gas could vary greatly (i.e., from 0 to over 30% by volume) during the venting cycle. One of the many difficulties associated with the high moisture content of the DCU 3 vent gas stream is that it is not possible to accurately anticipate the dry gas fraction of the gas stream. This, in turn, creates difficulties in attempting to use a proper instrument calibration range. To rectify this, the sample gas was diluted to approximately 20:1 and routed to two (2) separate THC analyzers that were calibrated at overlapping ranges.

Because of limitations associated with the vapor pressure and lower explosive limits of propane, certified calibration gases of highly concentrated (>300,000 ppm) propane in a balance of air are not commercially available. To mitigate these issues, calibration gases were prepared in a balance of nitrogen rather than air. Nitrogen was also used as the dilution gas. U.S. EPA Protocol calibration gases of propane in a balance of nitrogen at concentrations >15,000 ppm are also not commercially available due to the health and safety issues involved with their preparation and NIST-certification (i.e., flammability and risk of explosion). Due to these limitations, some Custom Certified (±2% accuracy) calibration gases (traceable to a primary standard) at concentrations up to 30,000 ppm were used in lieu of U.S. EPA Protocol gases.

The high-range THC analyzer (10,000 to 100,000 ppm range) was not calibrated by introducing calibration gas upstream of the dilution sampling probe. Instead, the high-range THC analyzer was calibrated directly, bypassing the dilution sampling system, while the low-range THC analyzer (100 to 10,000 ppm range) was calibrated with dilution air and used to establish the dilution system ratio. Both the high-range and low-range THC analyzers were interfaced with the same dilution sampling system.

7.10 Stainless Steel Nozzles

The high gas stream velocity, high moisture and PM concentrations, and significant pipe vibration associated with DCU Vent sources can easily damage glass or quartz nozzles used with isokinetic sampling trains. A damaged (e.g., chipped or cracked) nozzle can reduce the overall quality of measurement data due to potential sample loss, sample bias, or when a post-test leak check cannot be performed within method tolerances. The potential impact on data quality due to contamination or interference from a relatively small surface area of stainless steel in the sampling train is most likely lower than the impact from an unrecoverable nozzle, which may be damaged inside the DCU 3 vent during each test run. Hence, EPA Methods 26A, 29, OTM-29, ASTM D6784-02, and SW-846 Method 0011 (if applicable) were modified to utilize stainless steel nozzles.

7.11 Zinc Acetate and Potassium Hydroxide Scrubbing Impingers

To protect sensitive sampling equipment as well as testing personnel from H_2S exhausting out of the isokinetic sampling trains, additional impingers were used for the purpose of scrubbing the sample gas before contact with the dry gas meters and sampling pumps and the subsequent release to atmosphere through an exhaust orifice. Two impingers with Greenburg-Smith stems, containing 100 ml each of a solution of 10% zinc acetate, were inserted before the final silica gel impinger used as a desiccant. An empty knockout impinger with a modified Greenburg-Smith stem, containing 100 ml of a solution of 1.0 N potassium hydroxide (KOH), and an additional empty knockout impinger were inserted in the sampling train between the 10% zinc acetate impingers and the silica gel impinger. URS ensured that the vast majority of the moisture content was condensed before gas contact with these scrubbing impingers by adding a large glass condenser and an appropriate amount of empty knockout impingers into the sampling trains. All impingers were weighed before and after the sampling run for the gravimetric determination of the DCU 3 vent gas moisture concentration, but the scrubbing impingers (as well as the desiccant impinger) were not be recovered for sample analysis. This design has been used successfully by URS during previous ICR test programs of DCU vents.

7.12 Impinger Train Exit Temperature

Due to circumstances beyond URS's control, the measured final impinger exit temperatures for isokinetic sampling trains exceeded 68°F during most of each test runs. High temperatures at this sampling train location are attributed to the very slow rate of dry gas (0.5 to 5 liters per minute) passing through the multi-component (i.e., 6- to 14-impinger) sampling trains and the subsequent minimal heat transfer at this thermocouple location. However, sample gas temperatures were measured at the exit of the condenser (upstream of all of the impingers) used in each isokinetic sampling train. The condenser exit temperature demonstrated the efficiency of moisture condensation and met the test method specification of ≤68°F.

7.13 Limited Dry Gas Sample Volume

The Refinery FAQ website maintained by U.S. EPA describes several acceptable test method modifications for use on various sources. Specifically, U.S. EPA waives all dry gas sample volume requirements associated with EPA Method 4 and the isokinetic sampling trains. The target dry gas sample volume of >0.05 m^3 and a wet gas sample volume of >5 m^3 described in the previously submitted *Test Plan* were based upon sampling during a complete venting cycle of approximately 70 minutes in length.

7.14 Dry Gas Meter Calibration

The sampling of DCU Vent emissions generally requires dry gas sampling rates between 0.5 and 5 liters per minute. For this reason, dry gas meters for use during the ICR test program were calibrated against a separate set of critical orifices for low-flow rate applications. A 3-point pre-test calibration was performed in triplicate before use in the field, and each Y_1 (calibration result) had to agree within 4% of the average Y_1 at the selected flow rate. The Individual Y_1 values must be between 0.9. and 1.10. A single-point post-test calibration was also performed in triplicate as soon as possible after the ICR test program and had to agree within 5% of the 3-point calibration at the selected flow rate. The single orifice used during the post-test calibration was selected to be representative of the average sampling rate obtained during the ICR test program.

7.15 Summary of U.S. EPA Correspondence

Table 7-1 provides an “executive summary” of the correspondence, communications, and determinations made between URS and U.S. EPA regarding the proposed test method modifications both prior to and during the project. Appendix 7 of this test report includes the actual, written communication made between URS and U.S. EPA for this project.

Table 7-1. Executive Summary of Proposed Test Program Modifications

Test Plan Mod No.	Test Method	Program Category	Test Report Section	URS Modification
1	−	Operations	7.2	Identical emissions from the East and West Coke Drums
2	−	Operations	7.3	Sludge injection into coke drums
3	−	Operations	4.2, 7.4	Elimination of ejector vent
4	1, 2	Sampling	4.4, 5.2, 7.5	Single-point sampling
5	2	Sampling	5.2, 7.6	Type-S pitot tubes with EPA Method 1A
6	Various	Sampling	7.7	Sampling probe and filter temperatures at 300±25°F
7	Various	Sampling	7.8	Isokinetic sampling rate
8	25A	Sampling	7.9	Variable total hydrocarbon concentration
9	Various	Sampling	7.10	Stainless steel nozzles
10	Various	Sampling	7.11	Zinc acetate and potassium hydroxide scrubbing impingers
11	Various	Sampling	7.12	Impinger train exit temperature
12	Various	Sampling	7.13	Limited dry gas sample volume
13	Various	Sampling	7.14	Dry gas meter calibration
14	1, 2	Sampling	5.3	Cyclonic flow
15	3A	Sampling	5.4	Dry gas molecular weight
16	1, 2	Sampling	7.5	Stratification test
17	15A	Sampling	5.9	Sampling system design
18	15A	Sampling	5.9	Recovery study using H_2S
19	15A	Sampling	5.9	Recovery study prior to test run
20	15A	Sampling	5.9	Recovery study criteria of 70-130%
21	205	Sampling	5.10.1	U.S. EPA Protocol gas
22	18	Sampling	5.10.2	Dilution system sampling and sorbent sampling
23	26A	Sampling	5.12	Sampling train impinger design
24	29	Sampling	5.13	Sampling train impinger design
25	29	Analysis	5.13	0.1N HNO_3 recovery volumes
26	OTM-29	Sampling	5.17	Sampling train impinger design
27	202	Sampling	5.6	Sampling train impinger design
28	320	Sampling	5.15	Dilution sampling system with EPA Method 320
29	D6784-02	Sampling	5.18	Sampling train impinger design
30	0010	Sampling	5.16	Sampling train impinger design
31	0010	Analysis	5.16	Analytical fractions
32	3542	Analysis	5.16	General procedures

8.0 TESTING ISSUES

For clarification, this section serves to summarize the major (i.e., high impact) aspects of the test program which deviated from what was indicated in the original *Test Plan* submittal. These issues and deviations encountered were often beyond the control of the test firm or plant operations staff, and are not uncommon for typical stack test programs. These issues and deviations were as follows:

1. Ideally, nine (9) runs were anticipated to be performed for the BP Husky ICR test program (not including a "Preliminary" run to gather data to properly set up the test equipment). This corresponds to three (3) runs each for Pollutant Sample Groups A, C, and D. However, for this test program, five (5) runs were performed for Group A, three (3) runs were performed for Group C, and four (4) runs were performed for Group D.

- Group A: Run A-1 was repeated, due to operator error with the dilution FTIR and CEM systems. For the Group A pollutants, Runs A-2, A-3, and A-4 were included in the 3-run averages.

- Group C: No runs were repeated. For the Group C pollutants, Runs C-1, C-2, and C-3 were included in the 3-run averages.

- Group D: Run D-1 was repeated, due to probe plugging and operator error with the dilution CEM system. Run D-3 was also repeated, since excess H_2S in the vent gas appeared to have reduced the acidic capture properties of the $KMnO_4$ impinger of the mercury sampling train. For the Group D pollutants, Runs D-2, D-4, and D-5 were included in the 3-run averages.

2. In the Test Plan, it was indicated that EPA Method 10 was specified to measure the CO emissions from the DCU 3 vent. However, during Run A-1 it was determined that it would be preferred to instead use Method 320 to determine the CO emissions, since this deviation would simplify the operation of the dilution sampling system.

3. The sampling train configuration employed in the field deviated from the specification in the Test Plan. This deviation is minor, and involves the incorporation of additional knockout impingers, to accommodate the increased condensate collected in the longer than anticipated

sample runs. However, the increased condensate volume collected may have had some impact on the sample analyses. Depending on the sample train, the additional condensate could have had different impacts as follows:

- For the determination of semivolatile organics by SW-846 Method 0010, the greater amount of condensate makes the extraction more difficult and cumbersome, but should have a minimal impact on the quantitation and detection limit.
- For the determination of metals by EPA Method 29, the greater amount of condensate makes the digestion more difficult, requiring more acid and time, and potentially adding more background and laboratory contamination.
- For the determination of HCN by OTM-29 and chloride and fluoride by EPA Method 26A, the large amount of condensate was delivered to the laboratory in multiple sample bottles. Separate aliquots were removed from each bottle, and a composite sample was developed for analysis. As such, there is increased uncertainty associated with the representativeness of the composite sample.

4. In multiple instances, data was not recorded at appropriate intervals during the test. This can be attributed to the difficulties in communication that are encountered at what was a challenging sampling location, as well as to sampling technician error. The gaps in data recording have varying impacts on data quality; the highest impact occurred during Run C-3, where ΔP readings were not recorded for the first 20 minutes of the test run.

5. An isokinetic sampling rate of ≤110% was proposed in the *Test Plan* as a modification to the 100 ±20% suggested in the ICR. During two runs (C-2 and C-3), this rate was not achieved. Table 8-1 provides a summary of the isokinetic sampling results for this project on a run-by-run basis. All isokinetic sampling runs in excess of the proposed "≤110%" threshold are also highlighted.

Table 8-1. Summary of Isokinetic Sampling Results

Group	Run	Pollutant Tested	% Isokinetic Sampling Rate
A	1	SVOC	92.3
	2	SVOC	81.2
	3	SVOC	105
	4	SVOC	71.6
C	1	HCl/Cl_2/HF	97.9
	2	HCl/Cl_2/HF	**199**
	3	HCl/Cl_2/HF	**236**
	1	HCN	98.1
	2	HCN	**149**
	3	HCN	**166**
D	1	PM/$PM_{2.5}$	Not Performed
	2	PM/$PM_{2.5}$	91.7
	3	PM/$PM_{2.5}$	Not Performed
	4	PM/$PM_{2.5}$	97.3
	5	PM/$PM_{2.5}$	56.5
	1	Metals	Not Performed
	2	Metals	86.0
	3	Metals	Not Performed
	4	Metals	88.5
	5	Metals	54.0
	1	Hg	Not Performed
	2	Hg	81.9
	3	Hg	Not Performed
	4	Hg	80.4
	5	Hg	63.9

6. During a number of test runs, temperatures of the varying components of the sampling trains deviated from what was specified in the *Test Plan*. These deviations can be categorized as follows: probe temperature; filter temperature; condenser/XAD temperature; and impinger exit temperature. Probe and filter temperatures were often observed outside the *Test Plan* specification of 275-325°F. This is considered to have a low impact on data quality, as in no case was sample flow impeded to the impinger train. When condenser/XAD temperatures exceeded the specification of 68°F, it was for only brief periods during the sampling runs,

and is also considered to have a limited impact on data quality. Impinger exit temperature deviations have little to no impact on data quality. These readings are due to the low flow of cooled sample gas across the thermocouple, coupled with the extremely high ambient (>120 ^{o}F) temperatures.

7. Oxygen and carbon dioxide were measured via EPA Method 3A in all runs to determine the molecular weight of the stack gas. In many instances, neither pre-test calibration nor post-test drift checks of the instruments met method specifications. It was necessary to dilute the exhaust gas significantly to remove the moisture and to prepare a matrix that would behave appropriately in the monitoring instrumentation. As a result of the extreme dilution, the oxygen and carbon dioxide levels observed at the instruments were at the extreme low end of the calibration span of the instruments. This resulted in measurements outside the specifications in the methods. Because of the high moisture content in the actual emissions stream (>98%), the concentration of oxygen and carbon dioxide have a negligible impact on the determination of molecular weight; consequently, the measurements are sufficient for the determination of molecular weight and have no impact on the usability of these emissions data. In terms of absolute quantification of gas concentrations, the Method 3A data have a high degree of uncertainty.

8. Sulfur dioxide and oxides of nitrogen were measured by EPA Methods 6C and 7E, respectively. As described above for oxygen and carbon dioxide, due to the high moisture content of the sample stream, it was necessary to dilute the exhaust gas to create a matrix that would behave appropriately in the monitoring instrumentation. As a result of the necessary high dilution ratio, the observed sulfur dioxide and oxides of nitrogen concentrations were at the extreme low end of the calibration span of the instruments. Data from these methods have a high degree of uncertainty.

9. In a number of instances, the calculated dilution ratio for the CEMS sampling system varied greatly when assessed before and after the sampling event. As instrument drift and dilution

system drift are both components of overall system drift, it is impossible to separate the dilution system drift from the actual analyzer drift for any given sampling run. Substantial efforts were taken to ensure the stability of the dilution system during sampling, including the operation of a heated filter and probe, and the blow back of any accumulated moisture or particulate matter on the dilution orifice. The dilution ratio is critical in the calculation of the exhaust gas components measured via the dilution sampling systems. To provide the most conservative, 'worst-case' numbers, **the higher of the two dilution ratios is applied to all of the emissions calculations**, with the exception of Method 320 data, which used a different dilution ratio calculation methodology. This data assessment methodology impacts the determination of instrument drift as defined in EPA methods 3A, 6C, 7E, and 25A. Because the two systems (analyzer and dilution system) could not be assessed separately, the method specifications for analyzer drift were not met in many cases; however, the calculation methodology applied above effectively incorporates any system drift that would otherwise impart an inappropriate bias in the emissions results.

10. The majority of wet chemistry samples were analyzed outside of the hold time specified in the Test Plan. The Test Plan specified an aggressive turnaround window that the analytical laboratories were unable to meet. The laboratory delays were associated with the increased load in the laboratory due to the large amount of refinery ICR work, and the complexity of the matrices of these samples. However, the impact on the analysis of the samples outside of the hold times specified in the test plan is minor. In many cases, the EPA stated hold times were met; in others, the corresponding EPA Method does not specify a hold time for analysis.

11. In a number of field blank samples, analytes were found at detectable levels. Specifically, analytes of interest were found in the Ontario Hydro, EPA Method 26A, and EPA Method 29 field blank trains as follows:

    - Mercury was found in the field blank sample for Ontario Hydro at a level consistent with the exhaust gas samples. Results for mercury can be considered to be biased high, or possibly considered as false positives.

- Multiple analytes were found at detectable levels in the field blank sample of the EPA Method 29 train (lead, antimony, arsenic, beryllium, cadmium, cobalt, manganese and nickel). The results for each of these analytes can be considered to be biased high.
- Fluoride was found in the field blank sample of the EPA Method 26A train. The results for hydrogen fluoride may be considered biased high.

12. The levels of semivolatile organic target analytes in the field samples of the SW-846 Method 0010 sampling train required a high sample dilution to be within the calibration range of the analytical instrument. As a result of the dilutions, surrogate spikes added before the extraction were diluted to below the detection limit in all field samples. The samples for analysis by high-resolution had another aliquot of surrogate spiking material added post-extraction, and these surrogates showed acceptable recovery. All laboratory samples (blanks and spikes) showed an acceptable recovery of all surrogate spikes. This has an overall minor impact on the quality of the Method 0010 samples.

13. For the EPA Method 29 samples, the matrix spike/matrix spike duplicate recoveries for beryllium, chromium, cobalt and manganese on the impinger sample were outside the specification of 75-125% recovery as follows:

    - Beryllium: recovery between 65 and 70%
    - Chromium: recovery between 135 and 140%
    - Cobalt: recovery between 135 and 140%
    - Manganese: recovery between 135 and 140%

    These results indicate increased imprecision for the results for these analytes in the impinger catch fraction. The impinger catch fraction is only one of three fractions that make up the total for the sampling train, and in general is not the largest result. While there is increased imprecision associated with these results, it is expected that the overall sum for each sampling train is acceptable as an estimate of emissions.

14. There were minor paperwork mix-ups for the Method 18 sorbent samples as follows:

    - No chain-of-custody paperwork was provided for two bag samples. These were readily identified by the laboratory and analyzed and reported correctly; and
    - A spiked and unspiked sorbent tube were reversed when labeled in the field. These were also readily identified, both by the laboratory tube identification number and by the results.

15. During the analysis of the EPA Method 18 sorbent tubes, recovery issues were identified for four analytes as follows:

    - Acrylonitrile was recovered at 50.5%. Acrylonitrile was measured during this test program with the sorbent method described in this document and using bag samples. No acrylonitrile was detected with either methodology. As the data using sorbents show poor surrogate recovery, the acrylonitrile results using the bag samples are used to estimate acrylonitrile emissions during this test effort.
    - 2-nitropropane was recovered at 46.9%. Results for 2-nitropropane show values above the detection limit, but below the quantitation limit. The very low spike recovery suggests that these results may be questionable and biased low. These results are noted as having increased uncertainty and possible low bias.
    - Styrene was recovered at 135%. Results for 2-styrene show consistent values above the detection limit, but below the quantitation limit. The spike recovery outside the acceptance criteria suggests that these results may be questionable and may have a high bias. These results are noted as having increased uncertainty and possible high bias.
    - On one run, MTBE was not recovered at all (0%). This is considered to be an outlier, and the MTBE recovery from the other two runs (93.2 and 98.3%) are averaged and used as the recovery efficiency for the field results.

16. Samples collected by OTM-29 for the determination of hydrogen cyanide in the emissions included acidic impingers containing lead acetate and alkaline impingers containing sodium hydroxide. The lead acetate samples were received by the laboratory at a pH of 4. Although this is not discussed in the method, the lead acetate samples are set up in the train to protect the caustic impingers from sulfide in the gas stream. The method indicates that there are potential issues with both sulfide as an analytical interferent and sulfide reactivity with cyanide to form thiocyanate. These samples were held at the acidic pH (4) to collect

hydrogen sulfide, but also allow hydrogen cyanide to pass through. Despite the pH of these samples being outside the pH specification, there is no indication of an adverse impact on the results. The field spike recovery was excellent, indicating acceptable overall method performance. No data were flagged based on sample preservation issues. Further, the method has no specification for analysis of the lead acetate samples or the use of the results. As cyanide was detected in one of the samples, the result from the lead acetate sample is added to the results from the sodium hydroxide samples to provide a conservative estimate of emissions.

17. The background matrix of the samples sent to the FTIR instrument varied during the course of each vent emission event. Specifically, the methane concentration as seen by the FTIR was highest at the beginning of the vent event, and tapered down fairly quickly. The background matrix during the beginning of the run was more complex, and therefore, the ability of the instrument to detect trace aldehydes was compromised. None of the three target analytes was identified and quantified in any of the sampling runs. Detection limits were developed, following method guidance for the three aldehyde target analytes, during the period after the large methane peak. Based on the judgment of the spectroscopist, the detection limit during the methane peak is estimated to be a full order of magnitude higher. The average concentration of the three (3) aldehydes was developed presuming that the detection limit during the first few minutes of a given run is higher, and therefore the average for the run is elevated.

Appendix 5 of this test report includes a spreadsheet table of URS's field notes, which summarize all of the issues and deviations that occurred during the test program. In all, 145 deviations were logged, many of them in duplicate.

9.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The quality assurance (QA) objectives for this test program were designed to provide a qualitative assessment of the measurement system data. The two aspects of data quality that are of primary concern are precision and accuracy. Accuracy reflects the degree to which the measured value represents the actual or "true" value for a given parameter and includes elements of both bias and precision. Accuracy is expressed in terms of percent error, or difference between a measured value and the theoretical value, expressed as a percentage of the theoretical. For assays, the objective is based on the mean measured value. For surrogate and matrix spike (MS), recoveries, the objective is based on single measurement results. Table 9-1 presents a summary of the QA objectives.

Precision is a measure of the variability associated with the measurement system. Precision is expressed according to the type of measurement. For surrogate and replicate assays, precision is expressed as percent relative standard deviation (RSD) for the set of spike recoveries or assay results. For objectives measured by MS duplicates (MSD) or duplicate analyses, precision is expressed as the relative percent difference (RPD) between MS/MSD recoveries or duplicate analyses. If the QA objectives for accuracy and precision are not met, careful interpretation of the analytical data was made to evaluate the associated impact on the reporting of data as part of the ICR program. Results that are outside these objectives may indicate matrix interferences that are sometimes present in stack emission samples. As such, results that are outside these specifications do not necessarily invalidate the data, but rather indicate the need to evaluate the data carefully and explain potential biases and/or limitations in the use of the data. The evaluation for data validity was based in part upon the evaluation of the laboratory’s adherence to the QC and corrective action specifications. All QA/QC data was thoroughly reviewed and interpreted for report.

Other QA objectives were representativeness, comparability and completeness. Representativeness is a function of sampling strategy. Representative DCU 3 vent gas samples were collected by following approved RMs or good engineering practices. Comparability is the degree to which data from a given study can be compared to data from other similar studies. Adhering to the RMs specified in “Component 4” of the ICR and described in this test report enhances data comparability between the DCUs selected for the ICR test programs as part of the ICR, and between the DCUs and other process units under investigation by U.S. EPA. Analytical results have also been presented in appropriate units according to industry standards, or as required by the ERT software. The completeness objective of 100% reflects the requirement to provide three (3) valid determinations for target compound concentrations and mass emission rates during the ICR test program.

QA/QC activities associated with the collection of the DCU 3 vent gas samples included (where applicable):

- Use of pre-printed sampling data sheets;
- Use of calibrated sampling equipment;
- Use of calibration standards of appropriate and documented quality;
- Collection of data at appropriate operating conditions;
- Collection of acceptable sample volumes;
- Performance of sampling system leak checks; and
- Collection of data per "Component 4" of the ICR, program-specific guidance from U.S. EPA (either via email discussions or EPA's FAQ website), applicable EPA test methods, and the previously submitted *Test Plan*.

QA/QC activities associated with the analyses of the DCU 3 vent gas samples will include (if applicable):

- Use of pre-printed recovery data sheets;
- Calibration of the analytical instrumentation;
- Use of documented calibration standards;
- Replicate analyses;
- Incorporation of appropriate holding-time criteria; and

- Analyses of samples per "Component 4" of the ICR, program-specific guidance from U.S. EPA (either via email discussions or EPA's FAQ website), applicable EPA test methods, and the previously submitted *Test Plan*.

Field blanks for the stack gas samples were prepared by recovering assembled trains that have been treated as the "actual" trains except that no stack gas was passed through the blank trains.

In addition, EPA Method 202 has specific requirements for the performance of the field blank: 1) it must be performed after the first or second test run of a series, and 2) 100 mL of HPLC H_2O must be added to the first impinger prior to the nitrogen purge. Sample results may be corrected to $PM_{2.5}$-CON masses found in the field blank under certain conditions. ASTM D6784-02 also allows sample result correction to field blank results. SW-846 Method 0010 requires that a field blank be performed while the filter and probe are heated. Media trip blanks consist of sampling media that are stored and shipped from the facility and handled as ordinary samples, but are never assembled in trains. Media trip blanks collected were not analyzed unless needed to identify sources of contamination found in the field or trip blank samples. Reagent blanks were collected during the ICR test program and were analyzed to identify any potential sources of contamination found in the field blank samples. EPA Methods 5, 29, and ASTM D6784-02 also allow the correction of sample results to target compound masses found in reagent blanks and media trip blanks, under certain conditions.

MS/MSD samples were prepared for samples collected with the EPA Methods 26A, 29 and SW-846 Method 0010 sampling trains by spiking sample splits with known concentrations of target analytes. The MS/MSD compounds and acceptance criteria are specified in the methods. The MS results provided a measure of the effectiveness of the method, in terms of analyte recovery (accuracy), in the actual sample matrices. The MSD results provided a measure of variability, much like field or analytical duplicate samples, but at a predictable concentration. A laboratory control sample (LCS) was also included with each analytical batch and was used to indicate matrix interferences. The LCS consisted of a clean, control matrix similar to the sample matrix that was spiked with the same analytes and at the same concentrations as the MS. When the MS results indicated potential matrix interferences, the LCS was used to verify the MS procedure.

Surrogate spiked samples were used to monitor method performance for SW-846 Method 0010. The surrogate spike compounds routinely used with SW-846 Methods 8260B were used for all applicable samples from this test.

Table 9-1. Summary of Quality Assurance Objectives

Sample Group	Method	Target Compound	Precision	Accuracy	Field Blank	Trip Blank	MS/ MSD	Surrogate Spike	Field/Lab Spike
A1 / C2	18 (bag)	Methane/Ethane VOC HAP H_2S, COS, and CS_2	<5% RPD for triplicate calibration injections; <5% RPD between pre- and post-test calibration	70-130% recovery for field spike	-	-	-	-	1
A1	18 (sorbent)	VOC HAP	<5% RPD for triplicate calibration injections; <5% RPD between pre- and post-test calibration	70-130% recovery for field spike	-	1	-	-	All
A1	308	Methanol	<5% RPD for duplicate calibration injections; <10 % RPD between initial and daily calibration	-	-	1	-	-	-
A1	320	Aldehydes	<5% RPD between pre- and post-test CTS spectra; <5% RPD between duplicate QA and validation spikes	CTS spectra within ±2 of calibration gas value; 70-130% recovery for QA and validation spikes	-	-	-	-	1
A2	0010	SVOC HAP	<20% RPD for initial calibration; <35% RPD for MSD	23-133% recovery of method-specified surrogates; 70-130% recovery for MS	1	1	1	All	-
A3	25A	THC	Span and zero drift within 3% of span	Calibration error within 5% of calibration gas value	-	-	-	-	-
C1	26A	HCl, Cl_2, and HF	<5% RPD for duplicate analyses for each sample; <25% RPD for MSD	75-125% recovery for MS	1	1	1	-	-
C1	OTM-29	HCN	<5% RPD for duplicate analyses for each sample; <20% RPD for MSD	80-120% recovery for MS, 80-120% recovery for field spike	1	1	1	-	1
C2	15A	TRS	<1% RPD for duplicate analyses for each sample	70-130% recovery for field spike	-	-	-	-	All
D1	29	Metals	20% RPD for MSD	80-120% recovery for LCS; 75-125% for MS	1	1	1	-	-
D1	5	PM	Replicate weights ±0.5 mg	Replicate weights ±0.5 mg	1	1	-	-	-
D1	202	$PM_{2.5}$-CON	Replicate weights ±0.5 mg	Replicate weights ±0.5 mg	1	1	-	-	-
D2	ASTM D6784	Hg^{tp}, Hg^0, and Hg^{2+}	<10% RPD for duplicate analyses for each sample; <10% RPD for triplicate analyses of every 10th sample	90-110% recovery for MS	1	1	1	-	-
D4	7E	NO_X	Span and zero drift within 3% of span	System calibration error within 2% of span from calibration gas value	-	-	-	-	-
D4	6C	SO_2	Span and zero drift within 3% of span	System calibration error within 2% of span from calibration gas value	-	-	-	-	-
All	3A	O_2 and CO_2	Span and zero drift within 3% of span	System calibration error within 2% of span from calibration gas value	-	-	-	-	-

10.0 SAMPLE CUSTODY

Sample handling/custody procedures, including labeling, preserving, storing, and transporting samples, was conducted in a way to ensure the integrity of the samples and to provide an unambiguous link between the results of the analyses and the physical conditions they represent. The following sections describe general sample handling concerns, the sample labeling scheme, sample tracking procedures, and any sample preservation and holding time requirements.

10.1 Sample Handling

Samples were protected from evaporation, contamination, and degradation. Following collection, samples were handled in clean, ventilated work areas and were removed to dark, cool storage, as necessary and as soon as possible.

Filters used for total PM measurements were pre-weighed at the appropriate analytical laboratory prior to the commencement of field activities. Each filter was given a unique identification number, which was labeled on the filter container once the filter was ready for use. Records maintained at the analytical laboratory associated the unique filter ID with the tare weight established for each filter. During field activities, the filter ID was transferred from the filter container to a sampling data sheet when the filter was to be used. In addition to the filter ID, the site locations, sample date, sampling equipment identification numbers, and operator initials were recorded on the sampling data sheet.

All filters used for applicable target compound measurements were placed in glass Petri dishes, sealed with Teflon tape, and placed in individual Ziploc® plastic bags. Sample fractions were grouped with other fractions of the same hazard class and with similar temperature specifications for shipment. Where needed, ice contained in double plastic bags was added and the boxes or coolers were taped shut.

At the conclusion of sampling, a pre-printed sample label with a project specific sample ID (also recorded on the sampling data sheet) was affixed to the sample containers. The project sample label displayed the project specific ID, the analytical laboratory filter ID, the filter tare weight, the sample date and time, the operator initials, and test condition and run number, as applicable. Sample containers and sample labels were labeled/completed using waterproof ink.

The samples were packaged and labeled for shipment using approved shipping containers in compliance with current U.S. Department of Transportation (DOT) dangerous goods regulations. All sample containers were wiped clean and sealed with Teflon tape before packaging for shipment. Absorbent paper, vermiculite, or equivalent material was used to absorb shock and spills.

A sample transfer form was included in each shipping container, identifying each sample and the analytical requirements. "Strict" chain-of-custody procedures were not enforced, (i.e., signatures were not required to release sample custody within URS staff, access to the field laboratory was not strictly controlled, custody seals were not used on individual samples, the mobile laboratory was not always locked while unattended, etc.), although all pertinent information was recorded and the samples were tracked via an unbroken documentation trail.

Chain-of-custody records, and any other shipping and sample documentation accompanied each applicable shipment. These documents were enclosed in a waterproof plastic bag inside each sample shipping container.

Upon receipt of a sample shipment, the laboratory sample custodian inspected the shipping container for warning labels before opening. The sample custodian opened the container and checked the contents for evidence of breakage or leakage. The contents of the container were inspected for chain-of-custody documents and other information or instructions. The condition of the samples, including the presence of ice was noted on the chain-of-custody document, and the laboratory shipment receipt form. The sample custodian verified that all information on the sample bottle labels was correct and consistent with the chain-of-custody forms, and acknowledged receipt on the custody form. The chain-of-custody form and the bill of lading were retained in the project file.

Any discrepancy between the samples and the chain-of-custody information, any broken or leaking sample bottles, or any other nonconformance was reported immediately to the URS Project Manager and corrective action options were discussed and implemented, where necessary. Notations of the problem and resolution were made on the chain-of-custody or an addendum to the chain-of-custody form, initialed, and dated by the sample custodian. The URS Project Manager and BP-Husky Site Contact were kept informed of all issues and responses.

10.2 Traceability

Traceability refers to the link between the results of analyses and the physical reality they represent. This link includes not only sample custody but also documentation of preparation of supplies that become an integral part of the sample (e.g., filters), documentation of the exact location, and specific considerations associated with sample acquisition, documentation of sample preservation, etc. This type of data was recorded in field logbooks and through the use of prepared sample labels and standardized field tracking forms.

Accurate documentation of field sampling data, sample collection and handling records were maintained throughout the program by all participants involved in the data and sample collection, transport, and analysis. The Project Manager and leads were responsible for ensuring the completion of all data sheets, sample log book entries, and transfer forms. Field personnel involved in the sample collection and recovery assisted in this effort as their individual responsibility dictated.

All sampling data, including sampling times, locations, identification codes, and other pertinent and specific sample information were recorded on pre-formatted data sheets and/or in bound notebooks. For individual samples, all pertinent information was logged in the master sample logbook.

A master logbook was kept for tracking and identifying all samples taken during the test effort. Each sample was given a unique log number that identified the project, run number, and a sequential identification number based upon the order of entry. A copy of this log is included in Appendix 5 of this test report.

Sample labels were affixed to the outer containers used to transport the field samples. The label was marked to include the date and time(s) of collection, the sampler's initials, tare and gross weights (as appropriate), and the sample log number. Transfer forms were completed by field personnel involved in the sample handling prior to shipment or transfer for off-site analysis.

10.3 Holding Times

A summary of sample preservation and holding times is presented in Table 10-1. Holding times in all cases are based upon the requirements of the ICR test program reporting schedule and are more conservative than the holding times specified in the applicable analytical methods. Storage conditions were checked on site and upon receipt of the samples in the laboratories. Any deficiencies were recorded on the chain-of-custody and laboratory shipment receipt forms.

Table 10-1. Sample Preservation and Holding Times

Parameter	Method	Preservation	Holding Time
SVOC HAPs	0010	Glass containers; Resin traps wrapped with aluminum foil and sealed with glass cap or plug or Teflon (stored at <4°C)	Extract and Analyze within 14 days
HCl, Cl_2, and HF	26A	Plastic or glass containers	Analyze within 14 days
HCN	29	Plastic or glass containers (stored at <4°C)	Analyze within 14 days
PM and $PM_{2.5}$-CON	5/202	Plastic or glass containers	Analyze within 14 days
Metals	29	PM: Plastic or glass containers Metals: Glass containers	Analyze within 14 days
Hg	ASTM D6784	Glass containers	Analyze within 14 days
TRS	15A	Plastic or glass containers	Analyze within 14 days
VOC HAPs	18	Sorbent trap	Analyze within 14 days
Methane, Ethane; VOC HAPs; H_2S, COS, and CS_2	18	Bag samples	Analyze within 48 hours
Methanol	308	Sorbent trap	Analyze within 14 days

10.4 Sample Shipping Logistics

Enthalpy Analytical, Inc. in Durham, North Carolina served as the laboratory for the analysis of speciated VOC HAPs, $HCl/Cl_2/HF$, HCN, PM, and $PM_{2.5}$-CON samples. TestAmerica Laboratories, Inc., in West Sacramento, California served as the laboratory for analysis of speciated SVOC HAPs, multiple metals, and speciated Hg samples.

EPA Method 18 bag and sorbent samples and EPA Method 308 sorbent samples were packed by URS in the field and shipped via Federal Express to Enthalpy Analytical, Inc. All other samples were delivered by truck- and hand-delivered by URS to TestAmerica’s office in Knoxville, Tennessee. TestAmerica (Knoxville) in turn shipped these samples to their West Sacramento laboratory.

11.0 CALIBRATION PROCEDURES AND FREQUENCY

Information presented in this section pertains to the calibration of sampling systems. Included are descriptions of each procedure or references to applicable standard operating procedures, the frequency of calibrations, and the calibration standards to be used.

Prior to field sampling, the equipment was calibrated using referenced procedures, and the results were documented and retained. If a referenced calibration technique for a particular piece of apparatus was not available, then state-of-the-art techniques were used. A discussion of the procedures used to calibrate this equipment is presented below.

11.1 Type-S Pitot Tube Calibration

U.S. EPA has specified guidelines concerning the construction and geometry of an acceptable Type-S pitot tube. If the specified design and construction guidelines are met, a pitot tube coefficient of 0.84 can be used. Information related to the design, construction and inspection of the Type-S pitot tube is presented in detail in Calibration Procedure 2 in "*Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods*," U.S. EPA Document 600/R-94/038c. Only Type-S pitot tubes meeting the required EPA specifications were used during this project. Prior to the field sampling, the pitot tubes were inspected and documented as meeting EPA specifications.

11.2 Sampling Nozzle Calibration

Calculation of the isokinetic sampling rate requires that the cross-sectional area of the sampling nozzle be accurately and precisely known, to the nearest thousandth of an inch. All nozzles used for isokinetic sampling were thoroughly cleaned, visually inspected, and calibrated according to the procedure outlined in Calibration Procedure 5b in "*Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods*," U.S. EPA Document 600/R-94/038c. According to this procedure, three measurements of the inside diameter of the nozzle were made on different cross-sections. Using a Vernier caliper, measurements were made to the nearest 0.001 inch. Nozzles were considered acceptable if the difference between any two measurements was less than 0.004 inches. The nozzle calibrations were recorded on the field sampling data sheets.

11.3 Temperature Measuring Device Calibration

During source sampling, accurate temperature measurements are required. Thermocouple temperature sensors were calibrated at a single point against a NIST-traceable mercury-in-glass thermometer, and the linearity was confirmed using a traceable precision voltage generator.

11.4 Dry Gas Meter and Orifice Calibration

Dry gas meters (DGMs) were used in the vent gas sampling trains to monitor the sampling rate and to measure the sample volume. Critical orifices were used as calibration tools.

11.4.1 Dry Gas Meter

All dry gas meters were calibrated (documented correction factor at standard conditions) before the departure of the equipment to the field. Dry gas meters were calibrated against traceable critical orifices. A standard 5-point (five different orifices, or flow rates) calibration is performed on each URS dry gas meter every six months. For the 5-point calibration, duplicate calibrations are performed at each of the five flow rates. If necessary, additional maintenance and calibrations are conducted until the calibration results (Y_1) vary by no more than 2%. The average Y_1 is then calculated and recorded on the DGM calibration data sheet. A standard 3-point calibration was performed as a pre-test and post-test calibration check. The 3-point calibrations must agree within 5% of the 5-point calibration. Post-test calibration checks were performed on each DGM used in the field as soon as possible after the equipment was returned to URS. Duplicate calibrations at each flow rate were also performed during the standard 3-point pre- and post-test calibrations.

A positive pressure leak-check of the system was performed prior to calibration. To perform the leak-check, the system was placed under approximately ten inches of water pressure and a gauge-oil manometer was used to determine if the pressure decrease could be detected over a one-minute period. If leaks were detected, they were eliminated before the actual calibrations were performed.

Before the calibration of a dry gas meter, the pump was allowed to run for five minutes after the sampling console was assembled and leak-checked. Once the pump and dry gas meter were warmed up, the critical orifice was attached, and air was pulled through the dry gas meter at the specified flow rate. After ten minutes, the valve was closed and the volume of gas read by the meter was compared to the volume of gas that passed through the critical orifice.

11.4.2 Orifice

The critical orifice was calibrated by comparison to an independently calibrated dry gas meter. An orifice calibration factor was calculated for each of the 18 flow settings during a full calibration. The arithmetic average of the values obtained during the calibration was used.

Copies of the pre- and post-test calibration data for the equipment used during this project are include in Appendix 8 of this test report.

12.0 PROJECT DATES AND DEADLINES

The BP-Husky ICR test program was performed over a 14-day period from July 14-27, 2011. Per the Refinery ICR, all facilities subject to the ICR test program requirements must “complete and submit test results” by August 31, 2011. However, due to various factors, most notably sub-contracted laboratory sample analyses backlogs, U.S. EPA has allowed BP Husky (and other refineries) to submit their test results (in both an ERT and RTS electronic hardcopy format) when they become available and are finalized. Appendix 7 of this test report includes a letter from the analytical laboratory (Enthalpy Analytical) that addresses the delay in issuing the final test results due to their sample analysis backlogs.

In lieu of not being able to meet U.S. EPA’s August 31, 2011 deadline, BP Husky submitted a preliminary “isokinetic sampling results summary” to U.S. EPA on July 27, 2011 and an interim “test results received and reviewed to date” data set on August 26, 2011.

APPENDIX 1 – ICR ERT AND RTS DATA PRINTOUTS

ERT Data

Due to formatting issues, all ERT-related data is being provided to U.S. EPA
in an electronic format only

Supporting Excel Spreadsheet Data

BP HUSKY DCU 3 - PM/PM2.5 RESULTS (METHOD 5/202)

	Cond D Run 2		Cond D Run 4		Cond D Run 5		Average
Volume Collected (dscf)	2.491		5.053		1.528		
Stack Gas Flow Rate (dscfm)	37		55		31		
Duration (min)	111		138		129		
Cycles per Year	531		531		531		
Mass Found (mg)	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Filterable PM	17.0		52.9		476.7		
Condensable PM (Organic)	88.6		72.7		159.2		
Condensable PM (Inorganic)	180.3		238.3		209.4		
PM - Total	286		364		845		
Stack Gas Concentration (gr/dscf)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Filterable PM	0.105	ADL	0.162	ADL	4.81	ADL	1.69
Condensable PM (Organic)	0.549	ADL	0.222	ADL	1.61	ADL	0.793
Condensable PM (Inorganic)	1.12	ADL	0.728	ADL	2.11	ADL	1.32
PM - Total	1.77	ADL	1.11	ADL	8.53	ADL	3.81
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Filterable PM	0.0332	ADL	0.0757	ADL	1.28	ADL	0.465
Condensable PM (Organic)	0.173	ADL	0.104	ADL	0.429	ADL	0.235
Condensable PM (Inorganic)	0.352	ADL	0.341	ADL	0.564	ADL	0.419
PM - Total	0.559	ADL	0.521	ADL	2.28	ADL	1.12
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Filterable PM	0.0615	ADL	0.174	ADL	2.76	ADL	0.999
Condensable PM (Organic)	0.320	ADL	0.239	ADL	0.923	ADL	0.494
Condensable PM (Inorganic)	0.652	ADL	0.784	ADL	1.21	ADL	0.883
PM - Total	1.03	ADL	1.20	ADL	4.90	ADL	2.38
Mass Emission Rate (tons per year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Filterable PM	0.0163	ADL	0.0462	ADL	0.733	ADL	0.265
Condensable PM (Organic)	0.0851	ADL	0.0635	ADL	0.245	ADL	0.131
Condensable PM (Inorganic)	0.173	ADL	0.208	ADL	0.322	ADL	0.234
PM - Total	0.274	ADL	0.318	ADL	1.30	ADL	0.631
Mass Emission Rate (lb/hr) (annualized average)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Filterable PM	0.00373	ADL	0.0105	ADL	0.167	ADL	0.0606
Condensable PM (Organic)	0.0194	ADL	0.0145	ADL	0.0559	ADL	0.0299
Condensable PM (Inorganic)	0.0395	ADL	0.0475	ADL	0.0736	ADL	0.0535
PM - Total	0.0627	ADL	0.0726	ADL	0.297	ADL	0.144

BP HUSKY DCU 3 - TRS DATA (METHOD 15A)

		Cond C Run 2		Cond C Run 3		Cond C Run 4		Average
Stack Gas Flow Rate (dscfm)		18.9		29.9		13.0		
Moisture (%)		99.63		98.98		99.74		
Duration (min)		134.00		56.00		46.00		
Cycles per Year		531.00		531.00		531.00		
Stack Gas Wet Concentration (ppmvw)	**Molecular Weight**	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Total Reduced Sulfur (TRS) (SO2)	64	213.9427		444.280		296.9		
Stack Gas Dry Concentration (ppmvd)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Total Reduced Sulfur (TRS) (SO2)		57,200	ADL	43,800	ADL	112,000	ADL	
Stack Gas Concentration (µg/dscm)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Reduced Sulfur (TRS) (SO2)		152,000,000	ADL	116,000,000	ADL	299,000,000	ADL	189,000,000
Mass Emission Rate (lb/hr)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Reduced Sulfur (TRS) (SO2)		10.8	ADL	13.0	ADL	14.6	ADL	12.8
Mass Emission Rate (lb/cycle)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Reduced Sulfur (TRS) (SO2)		24.0	ADL	12.2	ADL	11.2	ADL	15.8
Mass Emission Rate (tons/year)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Reduced Sulfur (TRS) (SO2)		6.38	ADL	3.23	ADL	2.96	ADL	4.19
Mass Emission Rate (lb/hr)(annualized average)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Reduced Sulfur (TRS) (SO2)		1.46	ADL	0.737	ADL	0.676	ADL	0.957

BP HUSKY DCU 3 - H2S/COS/CS2 RESULTS (METHOD 18 FPD)

		Cond C Run 2		Cond C Run 3		Cond C Run 4		Average
Stack Gas Flow Rate (dscfm)		18.9		29.9		13.0		
Moisture (%)		99.63		98.98		99.74		
Duration (min)		134.00		56.00		46.00		
Cycles per Year		531.00		531.00		531.00		
Stack Gas Wet Concentration (ppmvw)	**Molecular Weight**	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Hydrogen Sulfide (H_2S)	34.1	173.3344		512.357		178.6		
Carbonyl Sulfide (COS)	60.1	<22.3		<20.6		<21.9		
Carbon Disulfide (CS_2)	76.1	<24.4		<22.5		<23.9		
Stack Gas Dry Concentration (ppmvd)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Hydrogen Sulfide (H2S)		46,400	ADL	50,500	ADL	67,500	ADL	
Carbonyl Sulfide (COS)		<6,000	BDL	<2,000	BDL	<8,300	BDL	
Carbon Disulfide (CS2)		<6,500	BDL	<2,200	BDL	<9,000	BDL	
Stack Gas Concentration (μg/dscm)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Sulfide (H2S)		65,700,000	ADL	71,600,000	ADL	95,800,000	ADL	77,700,000
Carbonyl Sulfide (COS)		<15,000,000	BDL	<5,100,000	BDL	<21,000,000	BDL	<14,000,000
Carbon Disulfide (CS2)		<21,000,000	BDL	<7,000,000	BDL	<29,000,000	BDL	<19,000,000
Mass Emission Rate (lb/hr)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Sulfide (H2S)		4.65	ADL	8.01	ADL	4.66	ADL	5.77
Carbonyl Sulfide (COS)		<1.05	BDL	<0.568	BDL	<1.01	BDL	<0.88
Carbon Disulfide (CS2)		<1.46	BDL	<0.785	BDL	<1.39	BDL	<1.2
Mass Emission Rate (lb/cycle)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Sulfide (H2S)		10.4	ADL	7.48	ADL	3.58	ADL	7.14
Carbonyl Sulfide (COS)		<2.35	BDL	<0.530	BDL	<0.773	BDL	<1.2
Carbon Disulfide (CS2)		<3.26	BDL	<0.733	BDL	<1.07	BDL	<1.7
Mass Emission Rate (tons/year)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Sulfide (H2S)		2.76	ADL	1.98	ADL	0.949	ADL	1.90
Carbonyl Sulfide (COS)		<0.625	BDL	<0.141	BDL	<0.205	BDL	<0.32
Carbon Disulfide (CS2)		<0.866	BDL	<0.195	BDL	<0.284	BDL	<0.45
Mass Emission Rate (lb/hr)(annualized average)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Sulfide (H2S)		0.629	ADL	0.453	ADL	0.217	ADL	0.433
Carbonyl Sulfide (COS)		<0.143	BDL	<0.0321	BDL	<0.0468	BDL	<0.074
Carbon Disulfide (CS2)		<0.198	BDL	<0.0444	BDL	<0.0647	BDL	<0.10

BP HUSKY DCU 3 - METHANE/ETHANE RESULTS (METHOD 18 FID)

		Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Stack Gas Flow Rate (dscfm)		61.6		129.6		29.6		
Moisture (%)		99.20		97.72		99.57		
Duration (min)		130.00		96.00		60.00		
Cycles per Year		531.00		531.00		531.00		
Stack Gas Dry Concentration (ppmv)(corrected for dilution)								
Methane	16	4521.0		31700.3		3386.7		
Ethane	30.1	387.3		2822.2		444.5		
Stack Gas Dry Concentration (ppmvd)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Methane		564,000	ADL	1,390,000	ADL	780,000	ADL	
Ethane		48,300	ADL	124,000	ADL	102,000	ADL	
Stack Gas Concentration (µg/dscm)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methane		375,000,000	ADL	925,000,000	ADL	519,000,000	ADL	606,000,000
Ethane		60,400,000	ADL	155,000,000	ADL	128,000,000	ADL	115,000,000
Mass Emission Rate (lb/hr)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methane		86.5	ADL	449	ADL	57.5	ADL	198
Ethane		13.9	ADL	75.2	ADL	14.2	ADL	34.4
Mass Emission Rate (lb/cycle)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methane		187	ADL	718	ADL	57.5	ADL	321
Ethane		30.2	ADL	120	ADL	14.2	ADL	54.9
Mass Emission Rate (tons/year)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methane		49.7	ADL	191	ADL	15.3	ADL	85.2
Ethane		8.02	ADL	31.9	ADL	3.77	ADL	14.6
Mass Emission Rate (lb/hr)(annualized average)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methane		11.4	ADL	43.5	ADL	3.48	ADL	19.5
Ethane		1.83	ADL	7.29	ADL	0.860	ADL	3.33

BP HUSKY DCU 3 - VOC RESULTS (METHOD 18 BAG)

		Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Date		**7/21/2011**		**7/24/2011**		**7/25/2011**		
Time		**20:57-22:31**		**19:55-21:25**		**14:40-15:43**		
Volume Collected (dsL)		0.000		0.000		0.000		
Stack Gas Flow Rate (dscfm)		62		130		30		
Moisture		99.20		97.72		99.57		
Dilution Ratio		21.3		21.3		16.8		
Duration		130.0		96.0		60.0		
Cycles per year		531		531		531		
Stack Gas Concentration (ppmv)	**Molecular Weight**	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Acetone	58.1	<0.409		<0.409		<0.409		<0.41
Acetonitrile	41.1	<1.12		<1.12		<1.12		<1.1
Acrolein	56.1	<0.344		<0.344		<0.344		<0.34
Acrylonitrile	53.1	<0.319		<0.319		<0.319		<0.32
Benzene	78.1	<0.268		1.72	J	<0.268		<0.75
1,3-Butadiene	54.1	<0.253		<0.253		<0.253		<0.25
Carbon Disulfide	76.1	<0.0454		<0.0454		<0.0454		<0.045
1,2-Dibromoethane	187.9	<0.257		<0.257		<0.257		<0.26
Hexane	86.2	<0.231		<0.231		0.252	J	<0.24
Methylene Chloride	84.9	<0.959		<0.959		4.17		<2.0
Pentane	72.2	<0.257		0.313	J	0.269	J	<0.28
Tetrachloroethene	165.8	<0.291		<0.291		<0.291		<0.29
Trichloroethene	131.4	<0.379		<0.379		<0.379		<0.38
Toluene	92.1	<0.334		6.13	J	0.91	J	<2.5

		Cond A Run 2		Cond A Run 3		Cond A Run 4		
Date		**7/21/2011**		**7/24/2011**		**7/25/2011**		
Time		**20:57-22:31**		**19:55-21:25**		**14:40-15:43**		
Volume Collected (dsL)		0.000		0.000		0.000		
Stack Gas Flow Rate (dscfm)		62		130		30		
Moisture		99.20		97.72		99.57		
Dilution Ratio		21.3		21.3		16.8		
Duration		130		96		60		
Cycles per year		531		531		531		
Stack Gas Concentration (ug/dscm)(in the duct)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetone		<2.6E06	BDL	<9.2E05	BDL	<3.8E06	BDL	<2.5E06
Acetonitrile		<5.1E06	BDL	<1.8E06	BDL	<7.4E06	BDL	<4.8E06
Acrolein		<2.1E06	BDL	<7.5E05	BDL	<3.1E06	BDL	<2.0E06
Acrylonitrile		<1.9E06	BDL	<6.6E05	BDL	<2.7E06	BDL	<1.8E06
Benzene		<2.3E06	BDL	5.23E06	ADL	<3.4E06	BDL	<3.6E06
1,3-Butadiene		<1.5E06	BDL	<5.3E05	BDL	<2.2E06	BDL	<1.4E06
Carbon Disulfide		<3.8E05	BDL	<1.3E05	BDL	<5.6E05	BDL	<3.6E05
1,2-Dibromoethane		<5.3E06	BDL	<1.9E06	BDL	<7.8E06	BDL	<5.0E06
Hexane		<2.2E06	BDL	<7.7E05	BDL	3.50E06	ADL	<2.2E06
Methylene Chloride		<9.0E06	BDL	<3.2E06	BDL	5.71E07	ADL	<2.3E07
Pentane		<2.0E06	BDL	8.79E05	ADL	3.13E06	ADL	<2.0E06

Tetrachloroethene		<5.3E06	BDL	<1.9E06	BDL	<7.8E06	BDL	<5.0E06
Trichloroethene		<5.5E06	BDL	<1.9E06	BDL	<8.0E06	BDL	<5.2E06
Toluene		<3.4E06	BDL	2.20E07	ADL	1.35E07	ADL	<1.3E07

		Cond A Run 2		Cond A Run 3		Cond A Run 4		
Date		7/21/2011		7/24/2011		7/25/2011		
Time		20:57-22:31		19:55-21:25		14:40-15:43		
Volume Collected (dsL)		0.000		0.000		0.000		
Stack Gas Flow Rate (dscfm)		62		130		30		
		21.3		21.3		16.8		
Duration		130		96		60		
Cycles per year		531		531		531		
Mass Emission Rate (lb/hr)		Value	DL	Value	DL	Value	DL	Value
Acetone		<6.1E-01	BDL	<4.5E-01	BDL	<4.2E-01	BDL	<4.9E-01
Acetonitrile		<1.2E00	BDL	<8.7E-01	BDL	<8.2E-01	BDL	<9.6E-01
Acrolein		<4.9E-01	BDL	<3.6E-01	BDL	<3.4E-01	BDL	<4.0E-01
Acrylonitrile		<4.3E-01	BDL	<3.2E-01	BDL	<3.0E-01	BDL	<3.5E-01
Benzene		<5.3E-01	BDL	2.54E00	ADL	<3.7E-01	BDL	<1.1E00
1,3-Butadiene		<3.5E-01	BDL	<2.6E-01	BDL	<2.4E-01	BDL	<2.8E-01
Carbon Disulfide		<8.8E-02	BDL	<6.5E-02	BDL	<6.2E-02	BDL	<7.2E-02
1,2-Dibromoethane		<1.2E00	BDL	<9.1E-01	BDL	<8.6E-01	BDL	<1.0E00
Hexane		<5.1E-01	BDL	<3.8E-01	BDL	3.88E-01	ADL	<4.2E-01
Methylene Chloride		<2.1E00	BDL	<1.5E00	BDL	6.33E00	ADL	<3.3E00
Pentane		<4.7E-01	BDL	4.27E-01	ADL	3.47E-01	ADL	<4.2E-01
Tetrachloroethene		<1.2E00	BDL	<9.1E-01	BDL	<8.6E-01	BDL	<1.0E00
Trichloroethene		<1.3E00	BDL	<9.4E-01	BDL	<8.9E-01	BDL	<1.0E00
Toluene		<7.8E-01	BDL	1.07E01	ADL	1.50E00	ADL	<4.3E00

ADL - Above Detection Level
BDL - Below Detection Level
DLL - Detection Level Limited

		Cond A Run 2		Cond A Run 3		Cond A Run 4		
Date		7/21/2011		7/24/2011		7/25/2011		
Time		20:57-22:31		19:55-21:25		14:40-15:43		
Volume Collected (dsL)		0		0		0		
Stack Gas Flow Rate (dscfm)		61.6		129.6		29.6		
		21.3		21.3		16.8		
Duration		130		96		60		
Cycles per year		531		531		531		
Mass Emission lbs/cycle		Value	DL	Value	DL	Value	DL	Value
Acetone		<1.3E00	BDL	<7.2E-01	BDL	<4.2E-01	BDL	<8.2E-01
Acetonitrile		<2.5E00	BDL	<1.4E00	BDL	<8.2E-01	BDL	<1.6E00
Acrolein		<1.1E00	BDL	<5.8E-01	BDL	<3.4E-01	BDL	<6.6E-01
Acrylonitrile		<9.4E-01	BDL	<5.1E-01	BDL	<3.0E-01	BDL	<5.8E-01
Benzene		<1.2E00	BDL	4.06E00	ADL	<3.7E-01	BDL	<1.9E00

1,3-Butadiene		<7.6E-01	BDL	<4.1E-01	BDL	<2.4E-01	BDL	<4.7E-01
Carbon Disulfide		<1.9E-01	BDL	<1.0E-01	BDL	<6.2E-02	BDL	<1.2E-01
1,2-Dibromoethane		<2.7E00	BDL	<1.5E00	BDL	<8.6E-01	BDL	<1.7E00
Hexane		<1.1E00	BDL	<6.0E-01	BDL	3.88E-01	ADL	<7.0E-01
Methylene Chloride		<4.5E00	BDL	<2.5E00	BDL	6.33E00	ADL	<4.4E00
Pentane		<1.0E00	BDL	6.83E-01	ADL	3.47E-01	ADL	<6.8E-01
Tetrachloroethene		<2.7E00	BDL	<1.5E00	BDL	<8.6E-01	BDL	<1.7E00
Trichloroethene		<2.7E00	BDL	<1.5E00	BDL	<8.9E-01	BDL	<1.7E00
Toluene		<1.7E00	BDL	1.71E01	ADL	1.50E00	ADL	<6.8E00

		Cond A Run 2		Cond A Run 3		Cond A Run 4		
Date		7/21/2011		7/24/2011		7/25/2011		
Time		20:57-22:31		19:55-21:25		14:40-15:43		
Volume Collected (dsL)		0		0		0		
Stack Gas Flow Rate (dscfm)		61.6		129.6		29.6		
		21.3		21.3		16.8		
Duration		130		96		60		
Cycles per year		531		531		531		
Mass Emission tons per year		Value	DL	Value	DL	Value	DL	Value
Acetone		<3.5E-01	BDL	<1.9E-01	BDL	<1.1E-01	BDL	<2.2E-01
Acetonitrile		<6.7E-01	BDL	<3.7E-01	BDL	<2.2E-01	BDL	<4.2E-01
Acrolein		<2.8E-01	BDL	<1.5E-01	BDL	<9.2E-02	BDL	<1.8E-01
Acrylonitrile		<2.5E-01	BDL	<1.4E-01	BDL	<8.0E-02	BDL	<1.5E-01
Benzene		<3.1E-01	BDL	1.08E00	ADL	<9.9E-02	BDL	<4.9E-01
1,3-Butadiene		<2.0E-01	BDL	<1.1E-01	BDL	<6.5E-02	BDL	<1.3E-01
Carbon Disulfide		<5.1E-02	BDL	<2.8E-02	BDL	<1.6E-02	BDL	<3.2E-02
1,2-Dibromoethane		<7.1E-01	BDL	<3.9E-01	BDL	<2.3E-01	BDL	<4.4E-01
Hexane		<2.9E-01	BDL	<1.6E-01	BDL	1.03E-01	ADL	<1.8E-01
Methylene Chloride		<1.2E00	BDL	<6.5E-01	BDL	1.68E00	ADL	<1.2E00
Pentane		<2.7E-01	BDL	1.81E-01	ADL	9.22E-02	ADL	<1.8E-01
Tetrachloroethene		<7.1E-01	BDL	<3.9E-01	BDL	<2.3E-01	BDL	<4.4E-01
Trichloroethene		<7.3E-01	BDL	<4.0E-01	BDL	<2.4E-01	BDL	<4.6E-01
Toluene		<4.5E-01	BDL	4.53E00	ADL	3.98E-01	ADL	<1.8E00

		Cond A Run 2	Cond A Run 3	Cond A Run 4	
Date		7/21/2011	7/24/2011	7/25/2011	
Time		20:57-22:31	19:55-21:25	14:40-15:43	
Volume Collected (dsL)		0	0	0	
Stack Gas Flow Rate (dscfm)		61.6	129.6	29.6	
		21.3	21.3	16.8	

Duration		130		96		60		
Cycles per year		531		531		531		
Mass Emission annualized average lbs/hr		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetone		<8.0E-02	BDL	<4.4E-02	BDL	<2.6E-02	BDL	<5.0E-02
Acetonitrile		<1.5E-01	BDL	<8.4E-02	BDL	<5.0E-02	BDL	<9.6E-02
Acrolein		<6.5E-02	BDL	<3.5E-02	BDL	<2.1E-02	BDL	<4.0E-02
Acrylonitrile		<5.7E-02	BDL	<3.1E-02	BDL	<1.8E-02	BDL	<3.5E-02
Benzene		<7.0E-02	BDL	2.46E-01	ADL	<2.3E-02	BDL	<1.1E-01
1,3-Butadiene		<4.6E-02	BDL	<2.5E-02	BDL	<1.5E-02	BDL	<2.9E-02
Carbon Disulfide		<1.2E-02	BDL	<6.3E-03	BDL	<3.7E-03	BDL	<7.2E-03
1,2-Dibromoethane		<1.6E-01	BDL	<8.8E-02	BDL	<5.2E-02	BDL	<1.0E-01
Hexane		<6.7E-02	BDL	<3.6E-02	BDL	2.35E-02	ADL	<4.2E-02
Methylene Chloride		<2.7E-01	BDL	<1.5E-01	BDL	3.84E-01	ADL	<2.7E-01
Pentane		<6.2E-02	BDL	4.14E-02	ADL	2.10E-02	ADL	<4.2E-02
Tetrachloroethene		<1.6E-01	BDL	<8.8E-02	BDL	<5.2E-02	BDL	<1.0E-01
Trichloroethene		<1.7E-01	BDL	<9.1E-02	BDL	<5.4E-02	BDL	<1.0E-01
Toluene		<1.0E-01	BDL	1.03E00	ADL	9.08E-02	ADL	<4.1E-01

BP HUSKY DCU 3 - VOC RESULTS (METHOD 18 SORBENT)

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	62		130		30		
Moisture	99.20		97.72		99.57		
Dilution Ratio	21.3		21.3		16.8		
Duration (minutes)	130.0		96.0		60.0		
Cycles per Year	531		531		531		
Mass Found (µg)	Value	DL	Value	DL	Value	DL	
Acetonitrile	<33.5	DLL	<17.1	BDL	<17.1	BDL	
Acrylonitrile	<13.3	BDL	<13.3	BDL	<13.3	BDL	
Chlorobenzene	<14.0	DLL	<8.10	DLL	8.34	ADL	
Cumene	<7.67	DLL	<4.30	BDL	<5.36	DLL	
Ethylbenzene	<30.3	DLL	<11.4	DLL	<13.9	DLL	
Methyl Isobutyl Ketone	<4.18	DLL	<4.33	DLL	<4.12	BDL	
Methyl t-Butyl Ether	<4.06	BDL	<4.91	DLL	<4.06	BDL	
Nitrobenzene	<21.1	DLL	<8.09	DLL	<16.4	DLL	
2-Nitropropane	<18.6	DLL	<15.5	DLL	<15.3	DLL	
Styrene	<8.33	DLL	<4.60	DLL	<6.59	DLL	
2,2,4-Trimethylpentane	<4.68	DLL	<3.34	BDL	<3.34	BDL	
o-Xylene	<71.5	DLL	<17.0	DLL	<31.2	DLL	
p-Xylene	<140	DLL	<69.5	DLL	<55.9	DLL	
Stack Gas Concentration (ug/dscm) 9at the meter)	Value	DL	Value	DL	Value	DL	Value
Acetonitrile	<1,100	DLL	<450	BDL	<490	BDL	<680
Acrylonitrile	<440	BDL	<350	BDL	<380	BDL	<390
Chlorobenzene	<460	DLL	<210	DLL	239	ADL	<300
Cumene	<250	DLL	<110	BDL	<150	DLL	<170
Ethylbenzene	<990	DLL	<300	DLL	<400	DLL	<560
Methyl Isobutyl Ketone	<140	DLL	<110	DLL	<120	BDL	<120
Methyl t-Butyl Ether	<130	BDL	<130	DLL	<120	BDL	<130
Nitrobenzene	<690	DLL	<210	DLL	<470	DLL	<460
2-Nitropropane	<600	DLL	<410	DLL	<440	DLL	<480
Styrene	<270	DLL	<120	DLL	<190	DLL	<190
2,2,4-Trimethylpentane	<150	DLL	<88	BDL	<96	BDL	<110
o-Xylene	<2,300	DLL	<450	DLL	<890	DLL	<1,200
p-Xylene	<4,600	DLL	<1,800	DLL	<1,600	DLL	<2,700

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	61.601		129.629		29.606		
Moisture	99.198		97.721		99.566		
Dilution Ratio	21.295		21.324		16.835		
Duration (minutes)	130.000		96.000		60.000		
Stack Gas Concentration (ug/dscm) (in the duct)	Value	DL	Value	DL	Value	DL	Value
Acetonitrile	<2.9E06	DLL	<4.2E05	BDL	<1.9E06	BDL	<1.7E06
Acrylonitrile	<1.2E06	BDL	<3.3E05	BDL	<1.5E06	BDL	<9.9E05
Chlorobenzene	<1.2E06	DLL	<2.0E05	DLL	9.26E05	ADL	<7.8E05

Cumene	<6.6E05	DLL	<1.1E05	BDL	<6.0E05	DLL	<4.6E05
Ethylbenzene	<2.6E06	DLL	<2.8E05	DLL	<1.5E06	DLL	<1.5E06
Methyl Isobutyl Ketone	<3.6E05	DLL	<1.1E05	DLL	<4.6E05	BDL	<3.1E05
Methyl t-Butyl Ether	<3.5E05	BDL	<1.2E05	DLL	<4.5E05	BDL	<3.1E05
Nitrobenzene	<1.8E06	DLL	<2.0E05	DLL	<1.8E06	DLL	<1.3E06
2-Nitropropane	<1.6E06	DLL	<3.8E05	DLL	<1.7E06	DLL	<1.2E06
Styrene	<7.2E05	DLL	<1.1E05	DLL	<7.3E05	DLL	<5.2E05
2,2,4-Trimethylpentane	<4.1E05	DLL	<8.2E04	BDL	<3.7E05	BDL	<2.9E05
o-Xylene	<6.2E06	DLL	<4.2E05	DLL	<3.5E06	DLL	<3.4E06
p-Xylene	<1.2E07	DLL	<1.7E06	DLL	<6.2E06	DLL	<6.7E06

ADL - Above Detection Level
BDL - Below Detection Level
DLL - Detection Level Limited

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	61.6		129.6		29.6		
Moisture	99.2		97.7		99.6		
Dilution Ratio	21.3		21.3		16.8		
Duration (minutes)	130		96		60		
Cycles per Year	531		531		531		
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetonitrile	<6.7E-01	DLL	<2.0E-01	BDL	<2.1E-01	BDL	<3.6E-01
Acrylonitrile	<2.7E-01	BDL	<1.6E-01	BDL	<1.6E-01	BDL	<2.0E-01
Chlorobenzene	<2.8E-01	DLL	<9.7E-02	DLL	1.03E-01	ADL	<1.6E-01
Cumene	<1.5E-01	DLL	<5.2E-02	BDL	<6.6E-02	DLL	<9.0E-02
Ethylbenzene	<6.1E-01	DLL	<1.4E-01	DLL	<1.7E-01	DLL	<3.0E-01
Methyl Isobutyl Ketone	<8.3E-02	DLL	<5.2E-02	DLL	<5.1E-02	BDL	<6.2E-02
Methyl t-Butyl Ether	<8.1E-02	BDL	<5.9E-02	DLL	<5.0E-02	BDL	<6.3E-02
Nitrobenzene	<4.2E-01	DLL	<9.7E-02	DLL	<2.0E-01	DLL	<2.4E-01
2-Nitropropane	<3.7E-01	DLL	<1.9E-01	DLL	<1.9E-01	DLL	<2.5E-01
Styrene	<1.7E-01	DLL	<5.5E-02	DLL	<8.1E-02	DLL	<1.0E-01
2,2,4-Trimethylpentane	<9.4E-02	DLL	<4.0E-02	BDL	<4.1E-02	BDL	<5.8E-02
o-Xylene	<1.4E00	DLL	<2.0E-01	DLL	<3.8E-01	DLL	<6.7E-01
p-Xylene	<2.8E00	DLL	<8.3E-01	DLL	<6.9E-01	DLL	<1.4E00

ADL - Above Detection Level
BDL - Below Detection Level
DLL - Detection Level Limited

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	61.60		129.63		29.61		
Moistrure	99.2		97.7		99.6		
Dilution Ratio	21.3		21.3		16.8		
Duration (minutes)	130		96		60		
Cycles per Year	531		531		531		
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetonitrile	<1.4E00	DLL	<3.3E-01	BDL	<2.1E-01	BDL	<6.6E-01
Acrylonitrile	<5.8E-01	BDL	<2.6E-01	BDL	<1.6E-01	BDL	<3.3E-01
Chlorobenzene	<6.1E-01	DLL	<1.6E-01	DLL	1.03E-01	ADL	<2.9E-01

Cumene	<3.3E-01	DLL	<8.2E-02	BDL	<6.6E-02	DLL	<1.6E-01
Ethylbenzene	<1.3E00	DLL	<2.2E-01	DLL	<1.7E-01	DLL	<5.7E-01
Methyl Isobutyl Ketone	<1.8E-01	DLL	<8.3E-02	DLL	<5.1E-02	BDL	<1.0E-01
Methyl t-Butyl Ether	<1.8E-01	BDL	<9.4E-02	DLL	<5.0E-02	BDL	<1.1E-01
Nitrobenzene	<9.1E-01	DLL	<1.6E-01	DLL	<2.0E-01	DLL	<4.2E-01
2-Nitropropane	<8.0E-01	DLL	<3.0E-01	DLL	<1.9E-01	DLL	<4.3E-01
Styrene	<3.6E-01	DLL	<8.8E-02	DLL	<8.1E-02	DLL	<1.8E-01
2,2,4-Trimethylpentane	<2.0E-01	DLL	<6.4E-02	BDL	<4.1E-02	BDL	<1.0E-01
o-Xylene	<3.1E00	DLL	<3.3E-01	DLL	<3.8E-01	DLL	<1.3E00
p-Xylene	<6.0E00	DLL	<1.3E00	DLL	<6.9E-01	DLL	<2.7E00

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	61.6		129.6		29.6		
Moisture	99.2		97.7		99.6		
Dilution Ratio	21.3		21.3		16.8		
Duration (minutes)	130		96		60		
Cycles per Year	531		531		531		
Mass Emission Rate (tons/year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetonitrile	<3.8E-01	DLL	<8.7E-02	BDL	<5.6E-02	BDL	<1.8E-01
Acrylonitrile	<1.5E-01	BDL	<6.8E-02	BDL	<4.4E-02	BDL	<8.8E-02
Chlorobenzene	<1.6E-01	DLL	<4.1E-02	DLL	2.73E-02	ADL	<7.7E-02
Cumene	<8.8E-02	DLL	<2.2E-02	BDL	<1.8E-02	DLL	<4.3E-02
Ethylbenzene	<3.5E-01	DLL	<5.8E-02	DLL	<4.5E-02	DLL	<1.5E-01
Methyl Isobutyl Ketone	<4.8E-02	DLL	<2.2E-02	DLL	<1.3E-02	BDL	<2.8E-02
Methyl t-Butyl Ether	<4.7E-02	BDL	<2.5E-02	DLL	<1.3E-02	BDL	<2.8E-02
Nitrobenzene	<2.4E-01	DLL	<4.1E-02	DLL	<5.4E-02	DLL	<1.1E-01
2-Nitropropane	<2.1E-01	DLL	<7.9E-02	DLL	<5.0E-02	DLL	<1.1E-01
Styrene	<9.6E-02	DLL	<2.3E-02	DLL	<2.2E-02	DLL	<4.7E-02
2,2,4-Trimethylpentane	<5.4E-02	DLL	<1.7E-02	BDL	<1.1E-02	BDL	<2.7E-02
o-Xylene	<8.2E-01	DLL	<8.6E-02	DLL	<1.0E-01	DLL	<3.4E-01
p-Xylene	<1.6E00	DLL	<3.5E-01	DLL	<1.8E-01	DLL	<7.1E-01

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	30.666		37.914		34.915		
Stack Gas Flow Rate (dscfm)	61.601		129.629		29.606		
Moisture	99.2		97.7		99.6		
Dilution Ratio	21.3		21.3		16.8		
Duration (minutes)	130.000		96.000		60.000		
Cycles per Year	531.000		531.000		531.000		
Mass Emission Rate (annualized lbs/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acetonitrile	<8.8E-02	DLL	<2.0E-02	BDL	<1.3E-02	BDL	<4.0E-02
Acrylonitrile	<3.5E-02	BDL	<1.6E-02	BDL	<1.0E-02	BDL	<2.0E-02
Chlorobenzene	<3.7E-02	DLL	<9.4E-03	DLL	6.22E-03	ADL	<1.7E-02
Cumene	<2.0E-02	DLL	<5.0E-03	BDL	<4.0E-03	DLL	<9.7E-03

Ethylbenzene	<7.9E-02	DLL	<1.3E-02	DLL	<1.0E-02	DLL	<3.4E-02
Methyl Isobutyl Ketone	<1.1E-02	DLL	<5.0E-03	DLL	<3.1E-03	BDL	<6.4E-03
Methyl t-Butyl Ether	<1.1E-02	BDL	<5.7E-03	DLL	<3.0E-03	BDL	<6.5E-03
Nitrobenzene	<5.5E-02	DLL	<9.4E-03	DLL	<1.2E-02	DLL	<2.6E-02
2-Nitropropane	<4.9E-02	DLL	<1.8E-02	DLL	<1.1E-02	DLL	<2.6E-02
Styrene	<2.2E-02	DLL	<5.3E-03	DLL	<4.9E-03	DLL	<1.1E-02
2,2,4-Trimethylpentane	<1.2E-02	DLL	<3.9E-03	BDL	<2.5E-03	BDL	<6.2E-03
o-Xylene	<1.9E-01	DLL	<2.0E-02	DLL	<2.3E-02	DLL	<7.7E-02
p-Xylene	<3.7E-01	DLL	<8.1E-02	DLL	<4.2E-02	DLL	<1.6E-01

BP HUSKY DCU 3 - THC RESULTS (METHOD 25A)

		Run A2	Run A3	Run A4	Average
Stack Gas Flow Rate (dscfm)		61.6	129.6	29.6	
Moisture (%)		99.20	97.72	99.57	
Duration (Minutes)		130.00	96.00	60.00	
Cycles per year		531.00	531.00	531.00	
Uncorrected Concentration (ppmvw)	**Molecular Weight**				
THC (as propane)	44.1	2000	12800	2170	
Methane	16	4520	31700	3390	
Ethane	30.1	387	2820	444	
Methane (as propane)	44.1	1870	11900	1230	
Ethane (as propane)	44.1	291	1940	297	
NMNEHC (as propane)	44.1	-154	-1050	645	
Moisture-Corrected Concentration (ppmvd)					
THC (as propane)		249000	562000	500000	437000
NMNEHC (as propane)		-19200	-46100	149000	27700
Concentration (ug/dscm)					
THC (as propane)		4.57E+08	1.03E+09	9.16E+08	8.01E+08
NMNEHC (as propane)		-3.52E+07	-8.45E+07	2.72E+08	5.09E+07
Concentration (lbs/hr)					
THC (as propane)		106	500	102	236
NMNEHC (as propane)		-8.13	-41.0	30.2	-6.32
Concentration (lbs/cycle)					
THC (as propane)		229	800	102	377
NMNEHC (as propane)		-17.6	-65.6	30.2	-17.7
Concentration (tons/year)					
THC (as propane)		60.7	212	27	100
NMNEHC (as propane)		-4.67	-17.4	8.02	-4.69
Concentration (lbs/hr) (annualized average)					
THC (as propane)		13.9	48.5	6.16	22.8
NMNEHC (as propane)		-1.07	-3.98	1.83	-1.07

BP HUSKY DCU 3 - HCl/Cl2/HF RESULTS (METHOD 26A)

	Cond C Run 1		Cond C Run 2		Cond C Run 3		Average
Volume (dscf)	1.225		1.903		0.799		
Stack Gas Flow Rate (dscfm)	15.4		30.1		13.7		
Duration (min)	127.0		57.0		45.0		
Cycles per Year	531.0		531.0		531.0		
Mass Found (µg)	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Hydrogen Chloride	<1,640		<1,112		259,550		
Chlorine	<296		<86.0		<69.6		
Hydrogen Fluoride	<1,680		<1,139		<1,526		
Stack Gas Concentration (mg/dscm)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Chloride	<47	BDL	<21	BDL	11,500	ADL	<3,800
Chlorine	<8.5	BDL	<1.6	BDL	<3.1	BDL	<4.4
Hydrogen Fluoride	<48	BDL	<21	BDL	<67	BDL	<46
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Chloride	<2.7E-3	BDL	<2.3E-3	BDL	5.90E-1	ADL	<2.0E-1
Chlorine	<4.9E-4	BDL	<1.8E-4	BDL	<1.6E-4	BDL	<2.8E-4
Hydrogen Fluoride	<2.8E-3	BDL	<2.4E-3	BDL	<3.5E-3	BDL	<2.9E-3
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Chloride	<5.8E-3	BDL	<2.2E-3	BDL	4.43E-1	ADL	<1.5E-1
Chlorine	<1.0E-3	BDL	<1.7E-4	BDL	<1.2E-4	BDL	<4.4E-4
Hydrogen Fluoride	<5.9E-3	BDL	<2.3E-3	BDL	<2.6E-3	BDL	<3.6E-3
Mass Emission Rate (tons/yr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Chloride	<1.5E-3	BDL	<5.9E-4	BDL	1.18E-1	ADL	<4.0E-2
Chlorine	<2.8E-4	BDL	<4.5E-5	BDL	<3.2E-5	BDL	<1.2E-4
Hydrogen Fluoride	<1.6E-3	BDL	<6.0E-4	BDL	<6.9E-4	BDL	<9.5E-4
Mass Emission Rate (lb/hr, annualized average)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Hydrogen Chloride	<3.5E-4	BDL	<1.3E-4	BDL	2.68E-2	ADL	<9.1E-3
Chlorine	<6.3E-5	BDL	<1.0E-5	BDL	<7.2E-6	BDL	<2.7E-5
Hydrogen Fluoride	<3.6E-4	BDL	<1.4E-4	BDL	<1.6E-4	BDL	<2.2E-4

BP HUSKY DCU 3 - METALS RESULTS (METHOD 29)

	PNR/ FILT (µg)	Flag	NI (µg)	Flag	Ace Rns (µg)	Flag	Totals (µg)
Condition D Run 2							
Antimony	0.18	B, J	0.064	B	<0.0054		<0.249
Arsenic	<0.075		0.41	J	<0.075		<0.560
Beryllium	0.064	B	<0.058	G	<0.012		<0.134
Cadmium	0.14	B	0.11	B	0.011	B	0.261
Chromium	2.7		3.8		<0.14		<6.64
Cobalt	0.28	J	0.21		0.023	B	0.513
Lead	0.68		1.3	J	0.069	B, J	2.05
Manganese	7.9		8.3		0.41		16.6
Nickel	5.7		4.8	J	0.098	B, J	10.6
Selenium	<0.26	G	1.9		<0.26		<2.42
Condition D Run 4							
Antimony	0.21	B, J	0.086	B	<0.0054		<0.301
Arsenic	<0.075		1.5	J	0.17	B, J	<1.75
Beryllium	<0.012		<0.012		<0.012		<0.0360
Cadmium	0.11	B	0.19		<0.011		<0.311
Chromium	4.6		1.9		<0.14		<6.64
Cobalt	0.72	J	0.23		<0.0086		<0.959
Lead	1.5		1.1	J	0.038	B, J	2.64
Manganese	8.9		10.1		0.2		19.2
Nickel	105		3.8	J	0.071	B, J	109
Selenium	<0.26	G	29.9		<0.26		<30.4
Condition D Run 5							
Antimony	0.47	J	0.22	B	<0.0054		<0.695
Arsenic	<0.075		0.94	J	<0.075		<1.09
Beryllium	<0.012		<0.012		<0.012		<0.0360
Cadmium	0.049	B	0.1	B	<0.011		<0.160
Chromium	5.6		1.6		0.88		8.08
Cobalt	0.98	J	0.14	B	0.094	B	1.21
Lead	1		61.7	J	0.71	J	63.4
Manganese	13.4		6.8		3.8		24.0
Nickel	6.9		5.4	J	3.4	J	15.7
Selenium	<0.26	G	4		<0.26		<4.52

	Cond D Run 2		Cond D Run 4		Cond D Run 5		Average
Volume Collected (dscf)	1.570		4.547		1.651		
Stack Gas Flow Rate (dscfm)	32		53		35		
Duration (min)	102		140		131		
Cycles Per Year	531		531		531		
Mass Found (µg)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Antimony	<0.249	ADL	<0.301	ADL	<0.695	ADL	
Arsenic	<0.560	DLL	<1.75	DLL	<1.09	DLL	
Beryllium	<0.134	DLL	<0.0360	BDL	<0.0360	BDL	
Cadmium	0.261	ADL	<0.311	ADL	<0.160	ADL	
Chromium	<6.64	ADL	<6.64	ADL	8.08	ADL	
Cobalt	0.513	ADL	<0.959	ADL	1.21	ADL	
Lead	2.05	ADL	2.64	ADL	63.4	ADL	
Manganese	16.6	ADL	19.2	ADL	24.0	ADL	
Nickel	10.6	ADL	109	ADL	15.7	ADL	
Selenium	<2.42	DLL	<30.4	DLL	<4.52	DLL	

Stack Gas Concentration (mg/dscm)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Antimony	<0.0056	ADL	<0.0023	ADL	<0.015	ADL	<0.0076
Arsenic	<0.013	DLL	<0.014	DLL	<0.023	DLL	<0.016
Beryllium	<0.0030	DLL	<0.00028	BDL	<0.00077	BDL	<0.0014
Cadmium	0.00587	ADL	<0.0024	ADL	<0.0034	ADL	<0.0039
Chromium	<0.15	ADL	<0.052	ADL	0.173	ADL	<0.12
Cobalt	0.0115	ADL	<0.0074	ADL	0.0260	ADL	<0.015
Lead	0.0461	ADL	0.0205	ADL	1.36	ADL	0.474
Manganese	0.374	ADL	0.149	ADL	0.513	ADL	0.345
Nickel	0.238	ADL	0.845	ADL	0.336	ADL	0.473
Selenium	<0.054	DLL	<0.24	DLL	<0.097	DLL	<0.13
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Antimony	<6.7E-7	ADL	<4.6E-7	ADL	<1.9E-6	ADL	<1.0E-6
Arsenic	<1.5E-6	DLL	<2.7E-6	DLL	<3.0E-6	DLL	<2.4E-6
Beryllium	<3.6E-7	DLL	<5.5E-8	BDL	<1.0E-7	BDL	<1.7E-7
Cadmium	6.96E-7	ADL	<4.8E-7	ADL	<4.5E-7	ADL	<5.4E-7
Chromium	<1.8E-5	ADL	<1.0E-5	ADL	2.26E-5	ADL	<1.7E-5
Cobalt	1.37E-6	ADL	<1.5E-6	ADL	3.39E-6	ADL	<2.1E-6
Lead	5.47E-6	ADL	4.06E-6	ADL	1.77E-4	ADL	6.23E-5
Manganese	4.43E-5	ADL	2.95E-5	ADL	6.71E-5	ADL	4.70E-5
Nickel	2.83E-5	ADL	1.67E-4	ADL	4.39E-5	ADL	7.99E-5
Selenium	<6.5E-6	DLL	<4.7E-5	DLL	<1.3E-5	DLL	<2.2E-5
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Antimony	<1.1E-6	ADL	<1.1E-6	ADL	<4.2E-6	ADL	<2.2E-6
Arsenic	<2.5E-6	DLL	<6.3E-6	DLL	<6.7E-6	DLL	<5.2E-6
Beryllium	<6.1E-7	DLL	<1.3E-7	BDL	<2.2E-7	BDL	<3.2E-7
Cadmium	1.18E-6	ADL	<1.1E-6	ADL	<9.8E-7	ADL	<1.1E-6
Chromium	<3.0E-5	ADL	<2.4E-5	ADL	4.93E-5	ADL	<3.4E-5
Cobalt	2.33E-6	ADL	<3.4E-6	ADL	7.41E-6	ADL	<4.4E-6
Lead	9.29E-6	ADL	9.47E-6	ADL	3.87E-4	ADL	1.35E-4
Manganese	7.53E-5	ADL	6.89E-5	ADL	1.47E-4	ADL	9.69E-5
Nickel	4.81E-5	ADL	3.91E-4	ADL	9.59E-5	ADL	1.78E-4
Selenium	<1.1E-5	DLL	<1.1E-4	DLL	<2.8E-5	DLL	<4.9E-5
Mass Emission Rate (tons per year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Antimony	<3.0E-7	ADL	<2.9E-7	ADL	<1.1E-6	ADL	<5.7E-7
Arsenic	<6.7E-7	DLL	<1.7E-6	DLL	<1.8E-6	DLL	<1.4E-6
Beryllium	<1.6E-7	DLL	<3.4E-8	BDL	<5.8E-8	BDL	<8.5E-8
Cadmium	3.14E-7	ADL	<3.0E-7	ADL	<2.6E-7	ADL	<2.9E-7
Chromium	<8.0E-6	ADL	<6.3E-6	ADL	1.31E-5	ADL	<9.1E-6
Cobalt	6.18E-7	ADL	<9.1E-7	ADL	1.97E-6	ADL	<1.2E-6
Lead	2.47E-6	ADL	2.51E-6	ADL	1.03E-4	ADL	3.59E-5
Manganese	2.00E-5	ADL	1.83E-5	ADL	3.89E-5	ADL	2.57E-5
Nickel	1.28E-5	ADL	1.04E-4	ADL	2.55E-5	ADL	4.73E-5
Selenium	<2.9E-6	DLL	<2.9E-5	DLL	<7.3E-6	DLL	<1.3E-5
Mass Emission Rate (lb/hr) (annualized average)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Antimony	<6.9E-8	ADL	<6.6E-8	ADL	<2.6E-7	ADL	<1.3E-7
Arsenic	<1.5E-7	DLL	<3.8E-7	DLL	<4.0E-7	DLL	<3.1E-7
Beryllium	<3.7E-8	DLL	<7.8E-9	BDL	<1.3E-8	BDL	<1.9E-8
Cadmium	7.18E-8	ADL	<6.8E-8	ADL	<5.9E-8	ADL	<6.6E-8
Chromium	<1.8E-6	ADL	<1.4E-6	ADL	2.99E-6	ADL	<2.1E-6
Cobalt	1.41E-7	ADL	<2.1E-7	ADL	4.49E-7	ADL	<2.7E-7
Lead	5.63E-7	ADL	5.74E-7	ADL	2.35E-5	ADL	8.20E-6
Manganese	4.57E-6	ADL	4.18E-6	ADL	8.88E-6	ADL	5.88E-6
Nickel	2.91E-6	ADL	2.37E-5	ADL	5.81E-6	ADL	1.08E-5
Selenium	<6.7E-7	DLL	<6.6E-6	DLL	<1.7E-6	DLL	<3.0E-6

BP HUSKY DCU 3 - METHANOL RESULTS (METHOD 308)

	Cond A	Flag	SG-FH	Flag	SG-BH	Flag	Totals (µg)
Condition A Run 2							
Methanol	<13.7		<1.63		<1.63		<17.0
Condition A Run 3							
Methanol	<13.7		<1.63		<1.63		<17.0
Condition A Run 4							
Methanol	<13.7		<1.63		<1.63		<17.0

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume Collected (dsL)	45.801		33.821		28.111		
Stack Gas Flow Rate (dscfm)	62		130		30		
Moisture	99.20		97.72		99.57		
Vent Duration (Minutes)	130		96		60		
Cycles per year	531		531		531		
Dilution Ratio	15.6		14.5		16.3		
Mass Found (µg)	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Methanol	<17.0		<17.0		<17.0		
Stack Gas Concentration (µg/dscm)(at the meter)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<371	BDL	<503	BDL	<605	BDL	<493
Stack Gas Concentration (µg/dscm)(in the duct)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<721,000	BDL	<319,000	BDL	<2,270,000	BDL	<1,100,000
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<1.7E-01	BDL	<1.5E-01	BDL	<2.5E-01	BDL	<1.9E-01
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<3.6E-01	BDL	<2.5E-01	BDL	<2.5E-01	BDL	<2.9E-01
Mass Emission Rate (tons per year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<9.6E-02	BDL	<6.6E-02	BDL	<6.7E-02	BDL	<7.6E-02
Mass Emission Rate (annualized average, lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Methanol	<2.2E-02	BDL	<1.5E-02	BDL	<1.5E-02	BDL	<1.7E-02

BP HUSKY DCU 3 - ALDEHYDES AND CO RESULTS (METHOD 320)

		Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Stack Gas Flow Rate (dscfm)		61.6		129.6		29.6		
Moisture (%)		99.20		97.72		99.57		
Duration (min)		130.00		96.00		60.00		
Cycles per Year		531.00		531.00		531.00		
Stack Gas Wet Concentration (ppmvw)	**Molecular Weight**	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Formaldehyde	30	<1.9		<2.1		<3.8		
Acetaldehyde	44	<7.7		<8.5		<15.4		
Propanal	58	<11.8		<9.5		<20.5		
Carbon Monoxide	28	31.4		46.4		29.8		
Stack Gas Dry Concentration (ppmvd)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Formaldehyde		<240	BDL	<92	BDL	<870	BDL	
Acetaldehyde		<960	BDL	<370	BDL	<3,500	BDL	
Propanal		<1,500	BDL	<420	BDL	<4,700	BDL	
Carbon Monoxide		3,920	ADL	2,040	ADL	6,860	ADL	
Stack Gas Concentration (μg/dscm)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Formaldehyde		<300,000	BDL	<110,000	BDL	<1,100,000	BDL	<500,000
Acetaldehyde		<1,800,000	BDL	<680,000	BDL	<6,500,000	BDL	<3,000,000
Propanal		<3,500,000	BDL	<1,000,000	BDL	<11,000,000	BDL	<5,300,000
Carbon Monoxide		4,560,000	ADL	2,370,000	ADL	7,990,000	ADL	4,970,000
Mass Emission Rate (lb/hr)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Formaldehyde		<0.0681	BDL	<0.0558	BDL	<0.121	BDL	<0.082
Acetaldehyde		<0.405	BDL	<0.331	BDL	<0.719	BDL	<0.48
Propanal		<0.818	BDL	<0.488	BDL	<1.26	BDL	<0.86
Carbon Monoxide		1.05	ADL	1.15	ADL	0.885	ADL	1.03
Mass Emission Rate (lb/cycle)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Formaldehyde		<0.148	BDL	<0.0892	BDL	<0.121	BDL	<0.12
Acetaldehyde		<0.877	BDL	<0.530	BDL	<0.719	BDL	<0.71
Propanal		<1.77	BDL	<0.780	BDL	<1.26	BDL	<1.3
Carbon Monoxide		2.28	ADL	1.84	ADL	0.885	ADL	1.67
Mass Emission Rate (tons/year)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Formaldehyde		<0.0392	BDL	<0.0237	BDL	<0.0321	BDL	<0.032
Acetaldehyde		<0.233	BDL	<0.141	BDL	<0.191	BDL	<0.19
Propanal		<0.471	BDL	<0.207	BDL	<0.335	BDL	<0.34
Carbon Monoxide		0.605	ADL	0.489	ADL	0.235	ADL	0.443
Mass Emission Rate (lb/hr)(annualized average)		**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Formaldehyde		<0.00895	BDL	<0.00541	BDL	<0.00733	BDL	<0.0072
Acetaldehyde		<0.0532	BDL	<0.0321	BDL	<0.0436	BDL	<0.043
Propanal		<0.107	BDL	<0.0473	BDL	<0.0764	BDL	<0.077
Carbon Monoxide		0.138	ADL	0.112	ADL	0.0536	ADL	0.101

BP HUSKY DCU 3 - SVOC RESULTS (METHOD 0010)

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	62		130		30		
Mass Found (ug)	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Acenaphthene (POM)	3200		6600		1,000		
Acenaphthylene (POM)	670		1200		220		
Aniline	<4300		<4300		<860		
Anthracene (POM)	15,000		22,000		6,100		
Benzidine	<30000		<30000		<6000		
Benzo(a)anthracene (POM)	1100		930		1,500		
Benzo(b)fluoranthene (POM)	<750		<1500		420	J	
Benzo(k)fluoranthene (POM)	<1100		<2200		<220		
Benzo(ghi)perylene (POM)	620		480	J	1,100		
Benzo(a)pyrene (POM)	960		790		1,700		
Benzo(e)pyrene (POM)	530		490	J	960		
Biphenyl (POM)	4,700	J	8,700		1,000		
Chrysene (POM)	1600		1200		1,800		
Cresols (total)	15,000		12,000		4,500		
Dibenz(a,h)anthracene (POM)	220	J	<200		400		
Dibenzofuran	4,000	J	7,900		1,100		
Dibenzo(a,e)pyrene	<340		<340		610	J	
3,3'-Dimethoxybenzidine (POM)	<7000		<7000		<1400		
7,12-Dimethylbenz(a)anthracene	<1800		<1800		590	J	
p-Dimethylaminoazobenzene	<1200		<1200		<240		
3,3'-Dimethylbenzidine	<9000		<9000		<1800		
alpha,alpha-Dimethylphenethylamine	<4200		<4200		<830		
2,4-Dimethylphenol	5,800		6,600		2,000		
Fluoranthene (POM)	1900		1700		1,500		
Fluorene (POM)	11,000		21,000		4,200		
Indeno(1,2,3-cd)pyrene (POM)	170	J	140	J	320		
Isophorone	<1400		<1400		<280		
3-Methylcholanthrene (POM)	<1900		<1900		<380		
2-Methylnaphthalene (POM)	160,000	D	330,000	D	44,000	D	
Naphthalene (POM)	88,000		190,000	D	22,000	D	
Nitrobenzene	<1400		<1400		<290		
Perylene (POM)	<78		<160		110		
Phenanthrene (POM)	35,000		54,000		16,000		
Phenol	6,300		4,300	J	1,700		
1,4-Phenylenediamine	<12000		<12000		<2500		
Pyrene (POM)	7,400		5,900		5,700		
o-Toluidine	1,800	J	2,300	J	640	J	
POM (including NDs at full value)	<340,000		<660,000		<110,000		
POM (treating NDs as zero)	332,000		645,000		110,000		

	Cond A Run 2		**Cond A Run 3**		**Cond A Run 4**		**Average**
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	62		130		30		
Stack Gas Concentration (ug/dscm)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acenaphthene (POM)	42,500	ADL	33,600	ADL	37,600	ADL	37,900
Acenaphthylene (POM)	8,890	ADL	6,110	ADL	8,270	ADL	7,760
Aniline	<57,000	BDL	<22,000	BDL	<32,000	BDL	<37,000
Anthracene (POM)	199,000	ADL	112,000	ADL	229,000	ADL	180,000
Benzidine	<400,000	BDL	<150,000	BDL	<230,000	BDL	<260,000
Benzo(a)anthracene (POM)	14,600	ADL	4,730	ADL	56,400	ADL	25,200
Benzo(b)fluoranthene (POM)	<10,000	BDL	<7,600	BDL	15,800	ADL	<11,000
Benzo(k)fluoranthene (POM)	<15,000	BDL	<11,000	BDL	<8,300	BDL	<11,000
Benzo(ghi)perylene (POM)	8,230	ADL	2,440	ADL	41,300	ADL	17,300
Benzo(a)pyrene (POM)	12,700	ADL	4,020	ADL	63,900	ADL	26,900
Benzo(e)pyrene (POM)	7,030	ADL	2,490	ADL	36,100	ADL	15,200
Biphenyl (POM)	62,400	ADL	44,300	ADL	37,600	ADL	48,100
Chrysene (POM)	21,200	ADL	6,110	ADL	67,700	ADL	31,700
Cresols (total)	199,000	ADL	61,100	ADL	169,000	ADL	143,000
Dibenz(a,h)anthracene (POM)	2,920	ADL	<1,000	BDL	15,000	ADL	<6,300
Dibenzofuran	53,100	ADL	40,200	ADL	41,300	ADL	44,900
Dibenzo(a,e)pyrene	<4,500	BDL	<1,700	BDL	22,900	ADL	<9,700
3,3'-Dimethoxybenzidine (POM)	<93,000	BDL	<36,000	BDL	<53,000	BDL	<60,000
7,12-Dimethylbenz(a)anthracene	<24,000	BDL	<9,200	BDL	22,200	ADL	<18,000
p-Dimethylaminoazobenzene	<16,000	BDL	<6,100	BDL	<9,000	BDL	<10,000
3,3'-Dimethylbenzidine	<120,000	BDL	<46,000	BDL	<68,000	BDL	<78,000
alpha,alpha-Dimethylphenethylamine	<56,000	BDL	<21,000	BDL	<31,000	BDL	<36,000
2,4-Dimethylphenol	77,000	ADL	33,600	ADL	75,200	ADL	61,900
Fluoranthene (POM)	25,200	ADL	8,650	ADL	56,400	ADL	30,100
Fluorene (POM)	146,000	ADL	107,000	ADL	158,000	ADL	137,000
Indeno(1,2,3-cd)pyrene (POM)	2,260	ADL	713	ADL	12,000	ADL	5,000
Isophorone	<19,000	BDL	<7,100	BDL	<11,000	BDL	<12,000
3-Methylcholanthrene (POM)	<25,000	BDL	<9,700	BDL	<14,000	BDL	<16,000
2-Methylnaphthalene (POM)	2,120,000	ADL	1,680,000	ADL	1,650,000	ADL	1,820,000
Naphthalene (POM)	1,170,000	ADL	967,000	ADL	827,000	ADL	987,000
Nitrobenzene	<19,000	BDL	<7,100	BDL	<11,000	BDL	<12,000
Perylene (POM)	<1,000	BDL	<810	BDL	4,130	ADL	<2,000
Phenanthrene (POM)	465,000	ADL	275,000	ADL	601,000	ADL	447,000
Phenol	83,600	ADL	21,900	ADL	63,900	ADL	56,500
1,4-Phenylenediamine	<160,000	BDL	<61,000	BDL	<94,000	BDL	<100,000
Pyrene (POM)	98,200	ADL	30,000	ADL	214,000	ADL	114,000
o-Toluidine	23,900	ADL	11,700	ADL	24,100	ADL	19,900
POM (including NDs at full value)	<4,600,000		<3,400,000		<4,200,000		<4,000,000
POM (treating NDs as zero)	4,410,000		3,280,000		4,140,000		3,940,000

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	62		130		30		
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acenaphthene (POM)	9.80E-03	ADL	1.63E-02	ADL	4.17E-03	ADL	1.01E-02
Acenaphthylene (POM)	2.05E-03	ADL	2.97E-03	ADL	9.17E-04	ADL	1.98E-03
Aniline	<1.3E-02	BDL	<1.1E-02	BDL	<3.6E-03	BDL	<9.1E-03
Anthracene (POM)	4.59E-02	ADL	5.44E-02	ADL	2.54E-02	ADL	4.19E-02
Benzidine	<9.2E-02	BDL	<7.4E-02	BDL	<2.5E-02	BDL	<6.4E-02
Benzo(a)anthracene (POM)	3.37E-03	ADL	2.30E-03	ADL	6.25E-03	ADL	3.97E-03
Benzo(b)fluoranthene (POM)	<2.3E-03	BDL	<3.7E-03	BDL	1.75E-03	ADL	<2.6E-03
Benzo(k)fluoranthene (POM)	<3.4E-03	BDL	<5.4E-03	BDL	<9.2E-04	BDL	<3.2E-03
Benzo(ghi)perylene (POM)	1.90E-03	ADL	1.19E-03	ADL	4.58E-03	ADL	2.56E-03
Benzo(a)pyrene (POM)	2.94E-03	ADL	1.95E-03	ADL	7.09E-03	ADL	3.99E-03
Benzo(e)pyrene (POM)	1.62E-03	ADL	1.21E-03	ADL	4.00E-03	ADL	2.28E-03
Biphenyl (POM)	1.44E-02	ADL	2.15E-02	ADL	4.17E-03	ADL	1.34E-02
Chrysene (POM)	4.90E-03	ADL	2.97E-03	ADL	7.50E-03	ADL	5.12E-03
Cresols (total)	4.59E-02	ADL	2.97E-02	ADL	1.88E-02	ADL	3.15E-02
Dibenz(a,h)anthracene (POM)	6.74E-04	ADL	<4.9E-04	BDL	1.67E-03	ADL	<9.5E-04
Dibenzofuran	1.23E-02	ADL	1.95E-02	ADL	4.58E-03	ADL	1.21E-02
Dibenzo(a,e)pyrene	<1.0E-03	BDL	<8.4E-04	BDL	2.54E-03	ADL	<1.5E-03
3,3'-Dimethoxybenzidine (POM)	<2.1E-02	BDL	<1.7E-02	BDL	<5.8E-03	BDL	<1.5E-02
7,12-Dimethylbenz(a)anthracene	<5.5E-03	BDL	<4.4E-03	BDL	2.46E-03	ADL	<4.1E-03
p-Dimethylaminoazobenzene	<3.7E-03	BDL	<3.0E-03	BDL	<1.0E-03	BDL	<2.5E-03
3,3'-Dimethylbenzidine	<2.8E-02	BDL	<2.2E-02	BDL	<7.5E-03	BDL	<1.9E-02
alpha,alpha-Dimethylphenethylamine	<1.3E-02	BDL	<1.0E-02	BDL	<3.5E-03	BDL	<8.9E-03
2,4-Dimethylphenol	1.78E-02	ADL	1.63E-02	ADL	8.34E-03	ADL	1.41E-02
Fluoranthene (POM)	5.82E-03	ADL	4.20E-03	ADL	6.25E-03	ADL	5.42E-03
Fluorene (POM)	3.37E-02	ADL	5.19E-02	ADL	1.75E-02	ADL	3.44E-02
Indeno(1,2,3-cd)pyrene (POM)	5.21E-04	ADL	3.46E-04	ADL	1.33E-03	ADL	7.34E-04
Isophorone	<4.3E-03	BDL	<3.5E-03	BDL	<1.2E-03	BDL	<3.0E-03
3-Methylcholanthrene (POM)	<5.8E-03	BDL	<4.7E-03	BDL	<1.6E-03	BDL	<4.0E-03
2-Methylnaphthalene (POM)	4.90E-01	ADL	8.16E-01	ADL	1.83E-01	ADL	4.96E-01
Naphthalene (POM)	2.70E-01	ADL	4.70E-01	ADL	9.17E-02	ADL	2.77E-01
Nitrobenzene	<4.3E-03	BDL	<3.5E-03	BDL	<1.2E-03	BDL	<3.0E-03
Perylene (POM)	<2.4E-04	BDL	<4.0E-04	BDL	4.58E-04	ADL	<3.6E-04
Phenanthrene (POM)	1.07E-01	ADL	1.33E-01	ADL	6.67E-02	ADL	1.02E-01
Phenol	1.93E-02	ADL	1.06E-02	ADL	7.09E-03	ADL	1.23E-02
1,4-Phenylenediamine	<3.7E-02	BDL	<3.0E-02	BDL	<1.0E-02	BDL	<2.6E-02
Pyrene (POM)	2.27E-02	ADL	1.46E-02	ADL	2.38E-02	ADL	2.03E-02
o-Toluidine	5.51E-03	ADL	5.69E-03	ADL	2.67E-03	ADL	4.62E-03
POM (including NDs at full value)	<1.1		<1.6		<0.47		<1.0
POM (treating NDs as zero)	1.02		1.59		0.459		1.02

ADL - Above Detection Level
BDL - Below Detection Level
DLL - Detection Level Limited

	Cond A Run 2		Cond A Run 3		Cond A Run 4		Average
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	61.6		129.6		29.6		
Sample Duration (min)	94		90		63		
Hours per cycle	16.5		16.5		16.5		
Cycles per year	531		531		531		
Mass Emissions (lbs/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acenaphthene (POM)	1.54E-02	ADL	2.45E-02	ADL	4.38E-03	ADL	1.47E-02
Acenaphthylene (POM)	3.21E-03	ADL	4.45E-03	ADL	9.63E-04	ADL	2.88E-03
Aniline	<2.1E-02	BDL	<1.6E-02	BDL	<3.8E-03	BDL	<1.3E-02
Anthracene (POM)	7.20E-02	ADL	8.16E-02	ADL	2.67E-02	ADL	6.01E-02
Benzidine	<1.4E-01	BDL	<1.1E-01	BDL	<2.6E-02	BDL	<9.4E-02
Benzo(a)anthracene (POM)	5.28E-03	ADL	3.45E-03	ADL	6.56E-03	ADL	5.10E-03
Benzo(b)fluoranthene (POM)	<3.6E-03	BDL	<5.6E-03	BDL	1.84E-03	ADL	<3.7E-03
Benzo(k)fluoranthene (POM)	<5.3E-03	BDL	<8.2E-03	BDL	<9.6E-04	BDL	<4.8E-03
Benzo(ghi)perylene (POM)	2.97E-03	ADL	1.78E-03	ADL	4.81E-03	ADL	3.19E-03
Benzo(a)pyrene (POM)	4.61E-03	ADL	2.93E-03	ADL	7.44E-03	ADL	4.99E-03
Benzo(e)pyrene (POM)	2.54E-03	ADL	1.82E-03	ADL	4.20E-03	ADL	2.85E-03
Biphenyl (POM)	2.26E-02	ADL	3.23E-02	ADL	4.38E-03	ADL	1.97E-02
Chrysene (POM)	7.68E-03	ADL	4.45E-03	ADL	7.88E-03	ADL	6.67E-03
Cresols (total)	7.20E-02	ADL	4.45E-02	ADL	1.97E-02	ADL	4.54E-02
Dibenz(a,h)anthracene (POM)	1.06E-03	ADL	<7.4E-04	BDL	1.75E-03	ADL	<1.2E-03
Dibenzofuran	1.92E-02	ADL	2.93E-02	ADL	4.81E-03	ADL	1.78E-02
Dibenzo(a,e)pyrene	<1.6E-03	BDL	<1.3E-03	BDL	2.67E-03	ADL	<1.9E-03
3,3'-Dimethoxybenzidine (POM)	<3.4E-02	BDL	<2.6E-02	BDL	<6.1E-03	BDL	<2.2E-02
7,12-Dimethylbenz(a)anthracene	<8.6E-03	BDL	<6.7E-03	BDL	2.58E-03	ADL	<6.0E-03
p-Dimethylaminoazobenzene	<5.8E-03	BDL	<4.4E-03	BDL	<1.1E-03	BDL	<3.8E-03
3,3'-Dimethylbenzidine	<4.3E-02	BDL	<3.3E-02	BDL	<7.9E-03	BDL	<2.8E-02
alpha,alpha-Dimethylphenethylamine	<2.0E-02	BDL	<1.6E-02	BDL	<3.6E-03	BDL	<1.3E-02
2,4-Dimethylphenol	2.78E-02	ADL	2.45E-02	ADL	8.75E-03	ADL	2.04E-02
Fluoranthene (POM)	9.12E-03	ADL	6.30E-03	ADL	6.56E-03	ADL	7.33E-03
Fluorene (POM)	5.28E-02	ADL	7.79E-02	ADL	1.84E-02	ADL	4.97E-02
Indeno(1,2,3-cd)pyrene (POM)	8.16E-04	ADL	5.19E-04	ADL	1.40E-03	ADL	9.12E-04
Isophorone	<6.7E-03	BDL	<5.2E-03	BDL	<1.2E-03	BDL	<4.4E-03
3-Methylcholanthrene (POM)	<9.1E-03	BDL	<7.0E-03	BDL	<1.7E-03	BDL	<5.9E-03
2-Methylnaphthalene (POM)	7.68E-01	ADL	1.22E00	ADL	1.93E-01	ADL	7.28E-01
Naphthalene (POM)	4.22E-01	ADL	7.05E-01	ADL	9.63E-02	ADL	4.08E-01
Nitrobenzene	<6.7E-03	BDL	<5.2E-03	BDL	<1.3E-03	BDL	<4.4E-03
Perylene (POM)	<3.7E-04	BDL	<5.9E-04	BDL	4.81E-04	ADL	<4.8E-04
Phenanthrene (POM)	1.68E-01	ADL	2.00E-01	ADL	7.00E-02	ADL	1.46E-01
Phenol	3.02E-02	ADL	1.59E-02	ADL	7.44E-03	ADL	1.79E-02
1,4-Phenylenediamine	<5.8E-02	BDL	<4.4E-02	BDL	<1.1E-02	BDL	<3.8E-02
Pyrene (POM)	3.55E-02	ADL	2.19E-02	ADL	2.49E-02	ADL	2.74E-02
o-Toluidine	8.64E-03	ADL	8.53E-03	ADL	2.80E-03	ADL	6.66E-03
POM (including NDs at full value)	<1.6		<2.4		<0.49		<1.5
POM (treating NDs as zero)	1.59		2.39		0.482		1.49

	Cond A Run 2		**Cond A Run 3**		**Cond A Run 4**		**Average**
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	61.6		129.6		29.6		
Sample Duration (min)	94		90		63		
Hours per cycle	16.5		16.5		16.5		
Cycles per year	531		531		531		
Mass Emissions (tons per year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acenaphthene (POM)	4.08E-03	ADL	6.50E-03	ADL	1.16E-03	ADL	3.91E-03
Acenaphthylene (POM)	8.53E-04	ADL	1.18E-03	ADL	2.56E-04	ADL	7.63E-04
Aniline	<5.5E-03	BDL	<4.2E-03	BDL	<1.0E-03	BDL	<3.6E-03
Anthracene (POM)	1.91E-02	ADL	2.17E-02	ADL	7.09E-03	ADL	1.59E-02
Benzidine	<3.8E-02	BDL	<3.0E-02	BDL	<7.0E-03	BDL	<2.5E-02
Benzo(a)anthracene (POM)	1.40E-03	ADL	9.15E-04	ADL	1.74E-03	ADL	1.35E-03
Benzo(b)fluoranthene (POM)	<9.6E-04	BDL	<1.5E-03	BDL	4.88E-04	ADL	<9.7E-04
Benzo(k)fluoranthene (POM)	<1.4E-03	BDL	<2.2E-03	BDL	<2.6E-04	BDL	<1.3E-03
Benzo(ghi)perylene (POM)	7.90E-04	ADL	4.72E-04	ADL	1.28E-03	ADL	8.47E-04
Benzo(a)pyrene (POM)	1.22E-03	ADL	7.78E-04	ADL	1.98E-03	ADL	1.33E-03
Benzo(e)pyrene (POM)	6.75E-04	ADL	4.82E-04	ADL	1.12E-03	ADL	7.58E-04
Biphenyl (POM)	5.99E-03	ADL	8.56E-03	ADL	1.16E-03	ADL	5.24E-03
Chrysene (POM)	2.04E-03	ADL	1.18E-03	ADL	2.09E-03	ADL	1.77E-03
Cresols (total)	1.91E-02	ADL	1.18E-02	ADL	5.23E-03	ADL	1.20E-02
Dibenz(a,h)anthracene (POM)	2.80E-04	ADL	<2.0E-04	BDL	4.65E-04	ADL	<3.1E-04
Dibenzofuran	5.09E-03	ADL	7.78E-03	ADL	1.28E-03	ADL	4.72E-03
Dibenzo(a,e)pyrene	<4.3E-04	BDL	<3.3E-04	BDL	7.09E-04	ADL	<4.9E-04
3,3'-Dimethoxybenzidine (POM)	<8.9E-03	BDL	<6.9E-03	BDL	<1.6E-03	BDL	<5.8E-03
7,12-Dimethylbenz(a)anthracene	<2.3E-03	BDL	<1.8E-03	BDL	6.85E-04	ADL	<1.6E-03
p-Dimethylaminoazobenzene	<1.5E-03	BDL	<1.2E-03	BDL	<2.8E-04	BDL	<1.0E-03
3,3'-Dimethylbenzidine	<1.1E-02	BDL	<8.9E-03	BDL	<2.1E-03	BDL	<7.5E-03
alpha,alpha-Dimethylphenethylamine	<5.3E-03	BDL	<4.1E-03	BDL	<9.6E-04	BDL	<3.5E-03
2,4-Dimethylphenol	7.39E-03	ADL	6.50E-03	ADL	2.32E-03	ADL	5.40E-03
Fluoranthene (POM)	2.42E-03	ADL	1.67E-03	ADL	1.74E-03	ADL	1.95E-03
Fluorene (POM)	1.40E-02	ADL	2.07E-02	ADL	4.88E-03	ADL	1.32E-02
Indeno(1,2,3-cd)pyrene (POM)	2.17E-04	ADL	1.38E-04	ADL	3.72E-04	ADL	2.42E-04
Isophorone	<1.8E-03	BDL	<1.4E-03	BDL	<3.3E-04	BDL	<1.2E-03
3-Methylcholanthrene (POM)	<2.4E-03	BDL	<1.9E-03	BDL	<4.4E-04	BDL	<1.6E-03
2-Methylnaphthalene (POM)	2.04E-01	ADL	3.25E-01	ADL	5.11E-02	ADL	1.93E-01
Naphthalene (POM)	1.12E-01	ADL	1.87E-01	ADL	2.56E-02	ADL	1.08E-01
Nitrobenzene	<1.8E-03	BDL	<1.4E-03	BDL	<3.4E-04	BDL	<1.2E-03
Perylene (POM)	<9.9E-05	BDL	<1.6E-04	BDL	1.28E-04	ADL	<1.3E-04
Phenanthrene (POM)	4.46E-02	ADL	5.32E-02	ADL	1.86E-02	ADL	3.88E-02
Phenol	8.02E-03	ADL	4.23E-03	ADL	1.98E-03	ADL	4.74E-03
1,4-Phenylenediamine	<1.5E-02	BDL	<1.2E-02	BDL	<2.9E-03	BDL	<1.0E-02
Pyrene (POM)	9.43E-03	ADL	5.81E-03	ADL	6.62E-03	ADL	7.28E-03
o-Toluidine	2.29E-03	ADL	2.26E-03	ADL	7.44E-04	ADL	1.77E-03
POM (including NDs at full value)	<0.44		<0.65		<0.13		<0.40
POM (treating NDs as zero)	0.423		0.635		0.128		0.395

	Cond A Run 2		**Cond A Run 3**		**Cond A Run 4**		**Average**
Volume (dscf)	2.661		6.937		0.940		
Stack Gas Flow Rate (dscfm)	61.6		129.6		29.6		
Sample Duration (min)	94		90		63		
Hours per cycle	16.5		16.5		16.5		
Cycles per year	531		531		531		
Mass Emissions (lbs/hr, annualize average))	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Acenaphthene (POM)	9.31E-04	ADL	1.48E-03	ADL	2.65E-04	ADL	8.93E-04
Acenaphthylene (POM)	1.95E-04	ADL	2.70E-04	ADL	5.84E-05	ADL	1.74E-04
Aniline	<1.3E-03	BDL	<9.7E-04	BDL	<2.3E-04	BDL	<8.1E-04
Anthracene (POM)	4.36E-03	ADL	4.94E-03	ADL	1.62E-03	ADL	3.64E-03
Benzidine	<8.7E-03	BDL	<6.7E-03	BDL	<1.6E-03	BDL	<5.7E-03
Benzo(a)anthracene (POM)	3.20E-04	ADL	2.09E-04	ADL	3.98E-04	ADL	3.09E-04
Benzo(b)fluoranthene (POM)	<2.2E-04	BDL	<3.4E-04	BDL	1.11E-04	ADL	<2.2E-04
Benzo(k)fluoranthene (POM)	<3.2E-04	BDL	<4.9E-04	BDL	<5.8E-05	BDL	<2.9E-04
Benzo(ghi)perylene (POM)	1.80E-04	ADL	1.08E-04	ADL	2.92E-04	ADL	1.93E-04
Benzo(a)pyrene (POM)	2.79E-04	ADL	1.78E-04	ADL	4.51E-04	ADL	3.03E-04
Benzo(e)pyrene (POM)	1.54E-04	ADL	1.10E-04	ADL	2.55E-04	ADL	1.73E-04
Biphenyl (POM)	1.37E-03	ADL	1.96E-03	ADL	2.65E-04	ADL	1.20E-03
Chrysene (POM)	4.65E-04	ADL	2.70E-04	ADL	4.77E-04	ADL	4.04E-04
Cresols (total)	4.36E-03	ADL	2.70E-03	ADL	1.19E-03	ADL	2.75E-03
Dibenz(a,h)anthracene (POM)	6.40E-05	ADL	<4.5E-05	BDL	1.06E-04	ADL	<7.2E-05
Dibenzofuran	1.16E-03	ADL	1.78E-03	ADL	2.92E-04	ADL	1.08E-03
Dibenzo(a,e)pyrene	<9.9E-05	BDL	<7.6E-05	BDL	1.62E-04	ADL	<1.1E-04
3,3'-Dimethoxybenzidine (POM)	<2.0E-03	BDL	<1.6E-03	BDL	<3.7E-04	BDL	<1.3E-03
7,12-Dimethylbenz(a)anthracene	<5.2E-04	BDL	<4.0E-04	BDL	1.56E-04	ADL	<3.6E-04
p-Dimethylaminoazobenzene	<3.5E-04	BDL	<2.7E-04	BDL	<6.4E-05	BDL	<2.3E-04
3,3'-Dimethylbenzidine	<2.6E-03	BDL	<2.0E-03	BDL	<4.8E-04	BDL	<1.7E-03
alpha,alpha-Dimethylphenethylamine	<1.2E-03	BDL	<9.4E-04	BDL	<2.2E-04	BDL	<8.0E-04
2,4-Dimethylphenol	1.69E-03	ADL	1.48E-03	ADL	5.30E-04	ADL	1.23E-03
Fluoranthene (POM)	5.53E-04	ADL	3.82E-04	ADL	3.98E-04	ADL	4.44E-04
Fluorene (POM)	3.20E-03	ADL	4.72E-03	ADL	1.11E-03	ADL	3.01E-03
Indeno(1,2,3-cd)pyrene (POM)	4.94E-05	ADL	3.15E-05	ADL	8.49E-05	ADL	5.53E-05
Isophorone	<4.1E-04	BDL	<3.1E-04	BDL	<7.4E-05	BDL	<2.7E-04
3-Methylcholanthrene (POM)	<5.5E-04	BDL	<4.3E-04	BDL	<1.0E-04	BDL	<3.6E-04
2-Methylnaphthalene (POM)	4.65E-02	ADL	7.42E-02	ADL	1.17E-02	ADL	4.41E-02
Naphthalene (POM)	2.56E-02	ADL	4.27E-02	ADL	5.84E-03	ADL	2.47E-02
Nitrobenzene	<4.1E-04	BDL	<3.1E-04	BDL	<7.7E-05	BDL	<2.7E-04
Perylene (POM)	<2.3E-05	BDL	<3.6E-05	BDL	2.92E-05	ADL	<2.9E-05
Phenanthrene (POM)	1.02E-02	ADL	1.21E-02	ADL	4.24E-03	ADL	8.85E-03
Phenol	1.83E-03	ADL	9.66E-04	ADL	4.51E-04	ADL	1.08E-03
1,4-Phenylenediamine	<3.5E-03	BDL	<2.7E-03	BDL	<6.6E-04	BDL	<2.3E-03
Pyrene (POM)	2.15E-03	ADL	1.33E-03	ADL	1.51E-03	ADL	1.66E-03
o-Toluidine	5.23E-04	ADL	5.17E-04	ADL	1.70E-04	ADL	4.03E-04
POM (including NDs at full value)	<0.100		<0.15		<0.030		<0.092
POM (treating NDs as zero)	0.0966		0.145		0.0292		0.0902

BP HUSKY DCU 3 - HCN RESULTS (OTM 29)

HCN Fraction Totals

	NaOH A	Flag	NaOH B	Flag	PbA	Flag	Totals (µg)
Condition D Run 2							
Hydrogen Cyanide	463		<13.1		<420		<900
Condition D Run 4							
Hydrogen Cyanide	<36.5		<13.8		<390		<440
Condition D Run 5							
Hydrogen Cyanide	424		<9.49		802	J	<1,200

	Cond C Run 1		**Cond C Run 2**		**Cond C Run 3**		**Average**
Volume (dscf)	0.870		1.876		0.696		
Stack Gas Flow Rate (dscfm)	22.4		29.7		12.3		
Duration	76.0		56.0		45.0		
Cycles per year	531		531		531		
Mass Found (µg)	**Value**	**Flag**	**Value**	**Flag**	**Value**	**Flag**	
Total Hydrogen Cyanide	<900	DLL	<440	BDL	<1,200	DLL	
Stack Gas Concentration (mg/dscm)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Hydrogen Cyanide	<36	DLL	<8.3	BDL	<63	DLL	<36
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Hydrogen Cyanide	<0.00305	DLL	<0.000921	BDL	<0.00289	DLL	<0.0023
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Hydrogen Cyanide	<0.0039	DLL	<0.00086	BDL	<0.0022	DLL	<0.0023
Mass Emission Rate (tons/yr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Hydrogen Cyanide	<0.00103	DLL	<0.000228	BDL	<0.000575	DLL	<0.00061
Mass Emission Rate (lb/hr)(annualized average)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Total Hydrogen Cyanide	<0.00023	DLL	<0.000052	BDL	<0.00013	DLL	<0.00014

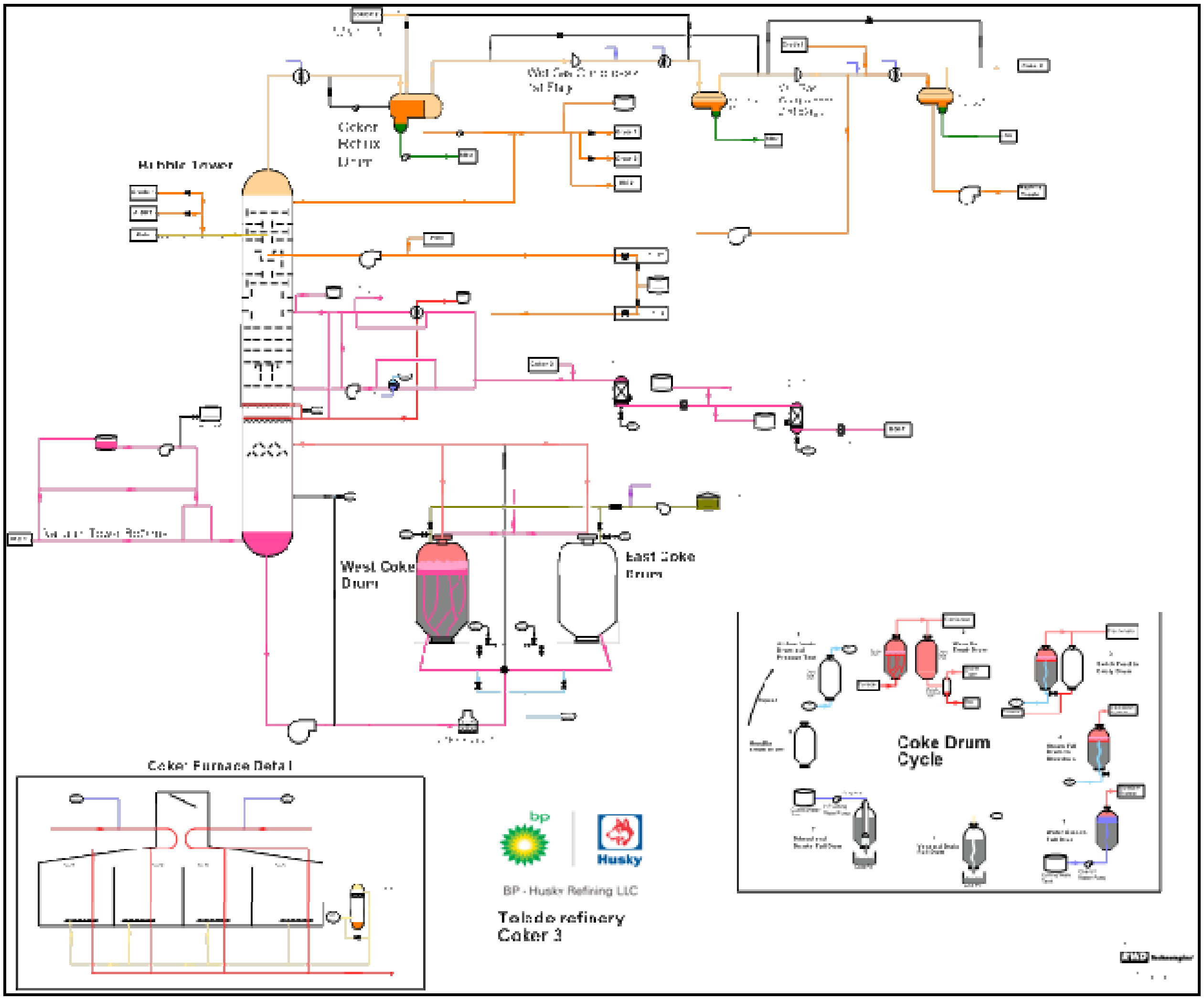
BP HUSKY DCU 3 - MERCURY RESULTS (ASTM D6784-02 / ONTARIO-HYDRO)

	PNR/Filt	Flag	KCl	Flag	NPI	Flag	$KMnO_4$	Flag	Totals (µg)
Condition D Run 2									
Oxidized Mercury (µg)	<0.0060	0	<0.94	0					<0.95
Elemental Mercury (µg)					<0.05	0	<0.059	B	<0.11
Total Mercury									<1.1
Condition D Run 4									
Oxidized Mercury (µg)	0.0074	B	<0.67	0					<0.68
Elemental Mercury (µg)					<0.078	0	0.24	0	<0.32
Total Mercury									<1.00
Condition D Run 5									
Oxidized Mercury (µg)	<0.006	0	1.2	B					<1.2
Elemental Mercury (µg)					<0.096	0	<0.095	0	<0.19
Total Mercury									<1.4

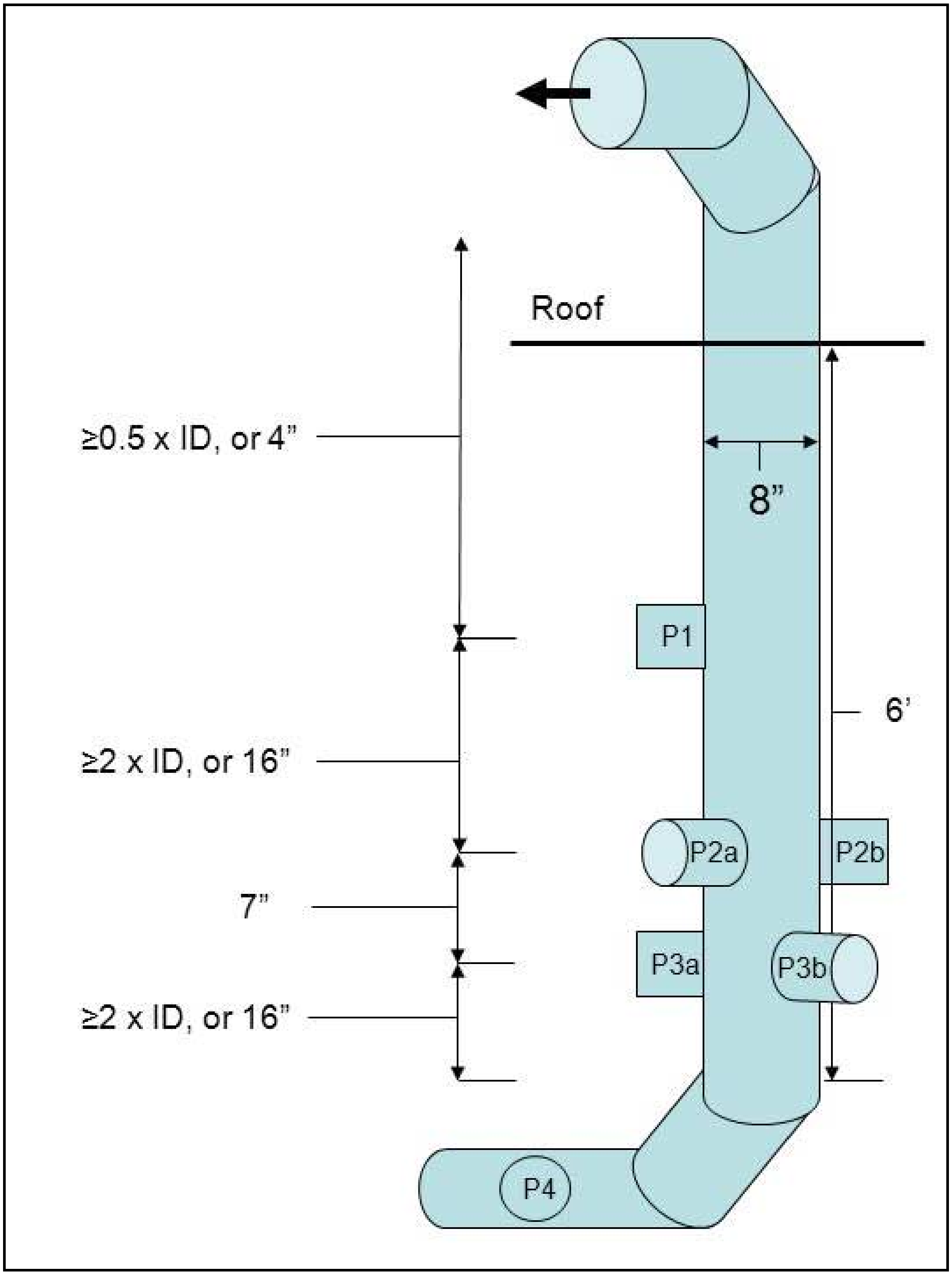
	Cond D Run 2		Cond D Run 4		Cond D Run 5		Average
Volume Collected (dscf)	1.721		1.713		1.458		
Stack Gas Flow Rate (dscfm)	30		39		42		
Duration (min)	106		72		82		
Cycles per year	531		531		531		
Mass Found (µg)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	
Oxidized Mercury	<0.95	BDL	<0.68	DLL	<1.2	DLL	
Elemental Mercury	<0.11	BDL	<0.32	DLL	<0.19	BDL	
Total Mercury	<1.1	BDL	<1.00	DLL	<1.4	DLL	
Stack Gas Concentration (µg/dscm)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Oxidized Mercury	<19	BDL	<14	DLL	<29	DLL	<21
Elemental Mercury	<2.2	BDL	<6.6	DLL	<4.6	BDL	<4.5
Total Mercury	<22	BDL	<21	DLL	<34	DLL	<25
Mass Emission Rate (lb/hr)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Oxidized Mercury	<2.1E-6	BDL	<2.0E-6	DLL	<4.6E-6	DLL	<2.9E-6
Elemental Mercury	<2.5E-7	BDL	<9.5E-7	DLL	<7.4E-7	BDL	<6.4E-7
Total Mercury	<2.4E-6	BDL	<3.0E-6	DLL	<5.4E-6	DLL	<3.6E-6
Mass Emission Rate (lb/cycle)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Oxidized Mercury	<3.8E-6	BDL	<2.4E-6	DLL	<6.3E-6	DLL	<4.2E-6
Elemental Mercury	<4.4E-7	BDL	<1.1E-6	DLL	<1.0E-6	BDL	<8.6E-7
Total Mercury	<4.2E-6	BDL	<3.6E-6	DLL	<7.4E-6	DLL	<5.0E-6
Mass Emission Rate (tons/year)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Oxidized Mercury	<1.0E-6	BDL	<6.4E-7	DLL	<1.7E-6	DLL	<1.1E-6
Elemental Mercury	<1.2E-7	BDL	<3.0E-7	DLL	<2.7E-7	BDL	<2.3E-7
Total Mercury	<1.1E-6	BDL	<9.5E-7	DLL	<2.0E-6	DLL	<1.3E-6
Mass Emission Rate (lb/hr, annualized average)	**Value**	**DL**	**Value**	**DL**	**Value**	**DL**	**Value**
Oxidized Mercury	<2.3E-7	BDL	<1.5E-7	DLL	<3.8E-7	DLL	<2.5E-7
Elemental Mercury	<2.7E-8	BDL	<6.9E-8	DLL	<6.1E-8	BDL	<5.2E-8
Total Mercury	<2.6E-7	BDL	<2.2E-7	DLL	<4.5E-7	DLL	<3.1E-7

APPENDIX 2 – FIGURES AND DIAGRAMS

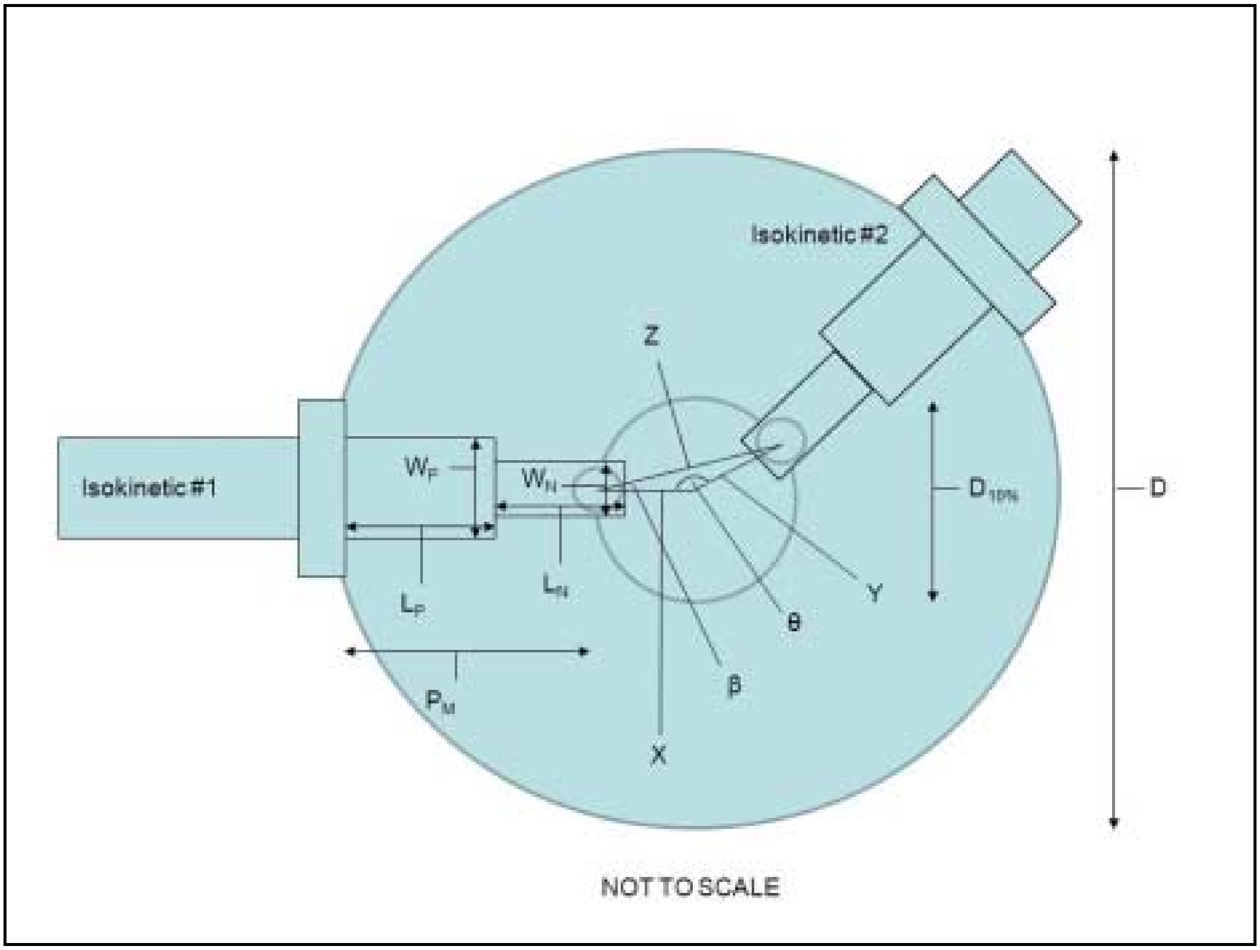
DCU 3 Process Flow Diagram



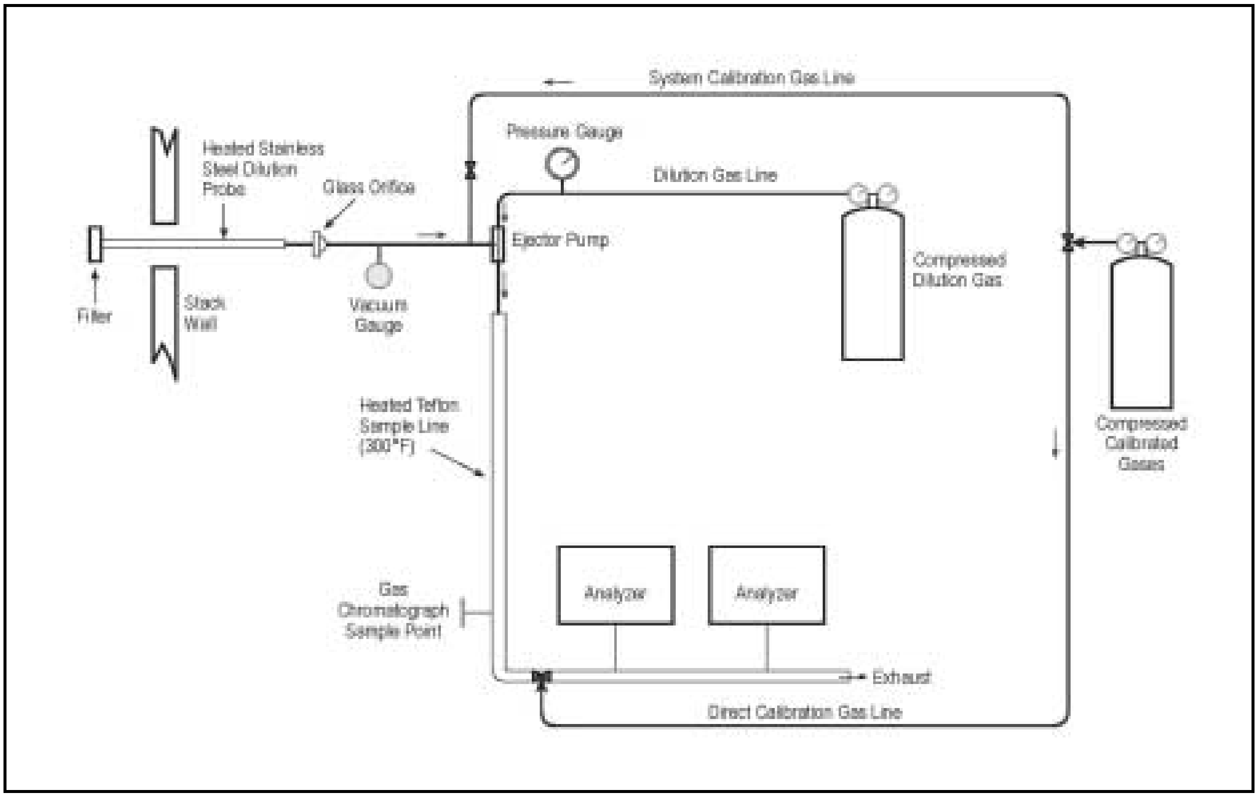
DCU 3 Vent Test Port Locations Schematic



DCU 3 Vent Cross-Sectional Schematic



IRM Sampling Diagram



APPENDIX 3 – ICR TEST METHOD DATA

Section A

Method 1 – Sample Points

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source DCU 3
Operator DCW

☑ Velocity Only ☐ Isokinetic Sampling	Upstream Distance[1] (ft/in) 74" ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☑ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) ~~516"~~ 216" ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
West Vent. P1 Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	50	4	21.75"
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

- see Figure 4-1 of source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCV3
Operator PCW

☐ Velocity Only
☑ Isokinetic Sampling
Number of Ports to be sampled 1
Duct Diameter[2] (in) 8
☐ Measurement
☐ Plant Information

Upstream Distance[1] (ft/in) >20"
☑ Measurement
☐ Plant Information

Downstream Distance[3] (ft/in) 23"
☑ Measurement
☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
West Vent - P2A Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4 ~~34.25~~	2.75 ~~2.74~~	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

see figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP- Husky
Project Number 40942317
Date 7-11-11
Source PCU 3
Operator PCW

☐ Velocity Only
☑ Isokinetic Sampling

Number of Ports to be sampled 1

Duct Diameter[2] (in) 8
☐ Measurement
☐ Plant Information

Upstream Distance[1] (ft/in) 720"
☑ Measurement
☐ Plant Information

Downstream Distance[3] (ft/in) 23"
☑ Measurement
☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
West Vent - P2B Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
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21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or Flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky

Project Number 40942317

Date 7-11-11

Source PCU3

Operator PCW

☐ Velocity Only ☑ Isokinetic Sampling	Upstream Distance[1] (ft/in) 727" ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☐ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) 16" ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
West Vent - P3A Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP - Husky
Project Number 40942317
Date 7-11-11
Source PCV3
Operator PCW

☐ Velocity Only ☑ Isokinetic Sampling	Upstream Distance[1] (ft/in) 727" ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☐ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) 16" ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
West Vent - P3B Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
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17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

- see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCV3
Operator PCW

☑ Velocity Only
☐ Isokinetic Sampling

Number of Ports to be sampled 1

Duct Diameter[2] (in) 8
☐ Measurement
☐ Plant Information

Upstream Distance[1] (ft/in) 74"
☐ Measurement
☐ Plant Information

Downstream Distance[3] (ft/in) ~~2~~ ≥ 16"
☑ Measurement
☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
East Vent - P1 Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)	Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	50	4	21.75	13			
2				14			
3				15			
4				16			
5				17			
6				18			
7				19			
8				20			
9				21			
10				22			
11				23			
12				24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

-see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCV3
Operator PCW

☐ Velocity Only
☑ Isokinetic Sampling

Number of Ports to be sampled 1

Duct Diameter[2] (in) 8
☐ Measurement
☐ Plant Information

Upstream Distance[1] (ft/in) >20"
☑ Measurement
☐ Plant Information

Downstream Distance[3] (ft/in) 23"
☑ Measurement
☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
East Vent - P2A Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

- see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCU3

Operator PCW

☐ Velocity Only ☑ Isokinetic Sampling	Upstream Distance[1] (ft/in) 720" ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☐ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) 23" ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
East Vent - P2B Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

-see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCU3
Operator PCW

☐ Velocity Only ☑ Isokinetic Sampling	Upstream Distance[1] (ft/in) 727" ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☐ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) 16" ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
East Vent - P3A Port Depth	17.75"

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

- see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance

EPA Method 1A – Circular Duct – Determination of Traverse Points

Project Name BP-Husky
Project Number 40942317
Date 7-11-11
Source PCU3
Operator PCW

☐ Velocity Only ☑ Isokinetic Sampling	Upstream Distance[1] (ft/in) 727'' ☑ Measurement ☐ Plant Information
Number of Ports to be sampled 1	
Duct Diameter[2] (in) 8 ☐ Measurement ☐ Plant Information	Downstream Distance[3] (ft/in) 16'' ☑ Measurement ☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	1
Number of traverse points per port	1
East Vent - P3B Port Depth	17.75''

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1	34.4	2.75	20.5
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			

Prepare a drawing of the source, showing the ports, disturbances, and the distances

– see Figure 4-1 of Source Test Plan

---

[1] From flow disturbance

[2] EPA Method 1A is applicable to stacks or ducts with diameters between 4" and 12".

[3] From isokinetic sampling location or flow disturbance.

Section B

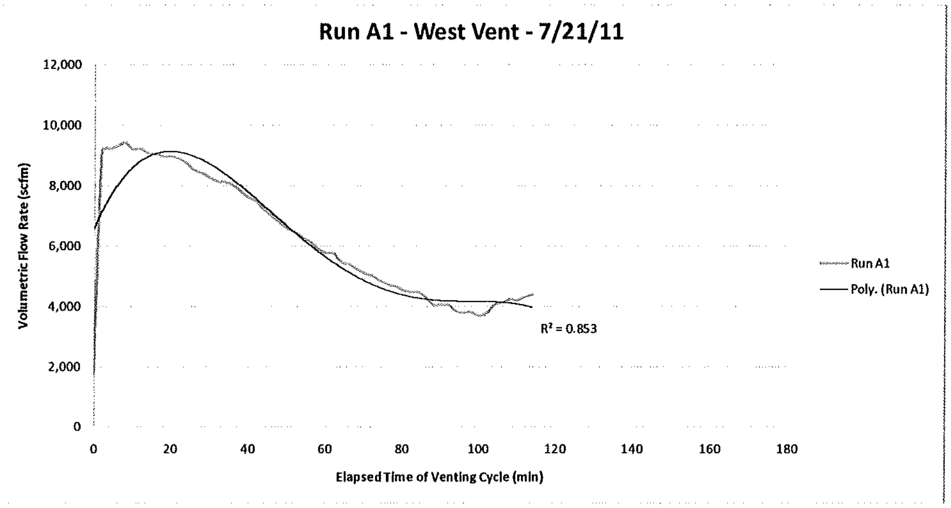
Method 2 – Velocity and Flow Rate

URS Data Printouts

MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run A1 - West Vent - 7/21/11

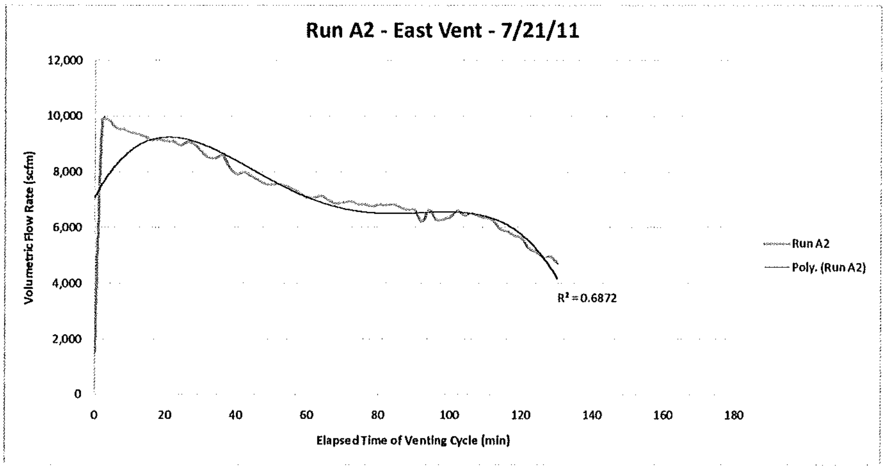
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
02:15	1.6	1.26491	165	34	17.98	95	99.06	29.12	2,015	1,799		17	0	0
02:17	44.8	6.69328	217	34	17.98	524	99.06	29.12	11,095	9,145		86	3,597	2
02:19	45.6	6.75278	218	34	17.98	530	99.06	29.12	11,202	9,219		86	21,887	4
02:21	46.3	6.80441	218	34	17.98	534	99.06	29.12	11,288	9,290		87	40,325	6
02:23	47.7	6.90652	220	34	17.98	542	99.06	29.12	11,474	9,415		88	58,905	8
02:25	45.7	6.76018	222	34	17.98	532	99.06	29.12	11,247	9,202		86	77,736	10
02:27	46.1	6.7897	222	32	17.98	535	99.06	29.12	11,323	9,221		87	96,140	12
02:29	44.6	6.67832	222	32	17.98	526	99.06	29.12	11,137	9,070		85	114,582	14
02:31	44.4	6.66333	222	32	17.98	525	99.06	29.12	11,112	9,049		85	132,721	16
02:33	43.8	6.61816	222	30	17.98	523	99.06	29.12	11,062	8,967		84	150,820	18
02:35	43.7	6.6106	222	30	17.98	522	99.06	29.12	11,050	8,957		84	168,754	20
02:37	43.1	6.56506	223	30	17.98	519	99.06	29.12	10,982	8,888		83	186,667	22
02:39	41.8	6.46529	223	28	17.98	512	99.06	29.12	10,840	8,733		82	204,444	24
02:41	39.6	6.29285	223	28	17.98	499	99.06	29.12	10,551	8,500		80	221,910	26
02:43	38.6	6.21289	221	28	17.98	492	99.06	29.12	10,402	8,404		79	238,910	28
02:45	37.4	6.11555	222	26	17.98	486	99.06	29.12	10,271	8,247		77	255,718	30
02:47	36.4	6.03324	223	26	17.98	479	99.06	29.12	10,140	8,130		76	272,212	32
02:49	36.3	6.02495	223	26	17.98	479	99.06	29.12	10,126	8,119		76	288,472	34
02:51	35.3	5.94138	223	26	17.98	472	99.06	29.12	9,986	8,006		75	304,710	36
02:53	33.5	5.78792	222	24	17.98	461	99.06	29.12	9,744	7,787		73	320,722	38
02:55	32	5.65685	222	22	17.98	451	99.06	29.12	9,546	7,592		71	336,296	40
02:57	30.9	5.55878	222	22	17.98	443	99.06	29.12	9,380	7,461		70	351,480	42
02:59	28.8	5.36656	221	20	17.98	429	99.06	29.12	9,071	7,191		67	366,401	44
03:01	27.2	5.21536	222	20	17.98	417	99.06	29.12	8,822	6,983		66	380,782	46
03:03	25.6	5.05964	222	18	17.98	406	99.06	29.12	8,579	6,758		63	394,748	48
03:05	24.2	4.91935	223	18	17.98	395	99.06	29.12	8,347	6,566		62	408,264	50
03:07	23.4	4.83735	220	18	17.98	387	99.06	29.12	8,190	6,471		61	421,396	52
03:09	22	4.69042	221	18	17.98	376	99.06	29.12	7,947	6,270		59	434,337	54
03:11	21.1	4.59347	221	18	17.98	368	99.06	29.12	7,783	6,140		58	446,876	56
03:13	19.5	4.41588	222	18	17.98	354	99.06	29.12	7,488	5,898		55	459,156	58
03:15	18.7	4.32435	223	18	17.98	347	99.06	29.12	7,338	5,772		54	470,952	60
03:17	18.6	4.31277	223	18	17.98	346	99.06	29.12	7,318	5,756		54	482,496	62
03:19	16.9	4.11096	224	14	17.98	332	99.06	29.12	7,015	5,456		51	494,008	64
03:21	16.5	4.06202	224	14	17.98	328	99.06	29.12	6,931	5,391		51	504,921	66
03:23	15.5	3.937	222	14	17.98	317	99.06	29.12	6,708	5,233		49	515,704	68
03:25	14.8	3.84708	223	12	17.98	311	99.06	29.12	6,576	5,097		48	526,170	70
03:27	14.3	3.78153	224	12	17.98	306	99.06	29.12	6,468	5,007		47	536,365	72
03:29	13.4	3.6606	223	12	17.98	296	99.06	29.12	6,257	4,850		46	546,379	74
03:31	12.8	3.57771	224	10	17.98	290	99.06	29.12	6,135	4,725		44	556,079	76
03:33	12.6	3.54965	224	7	17.98	289	99.06	29.12	6,109	4,671		44	565,530	78
03:35	11.9	3.44964	224	6	17.98	281	99.06	29.12	5,945	4,534		43	574,872	80
03:37	11.6	3.40588	224	6	17.98	277	99.06	29.12	5,869	4,476		42	583,939	82
03:39	11.6	3.40588	223	5	17.98	278	99.06	29.12	5,872	4,474		42	592,892	84
03:41	10.7	3.27109	224	5	17.98	267	99.06	29.12	5,644	4,294		40	601,840	86
03:43	9.5	3.08221	224	5	17.98	251	99.06	29.12	5,318	4,046		38	610,427	88
03:45	9.5	3.08221	223	5	17.98	251	99.06	29.12	5,314	4,049		38	618,518	90
03:47	9.5	3.08221	224	5	17.98	251	99.06	29.12	5,318	4,046		38	626,616	92
03:49	8.5	2.91548	223	5	17.98	238	99.06	29.12	5,027	3,830		36	634,707	94
03:51	8.4	2.89828	223	4	17.98	237	99.06	29.12	5,003	3,802		36	642,367	96
03:53	8.4	2.89828	223	4	17.98	237	99.06	29.12	5,003	3,802		36	649,972	98
03:55	7.9	2.81069	223	4	17.98	229	99.06	29.12	4,852	3,687		35	657,576	100
03:57	8.3	2.88097	223	4	17.98	235	99.06	29.12	4,973	3,780		35	664,951	102
03:59	9.6	3.09839	223	4	17.98	253	99.06	29.12	5,349	4,065		38	672,511	104
04:01	9.9	3.14643	223	5	17.98	256	99.06	29.12	5,425	4,133		39	680,641	106
04:03	10.4	3.2249	222	5	17.98	263	99.06	29.12	5,556	4,239		40	688,907	108
04:05	10.2	3.19374	222	5	17.98	260	99.06	29.12	5,502	4,198		39	697,385	110
04:07	10.8	3.28634	222	5	17.98	268	99.06	29.12	5,662	4,320		41	705,782	112
04:09	11.2	3.34664	222	5	17.98	273	99.06	29.12	5,766	4,399		41	714,422	114



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run A2 - East Vent - 7/21/11

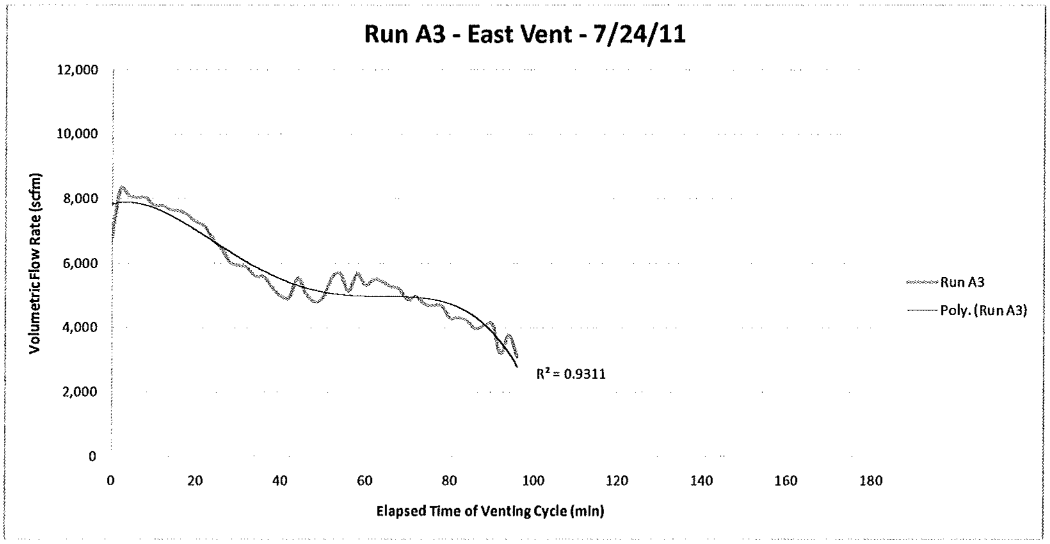
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
20:57	1.2	1.095445	134	4	17.98	84	99.19	29.00	1,767	1,538		12	0	0
20:59	56	7.483315	215	4	17.98	608	99.19	29.00	12,868	9,855		80	3,076	2
02:11	56	7.483315	216	4	17.98	609	99.19	29.00	12,877	9,848		80	22,785	4
21:03	52.8	7.266361	215	4	17.98	591	99.19	29.00	12,495	9,569		78	42,480	6
21:05	52.3	7.231874	216	4	17.98	588	99.19	29.00	12,445	9,517		77	61,619	8
21:07	51.2	7.155418	216	4	17.98	582	99.19	29.00	12,313	9,416		76	80,652	10
21:09	50.5	7.106335	216	4	17.98	578	99.19	29.00	12,229	9,351		76	99,484	12
21:11	49.7	7.049823	216	4	17.98	573	99.19	29.00	12,131	9,277		75	118,187	14
21:13	48.2	6.942622	216	4	17.98	565	99.19	29.00	11,947	9,136		74	136,741	16
21:15	48.5	6.964194	216	4	17.98	567	99.19	29.00	11,984	9,164		74	155,013	18
21:17	48	6.928203	217	3	17.98	565	99.19	29.00	11,946	9,099		74	173,342	20
21:19	47.7	6.906519	217	4	17.98	562	99.19	29.00	11,893	9,082		74	191,540	22
21:21	46.4	6.811755	217	3	17.98	555	99.19	29.00	11,745	8,946		73	209,704	24
21:23	47.6	6.899275	217	3	17.98	562	99.19	29.00	11,896	9,061		74	227,595	26
21:25	46.9	6.848357	217	2	17.98	559	99.19	29.00	11,823	8,983		73	245,717	28
21:27	44.1	6.640783	217	3	17.98	541	99.19	29.00	11,450	8,721		71	263,683	30
21:29	42	6.480741	218	3	17.98	529	99.19	29.00	11,183	8,505		69	281,125	32
21:31	41.8	6.465292	217	3	17.98	527	99.19	29.00	11,148	8,491		69	298,135	34
21:33	42.8	6.542171	219	3	17.98	534	99.19	29.00	11,297	8,579		70	315,117	36
21:35	38.2	6.180615	217	5	17.98	503	99.19	29.00	10,630	8,137		66	332,276	38
21:37	36	6	218	6	17.98	488	99.19	29.00	10,314	7,904		64	348,551	40
21:39	36.7	6.058052	218	6	17.98	492	99.19	29.00	10,414	7,980		65	364,358	42
21:41	35.5	5.958188	219	6	17.98	485	99.19	29.00	10,250	7,843		64	380,318	44
21:43	34.3	5.85662	219	5	17.98	477	99.19	29.00	10,088	7,700		62	396,004	46
21:45	33.2	5.761944	219	4	17.98	470	99.19	29.00	9,937	7,566		61	411,403	48
21:47	33	5.744563	218	4	17.98	468	99.19	29.00	9,900	7,548		61	426,534	50
21:49	33.1	5.75326	219	4	17.98	469	99.19	29.00	9,922	7,554		61	441,631	52
21:51	32.4	5.6921	219	4	17.98	464	99.19	29.00	9,817	7,474		61	456,739	54
21:53	31.5	5.612486	218	4	17.98	457	99.19	29.00	9,672	7,375		60	471,687	56
21:55	30.2	5.495453	219	4	17.98	448	99.19	29.00	9,477	7,216		59	486,437	58
21:57	29.1	5.394442	218	4	17.98	439	99.19	29.00	9,296	7,088		58	500,868	60
21:59	29.1	5.394442	219	3	17.98	440	99.19	29.00	9,315	7,074		57	515,044	62
22:01	29.6	5.440588	219	2	17.98	445	99.19	29.00	9,407	7,126		58	529,193	64
22:03	28.3	5.319774	219	2	17.98	435	99.19	29.00	9,198	6,967		57	543,444	66
22:05	27.4	5.234501	219	2	17.98	428	99.19	29.00	9,050	6,856		56	557,379	68
22:07	27.7	5.263079	217	2	17.98	430	99.19	29.00	9,086	6,903		56	571,090	70
22:09	28	5.291503	217	2	17.98	432	99.19	29.00	9,135	6,941		56	584,897	72
22:11	27.2	5.215362	217	2	17.98	426	99.19	29.00	9,004	6,841		56	598,778	74
22:13	27	5.196152	216	2	17.98	424	99.19	29.00	8,964	6,821		55	612,460	76
22:15	26.6	5.157519	217	2	17.98	421	99.19	29.00	8,904	6,765		55	626,101	78
22:17	27	5.196152	216	2	17.98	424	99.19	29.00	8,964	6,821		55	639,631	80
22:19	26.9	5.186521	217	2	17.98	423	99.19	29.00	8,954	6,803		55	653,272	82
22:21	27.1	5.205766	217	2	17.98	425	99.19	29.00	8,987	6,828		55	666,878	84
22:23	26.2	5.118594	216	2	17.98	417	99.19	29.00	8,830	6,719		55	680,534	86
22:25	25.7	5.069517	217	1	17.98	414	99.19	29.00	8,763	6,641		54	693,972	88
22:27	25.6	5.059644	217	1	17.98	413	99.19	29.00	8,746	6,628		54	707,254	90
22:29	22.5	4.743416	217	1	17.98	388	99.19	29.00	8,199	6,214		50	720,510	92
22:31	25.6	5.059644	217	1	17.98	413	99.19	29.00	8,746	6,628		54	732,938	94
22:33	23	4.795832	217	1	17.98	392	99.19	29.00	8,290	6,283		51	746,194	96
22:35	23.1	4.806246	217	1	17.98	393	99.19	29.00	8,308	6,296		51	758,760	98
22:37	23.7	4.868265	217	1	17.98	398	99.19	29.00	8,415	6,377		52	771,352	100
22:39	25.4	5.039841	217	1	17.98	412	99.19	29.00	8,712	6,602		54	784,107	102
22:41	24.2	4.91935	217	1	17.98	402	99.19	29.00	8,504	6,444		52	797,311	104
22:43	24.7	4.969909	217	1	17.98	406	99.19	29.00	8,591	6,511		53	810,200	106
22:45	23.9	4.888763	217	1	17.98	399	99.19	29.00	8,451	6,404		52	823,221	108
22:47	23.5	4.84768	216	1	17.98	396	99.19	29.00	8,373	6,355		52	836,030	110
22:49	22.8	4.774935	216	1	17.98	390	99.19	29.00	8,248	6,260		51	848,740	112
22:51	20.5	4.527693	216	1	17.98	370	99.19	29.00	7,821	5,936		48	861,260	114
22:53	20	4.472136	215	1	17.98	365	99.19	29.00	7,719	5,867		48	873,131	116
22:55	18.9	4.347413	215	1	17.98	355	99.19	29.00	7,504	5,704		46	884,865	118
22:57	18.3	4.27785	215	1	17.98	349	99.19	29.00	7,384	5,612		46	896,272	120
22:59	16	4	215	1	17.98	326	99.19	29.00	6,904	5,248		43	907,497	122
23:01	15.2	3.898718	215	1	17.98	318	99.19	29.00	6,729	5,115		42	917,993	124
23:03	14.2	3.768289	216	1	17.98	308	99.19	29.00	6,509	4,940		40	928,222	126
23:05	14.3	3.781534	214	1	17.98	308	99.19	29.00	6,522	4,965		40	938,103	128
23:07	13	3.605551	214	1	17.98	294	99.19	29.00	6,219	4,734		38	948,032	130



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run A3 - East Vent - 7/24/11

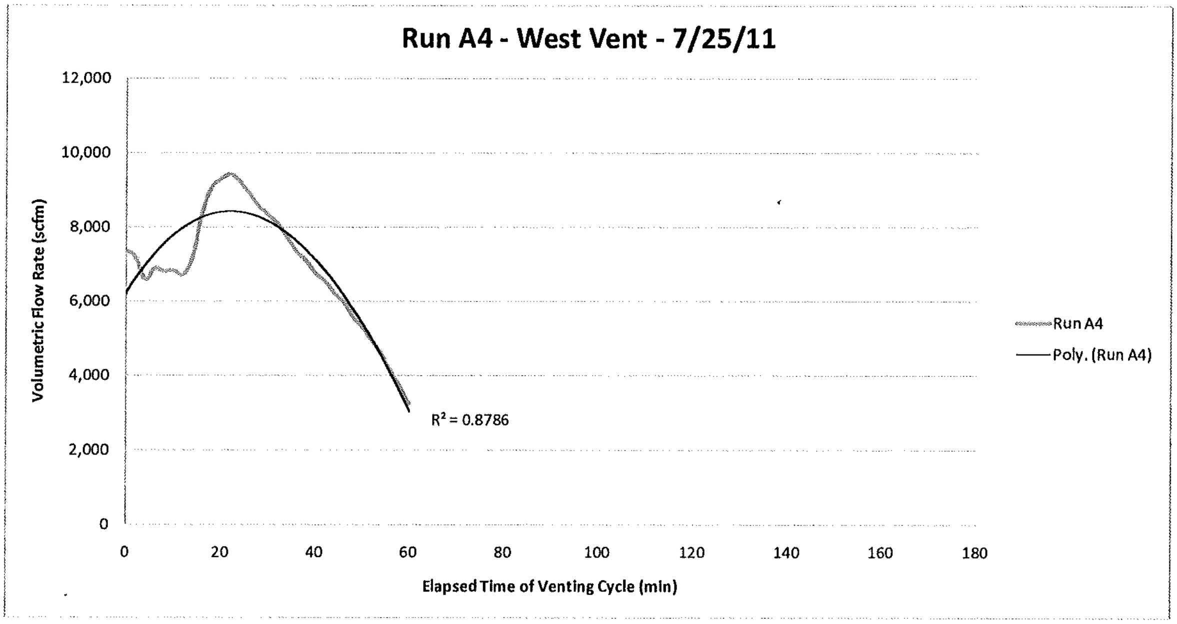
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
19:55	26.1	5.108816	213	4	17.96	414	97.79	29.16	8,755	6,761		150	0	0
19:57	39.1	6.252999	219	10	17.96	505	97.79	29.16	10,683	8,301		184	13,523	2
19:59	37.2	6.09918	222	10	17.96	494	97.79	29.16	10,444	8,079		179	30,124	4
20:01	36.9	6.074537	226	10	17.96	493	97.79	29.16	10,432	8,022		178	46,281	6
20:03	37.5	6.123724	229	5	17.96	501	97.79	29.16	10,605	8,020		178	62,326	8
20:05	35.4	5.94979	232	5	17.96	488	97.79	29.16	10,326	7,775		172	78,367	10
20:07	35.3	5.94138	232	5	17.96	487	97.79	29.16	10,311	7,764		172	93,917	12
20:09	34.1	5.839521	231	5	17.96	479	97.79	29.16	10,127	7,637		169	109,446	14
20:11	33.9	5.822371	233	5	17.96	478	97.79	29.16	10,112	7,603		168	124,719	16
20:13	32.7	5.718391	232	5	17.96	469	97.79	29.16	9,924	7,473		165	139,926	18
20:15	30.8	5.549775	232	5	17.96	455	97.79	29.16	9,632	7,253		161	154,872	20
20:17	29.8	5.458938	232	4	17.96	448	97.79	29.16	9,486	7,125		158	169,377	22
20:19	26.4	5.138093	232	4	17.96	422	97.79	29.16	8,928	6,706		148	183,627	24
20:21	24.3	4.929503	232	3	17.96	405	97.79	29.16	8,576	6,426		142	197,040	26
20:23	21.2	4.604346	233	3	17.96	379	97.79	29.16	8,017	5,998		133	209,891	28
20:25	20.6	4.538722	233	3	17.96	374	97.79	29.16	7,902	5,912		131	221,887	30
20:27	20.2	4.494441	234	3	17.96	370	97.79	29.16	7,831	5,850		130	233,711	32
20:29	18.3	4.27785	233	3	17.96	352	97.79	29.16	7,448	5,572		123	245,412	34
20:31	18.2	4.266146	233	3	17.96	351	97.79	29.16	7,428	5,557		123	256,557	36
20:33	16	4	234	3	17.96	329	97.79	29.16	6,969	5,207		115	267,671	38
20:35	14.5	3.807887	234	3	17.96	314	97.79	29.16	6,635	4,957		110	278,085	40
20:37	14.3	3.781534	234	2	17.96	312	97.79	29.16	6,597	4,916		109	287,998	42
20:39	18	4.242641	234	2	17.96	350	97.79	29.16	7,401	5,516		122	297,831	44
20:41	14.8	3.847077	232	2	17.96	317	97.79	29.16	6,702	5,009		111	308,862	46
20:43	13.5	3.674235	233	2	17.96	303	97.79	29.16	6,405	4,780		106	318,879	48
20:45	14.3	3.781534	233	2	17.96	312	97.79	29.16	6,592	4,920		109	328,440	50
20:47	17.9	4.230839	233	3	17.96	348	97.79	29.16	7,366	5,511		122	338,279	52
20:49	18.9	4.347413	231	3	17.96	357	97.79	29.16	7,558	5,671		126	349,302	54
20:51	15.4	3.924283	232	3	17.96	323	97.79	29.16	6,828	5,116		113	360,644	56
20:53	18.8	4.335897	231	3	17.96	356	97.79	29.16	7,538	5,656		125	370,875	58
20:55	16.5	4.062019	231	3	17.96	334	97.79	29.16	7,062	5,299		117	382,188	60
20:57	17.7	4.207137	231	3	17.96	346	97.79	29.16	7,314	5,488		122	392,786	62
20:59	17.2	4.147288	230	2	17.96	341	97.79	29.16	7,214	5,407		120	403,762	64
21:01	16.3	4.037326	231	2	17.96	332	97.79	29.16	7,028	5,260		116	414,577	66
21:03	15.8	3.974921	230	2	17.96	327	97.79	29.16	6,914	5,183		115	425,097	68
21:05	13.8	3.714835	229	2	17.96	305	97.79	29.16	6,457	4,847		107	435,462	70
21:07	14.4	3.794733	229	2	17.96	312	97.79	29.16	6,596	4,951		110	445,156	72
21:09	13	3.605551	229	2	17.96	296	97.79	29.16	6,267	4,704		104	455,059	74
21:11	12.8	3.577709	230	2	17.96	294	97.79	29.16	6,223	4,665		103	464,467	76
21:13	12.8	3.577709	231	2	17.96	294	97.79	29.16	6,228	4,661		103	473,797	78
21:15	10.8	3.286335	231	2	17.96	270	97.79	29.16	5,721	4,282		95	483,119	80
21:17	10.8	3.286335	229	2	17.96	270	97.79	29.16	5,712	4,288		95	491,683	82
21:19	10.4	3.224903	229	2	17.96	265	97.79	29.16	5,606	4,208		93	500,259	84
21:21	9.2	3.03315	229	2	17.96	249	97.79	29.16	5,272	3,958		88	508,674	86
21:23	9.6	3.098387	229	2	17.96	255	97.79	29.16	5,386	4,043		90	516,589	88
21:25	9.9	3.146427	229	2	17.96	259	97.79	29.16	5,469	4,105		91	524,675	90
21:27	6	2.44949	229	1	17.96	202	97.79	29.16	4,263	3,192		71	532,885	92
21:29	8.3	2.880972	229	1	17.96	237	97.79	29.16	5,014	3,754		83	539,269	94
21:31	5.2	2.280351	180	1	17.96	181	97.79	29.16	3,825	3,083		68	546,778	96



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run A4 - West Vent - 7/25/11

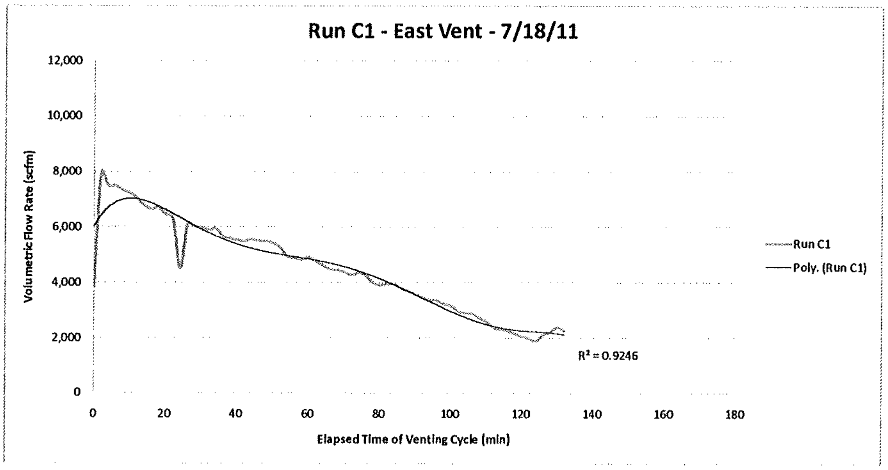
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
14:40	31.5	5.612486	218	0	17.99	458	99.47	29.20	9,686	7,362		39	0	0
14:42	30.2	5.495453	222	0	17.99	450	99.47	29.20	9,512	7,187		38	14,723	2
14:44	25.6	5.059644	230	0	17.99	416	99.47	29.20	8,809	6,579		35	29,098	4
14:46	27.1	5.205766	235	16	17.99	422	99.47	29.20	8,918	6,879		36	42,255	6
14:48	26.6	5.157519	238	16	17.99	419	99.47	29.20	8,855	6,800		36	56,012	8
14:50	26.8	5.176872	238	16	17.99	420	99.47	29.20	8,888	6,826		36	69,613	10
14:52	25.9	5.089204	239	16	17.99	413	99.47	29.20	8,744	6,705		35	83,265	12
14:54	29.6	5.440588	238	19	17.99	440	99.47	29.20	9,307	7,200		38	96,676	14
14:56	39.6	6.292853	238	24	17.99	506	99.47	29.20	10,701	8,377		44	111,075	16
14:58	45.7	6.760178	238	30	17.99	540	99.47	29.20	11,415	9,063		48	127,829	18
15:00	48.1	6.935416	239	31	17.99	553	99.47	29.20	11,705	9,302		49	145,956	20
15:02	49.2	7.014271	238	32	17.99	559	99.47	29.20	11,816	9,426		50	164,561	22
15:04	47.2	6.870226	238	30	17.99	548	99.47	29.20	11,600	9,211		49	183,413	24
15:06	43.9	6.625708	238	30	17.99	529	99.47	29.20	11,187	8,883		47	201,834	26
15:08	40.8	6.387488	238	28	17.99	511	99.47	29.20	10,811	8,544		45	219,600	28
15:10	38.9	6.236986	238	26	17.99	500	99.47	29.20	10,581	8,323		44	236,687	30
15:12	36.7	6.058052	237	24	17.99	487	99.47	29.20	10,294	8,070		43	253,332	32
15:14	33.6	5.796551	238	22	17.99	467	99.47	29.20	9,880	7,698		41	269,473	34
15:16	30.6	5.531727	238	20	17.99	447	99.47	29.20	9,452	7,329		39	284,870	36
15:18	28.7	5.357238	238	19	17.99	433	99.47	29.20	9,164	7,089		37	299,528	38
15:20	26.1	5.108816	238	18	17.99	414	99.47	29.20	8,750	6,752		36	313,706	40
15:22	24.4	4.939636	238	18	17.99	400	99.47	29.20	8,460	6,529		35	327,211	42
15:24	22.2	4.711688	238	15	17.99	383	99.47	29.20	8,099	6,205		33	340,269	44
15:26	20.6	4.538722	238	14	17.99	369	99.47	29.20	7,811	5,970		32	352,679	46
15:28	18	4.242641	239	13	17.99	346	99.47	29.20	7,316	5,570		29	364,619	48
15:30	16.2	4.024922	239	12	17.99	328	99.47	29.20	6,949	5,277		28	375,758	50
15:32	14.1	3.754997	240	11	17.99	307	99.47	29.20	6,495	4,914		26	386,313	52
15:34	12.3	3.507136	241	10	17.99	287	99.47	29.20	6,079	4,581		24	396,141	54
15:36	10	3.162278	242	8	17.99	260	99.47	29.20	5,498	4,117		22	405,302	56
15:38	8.1	2.84605	241	7	17.99	234	99.47	29.20	4,951	3,704		20	413,537	58
15:40	6.2	2.48998	242	6	17.99	205	99.47	29.20	4,340	3,234		17	420,944	60



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run C1 - East Vent - 7/18/11

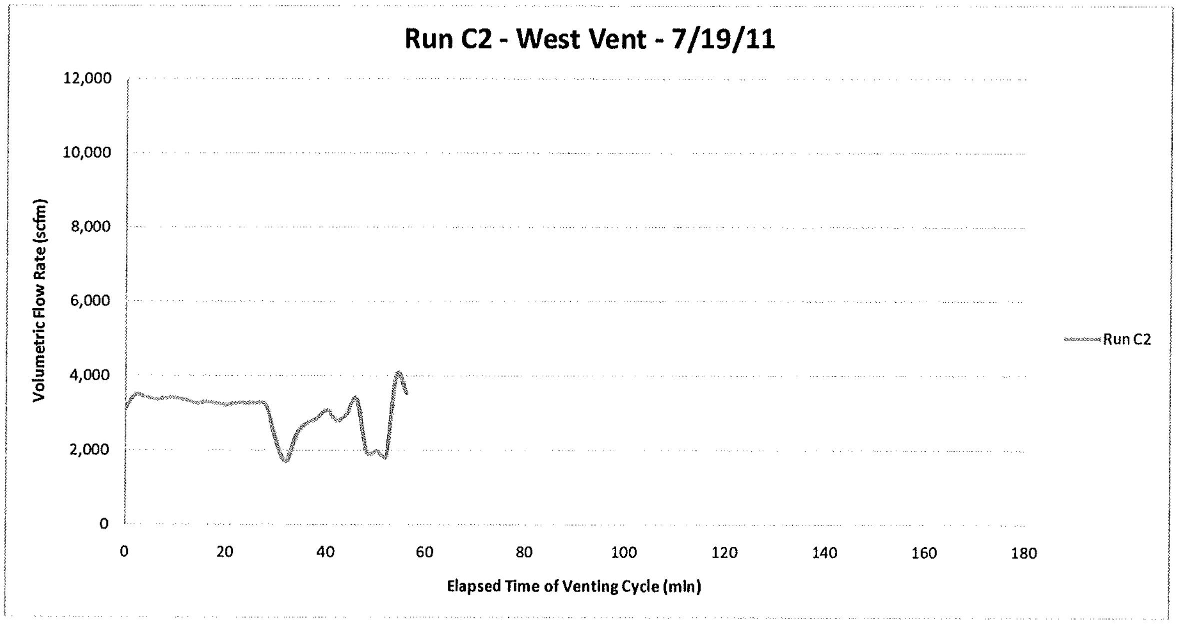
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
20:29	8.2	2.863564	221	18	17.99	229	99.62	29.22	4,842	3,833		14	0	0
20:31	35.4	5.94979	221	18	17.99	476	99.62	29.22	10,061	7,963		30	7,665	2
20:33	31.3	5.59464	221	18	17.99	447	99.62	29.22	9,461	7,488		28	23,592	4
20:35	31.3	5.59464	221	18	17.99	447	99.62	29.22	9,461	7,488		28	38,568	6
20:37	29.9	5.468089	221	18	17.99	437	99.62	29.22	9,247	7,319		28	53,545	8
20:39	29	5.385165	219	18	17.99	430	99.62	29.22	9,093	7,218		27	68,182	10
20:41	27.8	5.272571	222	18	17.99	422	99.62	29.22	8,923	7,052		27	82,619	12
20:43	25.7	5.069517	222	18	17.99	406	99.62	29.22	8,579	6,780		26	96,722	14
20:45	24.6	4.959839	220	18	17.99	396	99.62	29.22	8,381	6,643		25	110,283	16
20:47	24.9	4.98999	217	18	17.99	398	99.62	29.22	8,413	6,698		25	123,569	18
20:49	23.2	4.816638	220	18	17.99	385	99.62	29.22	8,139	6,452		24	136,966	20
20:51	22.2	4.711688	220	18	17.99	376	99.62	29.22	7,962	6,311		24	149,869	22
20:53	11.5	3.391165	221	12	17.99	273	99.62	29.22	5,776	4,506		17	162,491	24
20:55	20.7	4.549725	220	18	17.99	363	99.62	29.22	7,688	6,094		23	171,503	26
20:57	20.3	4.505552	221	18	17.99	360	99.62	29.22	7,619	6,030		23	183,691	28
20:59	20	4.472136	221	18	17.99	358	99.62	29.22	7,563	5,986		23	195,752	30
21:01	19.4	4.404543	220	18	17.99	352	99.62	29.22	7,443	5,900		22	207,723	32
21:03	19.8	4.449719	221	16	17.99	357	99.62	29.22	7,543	5,941		22	219,522	34
21:05	17.9	4.230839	220	16	17.99	339	99.62	29.22	7,167	5,653		21	231,405	36
21:07	17.6	4.195235	221	16	17.99	336	99.62	29.22	7,111	5,602		21	242,712	38
21:09	17.2	4.147288	222	16	17.99	333	99.62	29.22	7,035	5,533		21	253,915	40
21:11	16.9	4.110961	220	16	17.99	329	99.62	29.22	6,963	5,493		21	264,982	42
21:13	17.3	4.159327	221	16	17.99	333	99.62	29.22	7,051	5,554		21	275,968	44
21:15	17	4.123106	221	16	17.99	330	99.62	29.22	6,989	5,505		21	287,075	46
21:17	16.9	4.110961	220	16	17.99	329	99.62	29.22	6,963	5,493		21	298,085	48
21:19	16.5	4.062019	221	16	17.99	326	99.62	29.22	6,886	5,424		20	309,071	50
21:21	15.7	3.962323	221	14	17.99	318	99.62	29.22	6,733	5,278		20	319,919	52
21:23	13.8	3.714835	222	14	17.99	299	99.62	29.22	6,317	4,944		19	330,474	54
21:25	13.5	3.674235	222	14	17.99	295	99.62	29.22	6,248	4,890		18	340,363	56
21:27	13.1	3.619392	222	14	17.99	291	99.62	29.22	6,155	4,817		18	350,144	58
21:29	12.5	3.535534	163	12	17.99	272	99.62	29.22	5,760	4,912		18	359,779	60
21:31	12.8	3.577709	217	12	17.99	287	99.62	29.22	6,076	4,768		18	369,602	62
21:33	12.1	3.478505	221	12	17.99	280	99.62	29.22	5,925	4,622		17	379,138	64
21:35	11.5	3.391165	227	12	17.99	274	99.62	29.22	5,802	4,486		17	388,382	66
21:37	11.3	3.361547	227	12	17.99	272	99.62	29.22	5,751	4,447		17	397,354	68
21:39	11	3.316625	229	12	17.99	269	99.62	29.22	5,683	4,381		16	406,248	70
21:41	10.5	3.24037	229	12	17.99	262	99.62	29.22	5,552	4,281		16	415,011	72
21:43	10.8	3.286335	229	12	17.99	266	99.62	29.22	5,631	4,341		16	423,572	74
21:45	10.5	3.24037	229	10	17.99	263	99.62	29.22	5,566	4,270		16	432,254	76
21:47	9.3	3.04959	229	6	17.99	249	99.62	29.22	5,264	3,999		15	440,794	78
21:49	8.9	2.983287	228	6	17.99	243	99.62	29.22	5,146	3,915		15	448,792	80
21:51	9.1	3.016621	229	6	17.99	246	99.62	29.22	5,207	3,956		15	456,622	82
21:53	8.8	2.966479	214	6	17.99	239	99.62	29.22	5,064	3,933		15	464,533	84
21:55	8.2	2.863564	213	5	17.99	231	99.62	29.22	4,891	3,795		14	472,399	86
21:57	7.8	2.792848	213	5	17.99	226	99.62	29.22	4,770	3,701		14	479,988	88
21:59	7.3	2.701851	214	5	17.99	218	99.62	29.22	4,618	3,578		13	487,390	90
22:01	6.9	2.626785	215	5	17.99	212	99.62	29.22	4,493	3,476		13	494,545	92
22:03	6.5	2.54951	217	4	17.99	207	99.62	29.22	4,373	3,364		13	501,497	94
22:05	6.5	2.54951	218	4	17.99	207	99.62	29.22	4,376	3,362		13	508,225	96
22:07	6	2.44949	218	4	17.99	199	99.62	29.22	4,205	3,230		12	514,949	98
22:09	5.8	2.408319	219	4	17.99	196	99.62	29.22	4,137	3,173		12	521,408	100
22:11	5.1	2.258318	220	4	17.99	184	99.62	29.22	3,882	2,973		11	527,755	102
22:13	4.9	2.213594	220	3	17.99	180	99.62	29.22	3,810	2,911		11	533,702	104
22:15	4.8	2.19089	220	3	17.99	178	99.62	29.22	3,771	2,881		11	539,524	106
22:17	4.3	2.073644	218	3	17.99	168	99.62	29.22	3,564	2,731		10	545,286	108
22:19	3.9	1.974842	221	3	17.99	161	99.62	29.22	3,402	2,595		10	550,748	110
22:21	3.3	1.81659	220	3	17.99	148	99.62	29.22	3,127	2,389		9	555,938	112
22:23	3.1	1.760682	220	3	17.99	143	99.62	29.22	3,030	2,315		9	560,715	114
22:25	3	1.732051	221	2	17.99	141	99.62	29.22	2,987	2,273		9	565,346	116
22:27	2.7	1.643168	221	2	17.99	134	99.62	29.22	2,834	2,157		8	569,892	118
22:29	2.5	1.581139	222	2	17.99	129	99.62	29.22	2,729	2,074		8	574,205	120
22:31	2.3	1.516575	223	2	17.99	124	99.62	29.22	2,619	1,987		7	578,352	122
22:33	2.1	1.449138	222	2	17.99	118	99.62	29.22	2,501	1,900		7	582,327	124
22:35	2.6	1.612452	216	2	17.99	131	99.62	29.22	2,771	2,124		8	586,128	126
22:37	2.9	1.702939	221	2	17.99	139	99.62	29.22	2,937	2,235		8	590,376	128
22:39	3.3	1.81659	221	2	17.99	148	99.62	29.22	3,133	2,384		9	594,846	130
22:41	3	1.732051	222	2	17.99	141	99.62	29.22	2,989	2,271		9	599,614	132



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run C2 - West Vent - 7/19/11

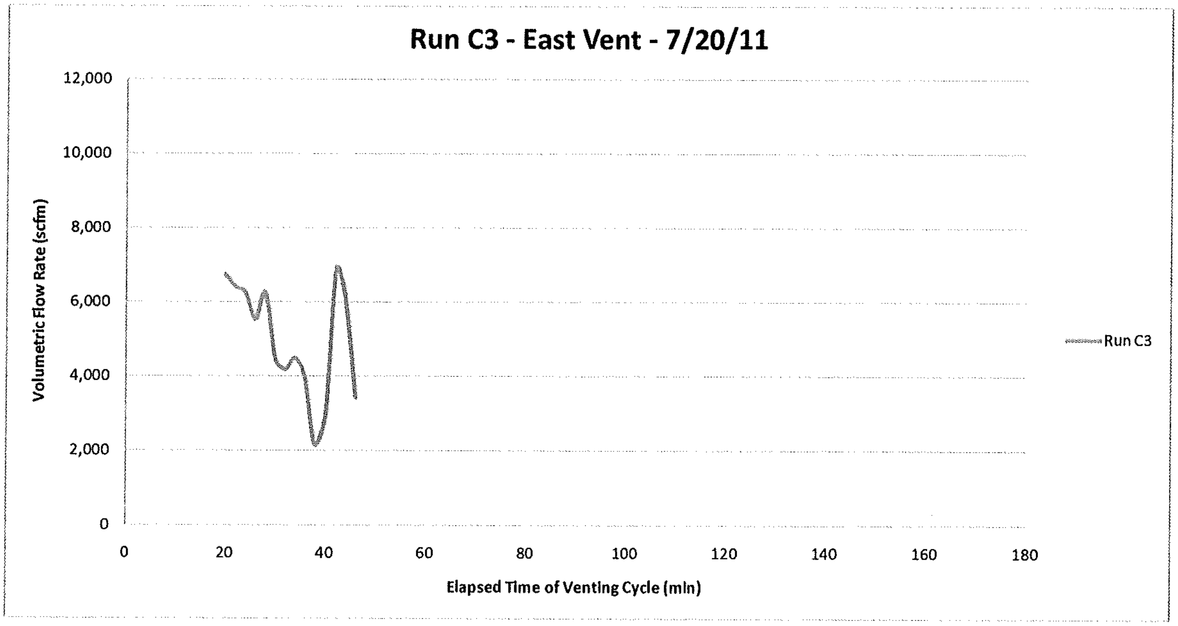
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
14:24	5.4	2.32379	216	8	17.98	188	98.99	29.16	3,969	3,082		31	0	0
14:26	6.9	2.626785	218	8	17.98	212	98.99	29.16	4,493	3,479		35	6,164	2
14:28	6.7	2.588436	221	8	17.98	210	98.99	29.16	4,437	3,420		35	13,121	4
14:30	6.5	2.54951	225	8	17.98	207	98.99	29.16	4,383	3,359		34	19,962	6
14:32	6.7	2.588436	229	8	17.98	211	98.99	29.16	4,463	3,400		34	26,680	8
14:34	6.7	2.588436	231	8	17.98	211	98.99	29.16	4,469	3,395		34	33,480	10
14:36	6.5	2.54951	231	8	17.98	208	98.99	29.16	4,402	3,344		34	40,271	12
14:38	6.2	2.48998	233	8	17.98	204	98.99	29.16	4,306	3,262		33	46,960	14
14:40	6.3	2.50998	233	8	17.98	205	98.99	29.16	4,340	3,288		33	53,483	16
14:42	6.2	2.48998	233	8	17.98	204	98.99	29.16	4,306	3,262		33	60,059	18
14:44	6	2.44949	234	8	17.98	200	98.99	29.16	4,239	3,206		33	66,582	20
14:46	6.2	2.48998	234	8	17.98	204	98.99	29.16	4,309	3,259		33	72,994	22
14:48	6.2	2.48998	234	8	17.98	204	98.99	29.16	4,309	3,259		33	79,513	24
14:50	6.2	2.48998	234	8	17.98	204	98.99	29.16	4,309	3,259		33	86,031	26
14:52	5.9	2.428992	232	10	17.98	198	98.99	29.16	4,187	3,192		32	92,549	28
14:54	2.9	1.702939	233	12	17.98	139	98.99	29.16	2,930	2,242		23	98,933	30
14:56	1.6	1.264911	234	14	17.98	103	98.99	29.16	2,173	1,668		17	103,416	32
14:58	3.3	1.81659	234	14	17.98	148	98.99	29.16	3,120	2,395		24	106,752	34
15:00	4.2	2.04939	234	16	17.98	166	98.99	29.16	3,512	2,709		27	111,543	36
15:02	4.6	2.144761	234	16	17.98	174	98.99	29.16	3,675	2,835		29	116,961	38
15:04	5.4	2.32379	235	16	17.98	188	98.99	29.16	3,985	3,069		31	122,631	40
15:06	4.4	2.097618	233	18	17.98	169	98.99	29.16	3,583	2,781		28	128,769	42
15:08	5	2.236068	235	18	17.98	181	98.99	29.16	3,825	2,961		30	134,332	44
15:10	6.5	2.54951	236	18	17.98	206	98.99	29.16	4,364	3,373		34	140,254	46
15:12	2.1	1.449138	235	18	17.98	117	98.99	29.16	2,479	1,919		19	147,000	48
15:14	2.2	1.48324	236	18	17.98	120	98.99	29.16	2,539	1,962		20	150,838	50
15:16	1.9	1.378405	237	18	17.98	112	98.99	29.16	2,361	1,822		18	154,763	52
15:18	9.3	3.04959	240	18	17.98	247	98.99	29.16	5,235	4,023		41	158,407	54
15:20	7.2	2.683282	242	16	17.98	219	98.99	29.16	4,624	3,527		36	166,454	56



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run C3 - East Vent - 7/20/11

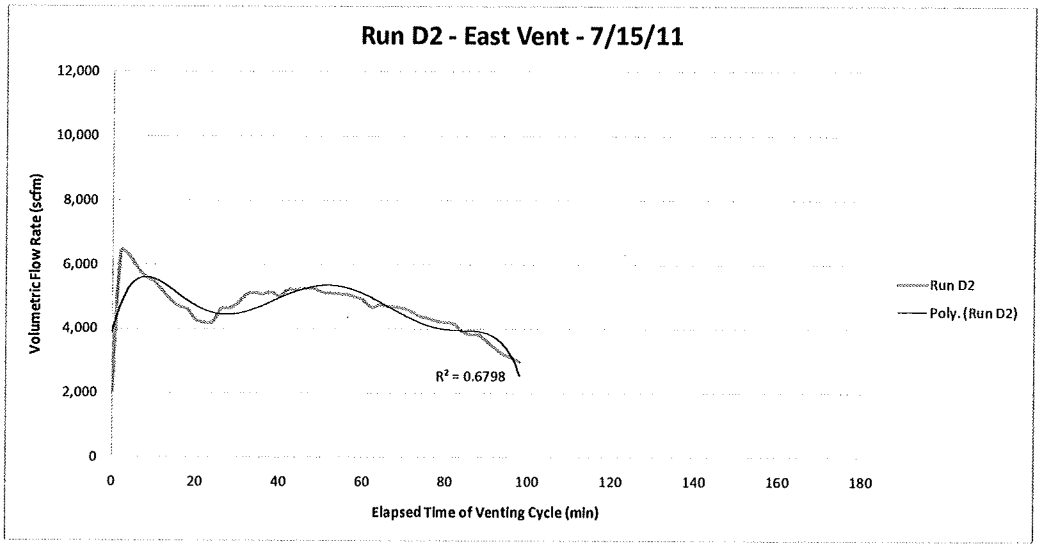
Time	delta P (In. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (In. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (In. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
09:05			199		17.99		99.74	29.08						0
09:07			216		17.99		99.74	29.08						2
09:09			217		17.99		99.74	29.08						4
09:11			219		17.99		99.74	29.08						6
09:13			221		17.99		99.74	29.08						8
09:15			213		17.99		99.74	29.08						10
09:17			213		17.99		99.74	29.08						12
09:19			213		17.99		99.74	29.08						14
09:21			213		17.99		99.74	29.08						16
09:23			213		17.99		99.74	29.08						18
09:25	24.3	4.929503	214	32	17.99	386	99.74	29.08	8,174	6,727		17		20
09:27	21.9	4.679744	214	34	17.99	366	99.74	29.08	7,742	6,402		17	148,004	22
09:29	21	4.582576	214	32	17.99	359	99.74	29.08	7,599	6,254		16	160,807	24
09:31	16.3	4.037326	214	34	17.99	316	99.74	29.08	6,679	5,523		14	173,315	26
09:33	21.1	4.593474	214	29	17.99	361	99.74	29.08	7,644	6,247		16	184,360	28
09:35	10.9	3.301515	214	24	17.99	261	99.74	29.08	5,527	4,463		12	196,854	30
09:37	9.3	3.04959	214	37	17.99	238	99.74	29.08	5,028	4,186		11	205,780	32
09:39	11	3.316625	214	26	17.99	262	99.74	29.08	5,539	4,494		12	214,153	34
09:41	8.4	2.898275	214	34	17.99	227	99.74	29.08	4,795	3,965		10	223,141	36
09:43	2.5	1.581139	214	30	17.99	124	99.74	29.08	2,628	2,153		6	231,071	38
09:45	4.4	2.097618	214	49	17.99	161	99.74	29.08	3,411	2,919		8	235,376	40
09:47	23.7	4.868265	216	59	17.99	371	99.74	29.08	7,841	6,840		18	241,214	42
09:49	19.1	4.370355	216	46	17.99	338	99.74	29.08	7,142	6,052		16	254,895	44
09:51	6.2	2.48998	215	40	17.99	194	99.74	29.08	4,094	3,427		9	266,999	46



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run D2 - East Vent - 7/15/11

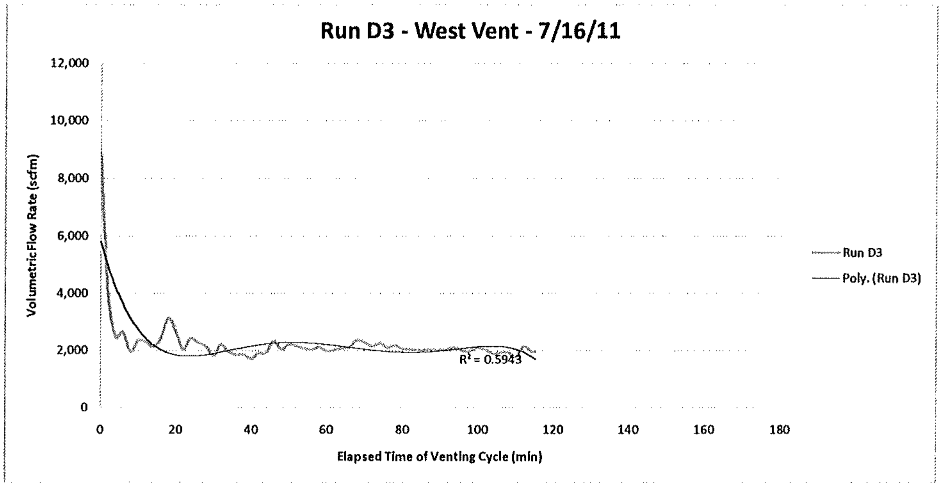
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
19:39	2.2	1.48324	180	10	17.99	116	99.30	29.26	2,454	2,030		14	0	0
19:41	22.8	4.774935	218	16	17.99	382	99.30	29.26	8,072	6,395		45	4,059	2
19:43	22.1	4.701064	222	16	17.99	377	99.30	29.26	7,971	6,278		44	16,849	4
19:45	19.6	4.427189	227	16	17.99	356	99.30	29.26	7,534	5,890		41	29,405	6
19:47	17.9	4.230839	231	14	17.99	342	99.30	29.26	7,238	5,599		39	41,185	8
19:49	17	4.123106	233	14	17.99	334	99.30	29.26	7,064	5,449		38	52,383	10
19:51	15.3	3.911521	231	14	17.99	316	99.30	29.26	6,692	5,177		36	63,281	12
19:53	13.8	3.714835	235	12	17.99	302	99.30	29.26	6,389	4,890		34	73,634	14
19:55	12.7	3.563706	235	10	17.99	290	99.30	29.26	6,144	4,680		33	83,414	16
19:57	12.3	3.507136	236	10	17.99	286	99.30	29.26	6,051	4,602		32	92,774	18
19:59	10.6	3.255764	237	10	17.99	266	99.30	29.26	5,622	4,269		30	101,978	20
20:01	10.2	3.193744	238	10	17.99	261	99.30	29.26	5,518	4,185		29	110,517	22
20:03	10.3	3.209361	238	10	17.99	262	99.30	29.26	5,545	4,205		29	118,887	24
20:05	12.3	3.507136	237	10	17.99	286	99.30	29.26	6,056	4,599		32	127,298	26
20:07	12.4	3.521363	236	12	17.99	287	99.30	29.26	6,061	4,632		32	136,495	28
20:09	13.2	3.63318	236	12	17.99	296	99.30	29.26	6,253	4,779		33	145,760	30
20:11	14.7	3.834058	235	12	17.99	312	99.30	29.26	6,594	5,047		35	155,318	32
20:13	15	3.872983	230	12	17.99	314	99.30	29.26	6,637	5,117		36	165,413	34
20:15	14.8	3.847077	234	12	17.99	313	99.30	29.26	6,612	5,068		35	175,646	36
20:17	15.2	3.898718	234	12	17.99	317	99.30	29.26	6,701	5,136		36	185,782	38
20:19	14.4	3.794733	233	12	17.99	308	99.30	29.26	6,517	5,003		35	196,054	40
20:21	15.6	3.949684	233	12	17.99	321	99.30	29.26	6,784	5,207		36	206,059	42
20:23	15.6	3.949684	234	12	17.99	321	99.30	29.26	6,788	5,203		36	216,473	44
20:25	15.8	3.974921	234	12	17.99	323	99.30	29.26	6,832	5,236		37	226,879	46
20:27	15.9	3.98748	234	12	17.99	324	99.30	29.26	6,853	5,253		37	237,352	48
20:29	15.2	3.898718	233	12	17.99	317	99.30	29.26	6,696	5,140		36	247,857	50
20:31	15	3.872983	233	12	17.99	314	99.30	29.26	6,652	5,106		36	258,137	52
20:33	14.9	3.860052	233	12	17.99	313	99.30	29.26	6,630	5,089		36	268,348	54
20:35	14.7	3.834058	232	12	17.99	311	99.30	29.26	6,580	5,058		35	278,525	56
20:37	14.3	3.781534	232	12	17.99	307	99.30	29.26	6,490	4,989		35	288,642	58
20:39	13.8	3.714835	232	12	17.99	301	99.30	29.26	6,376	4,901		34	298,619	60
20:41	12.5	3.535534	232	12	17.99	287	99.30	29.26	6,068	4,664		33	308,421	62
20:43	12.8	3.577709	228	12	17.99	289	99.30	29.26	6,122	4,734		33	317,749	64
20:45	12.6	3.549648	229	12	17.99	287	99.30	29.26	6,079	4,693		33	327,216	66
20:47	12.6	3.549648	230	10	17.99	288	99.30	29.26	6,098	4,678		33	336,602	68
20:49	12.4	3.521363	230	7	17.99	287	99.30	29.26	6,072	4,624		32	345,959	70
20:51	11.8	3.435113	229	7	17.99	280	99.30	29.26	5,919	4,514		32	355,206	72
20:53	11.1	3.331666	229	7	17.99	271	99.30	29.26	5,741	4,378		31	364,234	74
20:55	10.8	3.286335	228	7	17.99	267	99.30	29.26	5,658	4,321		30	372,990	76
20:57	10.4	3.224903	228	6	17.99	263	99.30	29.26	5,560	4,235		30	381,633	78
20:59	10.2	3.193744	227	6	17.99	260	99.30	29.26	5,502	4,198		29	390,104	80
21:01	10	3.162278	227	6	17.99	258	99.30	29.26	5,448	4,156		29	398,499	82
21:03	8.9	2.983287	226	6	17.99	243	99.30	29.26	5,136	3,924		27	406,811	84
21:05	8.4	2.898275	225	6	17.99	236	99.30	29.26	4,986	3,815		27	414,659	86
21:07	8.4	2.898275	224	5	17.99	236	99.30	29.26	4,988	3,813		27	422,289	88
21:09	7.6	2.75681	225	4	17.99	225	99.30	29.26	4,754	3,620		25	429,914	90
21:11	6.7	2.588436	224	4	17.99	211	99.30	29.26	4,460	3,401		24	437,153	92
21:13	6	2.44949	225	4	17.99	200	99.30	29.26	4,224	3,216		22	443,956	94
21:15	5.6	2.366432	226	4	17.99	193	99.30	29.26	4,084	3,105		22	450,388	96
21:17	5.2	2.280351	226	3	17.99	186	99.30	29.26	3,940	2,988		21	456,597	98



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run D3 - West Vent - 7/16/11

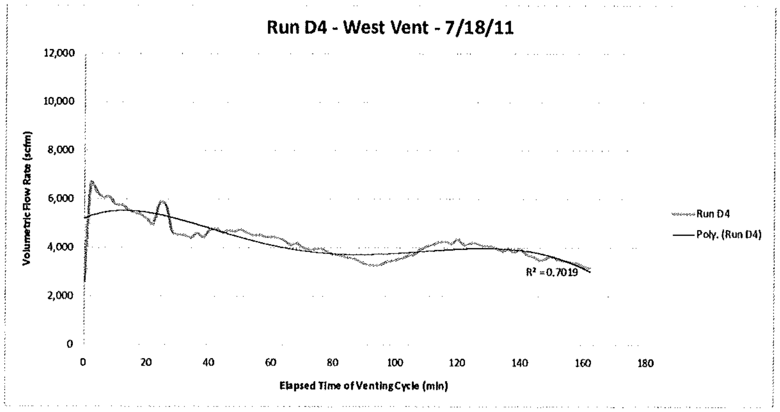
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
13:22	42	6.48074	230	36	17.99	509	99.51	29.38	10,774	8,825		43	0	0
13:24	8.2	2.86356	230	38	17.99	225	99.51	29.38	4,749	3,908		19	17,649	2
13:26	3.3	1.81659	230	34	17.99	143	99.51	29.38	3,027	2,468		12	25,466	4
13:28	3.8	1.94936	230	33	17.99	154	99.51	29.38	3,252	2,645		13	30,401	6
13:30	2.1	1.44914	227	30	17.99	114	99.51	29.38	2,421	1,964		10	35,692	8
13:32	3	1.73205	230	30	17.99	137	99.51	29.38	2,899	2,342		11	39,620	10
13:34	2.9	1.70294	230	28	17.99	135	99.51	29.38	2,857	2,297		11	44,304	12
13:36	2.5	1.58114	230	26	17.99	126	99.51	29.38	2,659	2,128		10	48,899	14
13:38	3.2	1.78885	230	25	17.99	142	99.51	29.38	3,012	2,405		12	53,155	16
13:40	5.4	2.32379	229	24	17.99	185	99.51	29.38	3,915	3,123		15	57,965	18
13:42	4	2	228	22	17.99	160	99.51	29.38	3,375	2,683		13	64,210	20
13:44	2.3	1.51658	227	22	17.99	121	99.51	29.38	2,557	2,036		10	69,577	22
13:46	3.2	1.78885	229	30	17.99	141	99.51	29.38	2,992	2,421		12	73,649	24
13:48	2.8	1.67332	227	30	17.99	132	99.51	29.38	2,795	2,268		11	78,490	26
13:50	2.5	1.58114	228	30	17.99	125	99.51	29.38	2,643	2,141		10	83,026	28
13:52	1.8	1.34164	228	28	17.99	106	99.51	29.38	2,248	1,813		9	87,308	30
13:54	2.7	1.64317	229	26	17.99	131	99.51	29.38	2,761	2,213		11	90,933	32
13:56	2.1	1.44914	228	26	17.99	115	99.51	29.38	2,434	1,953		10	95,360	34
13:58	1.9	1.3784	229	26	17.99	110	99.51	29.38	2,317	1,857		9	99,266	36
14:00	1.9	1.3784	228	24	17.99	110	99.51	29.38	2,320	1,854		9	102,980	38
14:02	1.6	1.26491	228	24	17.99	101	99.51	29.38	2,129	1,701		8	106,687	40
14:04	2	1.41421	228	24	17.99	113	99.51	29.38	2,381	1,902		9	110,089	42
14:06	2	1.41421	228	24	17.99	113	99.51	29.38	2,381	1,902		9	113,892	44
14:08	3	1.73205	228	23	17.99	138	99.51	29.38	2,919	2,326		11	117,696	46
14:10	2.3	1.51658	227	22	17.99	121	99.51	29.38	2,557	2,036		10	122,348	48
14:12	2.7	1.64317	227	20	17.99	131	99.51	29.38	2,777	2,201		11	126,421	50
14:14	2.6	1.61245	227	20	17.99	129	99.51	29.38	2,725	2,160		11	130,822	52
14:16	2.4	1.54919	228	20	17.99	124	99.51	29.38	2,620	2,073		10	135,141	54
14:18	2.3	1.51658	227	19	17.99	121	99.51	29.38	2,566	2,029		10	139,288	56
14:20	2.5	1.58114	227	19	17.99	126	99.51	29.38	2,675	2,115		10	143,346	58
14:22	2.2	1.48324	227	18	17.99	119	99.51	29.38	2,513	1,982		10	147,576	60
14:24	2.3	1.51658	228	17	17.99	122	99.51	29.38	2,574	2,022		10	151,540	62
14:26	2.4	1.54919	227	17	17.99	124	99.51	29.38	2,628	2,067		10	155,585	64
14:28	2.5	1.58114	228	17	17.99	127	99.51	29.38	2,684	2,109		10	159,720	66
14:30	3.1	1.76068	227	17	17.99	141	99.51	29.38	2,986	2,350		11	163,937	68
14:32	2.9	1.70294	228	17	17.99	137	99.51	29.38	2,891	2,271		11	168,636	70
14:34	2.6	1.61245	227	16	17.99	129	99.51	29.38	2,738	2,149		10	173,178	72
14:36	2.9	1.70294	228	14	17.99	137	99.51	29.38	2,901	2,263		11	177,477	74
14:38	2.5	1.58114	228	14	17.99	127	99.51	29.38	2,694	2,101		10	182,002	76
14:40	2.7	1.64317	227	14	17.99	132	99.51	29.38	2,797	2,185		11	186,204	78
14:42	2.4	1.54919	227	14	17.99	125	99.51	29.38	2,637	2,060		10	190,574	80
14:44	2.4	1.54919	227	14	17.99	125	99.51	29.38	2,637	2,060		10	194,694	82
14:46	2.3	1.51658	227	14	17.99	122	99.51	29.38	2,582	2,017		10	198,814	84
14:48	2.3	1.51658	227	14	17.99	122	99.51	29.38	2,582	2,017		10	202,848	86
14:50	2.3	1.51658	227	14	17.99	122	99.51	29.38	2,582	2,017		10	206,881	88
14:52	2.3	1.51658	227	14	17.99	122	99.51	29.38	2,582	2,017		10	210,914	90
14:54	2.4	1.54919	226	14	17.99	125	99.51	29.38	2,635	2,062		10	214,947	92
14:56	2.5	1.58114	226	14	17.99	127	99.51	29.38	2,690	2,104		10	219,070	94
14:58	2.2	1.48324	226	14	17.99	119	99.51	29.38	2,523	1,974		10	223,279	96
15:00	2.2	1.48324	226	14	17.99	119	99.51	29.38	2,523	1,974		10	227,226	98
15:02	2.5	1.58114	225	14	17.99	127	99.51	29.38	2,688	2,106		10	231,174	100
15:04	2.3	1.51658	225	14	17.99	122	99.51	29.38	2,578	2,020		10	235,385	102
15:06	2	1.41421	224	12	17.99	114	99.51	29.38	2,408	1,880		9	239,424	104
15:08	2.1	1.44914	224	12	17.99	117	99.51	29.38	2,467	1,927		9	243,184	106
15:10	2.1	1.44914	222	11	17.99	117	99.51	29.38	2,467	1,927		9	247,037	108
15:12	1.8	1.34164	224	10	17.99	108	99.51	29.38	2,290	1,779		9	250,891	110
15:14	2.6	1.61245	225	10	17.99	130	99.51	29.38	2,754	2,137		10	254,449	112
15:16	2.2	1.48324	225	10	17.99	120	99.51	29.38	2,534	1,966		10	258,723	114
15:17	2.2	1.48324	225	10	17.99	120	99.51	29.38	2,534	1,966		10	260,689	115


Run D3 - West Vent - 7/16/11

MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run D4 - West Vent - 7/18/11

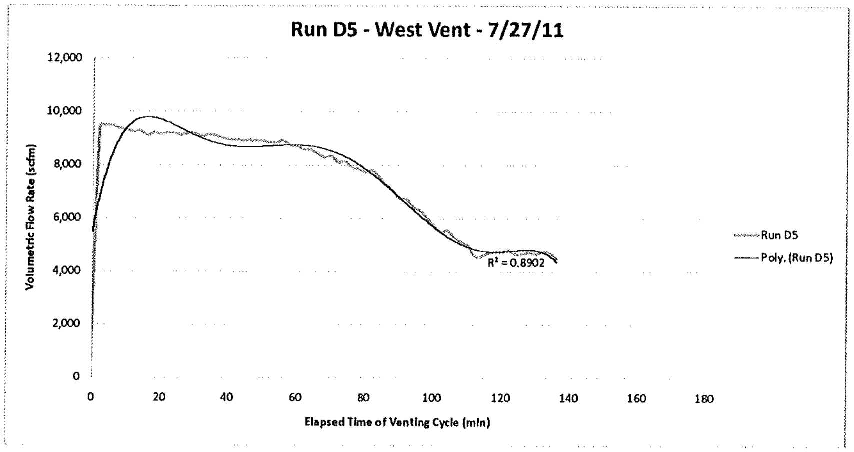
Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
02:20	3.2	1.78885	132	20	17.98	133	98.84	29.38	2,808	2,582		30	0	0
02:22	24.5	4.94975	215	18	17.98	393	98.84	29.38	8,315	6,675		77	5,164	2
02:24	22	4.69042	219	18	17.98	374	98.84	29.38	7,903	6,306		73	18,513	4
02:26	20.8	4.5607	230	18	17.98	366	98.84	29.38	7,746	6,083		71	31,126	6
02:28	21.1	4.59347	232	16	17.98	370	98.84	29.38	7,832	6,103		71	43,291	8
02:30	18.9	4.34741	233	16	17.98	351	98.84	29.38	7,418	5,772		67	55,497	10
02:32	18.8	4.3359	233	16	17.98	350	98.84	29.38	7,398	5,757		67	67,041	12
02:34	17.5	4.1833	233	14	17.98	338	98.84	29.38	7,155	5,541		64	78,554	14
02:36	16.8	4.09878	233	14	17.98	331	98.84	29.38	7,010	5,429		63	89,635	16
02:38	16.2	4.02492	222	12	17.98	324	98.84	29.38	6,846	5,361		62	100,493	18
02:40	15.4	3.92428	234	12	17.98	318	98.84	29.38	6,733	5,181		60	111,214	20
02:42	14.3	3.78153	234	12	17.98	307	98.84	29.38	6,488	4,993		58	121,576	22
02:44	13	3.60555	0	12	17.98	238	98.84	29.38	5,036	5,847		68	131,562	24
02:46	12.6	3.54965	0	12	17.98	234	98.84	29.38	4,958	5,757		67	143,256	26
02:48	12.5	3.53553	235	10	17.98	288	98.84	29.38	6,085	4,653		54	154,769	28
02:50	11.9	3.44964	234	10	17.98	280	98.84	29.38	5,933	4,543		53	164,076	30
02:52	11.7	3.42053	235	10	17.98	278	98.84	29.38	5,887	4,502		52	173,163	32
02:54	11.3	3.36155	234	8	17.98	274	98.84	29.38	5,796	4,417		51	182,167	34
02:56	12.2	3.49285	234	8	17.98	285	98.84	29.38	6,022	4,589		53	191,000	36
02:58	11.4	3.37639	233	8	17.98	275	98.84	29.38	5,817	4,439		51	200,178	38
03:00	12.9	3.59166	233	8	17.98	293	98.84	29.38	6,188	4,722		55	209,057	40
03:02	13.2	3.63318	231	8	17.98	295	98.84	29.38	6,251	4,784		55	218,502	42
03:04	12.4	3.52136	232	8	17.98	287	98.84	29.38	6,063	4,633		54	228,069	44
03:06	12.8	3.57771	232	8	17.98	291	98.84	29.38	6,160	4,707		55	237,336	46
03:08	12.6	3.54965	231	8	17.98	289	98.84	29.38	6,107	4,674		54	246,751	48
03:10	13	3.60555	233	8	17.98	294	98.84	29.38	6,212	4,741		55	256,099	50
03:12	12.2	3.49285	230	8	17.98	284	98.84	29.38	6,005	4,602		53	265,580	52
03:14	11.8	3.43511	232	8	17.98	280	98.84	29.38	5,914	4,520		52	274,785	54
03:16	11.8	3.43511	232	8	17.98	280	98.84	29.38	5,914	4,520		52	283,824	56
03:18	11.4	3.37639	232	8	17.98	275	98.84	29.38	5,813	4,443		52	292,864	58
03:20	11.4	3.37639	231	7	17.98	275	98.84	29.38	5,816	4,440		51	301,749	60
03:22	11.1	3.33167	227	7	17.98	271	98.84	29.38	5,722	4,394		51	310,630	62
03:24	10.6	3.25576	230	7	17.98	265	98.84	29.38	5,604	4,285		50	319,418	64
03:26	9.8	3.1305	232	7	17.98	255	98.84	29.38	5,396	4,114		48	327,988	66
03:28	10	3.16228	228	6	17.98	257	98.84	29.38	5,442	4,163		48	336,216	68
03:30	9.3	3.04959	231	6	17.98	249	98.84	29.38	5,260	4,006		46	344,541	70
03:32	8.9	2.98329	232	6	17.98	243	98.84	29.38	5,149	3,916		45	352,552	72
03:34	9	3	232	6	17.98	245	98.84	29.38	5,178	3,938		46	360,383	74
03:36	9.1	3.01662	230	5	17.98	246	98.84	29.38	5,205	3,960		46	368,259	76
03:38	8.4	2.89828	231	5	17.98	237	98.84	29.38	5,005	3,802		44	376,179	78
03:40	8	2.82843	231	5	17.98	231	98.84	29.38	4,884	3,711		43	383,783	80
03:42	7.8	2.79285	231	5	17.98	228	98.84	29.38	4,823	3,664		42	391,204	82
03:44	7.5	2.73861	229	5	17.98	223	98.84	29.38	4,722	3,598		42	398,532	84
03:46	7.3	2.70185	229	5	17.98	220	98.84	29.38	4,659	3,550		41	405,728	86
03:48	6.9	2.62679	229	4	17.98	214	98.84	29.38	4,535	3,447		40	412,827	88
03:50	6.4	2.52982	230	4	17.98	207	98.84	29.38	4,371	3,317		38	419,720	90
03:52	6.2	2.48998	230	4	17.98	203	98.84	29.38	4,302	3,265		38	426,355	92
03:54	6.2	2.48998	229	4	17.98	203	98.84	29.38	4,299	3,267		38	432,884	94
03:56	6.5	2.54951	227	4	17.98	208	98.84	29.38	4,395	3,350		39	439,419	96
03:58	6.8	2.60768	226	4	17.98	212	98.84	29.38	4,492	3,429		40	446,119	98
04:00	7	2.64575	229	4	17.98	216	98.84	29.38	4,568	3,472		40	452,977	100
04:02	7.3	2.70185	228	5	17.98	220	98.84	29.38	4,655	3,552		41	459,921	102
04:04	7.7	2.77489	224	5	17.98	225	98.84	29.38	4,767	3,659		42	467,025	104
04:06	8	2.82843	224	5	17.98	230	98.84	29.38	4,859	3,729		43	474,343	106
04:08	8.9	2.98329	226	6	17.98	242	98.84	29.38	5,127	3,933		46	481,801	108
04:10	9.5	3.08221	223	6	17.98	250	98.84	29.38	5,285	4,072		47	489,667	110
04:12	9.8	3.1305	225	6	17.98	254	98.84	29.38	5,376	4,130		48	497,811	112
04:14	10.2	3.19374	224	6	17.98	259	98.84	29.38	5,480	4,216		49	506,071	114
04:16	10.4	3.2249	224	6	17.98	262	98.84	29.38	5,534	4,257		49	514,503	116
04:18	10	3.16228	225	6	17.98	257	98.84	29.38	5,430	4,172		48	523,018	118
04:20	10.8	3.28634	225	7	17.98	266	98.84	29.38	5,636	4,341		50	531,362	120
04:22	9.7	3.11448	225	7	17.98	253	98.84	29.38	5,341	4,114		48	540,043	122
04:24	10	3.16228	223	6	17.98	256	98.84	29.38	5,422	4,178		48	548,271	124
04:26	10	3.16228	225	6	17.98	257	98.84	29.38	5,430	4,172		48	556,627	126
04:28	9.5	3.08221	225	6	17.98	250	98.84	29.38	5,293	4,066		47	564,970	128
04:30	9.5	3.08221	222	6	17.98	250	98.84	29.38	5,281	4,075		47	573,102	130
04:32	9.1	3.01662	224	6	17.98	245	98.84	29.38	5,176	3,983		46	581,253	132
04:34	8.5	2.91548	224	6	17.98	236	98.84	29.38	5,003	3,849		45	589,218	134
04:36	8.8	2.96648	221	6	17.98	240	98.84	29.38	5,079	3,925		46	596,915	136
04:38	8.4	2.89828	226	5	17.98	236	98.84	29.38	4,987	3,816		44	604,765	138
04:40	9	3	226	5	17.98	244	98.84	29.38	5,162	3,950		46	612,397	140
04:42	7.9	2.81069	227	5	17.98	229	98.84	29.38	4,839	3,698		43	620,297	142
04:44	7.6	2.75681	226	5	17.98	224	98.84	29.38	4,743	3,630		42	627,693	144
04:46	7	2.64575	226	5	17.98	215	98.84	29.38	4,552	3,483		40	634,952	146
04:48	7.3	2.70185	226	5	17.98	220	98.84	29.38	4,649	3,557		41	641,919	148
04:50	7.6	2.75681	226	4	17.98	225	98.84	29.38	4,749	3,625		42	649,034	150
04:52	7.1	2.66458	226	4	17.98	217	98.84	29.38	4,590	3,504		41	656,285	152
04:54	6.9	2.62679	226	4	17.98	214	98.84	29.38	4,525	3,454		40	663,292	154
04:56	6.7	2.58844	226	4	17.98	211	98.84	29.38	4,459	3,404		39	670,201	156
04:58	6.5	2.54951	225	4	17.98	207	98.84	29.38	4,389	3,355		39	677,009	158
05:00	6	2.44949	224	4	17.98	199	98.84	29.38	4,214	3,226		37	683,719	160
05:02	5.8	2.40832	223	3	17.98	196	98.84	29.38	4,145	3,170		37	690,170	162



MPC 205 DCU
Vent Emissions Test
Volumetric Flow Rate Data
EPA Method 2
Run 1

Run D5 - West Vent - 7/27/11

Time	delta P (in. H_2O)	SQRT delta P	Vent Temp. (°F)	Static Pressure (in. H_2O)	Average Wet Gas Molecular Weight (g/g-mol)	Velocity (ft/sec)	Average Moisture Conc. (%)	Bar. Pressure (in. Hg)	Volumetric Flow Rate (acfm)	Volumetric Flow Rate (scfm)	Extrapolated Volumetric Flow Rate (scfm)	Volumetric Flow Rate (dscfm)	Total Vent Gas Volume (scf)	Elapsed Time of Venting Cycle (min)
01:29	1.7	1.30384	108	6	17.99	97	99.52	29.10	2,048	1,879		9	0	0
01:31	48.2	6.94262	220	32	17.99	547	99.52	29.10	11,561	9,437		46	3,759	2
01:33	49.1	7.00714	222	30	17.99	554	99.52	29.10	11,713	9,489		46	22,633	4
01:35	49	7	224	30	17.99	554	99.52	29.10	11,719	9,465		46	41,610	6
01:37	48.6	6.97137	230	30	17.99	554	99.52	29.10	11,722	9,385		45	60,540	8
01:39	48.1	6.93542	231	30	17.99	552	99.52	29.10	11,670	9,330		45	79,310	10
01:41	47.2	6.87023	230	30	17.99	546	99.52	29.10	11,552	9,249		45	97,970	12
01:43	47.7	6.90652	233	30	17.99	550	99.52	29.10	11,638	9,278		45	116,469	14
01:45	46.1	6.7897	234	30	17.99	541	99.52	29.10	11,449	9,114		44	135,024	16
01:47	47.1	6.86294	233	30	17.99	547	99.52	29.10	11,565	9,219		45	153,253	18
01:49	46.5	6.81909	233	30	17.99	543	99.52	29.10	11,491	9,160		44	171,691	20
01:51	47	6.85565	233	30	17.99	546	99.52	29.10	11,552	9,209		44	190,012	22
01:53	46.8	6.84105	232	30	17.99	545	99.52	29.10	11,519	9,196		44	208,431	24
01:55	46	6.78233	232	30	17.99	540	99.52	29.10	11,420	9,118		44	226,824	26
01:57	46.8	6.84105	232	30	17.99	545	99.52	29.10	11,519	9,196		44	245,059	28
01:59	46.7	6.83374	232	30	17.99	544	99.52	29.10	11,507	9,187		44	263,452	30
02:01	45.6	6.75278	231	30	17.99	537	99.52	29.10	11,363	9,084		44	281,825	32
02:03	46.2	6.79706	231	30	17.99	541	99.52	29.10	11,437	9,144		44	299,993	34
02:05	45.8	6.76757	231	30	17.99	538	99.52	29.10	11,387	9,104		44	318,281	36
02:07	45.2	6.72309	232	30	17.99	535	99.52	29.10	11,321	9,038		44	336,490	38
02:09	44.5	6.67083	231	28	17.99	532	99.52	29.10	11,251	8,953		43	354,566	40
02:11	44.5	6.67083	231	28	17.99	532	99.52	29.10	11,251	8,953		43	372,472	42
02:13	44.1	6.64078	230	28	17.99	529	99.52	29.10	11,192	8,919		43	390,378	44
02:15	44.3	6.65582	230	28	17.99	530	99.52	29.10	11,218	8,939		43	408,216	46
02:17	44	6.63325	229	28	17.99	528	99.52	29.10	11,171	8,915		43	426,095	48
02:19	44	6.63325	231	28	17.99	529	99.52	29.10	11,188	8,903		43	443,926	50
02:21	43.4	6.58787	231	28	17.99	525	99.52	29.10	11,111	8,842		43	461,731	52
02:23	43.5	6.59545	230	28	17.99	525	99.52	29.10	11,116	8,858		43	479,414	54
02:25	44.1	6.64078	230	28	17.99	529	99.52	29.10	11,192	8,919		43	497,131	56
02:27	42.4	6.51153	230	28	17.99	519	99.52	29.10	10,974	8,746		42	514,969	58
02:29	42.1	6.48845	230	28	17.99	517	99.52	29.10	10,936	8,715		42	532,460	60
02:31	41.1	6.41093	229	26	17.99	512	99.52	29.10	10,823	8,596		41	549,889	62
02:33	41	6.40312	230	26	17.99	511	99.52	29.10	10,817	8,580		41	567,082	64
02:35	39.6	6.29285	229	26	17.99	502	99.52	29.10	10,623	8,438		41	584,241	66
02:37	38.3	6.1887	229	26	17.99	494	99.52	29.10	10,447	8,298		40	601,117	68
02:39	38.5	6.20484	224	26	17.99	493	99.52	29.10	10,437	8,350		40	617,714	70
02:41	36.8	6.0663	229	24	17.99	485	99.52	29.10	10,265	8,115		39	634,414	72
02:43	36.6	6.04979	221	24	17.99	481	99.52	29.10	10,178	8,140		39	650,644	74
02:45	35	5.91608	228	24	17.99	473	99.52	29.10	10,004	7,920		38	666,925	76
02:47	34.6	5.88218	228	24	17.99	470	99.52	29.10	9,946	7,874		38	682,764	78
02:49	33.6	5.79655	226	22	17.99	464	99.52	29.10	9,811	7,752		37	698,513	80
02:51	34.2	5.84808	227	22	17.99	468	99.52	29.10	9,905	7,816		38	714,018	82
02:53	32.3	5.68331	228	20	17.99	456	99.52	29.10	9,656	7,572		37	729,649	84
02:55	29.7	5.44977	228	20	17.99	438	99.52	29.10	9,259	7,261		35	744,792	86
02:57	28	5.2915	222	18	17.99	424	99.52	29.10	8,973	7,064		34	759,314	88
02:59	25.9	5.0892	228	18	17.99	410	99.52	29.10	8,668	6,764		33	773,441	90
03:01	25.8	5.07937	228	16	17.99	410	99.52	29.10	8,672	6,735		33	786,969	92
03:03	23.5	4.84768	225	16	17.99	390	99.52	29.10	8,258	6,441		31	800,438	94
03:05	22.7	4.76445	228	14	17.99	385	99.52	29.10	8,154	6,302		30	813,321	96
03:07	20.6	4.53872	223	14	17.99	366	99.52	29.10	7,740	6,025		29	825,924	98
03:09	18.9	4.34741	228	14	17.99	352	99.52	29.10	7,440	5,750		28	837,974	100
03:11	17.3	4.15933	227	12	17.99	337	99.52	29.10	7,131	5,492		27	849,474	102
03:13	17.8	4.219	228	12	17.99	342	99.52	29.10	7,238	5,567		27	860,458	104
03:15	16.2	4.02492	228	10	17.99	327	99.52	29.10	6,922	5,297		26	871,591	106
03:17	15.2	3.89872	227	8	17.99	318	99.52	29.10	6,717	5,122		25	882,186	108
03:19	14.5	3.80789	227	7	17.99	311	99.52	29.10	6,569	4,997		24	892,430	110
03:21	12.3	3.50714	227	6	17.99	286	99.52	29.10	6,057	4,596		22	902,424	112
03:23	12.3	3.50714	228	6	17.99	287	99.52	29.10	6,062	4,593		22	911,617	114
03:25	13	3.60555	228	6	17.99	295	99.52	29.10	6,232	4,722		23	920,803	116
03:27	13.2	3.63318	228	6	17.99	297	99.52	29.10	6,280	4,758		23	930,247	118
03:29	13.2	3.63318	228	7	17.99	296	99.52	29.10	6,272	4,764		23	939,764	120
03:31	13.4	3.6606	226	7	17.99	298	99.52	29.10	6,310	4,807		23	949,292	122
03:33	12.6	3.54965	226	7	17.99	289	99.52	29.10	6,119	4,661		23	958,906	124
03:35	12.8	3.57771	226	7	17.99	292	99.52	29.10	6,167	4,698		23	968,229	126
03:37	13	3.60555	227	7	17.99	294	99.52	29.10	6,220	4,731		23	977,626	128
03:39	12.7	3.56371	228	7	17.99	291	99.52	29.10	6,152	4,673		23	987,088	130
03:41	13.2	3.63318	229	6	17.99	297	99.52	29.10	6,284	4,755		23	996,434	132
03:43	13	3.60555	230	6	17.99	295	99.52	29.10	6,241	4,715		23	1,005,944	134
03:45	11.7	3.42053	230	6	17.99	280	99.52	29.10	5,921	4,473		22	1,015,374	136


Run D5 - West Vent - 7/27/11

Field Data Sheets

Sample Type – Velocity (EPA Methods 1A and 2)		Date 7/21/11		Condition A		Page 1 of 2	
Plant Name – BP-Husky Toledo		PTCF 0.84		Run 1		~~Sampling Train Leak Rate (ft^3 @ "Hg)~~	
Project Number - 40942317		Console No. A161396		Operator EDF		~~Initial~~	~~@~~ n/a
Location (Source) – DCU3 West Vent		DGMCF 0.997		Nozzle Dia (in) n/a		~~Final~~	~~@~~
Duct Dimension(s) 8"		ΔH@ 1.875		Nozzle ID n/a		Pitot Tube ID 0.75-01	
Elevation (relative to Barometer) (ft) 0		Kf n/a		Barometer ID BP-2		Pitot Tube Leak Check	
Nozzle Calib Caliper ID n/a	● n/a ● n/a ● n/a			Bar. Press. (in. Hg) 29.12		Initial (+) 00750	(-) 00750
				Stat. Press. (in. H$_2$O) see below		Final (+) 00750	(-) 00750

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H$_2$O)	ΔH (in. H$_2$O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ static pressure EDF 7/21	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	02:15	--	1.6	--	165	--	--	--	--	--	--	--	--
↓	02:17	--	44.8	--	217	3.4	--	--	--	--	--	--	--
	02:19	--	45.6	--	218	3.4	--	--	--	--	--	--	--
	02:21	--	46.3	--	218	3.4	--	--	--	--	--	--	--
	02:23	--	47.7	--	220	3.4	--	--	--	--	--	--	--
	02:25	--	45.7	--	222	3.4	--	--	--	--	--	--	--
	02:27	--	46.1	--	222	3.2	--	--	--	--	--	--	--
	02:29	--	44.6	--	222	3.2	--	--	--	--	--	--	--
	02:31	--	44.4	--	222	3.2	--	--	--	--	--	--	--
	02:33	--	43.8	--	222	3.0	--	--	--	--	--	--	--
	02:35	--	43.7	--	222	3.0	--	--	--	--	--	--	--
	02:37	--	43.1	--	223	3.0	--	--	--	--	--	--	--
	02:39	--	41.8	--	223	2.8	--	--	--	--	--	--	--
	02:41	--	39.6	--	223	2.8	--	--	--	--	--	--	--
	02:43	--	38.6	--	221	2.8	--	--	--	--	--	--	--
	02:45	--	37.4	--	222	2.6	--	--	--	--	--	--	--
	02:47	--	36.4	--	223	2.6	--	--	--	--	--	--	--
	02:49	--	36.3	--	223	2.6	--	--	--	--	--	--	--
	02:51	--	35.3	--	223	2.6	--	--	--	--	--	--	--
	02:53	--	33.5	--	222	2.4	--	--	--	--	--	--	--
	02:55	--	32.0	--	222	2.2	--	--	--	--	--	--	--
	02:57	--	30.9	--	222	2.2	--	--	--	--	--	--	--
	02:59	--	28.8	--	221	2.0	--	--	--	--	--	--	--
	03:01	--	27.2	--	222	2.0	--	--	--	--	--	--	--
	03:03	--	25.6	--	222	1.8	--	--	--	--	--	--	--
	03:05	--	24.2	--	223	1.8	--	--	--	--	--	--	--
	03:07	--	23.4	--	220	1.8	--	--	--	--	--	--	--
	03:09	--	22.0	--	221	1.8	--	--	--	--	--	--	--
	03:11	--	21.1	--	221	1.8	--	--	--	--	--	--	--
	03:13	--	19.5	--	222	1.8	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/21/11	Condition A	Page 2 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 1	~~Sampling Train Leak Rate (ft³ @ "Hg)~~
Project Number - 40942317	Console No. A161396	Operator EDF	~~Initial @~~ n/a
Location (Source) – DCU3 West Vent	DGMCF 0.997	Nozzle Dia (in) n/a	~~Final @~~
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib n/a Caliper ID	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.12	Initial (+) 0@750 (-) 0@750
		Stat. Press. (in. H_2O) see below	Final (+) 0@750 (-) 0@750

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ static pressure EDF 7/21	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	03:15	--	18.7	--	223	1.8	--	--	--	--	--	--	--
	03:17	--	18.6	--	223	1.8	--	--	--	--	--	--	--
	03:19	--	16.9	--	224	1.4	--	--	--	--	--	--	--
	03:21	--	16.5	--	224	1.4	--	--	--	--	--	--	--
	03:23	--	15.5	--	222	1.4	--	--	--	--	--	--	--
	03:25	--	14.8	--	223	1.2	--	--	--	--	--	--	--
	03:27	--	14.3	--	224	1.2	--	--	--	--	--	--	--
	03:29	--	13.4	--	223	1.2	--	--	--	--	--	--	--
	03:31	--	12.8	--	224	1.0	--	--	--	--	--	--	--
	03:33	--	12.6	--	224	.7	--	--	--	--	--	--	--
	03:35	--	11.9	--	224	.6	--	--	--	--	--	--	--
	03:37	--	11.6	--	224	.6	--	--	--	--	--	--	--
	03:39	--	11.6	--	223	.5	--	--	--	--	--	--	--
	03:41	--	10.7	--	224	.5	--	--	--	--	--	--	--
	03:43	--	9.5	--	224	.5	--	--	--	--	--	--	--
	03:45	--	9.5	--	223	.5	--	--	--	--	--	--	--
	03:47	--	9.5	--	224	.5	--	--	--	--	--	--	--
	03:49	--	8.5	--	223	.5	--	--	--	--	--	--	--
	03:51	--	8.4	--	223	.4	--	--	--	--	--	--	--
	03:53	--	8.4	--	223	.4	--	--	--	--	--	--	--
END MODO	03:55	--	7.9	--	223	.4	--	--	--	--	--	--	--
	03:57	--	8.3	--	223	.4	--	--	--	--	--	--	--
	03:59	--	9.6	--	223	.4	--	--	--	--	--	--	--
	04:01	--	9.9	--	223	.5	--	--	--	--	--	--	--
	04:03	--	10.4	--	222	.5	--	--	--	--	--	--	--
	04:05	--	10.2	--	222	.5	--	--	--	--	--	--	--
	04:07	--	10.8	--	222	.5	--	--	--	--	--	--	--
STOP	04:09	--	11.2	--	222	.5	--	--	--	--	--	--	--
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Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/21/11	Condition A	Page 1 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.00	Initial (+)0@750 (-)0@750
		Stat. Press. (in. H₂O) see below	Final (+)0@774 (-)0@774

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	~~Probe~~ static pressure EDF 7/21	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	20:57	--	1.2	--	134	-4	--	--	--	--	--	--	--
	20:59	--	56.0	--	215	-4	--	--	--	--	--	--	--
	21:01	--	56.0	--	216	-4	--	--	--	--	--	--	--
	21:03	--	52.8	--	215	-4	--	--	--	--	--	--	--
	21:05	--	52.3	--	216	-4	--	--	--	--	--	--	--
	21:07	--	51.2	--	216	-4	--	--	--	--	--	--	--
	21:09	--	50.5	--	216	-4	--	--	--	--	--	--	--
	21:11	--	49.7	--	216	-4	--	--	--	--	--	--	--
	21:13	--	48.2	--	216	-4	--	--	--	--	--	--	--
	21:15	--	48.5	--	216	-4	--	--	--	--	--	--	--
	21:17	--	48.0	--	217	-3	--	--	--	--	--	--	--
	21:19	--	47.7	--	217	-4	--	--	--	--	--	--	--
	21:21	--	46.4	--	217	-3	--	--	--	--	--	--	--
	21:23	--	47.6	--	217	-3	--	--	--	--	--	--	--
	21:25	--	46.9	--	217	-2	--	--	--	--	--	--	--
	21:27	--	44.1	--	217	-3	--	--	--	--	--	--	--
	21:29	--	42.0	--	218	-3	--	--	--	--	--	--	--
	21:31	--	41.8	--	217	-3	--	--	--	--	--	--	--
	21:33	--	42.8	--	219	-3	--	--	--	--	--	--	--
	21:35	--	38.2	--	217	-5	--	--	--	--	--	--	--
	21:37	--	36.0	--	218	-6	--	--	--	--	--	--	--
	21:39	--	36.7	--	218	-6	--	--	--	--	--	--	--
	21:41	--	35.5	--	219	-6	--	--	--	--	--	--	--
	21:43	--	34.3	--	219	-5	--	--	--	--	--	--	--
	21:45	--	33.2	--	219	-4	--	--	--	--	--	--	--
	21:47	--	33.0	--	218	-4	--	--	--	--	--	--	--
	21:49	--	33.1	--	219	-4	--	--	--	--	--	--	--
	21:51	--	32.4	--	219	-4	--	--	--	--	--	--	--
	21:53	--	31.5	--	218	-4	--	--	--	--	--	--	--
	21:55	--	30.2	--	219	-4	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/21/11	Condition A	Page 2 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BA2	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	n/a n/a n/a	Bar. Press. (in. Hg) 29.00	Initial (+)0@750 (-)0@750
		Stat. Press. (in. H₂O) see below	Final (+)0@775 (-)0@775

Point	Clock Time EDF 7/21	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	~~Probe~~ static pressure EDF 7/21	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	~~20~~21:57	-	29.1	-	218	-4	--	--	--	--	--	--	--
	21:59	-	29.1	--	219	-3	--	--	--	--	--	--	--
	22:01	-	29.6	--	219	-2	--	--	--	--	--	--	--
	22:03	-	28.3	--	219	-2	--	--	--	--	--	--	--
	22:05	-	27.4	--	219	-2	--	--	--	--	--	--	--
	22:07	-	27.7	--	217	-2	--	--	--	--	--	--	--
	22:09	-	28.0	--	217	-2	--	--	--	--	--	--	--
	22:11	-	27.2	--	217	-2	--	--	--	--	--	--	--
	22:13	-	27.0	--	216	-2	--	--	--	--	--	--	--
	22:15	-	26.6	--	217	-2	--	--	--	--	--	--	--
	22:17	-	27.0	--	216	-2	--	--	--	--	--	--	--
	22:19	-	26.9	--	217	-2	--	--	--	--	--	--	--
	22:21	-	27.1	--	217	-2	--	--	--	--	--	--	--
	22:23	-	26.2	--	216	-2	--	--	--	--	--	--	--
	22:25	-	25.7	--	217	-1	--	--	--	--	--	--	--
	22:27	-	25.6	--	217	-1	--	--	--	--	--	--	--
	22:29	-	22.5	--	217	-1	--	--	--	--	--	--	--
END MOON	22:31	-	25.6	--	217	-1	--	--	--	--	--	--	--
	22:33	-	23.0	--	217	-1	--	--	--	--	--	--	--
	22:35	-	23.1	--	217	-1	--	--	--	--	--	--	--
	22:37	-	23.7	--	217	-1	--	--	--	--	--	--	--
	22:39	-	25.4	--	217	-1	--	--	--	--	--	--	--
	22:41	-	24.2	--	217	-1	--	--	--	--	--	--	--
	22:43	-	24.7	--	217	-1	--	--	--	--	--	--	--
	22:45	-	23.9	--	217	-1	--	--	--	--	--	--	--
	22:47	-	23.5	--	216	-1	--	--	--	--	--	--	--
	22:49	-	22.8	--	216	-1	--	--	--	--	--	--	--
	22:51	-	20.5	--	216	-1	--	--	--	--	--	--	--
	22:53	-	20.0	--	215	-1	--	--	--	--	--	--	--
	22:55	-	18.9	-	215	-1	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/21/11	Condition A	Page 3 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BA-2	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.06	Initial (+) 0@>50 (-) 0@>50
		Stat. Press. (in. H_2O) see below	Final (+) 0@775 (-) 0@775

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ Static Pressure	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	22:57	--	18.3	--	215	-- 1	--	--	--	--	--	--	--
	22:59	--	16.0	--	215	-- 1	--	--	--	--	--	--	--
	23:01	--	15.2	--	215	-- 1	--	--	--	--	--	--	--
	23:03	--	14.2	--	216	-- 1	--	--	--	--	--	--	--
	23:05	--	14.3	--	214	-- 1	--	--	--	--	--	--	--
STOP	23:07	--	13.0	--	214	-- 1	--	--	--	--	--	--	--
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Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/24/11	Condition A	Page 1 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 3	Sampling Train Leak Rate (ft^3 @ "Hg)
Project Number - 40942317	Console No A161396	Operator MIb	Initial ~~n/a @~~
Location (Source) – DCU3 east	DGMCF n/a	Nozzle Dia (in) n/a	Final ~~@~~
Duct Dimension(s) 8"	ΔH@ n/a	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib n/a	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.16	Initial (+) 0@750 (-) 0@750
Caliper ID		Stat. Press. (in. H_2O) see below.	Final (+) 0@750 (-) 0@750

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H_2O)	ΔH (in. H_2O)	Stat. Press. Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
A1	19:55	--	26.1	--	213	4	--	--	--	--	--	--	--
	19:57	--	39.1	--	219	10	--	--	--	--	--	--	--
	19:59	--	37.2	--	222	10	--	--	--	--	--	--	--
	20:01	--	36.9	--	226	10	--	--	--	--	--	--	--
	20:03	--	37.5	--	229	5	--	--	--	--	--	--	--
	20:05	--	35.4	--	232	5	--	--	--	--	--	--	--
	20:07	--	35.3	--	232	5	--	--	--	--	--	--	--
	20:09	--	34.1	--	231	5	--	--	--	--	--	--	--
	20:11	--	33.9	--	233	5	--	--	--	--	--	--	--
	20:13	--	32.7	--	232	5	--	--	--	--	--	--	--
	20:15	--	30.8	--	232	5	--	--	--	--	--	--	--
	20:17	--	29.8	--	232	4	--	--	--	--	--	--	--
	20:19	--	26.4	--	232	4	--	--	--	--	--	--	--
	20:21	--	24.3	--	232	3	--	--	--	--	--	--	--
	20:23	--	21.2	--	233	3	--	--	--	--	--	--	--
	20:25	--	20.6	--	233	3	--	--	--	--	--	--	--
	20:27	--	20.2	--	234	3	--	--	--	--	--	--	--
	20:29	--	18.3	--	233	3	--	--	--	--	--	--	--
	20:31	--	18.2	--	233	3	--	--	--	--	--	--	--
	20:33	--	16.0	--	234	3	--	--	--	--	--	--	--
	20:35	--	14.5	--	234	3	--	--	--	--	--	--	--
	20:37	--	14.3	--	239	2	--	--	--	--	--	--	--
	20:39	--	18.0	--	234	2	--	--	--	--	--	--	--
	20:41	--	14.8	--	232	2	--	--	--	--	--	--	--
	20:43	--	13.5	--	233	2	--	--	--	--	--	--	--
	20:45	--	14.3	--	233	2	--	--	--	--	--	--	--
	20:47	--	17.9	--	233	3	--	--	--	--	--	--	--
	20:49	--	18.9	--	231	3	--	--	--	--	--	--	--
	20:51	--	15.4	--	232	3	--	--	--	--	--	--	--
	20:53	--	18.8	--	231	3	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/24/11	Condition A	Page 2 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A16396	Operator mlb	Initial n/a @
Location (Source) – DCU3 East	DGMCF n/a	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ n/a	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	n/a n/a n/a	Bar. Press. (in. Hg) 29.16	Initial (+) 0 @ 750 (-) 0 @ 750
		Stat. Press. (in. H₂O) see below	Final (+) 0 @ 750 (-) 0 @ 750

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Stat-Press-		Temperature (°F)						Vacuum (in. Hg)
					Stack	~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	20:55		16.5		231	3	--	--	--	--	--	--	
	20:57		17.7		231	3	--	--	--	--	--	--	--
	20:59		17.2		230	2	--	--	--	--	--	--	--
	21:01		16.3		231	2	--	--	--	--	--	--	--
	21:03		15.8		230	2	--	--	--	--	--	--	--
	21:05		13.8		229	2	--	--	--	--	--	--	--
	21:07	--	14.4	--	229	2	--	--	--	--	--	--	--
	21:09	--	13.0	--	229	2	--	--	--	--	--	--	--
	21:11	--	12.8	--	230	2	--	--	--	--	--	--	--
	21:13	--	12.8	--	231	2	--	--	--	--	--	--	--
	21:15	--	10.8	--	231	2	--	--	--	--	--	--	--
	21:17	--	10.8	--	229	2	--	--	--	--	--	--	--
	21:19	--	10.4	--	229	2	--	--	--	--	--	--	--
	21:21	--	9.2	--	229	2	--	--	--	--	--	--	--
	21:23	--	9.6	--	229	2	--	--	--	--	--	--	--
End Middle	21:25	--	9.9	--	231	2	--	--	--	--	--	--	--
↓	21:27	--	6.0	--	229	1	--	--	--	--	--	--	--
	21:29	--	8.3	--	229	1	--	--	--	--	--	--	--
Stop	21:31	--	5.2	--	180	1	--	--	--	--	--	--	--
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Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/25/11	Condition A	Page 1 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 4	~~Sampling Train Leak Rate (ft³ @ "Hg)~~
Project Number - 40942317	Console No. A161396	Operator mlb	Initial n/a @
Location (Source) – DCU3 West Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.20	Initial (+) 0@750 (-) 0@750
Caliper ID n/a		Stat. Press. (in. H₂O) see below	Final (+) 0@760 (-) 0@760

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	~~Probe~~ static pressure EDF 7/25	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	~~14:39~~ 14:40 MB 7/25/11	-	31.5	-	218	* --	--	--	--	--	--	--	--
	14:42	-	30.2	-	222	* --	--	--	--	--	--	--	--
	14:44	-	25.6	-	230	* --	--	--	--	--	--	--	--
	14:46	-	27.1	-	235	16	--	--	--	--	--	--	--
	14:48	-	26.6	-	238	16	--	--	--	--	--	--	--
	14:50	-	26.8	-	238	16	--	--	--	--	--	--	--
	14:52	-	25.9	-	239	16	--	--	--	--	--	--	--
	14:54	-	29.6	-	238	19	--	--	--	--	--	--	--
	14:56	-	39.6	-	238	24	--	--	--	--	--	--	--
	14:58	-	45.7	-	238	30	--	--	--	--	--	--	--
	15:00	-	48.1	-	239	31	--	--	--	--	--	--	--
	15:02	-	49.2	-	238	32	--	--	--	--	--	--	--
	15:04	-	47.2	-	238	30	--	--	--	--	--	--	--
	15:06	-	43.9	-	238	30	--	--	--	--	--	--	--
	15:08	-	40.8	-	238	28	--	--	--	--	--	--	--
	15:10	-	38.9	-	238	26	--	--	--	--	--	--	--
	15:12	-	36.7	-	237	24	--	--	--	--	--	--	--
	15:14	-	33.6	-	238	22	--	--	--	--	--	--	--
	15:16	-	30.6	-	238	20	--	--	--	--	--	--	--
	15:18	-	28.7	-	238	19	--	--	--	--	--	--	--
	15:20	-	26.1	-	238	18	--	--	--	--	--	--	--
	15:22	-	24.1	-	238	18	--	--	--	--	--	--	--
	15:24	-	22.2	-	238	15	--	--	--	--	--	--	--
	15:26	-	20.6	-	238	14	--	--	--	--	--	--	--
	15:28	-	18.0	-	239	13	--	--	--	--	--	--	--
	15:30	-	16.2	-	239	12	--	--	--	--	--	--	--
	15:32	-	14.1	-	240	11	--	--	--	--	--	--	--
	15:34	-	12.3	-	241	10	--	--	--	--	--	--	--
	15:36	-	10.0	-	242	8	--	--	--	--	--	--	--
	15:38	-	8.1	-	241	7	--	--	--	--	--	--	--

Comments: * Magnehelic failed to read stat. Pressure.

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7-25-17	Condition A	Page 2 of 2		
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161396	Operator MIB	Initial	@	
Location (Source) – DCU3 West	DGMCF 0.997	Nozzle Dia (in) n/a	Final	@	
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01		
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check		
Nozzle Calib Caliper ID n/a	n/a n/a n/a	Bar. Press. (in. Hg) 29.20	Initial	(+) See	pg 1
		Stat. Press. (in. H₂O) See below	Final	(+)	(-) 0

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Static Press. Stack	Temperature (°F) ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
End	15:40	—	6.2	—	242	6	--	--	--	--	--	--	--
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Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition 2	Page 1 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run ~~5~~ 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final n/a @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib	n/a n/a n/a	Bar. Press. (in. Hg) 29.22	Initial (+) 0@750 (-) 0@750
Caliper ID n/a		Stat. Press. (in. H₂O) see below	Final (+) 0@750 (-) 0@750

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔP (in. H₂O)	Temperature (°F) static pressure EDF 7/18								Vacuum (in. Hg)
					~~Stack~~	~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
A1	20:29	--	2	8.2	163	~~>106~~	--	--	--	--	--	--	--
	20:31	--	8.9	35.4	217	~~>100~~	EDF	--	--	--	--	--	--
	20:33	kPa --	7.8	31.3	221	~~>100~~	7/18	--	--	--	--	--	--
	20:35	--	7.9	31.3	227	~~>100~~	--	--	--	--	--	--	--
	20:37	--	7.5	29.9	227	~~>100~~	--	--	--	--	--	--	--
	20:39	--	29.0	--	229	--	--	--	--	--	--	--	--
	20:41	--	27.8	--	229	--	--	--	--	--	--	--	--
	20:43	--	25.7	--	229	--	--	--	--	--	--	--	--
	20:45	--	24.6	--	229	--	--	--	--	--	--	--	--
	20:47	--	24.9	--	229	1-8	--	--	--	--	--	--	--
	20:49	--	23.2	--	228	1-8	--	--	--	--	--	--	--
	20:51	--	22.2	--	229	1-8	--	--	--	--	--	--	--
	20:53	--	11.5	--	214	1-2	--	--	--	--	--	--	--
	20:55	--	20.7	--	213	1-8	--	--	--	--	--	--	--
	20:57	--	20.3	--	213	1-8	--	--	--	--	--	--	--
	20:59	--	20.0	--	214	1-8	--	--	--	--	--	--	--
	21:01	--	19.4	--	215	1-8	--	--	--	--	--	--	--
	21:03	--	19.8	--	217	1-6	--	--	--	--	--	--	--
	21:05	--	17.9	--	218	1-6	--	--	--	--	--	--	--
	21:07	--	17.6	--	218	1-6	--	--	--	--	--	--	--
	21:09	--	17.2	--	219	1-6	--	--	--	--	--	--	--
	21:11	--	16.9	--	220	1-6	--	--	--	--	--	--	--
	21:13	--	17.3	--	220	1-6	--	--	--	--	--	--	--
	21:15	--	17.0	--	220	1-6	--	--	--	--	--	--	--
	21:17	--	16.9	--	218	1-6	--	--	--	--	--	--	--
	21:19	--	16.5	--	221	1-6	--	--	--	--	--	--	--
	21:21	--	15.7	--	220	14	--	--	--	--	--	--	--
	21:23	--	13.8	--	220	14	--	--	--	--	--	--	--
	21:25	--	13.5	--	221	14	--	--	--	--	--	--	--
	21:27	--	13.1	--	221	14	--	--	--	--	--	--	--

Comments: points 20:29 - ~~20:35~~ 20:37 in kPa
static pressure probe connected at 20:47

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition 2	Page 2 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 5 1	Sampling Train Leak Rate (ft^3 @ "Hg)
Project Number - 40942317	Console No. 4161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final n/a @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib		Bar. Press. (in. Hg) 29.22	Initial (+)00750 (-)00750
Caliper ID n/a	● n/a ● n/a ● n/a	Stat. Press. (in. H$_2$O) see below	Final (+)00750 (-)00750

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H$_2$O)	ΔH (in. H$_2$O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	static pressure ~~Probe~~ EDF 7/18	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	21:29	--	12.5	--	221	1-2	--	--	--	--	--	--	--
	21:31	--	12.8	--	221	1-2	--	--	--	--	--	--	--
	21:33	--	12.1	--	221	1-2	--	--	--	--	--	--	--
	21:35	--	11.5	--	221	1-2	--	--	--	--	--	--	--
	21:37	--	11.3	--	221	1-2	--	--	--	--	--	--	--
	21:39	--	11.0	--	219	1-2	--	--	--	--	--	--	--
	21:41	--	10.5	--	222	1-2	--	--	--	--	--	--	--
	21:43	--	10.8	--	222	1-2	--	--	--	--	--	--	--
	21:45	--	10.5	--	220	1.0	--	--	--	--	--	--	--
	21:47	--	9.3	--	217	-6	--	--	--	--	--	--	--
End OTM29	21:49	--	8.9	--	220	-6	--	--	--	--	--	--	--
	21:51	--	9.1	--	220	-6	--	--	--	--	--	--	--
P1	21:53	--	8.8	--	221	-6	--	--	--	--	--	--	--
	21:55	--	8.2	--	220	-5	--	--	--	--	--	--	--
	21:57	--	7.8	--	221	-5	--	--	--	--	--	--	--
	21:59	--	7.3	--	221	-5	--	--	--	--	--	--	--
	22:01	--	6.9	--	220	-5	--	--	--	--	--	--	--
	22:03	--	6.5	--	221	-4	--	--	--	--	--	--	--
	22:05	--	6.5	--	220	-4	--	--	--	--	--	--	--
	22:07	--	6.0	--	221	-4	--	--	--	--	--	--	--
	22:09	--	5.8	--	222	-4	--	--	--	--	--	--	--
	22:11	--	5.1	--	220	-4	--	--	--	--	--	--	--
	22:13	--	4.9	--	221	-3	--	--	--	--	--	--	--
	22:15	--	4.8	--	221	-3	--	--	--	--	--	--	--
	22:17	--	4.3	--	220	-3	--	--	--	--	--	--	--
	22:19	--	3.9	--	221	-3	--	--	--	--	--	--	--
	22:21	--	3.3	--	221	-3	--	--	--	--	--	--	--
	22:23	--	3.1	--	222	-3	--	--	--	--	--	--	--
	22:25	--	3.0	--	222	-2	--	--	--	--	--	--	--
	22:37	--	2.7	--	222	-2	--	--	--	--	--	--	--

Comments: switch to console manometer for static pressure at 21:45

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition C	Page 3 of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run ~~5~~ 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 East Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final n/a @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	n/a n/	Bar. Press. (in. Hg) 29.22	Initial (+) 0@750 (-) 0@750
		Stat. Press. (in. H₂O) see below	Final (+) 0@750 (-) 0@750

static pressure EDF 7/18

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	22:29	--	2.5	--	222	-2	--	--	--	--	--	--	--
	22:31	--	2.3	--	223	-2	--	--	--	--	--	--	--
	22:33	--	2.1	--	222	-2	--	--	--	--	--	--	--
END M26A	22:35	--	2.6	--	216	-2	--	--	--	--	--	--	--
	22:37	--	2.9	--	221	-2	--	--	--	--	--	--	--
	22:39	--	3.3	--	221	-2	--	--	--	--	--	--	--
	22:41	--	3.0	--	222	-2	--	--	--	--	--	--	--
STOP	22:43	--		--		--	--	--	--	--	--	--	--
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Comments: All isokinetic trains finished by 2236.

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/19/11	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 2	Sampling Train Leak Rate (ft^3 @ "Hg)
Project Number - 40942317	Console No A161396	Operator MLB	Initial n/a @
Location (Source) – DCU3 West	DGMCF n/a	Nozzle Dia (in) n/a	Final n/a @
Duct Dimension(s) 8"	ΔH@ n/a	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib n/a	● n/a ● n/a ● n/a	Bar. Press. (in. Hg) 29.16	Initial (+) 0@20" (-) 0@20"
Caliper ID n/a		Stat. Press. (in. H$_2$O) see below	Final (+) 0@20" (-) 0@20"

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H$_2$O)	ΔH (in. H$_2$O)	Temperature (°F) Stack	Static Pressure ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	14:24	--	5.4	--	216	* --	--	--	--	--	--	--	--
	14:26	--	6.9	--	218	* --	--	--	--	--	--	--	--
	14:28	--	6.7	--	221	* --	--	--	--	--	--	--	--
	14:30	--	6.5	--	225	* --	--	--	--	--	--	--	--
	14:32	--	6.7	--	229	8	--	--	--	--	--	--	--
	14:34	--	6.7	--	231	8	--	--	--	--	--	--	--
	14:36	--	6.5	--	231	8	--	--	--	--	--	--	--
	14:38	--	6.2	--	233	8	--	--	--	--	--	--	--
	14:40	--	6.3	--	233	8	--	--	--	--	--	--	--
	14:42	--	6.2	--	233	8	--	--	--	--	--	--	--
	14:44	--	6.0	--	234	8	--	--	--	--	--	--	--
	14:46	--	6.2	--	234	8	--	--	--	--	--	--	--
	14:48	--	6.2	--	234	8	--	--	--	--	--	--	--
	14:50	--	6.2	--	234	8	--	--	--	--	--	--	--
	14:52	--	5.9	--	232	10	--	--	--	--	--	--	--
	14:54	--	2.9	--	233	12	--	--	--	--	--	--	--
	14:56	--	1.6	--	234	14	--	--	--	--	--	--	--
	14:58	--	3.3	--	234	14	--	--	--	--	--	--	--
	15:00	--	4.2	--	234	16	--	--	--	--	--	--	--
	15:02	--	4.6	--	234	16	--	--	--	--	--	--	--
	15:04	--	5.4	--	235	16	--	--	--	--	--	--	--
	15:06	--	4.4	--	233	18	--	--	--	--	--	--	--
	15:08	--	5.0	--	235	18	--	--	--	--	--	--	--
	15:10	--	6.5	--	236	18	--	--	--	--	--	--	--
	15:12	--	2.1	--	235	18	--	--	--	--	--	--	--
	15:14	--	2.2	--	236	18	--	--	--	--	--	--	--
	15:16	--	1.9	--	237	18	--	--	--	--	--	--	--
	15:18	--	9.3	--	240	18	--	--	--	--	--	--	--
	15:20	--	7.2	--	242	16	--	--	--	--	--	--	--
	~~15:22~~ MS 7/19/11	--					--	--	--	--	--	--	--

Comments: *static line was not plugged in.

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/20/11	Condition C	Page 1 of 1		
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161396	Operator MB	Initial	n/a	@ —
Location (Source) – DCU3 East	DGMCF n/a	Nozzle Dia (in) n/a	Final	—	@ —
Duct Dimension(s) 8"	ΔH@ n/a	Nozzle ID n/a	Pitot Tube ID 0.75-01		
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check		
Nozzle Calib Caliper ID n/a	n/a n/a n/a	Bar. Press. (in. Hg) 29.08	Initial	(+) 0@2"	(-) 0@2"
		Stat. Press. (in. H₂O) see below	Final	(+) 0@75"	(-) 0@75"

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	~~Probe~~ Static pres.	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	9:05	--	0.1	--	199	14	--	--	--	--	--	--	--
	9:07	--	1.3	--	216	14	--	--	--	--	--	--	--
	9:09	--	1.0	--	217	12	--	--	--	--	--	--	--
	9:11	invalid data	0.3	--	219	12	--	--	--	--	--	--	--
	9:13	--	0.3	--	221	12	--	--	--	--	--	--	--
	9:15	--	2.9	--	213	12	--	--	--	--	--	--	--
	9:17	--	1.6	--	213	12	--	--	--	--	--	--	--
	9:19	--	1.6	--	213	12	--	--	--	--	--	--	--
	9:21	--	1.9	--	213	12	--	--	--	--	--	--	--
	9:23	--	*2.5	--	213	14	--	--	--	--	--	--	--
	9:25	--	24.3	--	214	32	--	--	--	--	--	--	--
	9:27	--	21.9	--	214	34	--	--	--	--	--	--	--
	9:29	--	21.0	--	214	32	--	--	--	--	--	--	--
	9:31	--	16.3	--	214	34	--	--	--	--	--	--	--
	9:33	--	21.1	--	214	29	--	--	--	--	--	--	--
	9:35	--	10.9	--	214	24	--	--	--	--	--	--	--
	9:37	--	9.3	--	214	37	--	--	--	--	--	--	--
	9:39	--	11.0	--	214	26	--	--	--	--	--	--	--
	9:41	--	8.4	--	214	34	--	--	--	--	--	--	--
	9:43	--	2.5	--	214	30	--	--	--	--	--	--	--
	9:45	--	4.4	--	214	49	--	--	--	--	--	--	--
	9:47	--	23.7	--	216	59	--	--	--	--	--	--	--
	9:49	--	19.1	--	216	46	--	--	--	--	--	--	--
STOP	9:51	--	6.2	--	215	40	--	--	--	--	--	--	--
	~~9:53~~ MB 7/20/11			--		--	--	--	--	--	--	--	--
	~~9:55~~ MB 7/20/11			--		--	--	--	--	--	--	--	--
	~~9:57~~ MB 7/20/11			--		--	--	--	--	--	--	--	--
	~~9:59~~ MB 7/20/11			--		--	--	--	--	--	--	--	--
	~~10:01~~ MB 7/20/11			--		--	--	--	--	--	--	--	--
	~~10:03~~ MB 7/20/11			--		--	--	--	--	--	--	--	--

Comments: * Compressor valve found to be in the off position when we thought it was on we turned it on and everything started to work correctly. (905-925)

Sample Type – Velocity (EPA Methods 1A and 2)		Date 7/14/11 (14 written above)		Condition ~~Pretim~~ P		Page	1 of 2
Plant Name – BP-Husky Toledo		PTCF 0.84		Run ~~Pretim~~ 1		Sampling Train Leak Rate (ft³ @ "Hg)	
Project Number - 40942317		Console No. 416/396		Operator EDF		Initial	n/a @
Location (Source) – DCU3 ~~East~~ West Vent		DGMCF 0.997		Nozzle Dia (in) n/a		Final	@
Duct Dimension(s) 8"		ΔH@ 1.875		Nozzle ID n/a		Pitot Tube ID 0.75 -01	
Elevation (relative to Barometer) (ft) 0		Kf n/a		Barometer ID BP-2		Pitot Tube Leak Check	
Nozzle Calib				Bar. Press. (in. Hg) ~~29.38~~ 29.50		Initial	(+) 0 @ 50 (-) 0 @ 50
Caliper ID n/a	● n/a	● n/a	● n/a	Stat. Press. (in. H₂O) n/a		Final	(+) 0 @ 50 (-) 0 @ 50

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	02:20	--	10.2	--	184	--	--	--	--	--	--	--	
	02:22	--	33.2	--	214	--	--	--	--	--	--	--	--
	02:24	--	33.4	--	216	--	--	--	--	--	--	--	--
	02:26	--	32.0	--	217	--	--	--	--	--	--	--	--
	02:28	--	30.8	--	218	--	--	--	--	--	--	--	--
	02:30	--	30.6	--	217	--	--	--	--	--	--	--	--
	02:32	--	27.5	--	218	--	--	--	--	--	--	--	--
	02:34	--	26.1	--	218	--	--	--	--	--	--	--	--
	02:36	--	25.4	--	219	--	--	--	--	--	--	--	--
	02:38	--	24.2	--	220	--	--	--	--	--	--	--	--
	02:40	--	22.2	--	220	--	--	--	--	--	--	--	--
	02:42	--	20.6	--	220	--	--	--	--	--	--	--	--
	02:44	--	19.3	--	220	--	--	--	--	--	--	--	--
	02:46	--	17.7	--	218	--	--	--	--	--	--	--	--
	02:48	--	16.9	--	218	--	--	--	--	--	--	--	--
	02:50	--	16.1	--	217	--	--	--	--	--	--	--	--
	02:52	--	15.3	--	218	--	--	--	--	--	--	--	--
	02:54	--	14.6	--	219	--	--	--	--	--	--	--	--
	02:56	--	14.4	--	218	--	--	--	--	--	--	--	--
	02:58	--	14.2	--	217	--	--	--	--	--	--	--	--
EDF 7/14 03:00	~~02:00~~	--	13.9	--	221	--	--	--	--	--	--	--	--
P1	03:02	--	13.7	--	218	--	--	--	--	--	--	--	--
	03:04	--	12.8	--	219	--	--	--	--	--	--	--	--
	03:06	--	13.0	--	218	--	--	--	--	--	--	--	--
	03:08	--	12.1	--	219	--	--	--	--	--	--	--	--
	03:10	--	12.6	--	216	--	--	--	--	--	--	--	--
	03:12	--	11.2	--	220	--	--	--	--	--	--	--	--
	03:14	--	10.9	--	218	--	--	--	--	--	--	--	--
	03:16	--	11.8	--	216	--	--	--	--	--	--	--	--
	03:18	--	13.4	--	218	--	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/~~14~~ 15/11	Condition ~~Practice~~ P	Page 2 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run ~~Practice~~ 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 ~~East~~ West Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft)	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib		Bar. Press. (in. Hg) ~~29.38~~ 29.50	Initial (+) 0@50 (-) 0@50
Caliper ID n/a	n/a n/a n/a	Stat. Press. (in. H2O) n/a	Final (+) 0@50 (-) 0@50

EDF 7/14

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H2O)	ΔH (in. H2O)	Temperature (°F) Stack	Probe	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
03 P1	03:20	--	13.3	--	216	--	--	--	--	--	--	--	--
	03:22	--	14.6	--	220	--	--	--	--	--	--	--	--
	03:24	--	15.0	--	215	--	--	--	--	--	--	--	--
	03:26	--	15.2	--	218	--	--	--	--	--	--	--	--
	03:28	--	14.6	--	218	--	--	--	--	--	--	--	--
	03:30	--	15.0	--	219	--	--	--	--	--	--	--	--
	03:32	--	14.3	--	216	--	--	--	--	--	--	--	--
	03:34	--	14.0	--	218	--	--	--	--	--	--	--	--
	03:36	--	14.3	--	216	--	--	--	--	--	--	--	--
	03:38	--	13.6	--	216	--	--	--	--	--	--	--	--
	03:40	--	13.3	--	216	--	--	--	--	--	--	--	--
	03:42	--	13.4	--	218	--	--	--	--	--	--	--	--
	03:44	--	12.7	--	216	--	--	--	--	--	--	--	--
	03:46	--	12.4	--	217	--	--	--	--	--	--	--	--
	03:48	--	11.9	--	217	--	--	--	--	--	--	--	--
	03:50	--	11.3	--	218	--	--	--	--	--	--	--	--
	03:52	--	10.8	--	217	--	--	--	--	--	--	--	--
	03:54	--	10.2	--	215	--	--	--	--	--	--	--	--
	03:56	--	10.0	--	218	--	--	--	--	--	--	--	--
	03:58	--	9.8	--	216	--	--	--	--	--	--	--	--
	04:00	--	9.4	--	216	--	--	--	--	--	--	--	--
	04:02	--	8.4	--	216	--	--	--	--	--	--	--	--
	04:04	--	8.0	--	215	--	--	--	--	--	--	--	--
	04:06	--	7.7	--	215	--	--	--	--	--	--	--	--
	04:08	--	7.4	--	217	--	--	--	--	--	--	--	--
	04:10	--	6.8	--	217	--	--	--	--	--	--	--	--
	04:12	--	6.4	--	217	--	--	--	--	--	--	--	--
	04:14	--	6.2	--	219	--	--	--	--	--	--	--	--
STOP	04:16					--	--	--	--	--	--	--	--
		--		--		--	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)		Date 7/15/11	Condition D	Page 1 of 2			
Plant Name – BP-Husky Toledo		PTCF 0.84	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)			
Project Number - 40942317		Console No. 4161396	Operator EDF	Initial	n/a @		
Location (Source) – DCU3 P-1 East		DGMCF 0.997	Nozzle Dia (in) n/a	Final	@		
Duct Dimension(s) 8"		ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01			
Elevation (relative to Barometer) (ft)		Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check			
Nozzle Calib	n/a n/a n/a		Bar. Press. (in. Hg) 29.26	Initial	(+) 0@725	(-) 0@725	
Caliper ID 700904			Stat. Press. (in. H₂O) see below	Final	(+) 0@725	(-) 0@725	

EDF 7/15

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ static pressure	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	07:39 pm	--	2.2	--	180	10	--	--	--	--	--	--	--
	07:41 pm	--	22.8	--	218	~~18~~	16 EDF 7/15	--	--	--	--	--	--
	07:43 pm	--	22.1	--	222	~~18~~	16 EDF 7/15		--	--	--	--	--
	07:45 pm	--	19.6	--	227	16	--	--	--	--	--	--	--
	07:47 pm	--	17.9	--	231	14	--	--	--	--	--	--	--
	07:49 pm	--	17.0	--	233	14	--	--	--	--	--	--	--
	07:51 pm	--	15.3	--	231	14	--	--	--	--	--	--	--
	07:53 pm	--	13.8	--	235	12	--	--	--	--	--	--	--
	19:55	--	12.7	--	235	12	--	--	--	--	--	--	--
	19:57	--	12.3	--	236	10	--	--	--	--	--	--	--
	19:59	--	10.6	--	237	10	--	--	--	--	--	--	--
	20:01	--	10.2	239 EDF 7/15	~~236~~	10	--	--	--	--	--	--	--
	20:03	--	10.3	--	238	10	--	--	--	--	--	--	--
	20:05	--	12.3	--	237	10	--	--	--	--	--	--	--
	20:07	--	12.4	--	236	10	--	--	--	--	--	--	--
	20:09	--	13.2	--	236	12	--	--	--	--	--	--	--
	20:11	--	14.7	--	235	12	--	--	--	--	--	--	--
	20:13	--	15.0	--	230	12	--	--	--	--	--	--	--
	20:15	--	14.8	--	234	12	--	--	--	--	--	--	--
	20:17	--	15.2	--	234	12	--	--	--	--	--	--	--
	20:19	--	14.4	--	233	12	--	--	--	--	--	--	--
	20:21	--	15.6	--	233	12	--	--	--	--	--	--	--
	20:23	--	15.6	--	234	12	--	--	--	--	--	--	--
	20:25	--	15.8	--	234	12	--	--	--	--	--	--	--
	20:27	--	15.9	--	234	12	--	--	--	--	--	--	--
	20:29	--	15.2	--	233	12	--	--	--	--	--	--	--
	20:31	--	15.0	--	233	12	--	--	--	--	--	--	--
	20:33	--	14.9	--	233	12	--	--	--	--	--	--	--
	20:35	--	14.7	--	232	12	--	--	--	--	--	--	--
	20:37	--	14.3	--	232	12	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/15/11	Condition D	Page 2 of 2
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161396	Operator EDF	Initial n/a @
Location (Source) – DCU3 · East	DGMCF 0.997	Nozzle Dia (in) n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-D1
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calib		Bar. Press. (in. Hg) 29.26	Initial (+) 0@>25 (-) 0@>25
Caliper ID n/a	● n/a ● n/a ● n/a	Stat. Press. (in. H_2O) see below	Final (+) 0@>24 (-) 0@>24

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	static pressure ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	20:39	--	13.8	--	232	12	--	--	--	--	--	--	--
	20:41	--	13.5	--	232	12	--	--	--	--	--	--	--
	20:43	--	12.8	--	228	12	--	--	--	--	--	--	--
	20:45	--	12.6	--	229	12	--	--	--	--	--	--	--
	20:47	--	12.6	--	230	12	--	--	--	--	--	--	--
	20:49	--	12.4	--	230	10	--	--	--	--	--	--	--
	20:51	--	11.8	--	229	7	--	--	--	--	--	--	--
	20:53	--	11.1	--	229	7	--	--	--	--	--	--	--
	20:55	--	10.8	--	228	7	--	--	--	--	--	--	--
	20:57	--	10.4	--	228	7	--	--	--	--	--	--	--
	20:59	--	10.2	--	227	6	--	--	--	--	--	--	--
	21:01	--	10.0	--	227	6	--	--	--	--	--	--	--
	21:03	--	8.9	--	226	6	--	--	--	--	--	--	--
	21:05	--	8.4	--	225	6	--	--	--	--	--	--	--
	21:07	--	8.4	--	224	6	--	--	--	--	--	--	--
	21:09	--	7.6	--	225	5	--	--	--	--	--	--	--
	21:11	--	6.7	--	224	4	--	--	--	--	--	--	--
	21:13	--	6.0	--	225	4	--	--	--	--	--	--	--
	21:15	--	5.6	--	226	4	--	--	--	--	--	--	--
STOP	21:17	--	5.2	--	226	3	--	--	--	--	--	--	--
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Comments: switched to gauge oil manometer at 20:51

Sample Type – velocity (EPA Methods 1A and 2)	Date 7/16/11	Condition D	Page 1 of 2
Plant Name – BP-Husky Toledo	PTCF — 0.84	Run 3	~~Sampling Train Leak Rate (ft³ @ "Hg)~~
Project Number - 10942317	Console No. 416396	Operator MB	Initial ~~N/A @~~
Location (Source) – DCU3 West	DGMCF 0.994	Nozzle Dia (in) — n/a	Final ~~@~~
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID — n/a	Pitot Tube ID — 0.75-04
Elevation (relative to Barometer) (ft) 0	Kf —	Barometer ID 29.38	Pitot Tube Leak Check
Nozzle Calib		Bar. Press. (in. Hg) BP-2	Initial (+) 0@>30 (-) 0@>30
Caliper ID n/a	n/a n/a n/a	Stat. Press. (in. H_2O) see below	Final (+) 0@>30 (-) 0@>30

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	Static pressure ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	13:22	--	42	--	~~*107~~	36	--	--	--	--	--	--	--
	13:24	--	8.2	MB	~~*108~~	38	--	--	--	--	--	--	--
	13:26	--	3.3	7/16/11	~~*107~~	34	--	--	--	--	--	--	--
	13:28	--	3.8	--	~~*107~~	33	--	--	--	--	--	--	--
	13:20	--	2.1	--	227	30	--	--	--	--	--	--	--
	13:32	--	3.0	--	230	30	--	--	--	--	--	--	--
	13:34	--	2.9	--	230	28	--	--	--	--	--	--	--
	13:36	--	2.5	--	230	26	--	--	--	--	--	--	--
	17:38	--	3.2	--	230	25	--	--	--	--	--	--	--
	13:40	--	5.4	--	229	24	--	--	--	--	--	--	--
	13:42	--	4.0	--	228	22	--	--	--	--	--	--	--
	13:44	--	2.3	--	227	22	--	--	--	--	--	--	--
	13:46	--	3.2	--	229	30	--	--	--	--	--	--	--
	17:48	--	2.8	--	227	30	--	--	--	--	--	--	--
	13:50	--	2.5	--	228	30	--	--	--	--	--	--	--
	13:52	--	1.8	--	228	28	--	--	--	--	--	--	--
	13:54	--	2.7	--	229	26	--	--	--	--	--	--	--
	13:56	--	2.1	--	228	26	--	--	--	--	--	--	--
	13:58	--	1.9	--	229	26	--	--	--	--	--	--	--
	14:00	--	1.9	--	228	24	--	--	--	--	--	--	--
	14:02	--	1.6	--	228	24	--	--	--	--	--	--	--
	14:04	--	2.0	--	228	24	--	--	--	--	--	--	--
	14:06	--	2.0	--	228	24	--	--	--	--	--	--	--
	14:08	--	3.0	--	228	23	--	--	--	--	--	--	--
	14:10	--	2.3	--	227	22	--	--	--	--	--	--	--
	14:12	--	2.7	--	227	20	--	--	--	--	--	--	--
	14:14	--	2.6	--	227	20	--	--	--	--	--	--	--
	14:16	--	2.4	--	228	20	--	--	--	--	--	--	--
	14:18	--	2.3	--	227	19	--	--	--	--	--	--	--
	14:20	--	2.5	--	227	19	--	--	--	--	--	--	--

Comments: * Thermocouple malfunctioned

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/16/11	Condition D	Page 2 of 2
Plant Name – BP-Husky Toledo	PTCF — 0.84	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A16396	Operator mlb	Initial See pg1 @
Location (Source) – DCU3 West	DGMCF 0.994	Nozzle Dia (in) — n/a	Final @
Duct Dimension(s) 8"	ΔH@ 1.815	Nozzle ID — n/a	Pitot Tube ID 0.75-01
Elevation (relative to Barometer) (ft) 0	Kf — n/a	Barometer ID ~~28.38~~ 29.38 mlb 7/16/11	Pitot Tube Leak Check
Nozzle Calib Caliper ID n/a	n/a n/a n/a	Bar. Press. (in. Hg) BP1	Initial (+) See (-) pg1
		Stat. Press. (in. H_2O) see below	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Static pressure ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	14:22	--	2.2	--	227	18	--	--	--	--	--	--	--
	14:24	--	2.3	--	228	17	--	--	--	--	--	--	--
	14:26	--	2.4	--	227	17	--	--	--	--	--	--	--
	14:28	--	2.5	--	228	17	--	--	--	--	--	--	--
	14:30	--	3.1	--	227	14	--	--	--	--	--	--	--
	14:32	--	2.9	--	228	17	--	--	--	--	--	--	--
	14:34	--	2.6	--	227	16	--	--	--	--	--	--	--
	14:36	--	2.8	--	228	14	--	--	--	--	--	--	--
	14:38	--	2.5	--	228	14	--	--	--	--	--	--	--
	14:40	--	2.7	--	227	14	--	--	--	--	--	--	--
	14:42	--	2.4	--	227	14	--	--	--	--	--	--	--
	14:44	--	2.4	--	227	14	--	--	--	--	--	--	--
	14:46	--	2.3	--	227	14	--	--	--	--	--	--	--
	14:48	--	2.3	--	227	14	--	--	--	--	--	--	--
	14:50	--	2.3	--	227	14	--	--	--	--	--	--	--
	14:52	--	2.3	--	227	14	--	--	--	--	--	--	--
	14:54	--	2.4	--	226	14	--	--	--	--	--	--	--
	14:56	--	2.5	--	226	14	--	--	--	--	--	--	--
	14:58	--	2.2	--	226	14	--	--	--	--	--	--	--
	15:00	--	2.2	--	226	14	--	--	--	--	--	--	--
	15:02	--	2.5	--	225	14	--	--	--	--	--	--	--
	15:04	--	2.3	--	225	14	--	--	--	--	--	--	--
	15:06	--	2.0	--	224	12	--	--	--	--	--	--	--
	15:08	--	2.1	--	224	12	--	--	--	--	--	--	--
	15:10	--	2.1	--	222	11	--	--	--	--	--	--	--
	15:12	--	1.8	--	224	10	--	--	--	--	--	--	--
	15:14	--	2.6	--	225	10	--	--	--	--	--	--	--
	15:16	--	2.2	--	223	10	--	--	--	--	--	--	--
stop	15:17	--	2.2	--	223	10	--	--	--	--	--	--	--
		--		--		--	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition D	Page	1	of 3
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161396	Operator EOF	Initial	~~0.0~~ 0 @ ~~750"~~	
Location (Source) – DCU3 West Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final	~~0 @ 750"~~	
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01		
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check		
Nozzle Calib		Bar. Press. (in. Hg) 29.38	Initial	(+)0@>50	(-)0@>50
Caliper ID n/a	n/a n/a n/a	Stat. Press. (in. H₂O) see below	Final	(+)0@>50	(-)0@>50

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ static pressure	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	02:20	--	3.2	--	132	20	--	--	--	--	--	--	--
	02:22	--	24.5	--	215	1-8	--	--	--	--	--	--	--
	02:24	--	22.0	--	219	1-8	--	--	--	--	--	--	--
	02:26	--	20.8	--	230	1-8	--	--	--	--	--	--	--
	02:28	--	21.1	--	232	1-6	--	--	--	--	--	--	--
	02:30	--	18.9	--	233	1-6	--	--	--	--	--	--	--
	02:32	--	18.8	--	233	1-6	--	--	--	--	--	--	--
	02:34	--	17.5	--	233	1-4	--	--	--	--	--	--	--
	02:36	--	16.8	--	233	1-4	--	--	--	--	--	--	--
	02:38	--	16.2	--	222	1-2	--	--	--	--	--	--	--
	02:40	--	15.4	--	234	1-2	--	--	--	--	--	--	--
	02:42	--	14.3	--	234	1-2	--	--	--	--	--	--	--
	02:44	--	13.0	--	–	1-2	--	--	--	--	--	--	--
	02:46	--	12.6	--	–	1-2	--	--	--	--	--	--	--
	02:48	--	12.5	--	235	1-0	--	--	--	--	--	--	--
	02:50	--	11.9	--	234	1-0	--	--	--	--	--	--	--
	02:52	--	11.7	--	235	1-0	--	--	--	--	--	--	--
	02:54	--	11.3	--	234	-8	--	--	--	--	--	--	--
	02:56	--	12.2	--	234	-8	--	--	--	--	--	--	--
	02:58	--	11.4	--	233	-8	--	--	--	--	--	--	--
	03:00	--	12.9	--	233	-8	--	--	--	--	--	--	--
	03:02	--	13.2	--	231	-8	--	--	--	--	--	--	--
	03:04	--	12.4	--	232	-8	--	--	--	--	--	--	--
	03:06	--	12.8	--	232	-8	--	--	--	--	--	--	--
	03:08	--	12.6	--	231	-8	--	--	--	--	--	--	--
	03:10	--	13.0	--	233	-8	--	--	--	--	--	--	--
	03:12	--	12.2	--	230	-8	--	--	--	--	--	--	--
	03:14	--	11.8	--	232	-8	--	--	--	--	--	--	--
	03:16	--	11.8	--	232	-8	--	--	--	--	--	--	--
	03:18	--	11.4	--	232	-8	--	--	--	--	--	--	--

Comments: power to console went out at 02:44

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition D	Page 2 of 3		
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161396	Operator EDF	Initial	n/a	@ n/a
Location (Source) – DCU3 West Vent	DGMCF 0.997	Nozzle Dia (in) n/a	Final	n/a	@ n/a
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID n/a	Pitot Tube ID 0.75-01		
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check		
Nozzle Calib	n/a n/a	Bar. Press. (in. Hg) 29.38	Initial	(+) 0@>50	(-) 0@>50
Caliper ID n/a		Stat. Press. (in. H_2O) see below	Final	(+) 0@>50	(-) 0@>50

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	~~Probe~~ static pressure	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	
P1	03:20	--	11.4	--	231	-8	--	--	--	--	--	--	--
	03:22	--	11.1	--	227	-7	--	--	--	--	--	--	--
	03:24	--	10.6	--	230	-7	--	--	--	--	--	--	--
	03:26	--	9.8	--	232	-7	--	--	--	--	--	--	--
	03:28	--	10.0	--	228	-7	--	--	--	--	--	--	--
	03:30	--	9.3	--	231	-6	--	--	--	--	--	--	--
End OH	03:32	--	8.9	--	232	-6	--	--	--	--	--	--	--
P'	03:34	--	9.0	--	232	-6	--	--	--	--	--	--	--
	03:36	--	9.1	--	230	-5	--	--	--	--	--	--	--
	03:38	--	8.4	--	231	-5	--	--	--	--	--	--	--
	03:40	--	8.0	--	231	-5	--	--	--	--	--	--	--
	03:42	--	7.8	--	231	-5	--	--	--	--	--	--	--
	03:44	--	7.5	--	229	-5	--	--	--	--	--	--	--
	03:46	--	7.3	--	229	-5	--	--	--	--	--	--	--
	03:48	--	6.9	--	229	-4	--	--	--	--	--	--	--
	03:50	--	6.4	--	230	-4	--	--	--	--	--	--	--
	03:52	--	6.2	--	230	-4	--	--	--	--	--	--	--
	03:54	--	6.2	--	229	-4	--	--	--	--	--	--	--
	03:56	--	6.5	--	227	-4	--	--	--	--	--	--	--
	03:58	--	6.8	--	226	-4	--	--	--	--	--	--	--
	04:00	--	7.0	--	229	-4	--	--	--	--	--	--	--
	04:02	--	7.3	--	228	-5	--	--	--	--	--	--	--
	04:04	--	7.7	--	224	-5	--	--	--	--	--	--	--
	04:06	--	8.0	--	224	-5	--	--	--	--	--	--	--
	04:08	--	8.9	--	226	-6	--	--	--	--	--	--	--
	04:10	--	9.5	--	223	-6	--	--	--	--	--	--	--
	04:12	--	9.8	--	225	-6	--	--	--	--	--	--	--
	04:14	--	10.2	--	224	-6	--	--	--	--	--	--	--
	04:16	--	10.4	--	224	-6	--	--	--	--	--	--	--
	04:18	--	10.0	--	225	-6	--	--	--	--	--	--	--

Comments:

Sample Type – Velocity (EPA Methods 1A and 2)	Date 7/18/11	Condition D	Page 3 of 3		
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161396	Operator EDF	Initial	u/a @	
Location (Source) – DCU3 West Vent	DGMCF 0.997	Nozzle Dia (in) u/a	Final	u/a @	
Duct Dimension(s) 8"	ΔH@ 1.875	Nozzle ID u/a	Pitot Tube ID 0.75-01		
Elevation (relative to Barometer) (ft) 0	Kf u/a	Barometer ID BP-2	Pitot Tube Leak Check		
Nozzle Calib		Bar. Press. (in. Hg) 29.38	Initial	(+)0@750	(-)0@750
Caliper ID u/a	● u/a ● u/a ●	Stat. Press. (in. H₂O) see below	Final	(+)0@750	(-)0@750

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	static pressure ~~Probe~~	Filter	XAD Inlet	Imp Exit	DGM In	DGM Out	HtTrc Exit	Vacuum (in. Hg)
P1	04:20	--	10.8	--	225	-7	--	--	--	--	--	--	--
	04:22	--	9.7	--	225	-7	--	--	--	--	--	--	--
	04:24	--	10.0	--	223	-6	--	--	--	--	--	--	--
	04:26	--	10.0	--	225	-6	--	--	--	--	--	--	--
	04:28	--	9.5	--	225	-6	--	--	--	--	--	--	--
	04:30	--	9.5	--	222	-6	--	--	--	--	--	--	--
	04:32	--	9.1	--	224	-6	--	--	--	--	--	--	--
	04:34	--	8.5	--	224	-6	--	--	--	--	--	--	--
	04:36	--	8.8	--	221	-6	--	--	--	--	--	--	--
End M5/[illegible]	04:38	--	8.4	--	226	-5	--	--	--	--	--	--	--
End M29	04:40	--	9.0	--	226	-5	--	--	--	--	--	--	--
P1	04:42	--	7.9	--	227	-5	--	--	--	--	--	--	--
	04:44	--	7.6	--	226	-5	--	--	--	--	--	--	--
	04:46	--	7.0	--	226	-5	--	--	--	--	--	--	--
	04:48	--	7.3	--	226	-5	--	--	--	--	--	--	--
	04:50	--	7.6	--	226	-4	--	--	--	--	--	--	--
	04:52	--	7.1	--	226	-4	--	--	--	--	--	--	--
	04:54	--	6.9	--	226	-4	--	--	--	--	--	--	--
	04:56	EDF 7/18 -- 6.7	~~6.[illegible]~~	--	226	-4	--	--	--	--	--	--	--
	04:58	--	6.5	--	225	-4	--	--	--	--	--	--	--
	05:00	--	6.0	--	224	-4	--	--	--	--	--	--	--
	05:02	--	5.8	--	223	-3	--	--	--	--	--	--	--
STOP	05:04						--	--	--	--	--	--	--
		--		--		--	--	--	--	--	--	--	--
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Comments: All isokinetic sampling trains ended by 0440

Sample Type – ~~Method 308~~ Velocity	Date 7/27/11	Condition D	Page 1 of 3
Plant Name – BP-Husky Toledo	Console - A161396	Run 5	Pitot ~~Sampling Train~~ Leak Check
Project Number – 40942317	Critical Orifice No. n/a	Operator EDF	Initial +0@750 | -0@750
Location (Source) – DCU3 West Vent	Barometer ID BP-2	~~Pre-test Flow~~ n/a	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.10	~~Post-test Flow~~	Final +0@750 +0@750

Point	Clock Time	Volume (L)	~~ΔH~~ ΔP (in. H_2O)	Temperature (°F) Stack	Static Pressure ~~Critical Orifice~~	DGM In	DGM Out	Vacuum (in. Hg)
P1	01:29		1.7	-108	-6			
	01:31		48.2	-220	-32			
	01:33		49.1	-222	-30			
	01:35		49.0	-224	-30			
	01:37		48.6	-230	-30			
	01:39		48.1	-231	-30			
	01:41		47.2	-230	-30			
	01:43		47.7	-233	-30			
	01:45		46.1	-234	-30			
	01:47		47.1	-233	-30			
	01:49		46.5	-233	-30			
	01:51		47.0	-233	-30			
	01:53		46.8	-232	-30			
	01:55		46.0	-232	-30			
	01:57		46.8	-232	-30			
	01:59		46.7	-232	-30			
	02:01		45.6	-231	-30			
	02:03		46.2	-231	-30			
	02:05		45.8	-231	-30			
	02:07		45.2	-232	-30			
	02:09		44.5	-231	-28			
	02:11		44.5	-231	-28			
	02:13		44.1	-230	-28			
	02:15		44.3	-230	-28			
	02:17		44.0	-229	-28			
	02:19		44.0	-221	-28			
	02:21		43.4	-231	-28			
	02:23		43.5	-230	-28			
	02:25		44.1	-230	-28			
↓	02:27		42.4	-230	-28			

Comments: ~~Sorbent Trap ID:~~ pitot ID = 0.75-01 PTCF = 0.84

Adsorbent Tubes by Method 308
Revision Date: June 2011

Sample Type – ~~Method 18~~ Velocity	Date 7/27/11	Condition D	Page 2 of 3
Plant Name – BP-Husky Toledo	console: A161396	Run 5	Pitot ~~Sampling~~ Train Leak Check
Project Number – 40942317	Critical Orifice No. n/a	Operator EDF	Initial +0@750 | -0@750
Location (Source) – DCU3 West Vent	Barometer ID BP-2	Pre-test Flow n/a	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.10	~~Post-test Flow~~	Final +0@750 -0@750

Point	Clock Time	Volume (L)	~~ΔH~~ ΔP (in. H_2O)	Temperature (°F) Stack	static pressure ~~Critical Orifice~~	DGM In	DGM Out	Vacuum (in. Hg)
P1	02:29		42.1	-230	-28			
	02:31		41.1	-229	-26			
	02:33		41.0	-230	-26			
	02:35		39.6	-229	-26			
	02:37		38.3	-229	-26			
	02:39		38.5	-224	-26			
	02:41		36.8	-229	-24			
	02:43		36.6	-221	-24			
	02:45		35.0	-228	-24			
✓	02:47		34.6	-228	-24			
	02:49		33.6	-226	-22			
END OK	02:51		34.2	-227	-22			
P1	02:53		32.3	-228	-20			
	02:55		29.7	-228	-20			
	02:57		28.0	-222	-18			
	02:59		25.9	-228	-18			
	03:01		25.8	-228	-16			
	03:03		23.5	-225	-16			
	03:05		22.7	-228	-14			
	03:07		20.6	-223	-14			
	03:09		18.9	-228	-14			
	03:11		17.3	-227	-12			
	03:13		17.8	-228	-12			
	03:15		16.2	-228	-10			
	03:17		15.2	-227	-8			
	03:19		14.5	-227	-7			
	03:21		12.3	-227	-6			
	03:23		12.3	-228	-6			
	03:25		13.0	-228	-6			
	03:27		13.2	-228	-6			

Comments: ~~Sorbent Trap Pair IDs:~~ pitot ID = 0.75-01 PTCF: 0.84

Sample Type – ~~Method 18~~ Velocity	Date 7/27/11	Condition D	Page 3 of 3
Plant Name – BP-Husky Toledo	console - A161396	Run 5	Pitot ~~Sampling Train~~ Leak Check
Project Number – 40942317	Critical Orifice No. n/a	Operator EDF	Initial +0@750 | -0@750
Location (Source) – DCU3 West Vent	Barometer ID BP-2	Pre-test Flow	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft)	Bar. Press. (in. Hg) 29.10	Post-test Flow	final +0@750 -0@750

Point	Clock Time	Volume (L)	Δ~~H~~P (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Stack	Static pressure ~~Critical Orifice~~	DGM In	DGM Out	
P1	03:29		13.2	--228	-- 7			
↓	03:31		13.4	--226	-- 7			
	03:33		12.6	--226	-- 7			
	03:35		12.8	--226	-- 7			
END M5/202	03:37		13.0	--227	-- 7			
END M29	03:39		12.7	--228	-- 7			
P1	03:41		13.2	--229	-- 6			
↓	03:43		13.0	--230	-- 6			
STOP	03:45		11.7	--230	-- 6			
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Comments: Sorbent Trap Pair ID:

Section C

Method 3A – O_2 and CO_2

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	
M308	THC1 Post Test	15.58	14.22	16.32						
	THC2 Post Test	15.15	14.46	16.11						
	Average Post Test	**15.37**	**14.34**	**16.22**						

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 1

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,154.00**	94.00	**0.94%**
High (Span):	9,980.00	**9,801.00**	-179.00	**1.79%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	1.00	5154.00	5047.00	-440.00	-437.05	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	1.00	5004.00	5132.00	92.00	88.90	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.05**	0.05	**0.00%**
Mid:	11.40	**6.47**	-4.93	**0.05%**
High (Span):	23.50	**16.92**	-6.58	**0.07%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.05	-0.03	6.47	6.33	-1.85	-3.32	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.66**	0.18	**0.00%**
High (Span):	19.50	**19.10**	-0.40	**0.00%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	0.00	9.66	9.72	0.11	0.11	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**		
Low:	8,000.00	**8,250.00**		
Mid:	15,000.00	**15,500.00**		
High (Span):	29,900.00	**29,600.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-240.00	-520.00	16200.00	15400.00	2003.00		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 2

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,118.00**	58.00	**0.58%**
High (Span):	9,980.00	**9,869.00**	-111.00	**1.11%**

System Bias Check: **5060.00** ppm

Zero		Upscale		SO$_2$ Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**-4.00**	**5118.00**	**5236.00**	**-100.00**	**-95.75**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**4,990.00**	40.00	**0.40%**
High (Span):	9,910.00	**9,832.00**	-78.00	**0.78%**

System Bias Check: **4950.00** ppm

Zero		Upscale		NOx Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	**4990.00**	**5164.00**	**71.00**	**69.22**	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-0.03**	-0.03	**0.00%**
Mid:	11.40	**8.24**	-3.16	**0.03%**
High (Span):	23.50	**18.91**	-4.59	**0.05%**

System Bias Check: **11.40** ppm

Zero		Upscale		O2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**-0.05**	**8.24**	**4.52**	**-6.69**	**-11.86**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.64**	0.16	**0.00%**
High (Span):	19.50	**1.92**	-17.58	**0.18%**

System Bias Check: **9.48** ppm

Zero		Upscale		CO2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**9.64**	**0.00**	**9.75**	**-540.00**	**-93907.16**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-6.00**		
Low:	8,000.00	**8,221.00**		
Mid:	15,000.00	**15,640.00**		
High (Span):	29,900.00	**28,724.00**		

System Bias Check: **15000.00** ppm

Zero		Upscale		THC Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-250.00	**-190.00**	**17800.00**	**22400.00**	**12709.61**		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 3

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,095.00**	35.00	**0.35%**
High (Span):	9,980.00	**9,913.00**	-67.00	**0.67%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	**5095.00**	**0.00**	**24.00**	**47.67**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	**0.00**	**5004.00**	**0.00**	**60.00**	**117.74**	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	11.40	**12.00**	0.60	**0.01%**
High (Span):	23.50	**22.81**	-0.69	**0.01%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**0.00**	**12.00**	**0.00**	**2.66**	**5.05**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	9.48	**10.62**	1.14	**0.01%**
High (Span):	19.50	**17.61**	-1.89	**0.02%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.02	**0.00**	**10.62**	**0.00**	**-0.37**	**-0.68**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**2.00**		
Low:	8,000.00	**8,156.00**		
Mid:	15,000.00	**14,941.00**		
High (Span):	29,900.00	**29,453.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
29.00	**31.00**	**19100.00**	**15000.00**	**2170.00**		

Test Run A2
O_2 Calibration Data Summary

Project ID: 40942317
Date: 21-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.00
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	20:17	0.01	0.01	1%
span	CC99294	23.50	20:19	23.14	0.36	2%
mid-range	CC87182	11.40	20:22	11.58	0.18	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	20:17	0	0.01	49.92	18.47	N/A
span	20:19	23.50	0.99	49.91	18.46	23.8
mid-range	20:22	11.40	0.49	49.90	18.51	23.1
			Average Pre-Test DR	49.91	18.48	**23.5**
zero gas	22:44	0.0	0.01	49.74	18.07	N/A
span	22:48	23.50	0.93	49.75	17.94	25.2
mid-range	22:50	11.40	0.49	49.75	17.91	23.3
			Average Post-Test DR	49.75	17.97	**24.3**
			Average Span DR			24.5
			Average Mid-Range DR			23.2

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.01	22:44	0.01	0%
11.40	11.58	22:50	11.46	-1%

Test Run A3

O_2 Calibration Data Summary

Project ID:	40942317
Date:	24-Jul
Instrument Make/Model:	Servomex
ID Number:	14400D1/3982
Calibration Span Value (diluted):	1.05
Calibration Span Value:	23.50
Analyzer Operating Range:	25
Units:	% (dry)
Technician(s):	DC/KMM

Pre-Test System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	19:41	0.00	0.00	0%
span	CC99294	23.50	19:43	23.00	0.50	2%
mid-range	CC87182	11.40	19:44	11.65	0.25	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	19:41	0	0.00	49.83	18.27	N/A
span	19:43	23.50	1.03	49.84	18.25	22.9
mid-range	19:44	11.40	0.52	49.85	18.27	21.9
			Average Pre-Test DR	49.84	18.26	**22.4**
zero gas	21:29	0.0	-0.01	49.78	17.71	N/A
span	21:41	23.50	1.50	49.80	17.66	15.6
mid-range	21:43	11.40	0.75	49.81	17.66	15.2
			Average Post-Test DR	49.80	17.68	**15.4**
			Average Span DR			19.3
			Average Mid-Range DR			18.6

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0.00	21:29	-0.01	-1%
11.40	11.65	21:43	11.54	0%

Test Run A4

O_2 Calibration Data Summary

Project ID: 40942317
Date: 25-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.65
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	13:23	0.01	0.01	0%
span	CC99294	23.50	13:26	23.31	0.19	1%
mid-range	CC87182	11.40	13:28	11.50	0.10	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	13:23	0	0.01	49.95	18.07	N/A
span	13:26	23.50	1.63	49.92	18.03	14.4
mid-range	13:28	11.40	0.81	49.92	18.10	14.2
Average Pre-Test DR				49.93	18.07	**14.3**
zero gas	15:43	0.0	-0.03	49.94	18.77	N/A
span	15:47	23.50	1.26	49.95	18.75	18.6
mid-range	15:49	11.40	0.62	49.95	18.73	18.5
Average Post-Test DR				49.95	18.75	**18.6**
Average Span DR						16.5
Average Mid-Range DR						16.3

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0.01	15:43	-0.03	-2%
11.40	11.50	15:49	11.44	0%

Test Run C1

O_2 Calibration Data Summary

Project ID:	40942317
Date:	18-Jul
Instrument Make/Model:	Servomex
ID Number:	14400D1/3982
Calibration Span Value (diluted):	1.33
Calibration Span Value:	23.50
Analyzer Operating Range:	25
Units:	% (dry)
Technician(s):	DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	19:33	-0.03	0.03	2%
span	CC99294	23.50	19:37	23.64	0.14	1%
mid-range	CC87182	11.40	19:40	11.33	0.07	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	19:33	0	-0.03	58.82	17.74	N/A
span	19:37	23.50	1.34	58.84	17.68	17.6
mid-range	19:40	11.40	0.64	58.84	17.70	17.8
Average Pre-Test DR				58.84	17.70	**17.7**
zero gas	21:33	0.0	-0.02	58.87	17.55	N/A
span	21:43	23.50	1.28	58.87	17.62	18.4
mid-range	21:41	11.40	0.61	58.87	17.59	18.7
Average Post-Test DR				58.87	17.59	**18.5**
Average Span DR						18.0
Average Mid-Range DR						18.2

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-0.03	21:33	-0.02	1%
11.40	11.33	21:41	10.74	-3%

Test Run C2

O_2 Calibration Data Summary

Project ID: 40942317
Date: 19-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.34
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	11:35	0.00	0.00	0%
span	CC99294	23.50	11:39	23.51	0.01	0%
mid-range	CC87182	11.40	11:40	11.39	0.01	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	11:35	0	0.00	64.96	17.46	N/A
span	11:39	23.50	1.34	N/A	N/A	17.5
mid-range	11:40	11.40	0.65	N/A	N/A	17.5
Average Pre-Test DR				64.96	17.46	**17.5**
zero gas	15:22	0.0	-0.02	N/A	N/A	N/A
span	15:25	23.50	1.48	N/A	N/A	15.8
mid-range	15:27	11.40	0.70	N/A	N/A	16.3
Average Post-Test DR				#DIV/0!	#DIV/0!	**16.1**
Average Span DR						16.7
Average Mid-Range DR						16.9

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.00	15:22	-0.02	-1%
11.40	11.39	15:27	11.23	-1%

Test Run C3

O_2 Calibration Data Summary

Project ID:	40942317
Date:	20-Jul
Instrument Make/Model:	Servomex
ID Number:	14400D1/3982
Calibration Span Value (diluted):	1.32
Calibration Span Value:	23.50
Analyzer Operating Range:	25
Units:	% (dry)
Technician(s):	DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	08:22	0.00	0.00	0%
span	CC99294	23.50	08:24	23.16	0.34	1%
mid-range	CC87182	11.40	08:25	11.57	0.17	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	08:22	0	0.00	N/A	N/A	N/A
span	08:24	23.50	1.30	N/A	N/A	18.1
mid-range	08:25	11.40	0.65	N/A	N/A	17.6
			Average Pre-Test DR	#DIV/0!	#DIV/0!	**17.9**
zero gas	10:18	0.0	-0.03	N/A	N/A	N/A
span	10:14	23.50	1.26	N/A	N/A	18.6
mid-range	10:15	11.40	0.62	N/A	N/A	18.4
			Average Post-Test DR	#DIV/0!	#DIV/0!	**18.5**
			Average Span DR			18.4
			Average Mid-Range DR			18.0

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.00	10:18	-0.03	-3%
11.40	11.57	10:15	11.06	-2%

Test Run D2

O_2 Calibration Data Summary

Project ID:	40942317
Date:	15-Jul
Instrument Make/Model:	Servomex
ID Number:	14400D1/3982
Calibration Span Value (diluted):	0.22
Calibration Span Value:	23.50
Analyzer Operating Range:	25
Units:	% (wet)
Technician(s):	DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	18:05	0.05	0.05	22%
span	CC99294	23.50	18:27	16.92	6.58	28%
mid-range	CC87182	11.40	18:30	6.47	4.93	21%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	0.05	27.50	18.39	N/A
span	18:27	23.50	0.16	27.50	18.26	148
mid-range	18:30	11.40	0.06	27.50	18.26	187
			Average Pre-Test DR	27.50	18.30	168
			Average Pre-Test DR (CO2, NOX and SO2)			**106**
zero	20:13	0	-0.02	27.50	18.29	N/A
mid-range	20:20	11.40	0.07	27.50	18.19	171
			Average Mid-Test DR	27.50	18.24	N/A
			Average Mid-Test DR (CO2, NOX and SO2)			102
zero gas	21:38	0.0	-0.03	27.50	18.27	N/A
span	21:32	23.50	0.16	27.50	18.20	147
mid-range	21:27	11.40	0.06	27.50	18.23	192
			Average Post-Test DR	27.50	18.23	169
			Average Post-Test DR (CO2, NOX, and SO2)			105
			Average Span DR			147
			Average Mid-Range DR			183

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.05	20:13	-0.02	-32%
11.40	6.47	20:20	7.08	3%
0	0.05	21:32	-0.03	-35%
11.40	6.47	21:27	6.33	-1%

Test Run D3

O_2 Calibration Data Summary

Project ID: 40942317
Date: 16-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 0.22
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (wet)
Technician(s): DC/KMM

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	18:05	0.03	0.03	14%
span	CC99294	23.50	18:27	22.28	1.22	5%
mid-range	CC87182	11.40	18:30	8.87	2.53	11%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	0.03	N/A	18.15	N/A
span	18:27	23.50	0.21	N/A	18.12	114
mid-range	18:30	11.40	0.08	N/A	18.09	139
Average Pre-Test DR				#DIV/0!	18.12	127
Average Pre-Test DR (CO2, NOX and SO2)						**108**
zero gas	21:38	0.0	-0.04	N/A	18.11	N/A
span	21:32	23.50	0.14	N/A	18.10	171
mid-range	21:27	11.40	0.04	N/A	18.11	268
Average Post-Test DR				#DIV/0!	18.11	219
Average Post-Test DR (CO2, NOX, and SO2)						**107**
Average Span DR						143
Average Mid-Range DR						204

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0.03	21:32	-0.04	-32%
11.40	8.87	21:27	4.61	-18%

Test Run D4

O_2 Calibration Data Summary

Project ID: 40942317
Date: 18-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 0.22
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (wet)
Technician(s): DC/KMM

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	00:09	-0.03	0.03	13%
span	CC99294	23.50	00:00	18.91	4.59	20%
mid-range	CC87182	11.40	00:04	8.24	3.16	13%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:09	0	-0.03	N/A	18.27	N/A
span	00:00	23.50	0.18	N/A	18.24	132
mid-range	00:04	11.40	0.08	N/A	18.27	146
Average Pre-Test DR				#DIV/0!	18.27	139
Average Pre-Test DR (CO2, NOX and SO2)						**106**
zero	02:55	0	-0.08	43.08	18.74	N/A
mid-range	03:02	11.40	0.04	43.08	18.79	286
Average Mid-Test DR				43.08	18.76	N/A
Average Mid-Test DR (CO2, NOX and SO2)						96
zero gas	04:48	0.0	-0.05	43.21	19.17	N/A
span	04:51	23.50	0.18	43.21	19.15	134
mid-range	04:54	11.40	0.05	43.22	19.13	240
Average Post-Test DR				43.21	19.15	187
Average Post-Test DR (CO2, NOX, and SO2)						**95**
Average Span DR						133
Average Mid-Range DR						224

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	-0.03	02:55	-0.08	-22%
11.40	8.24	03:02	3.81	-19%
0	-0.03	04:51	-0.05	-8%
11.40	8.24	04:54	4.52	-16%

Test Run D5

O_2 Calibration Data Summary

Project ID: 40942317
Date: 26-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 0.22
Calibration Span Value: 23.50
Analyzer Operating Range: 25
Units: % (wet)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	00:36	0.02	0.02	8%
span	CC99294	23.50	00:40	22.81	0.69	3%
mid-range	CC87182	11.40	00:42	12.00	0.60	3%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:36	0	0.02	50.00	19.33	N/A
span	00:40	23.50	0.21	49.99	19.32	111
mid-range	00:42	11.40	0.11	49.98	19.32	102
			Average Pre-Test DR	49.99	19.32	107
			Average Pre-Test DR (NOX and SO2)			**108**
zero gas	03:41	0.0	0.02	49.97	19.55	N/A
span		23.50				#DIV/0!
mid-range		11.40				#DIV/0!
			Average Post-Test DR	49.97	19.55	#DIV/0!
			Average Pre-Test DR (NOX and SO2)			**#DIV/0!**
			Average Span DR			#DIV/0!
			Average Mid-Range DR			#DIV/0!

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0.02	03:41	0.02	1%
11.40	12.00	00:00	#DIV/0!	#DIV/0!

Test Run A2

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 20-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 0.80
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	20:17	-0.02	0.02	3%
span	CC99294	19.5	20:19	18.71	0.79	4%
mid-range	CC87182	9.48	20:22	9.90	0.42	2%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	20:17	0	-0.02	49.92	18.47	N/A
span	20:19	19.5	0.76	49.91	18.46	25.5
mid-range	20:22	9.48	0.40	49.90	18.51	23.4
Average Pre-Test DR				49.91	18.48	**24.5**
zero gas	22:44	0	-0.02	49.74	18.07	N/A
span	22:48	19.5	0.73	49.75	17.94	26.7
mid-range	22:50	9.48	0.42	49.75	17.91	22.5
Average Post-Test DR				49.75	17.97	**24.6**
Average Span DR						26.1
Average Mid-Range DR						23.0

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-0.02	22:44	-0.02	1%
9.48	9.90	22:50	10.33	2%

Test Run A3

CO$_2$ Calibration Data Summary

Project ID:	40942317
Date:	24-Jul
Instrument Make/Model:	Servomex
ID Number:	14400D1/3982
Calibration Span Value (diluted):	0.82
Calibration Span Value:	19.5
Analyzer Operating Range:	20
Units:	% (dry)
Technician(s):	DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	19:41	0.00	0.00	0%
span	CC99294	19.5	19:43	18.63	0.87	4%
mid-range	CC87182	9.48	19:44	9.95	0.47	2%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	19:41	0	0.00	49.83	18.27	N/A
span	19:43	19.5	0.78	49.84	18.25	25.0
mid-range	19:44	9.48	0.42	49.85	18.27	22.8
		Average Pre-Test DR		49.84	18.26	**23.9**
zero gas	21:29	0	0.00	49.78	17.71	N/A
span	21:41	19.5	1.30	49.80	17.66	15.0
mid-range	21:43	9.48	0.64	49.81	17.66	14.7
		Average Post-Test DR		49.80	17.68	**14.8**
		Average Span DR				20.0
		Average Mid-Range DR				18.7

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.00	21:29	0.00	0%
9.48	9.95	21:43	9.56	-2%

Test Run A4

CO$_2$ Calibration Data Summary

Project ID: 40942317
Date: 25-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.36
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	13:23	-0.02	0.02	1%
span	CC99294	19.5	13:26	19.81	0.31	2%
mid-range	CC87182	9.48	13:28	9.34	0.14	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	13:23	0	-0.02	49.95	18.07	N/A
span	13:26	19.5	1.39	49.92	18.03	14.1
mid-range	13:28	9.48	0.65	49.92	18.10	14.5
			Average Pre-Test DR	49.93	18.07	**14.3**
zero gas	21:29	0	-0.03	49.94	18.77	N/A
span	21:41	19.5	1.02	49.95	18.75	19.2
mid-range	21:43	9.48	0.52	49.95	18.73	18.1
			Average Post-Test DR	49.95	18.75	**18.6**
			Average Span DR			16.6
			Average Mid-Range DR			16.3

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-0.02	21:29	-0.03	-1%
9.48	9.34	21:43	9.77	2%

Test Run C1

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 18-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.05
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	19:33	-0.01	0.01	1%
span	CC99294	19.5	19:37	19.32	0.18	1%
mid-range	CC87182	9.48	19:40	9.57	0.09	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	19:33	0	-0.01	58.82	17.74	N/A
span	19:37	19.5	1.04	58.84	17.68	18.8
mid-range	19:40	9.48	0.51	58.84	17.70	18.4
			Average Pre-Test DR	58.84	17.70	**18.6**
zero gas	21:33	0	-0.01	58.87	17.55	N/A
span	21:43	19.5	1.03	58.87	17.62	19.0
mid-range	21:41	9.48	0.51	58.87	17.59	18.7
			Average Post-Test DR	58.87	17.59	**18.8**
			Average Span DR			18.9
			Average Mid-Range DR			18.6

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-0.01	21:33	-0.01	0%
9.48	9.57	21:41	9.46	-1%

Test Run C2
CO$_2$ Calibration Data Summary

Project ID: 40942317
Date: 19-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.14
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	**N2**	**0**	11:35	0.02	0.02	2%
span	**CC99294**	**19.5**	11:39	19.04	0.46	2%
mid-range	**CC87182**	**9.48**	11:40	9.72	0.24	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	**11:35**	0	**0.02**	64.96	17.46	N/A
span	**11:39**	19.5	**1.12**	N/A	N/A	17.5
mid-range	**11:40**	9.48	**0.57**	N/A	N/A	16.6
			Average Pre-Test DR	64.96	17.46	**17.1**
zero gas	**15:22**	0	**0.01**	N/A	N/A	N/A
span	**15:25**	19.5	**1.26**	N/A	N/A	15.5
mid-range	**15:27**	9.48	**0.61**	N/A	N/A	15.5
			Average Post-Test DR	#DIV/0!	#DIV/0!	**15.5**
			Average Span DR			16.5
			Average Mid-Range DR			16.1

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.02	15:22	0.01	-1%
9.48	9.72	15:27	9.48	-1%

Test Run C3

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 20-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 1.09
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (dry)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	08:22	0.01	0.01	1%
span	CC99294	19.5	08:24	18.77	0.73	4%
mid-range	CC87182	9.48	08:25	9.87	0.39	2%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	08:22	0	0.01	N/A	N/A	N/A
span	08:24	19.5	1.05	N/A	N/A	18.6
mid-range	08:25	9.48	0.55	N/A	N/A	17.2
Average Pre-Test DR				#DIV/0!	#DIV/0!	**17.9**
zero gas	10:18	0	0.00	N/A	N/A	N/A
span	10:14	19.5	1.04	N/A	N/A	18.7
mid-range	10:15	9.48	0.54	N/A	N/A	17.5
Average Post-Test DR				#DIV/0!	#DIV/0!	**18.1**
Average Span DR						18.7
Average Mid-Range DR						17.4

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.01	10:18	0.00	-1%
9.48	9.87	10:15	9.72	-1%

Test Run D2

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 15-Jul
Instrument Make/Model: TECO 41C
ID Number: 410005571
Calibration Span Value (diluted): 1,782
Calibration Span Value: 195,000
Analyzer Operating Range: 2,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	18:05	4	4	0%
span	CC99294	195,000	18:27	191,465	3,535	2%
mid-range	CC87182	94,800	18:30	96,583	1,783	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	4	27.50	18.39	N/A
span	18:27	195,000	1,750	27.50	18.26	111
mid-range	18:30	94,800	883	27.50	18.26	107
			Average Pre-Test DR	27.50	18.30	**109**
zero	20:13	0	10	27.50	18.29	N/A
mid-range	20:20	94,800	925	27.50	18.19	102
			Average Mid-Test DR	27.50	18.24	N/A
zero gas	21:38	0	12	27.50	18.27	N/A
span	21:32	195,000	1,765	27.50	18.20	110
mid-range	21:27	94,800	888	27.50	18.23	107
			Average Post-Test DR	27.50	18.23	109
			Average Span DR			111
			Average Mid-Range DR			106

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	4	20:13	10	0%
94,800	96,583	20:20	101,244	2%
0	4	21:32	12	0%
94,800	96,583	21:27	97,207	0%

Test Run D3

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 16-Jul
Instrument Make/Model: TECO 41C
ID Number: 410005571
Calibration Span Value (diluted): 1,758
Calibration Span Value: 195,000
Analyzer Operating Range: 2,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	18:05	2	2	0%
span	CC99294	195,000	18:27	191,941	3,059	2%
mid-range	CC87182	94,800	18:30	96,335	1,535	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	2	N/A	18.15	N/A
span	18:27	195,000	1,730	N/A	18.12	113
mid-range	18:30	94,800	868	N/A	18.09	109
Average Pre-Test DR				#DIV/0!	18.12	**111**
zero gas	21:38	0	-2	N/A	18.11	N/A
span	21:32	195,000	1,730	N/A	18.10	113
mid-range	21:27	94,800	871	N/A	18.11	109
Average Post-Test DR				#DIV/0!	18.11	**111**
Average Span DR						113
Average Mid-Range DR						109

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	2	21:32	-2	0%
94,800	96,335	21:27	96,568	0%

Test Run D4

CO$_2$ Calibration Data Summary

Project ID: 40942317
Date: 18-Jul
Instrument Make/Model: TECO 41C
ID Number: 410005571
Calibration Span Value (diluted): 1,798
Calibration Span Value: 195,000
Analyzer Operating Range: 2,000
Units: ppmvw
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	00:09	-3	3	0%
span	CC99294	195,000	00:00	191,798	3,202	2%
mid-range	CC87182	94,800	00:04	96,409	1,609	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:09	0	-3	N/A	18.27	N/A
span	00:00	195,000	**1,769**	N/A	18.24	110
mid-range	00:04	94,800	**889**	N/A	18.27	107
			Average Pre-Test DR	#DIV/0!	18.27	**108**
zero	02:55	0	-21	43.08	18.74	N/A
mid-range	03:02	94,800	969	43.08	18.79	98
			Average Mid-Test DR	43.08	18.76	N/A
zero gas	04:48	0	-19	43.21	19.17	N/A
span	04:51	195,000	**2,005**	43.21	19.15	97
mid-range	04:54	94,800	**1,031**	43.22	19.13	92
			Average Post-Test DR	43.21	19.15	**95**
			Average Span DR			104
			Average Mid-Range DR			99

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-3	02:55	-21	-1%
94,800	96,409	03:02	91,642	-2%
0	-3	04:51	-19	-1%
94,800	96,409	04:54	97,537	1%

Test Run D5

CO_2 Calibration Data Summary

Project ID: 40942317
Date: 26-Jul
Instrument Make/Model: Servomex
ID Number: 14400D1/3982
Calibration Span Value (diluted): 0.18
Calibration Span Value: 19.5
Analyzer Operating Range: 20
Units: % (wet)
Technician(s): DC/KMM

Pre-Test System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	**N2**	**0**	00:36	0.02	0.02	9%
span	**CC99294**	**19.5**	00:40	17.61	1.89	10%
mid-range	CC87182	**9.48**	00:42	10.62	1.14	6%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:36	0	**0.02**	50.00	19.33	N/A
span	00:40	19.5	**0.18**	49.99	19.32	106.9
mid-range	00:42	9.48	**0.11**	49.98	19.32	86.2
Average Pre-Test DR				49.99	19.32	96.6
Average Pre-Test DR (NOX and SO2)						**108**
zero gas	03:41	0	0.00	49.97	19.55	N/A
span		19.5		0.00	0.00	#DIV/0!
mid-range		9.48		0.00	0.00	#DIV/0!
Average Post-Test DR				49.97	19.55	**#DIV/0!**
Average Pre-Test DR (NOX and SO2)						**#DIV/0!**
Average Span DR						#DIV/0!
Average Mid-Range DR						#DIV/0!

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0.02	03:41	0.00	-11%
9.48	10.62	00:00	#DIV/0!	#DIV/0!

Section D

Method 4 – H_2O

All Method 4 (H_2O) information is included in the applicable sections of this report.

These sections are:

Appendix 3 – Section E: Method 5/202 (PM and $PM_{2.5}$-CON)
Appendix 3 – Section M: Method 26A (HCl, Cl_2, and HF)
Appendix 3 – Section N: Method 29 (Metals)
Appendix 3 – Section R: Method 0010 (Semi-VOC)
Appendix 3 – Section S: Method OTM-29 (HCN)
Appendix 3 – Section T: Method ASTM D6784-02 (Mercury)

APPENDIX 6 – SAMPLE CALCULATIONS

Section E

Method 5/202 – PM and $PM_{2.5}$

Laboratory Report

URS Corp. - Austin

9400 Amberglen Boulevard
Austin, TX 78729

BP – Husky Refining, LLC: DCU3
Toledo, OH

Client # 40942317

Analytical Report
(0811-09)

EPA Method 5

Particulate Matter

EPA Method 202

Condensable Particulate Matter

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 25 pages.

Valgena Respass

QA Review Performed by – Valgena Respass

Report Issued: 09/02/2011

Summary of Results

Company	URS Corp. - Austin
Analyst	KTH
Parameters	EPA Method 5

Client #	40942317
Job #	0811-09
# Samples	3 + Blanks

Compound	Sample ID / Particulate Matter (PM) Weight (mg)		
	M5-D2	***M5-D4***	***M5-D5***
Net Filter Catch	2.7	31.5	180.9
Net Front Rinse	14.3	21.4	295.8
Total Particulate	17.0	52.9	476.7
	M5-DFB	***M5-EntRB-Filter***	
Net Filter Catch	-1.2	-0.4	
Net Front Rinse	6.3	NA	
Total Particulate	5.1	-0.4	

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 202

Client #	40942317
Job #	0811-09
# Samples	3 Runs + Blanks

Compound	Sample ID / Condensible Particulate Matter (CPM) Weight (mg)		
	Run D2	***Run D4***	***Run D5***
Net Organic Catch	88.6	72.7	159.2
Corrected Inorganic	180.3	238.3	209.4
TB Corrected CPM	266.9	309.1	366.7
	Proof Blank		
Net Organic Catch	2.8		
Corrected Inorganic	0.7		
Non-TB Corrected CPM	3.5		
	Train Blank		
Organic Catch	14.9	If Train Blank Corrected CPM is >2.0 mg, then sample correction is 2.0 mg.	
Inorganic Catch	7.7		
CPM	22.6		

Results

EPA Method 5 - Particulate Determination - Data Analysis

Company	URS Corp. - Austin
Analyst	KTH
Parameters	EPA Method 5

Client #	40942317
Job #	0811-09
PO #	3 + Blanks

Analysis of Particulate Recovery

Sample ID	**M5-D2**		**M5-D4**		**M5-D5**		**M5-DFB**		**M5-EntRB-Filter**	
Filter ID	*3878*		*3874*		*3877*		*3873*		*3876*	
Filter tare (g)	0.3790		0.3609		0.3825		0.3814		0.3778	
Total tare (g)	0.3790	Dates	0.3609	Dates	0.3825	Dates	0.3814	Dates	0.3778	Dates
Final wt. (g) 1st	0.3814	8/30/11	0.3922	8/30/11	0.5632	8/30/11	0.3800	8/30/11	0.3772	8/30/11
Final wt. (g) 2nd	0.3817	8/31/11	0.3924	8/31/11	0.5634	8/31/11	0.3802	8/31/11	0.3774	8/31/11
Net filter catch (mg)	2.7		31.5		180.9		-1.2		-0.4	
Beaker number	*2342*	Dates	*2344*	Dates	*2345*	Dates	*2346*	Dates		
Final wt (g) 1st	2.2833	8/30/11	2.2570	8/30/11	2.5669	8/30/11	2.2554	8/30/11		
Final wt (g) 2nd	2.2831	8/31/11	2.2567	8/31/11	2.5665	8/31/11	2.2550	8/31/11		
Beaker tare (g)	2.2685		2.2349		2.2702		2.2484			
Acetone blank (g)	0.0003		0.0004		0.0005		0.0002			
Acetone vol (mL)	40.0		48.0		65.0		25.0			
Net front rinse (mg)	14.3		21.4		295.8		6.3			
Total particulate (mg)	17.0		52.9		476.7		5.1		-0.4	

Blank Acetone Analysis

Blank beaker number	*2356*
Blank volume (mL)	85.0
Beaker tare (g)	2.2513
Max acetone residue (g)	0.0007

		Dates
Final wt (g) 1st	2.2522	8/30/11
Final wt (g) 2nd	2.2520	8/31/11
Acetone residue (g)	0.0007	

In-House Blank Acetone Analysis

Blank beaker number	*2357*
Blank volume (mL)	200
Beaker tare (g)	2.2579
Max acetone residue (g)	0.0016

		Dates
Final wt (g) 1st	2.2583	8/30/11
Final wt (g) 2nd	2.2581	8/31/11
Acetone residue (g)	0.0002	

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 202

Client #	40642317
Job #	0811-09
# Samples	3 + Blanks

Analysis of Condensible Particulate Recovery

Sample ID Number	Train Blank		Run D2		Run D4		Run D5	
Organic								
Beaker Number	*2351*		*2347*		*2349*		*2350*	
Initial Acetone Volume, mL	118		335		170		144	
Initial Hexane Volume, mL	178		435		315		168	
Initial Hexane/Acetone Volume, mL	296		770		485		312	
Lab Hexane Volume, mL	165	Dates	795	Dates	975	Dates	885	Dates
Final Weight, g	2.2745	8/30/11 P	2.3663	8/30/11 P	2.3265	8/30/11 P	2.4094	8/30/11 P
Reweigh, Final, g	2.2742	8/31/11 P	2.3659	8/31/11 P	2.3261	8/31/11 P	2.4090	8/31/11 P
Beaker Tare, g	2.2593		2.2773		2.2534		2.2497	
Net Organic Catch, mg	14.9		88.6		72.7		159.2	
Inorganic								
Beaker Number	*9598*	Dates	*19428*	Dates	*9596*	Dates	*9597*	Dates
Final Weight, g	2.2272	8/30/11 A	2.4536	8/30/11 A	2.5051		2.4515	8/30/11 A
Reweigh, Final, g	2.2271	8/31/11 P	2.4535	8/31/11 P	2.5049		2.4513	8/31/11 P
Beaker Tare, g	2.2195		2.2736		2.2672		2.2423	
Sample H2O volume, mL	87.0		6,705		8,135		7,730	
Added H2O, Filter Extraction, mL	75.0		75.0		75.0		75.0	
Removed Pre-aliquot, mL	0.5		0.5		0.5		0.5	
Pre-aliquot CF	1.003		1.000		1.000		1.000	
Resuspended Volume, mL	100		100		100		100	
Removed Post-aliquot, mL	0.5		0.5		0.5		0.5	
Post-aliquot CF	1.01		1.01		1.01		1.01	
Net Inorganic, mg	7.7		180.9		238.9		210.0	
Ammonium Correction, mg	0.0		0.6		0.6		0.6	
Corrected Inorganic, mg	7.7		180.3		238.3		209.4	
Condensible Particulate Matter, mg	22.6		268.9		311.1		368.7	
TB Corrected CPM, mg			266.9		309.1		366.7	

Client Blank Analyses

Type Blank	Hexane		Type Blank	H2O Blank		Type Blank	Acetone	
Beaker Number	*2354*	Dates	Beaker Number	*2288*	Dates	Beaker Number	*2356*	Dates
Tare weight, g	2.2600		Tare weight, g	2.2572		Tare weight, g	2.2513	
Dry Residue Weight, g	2.2606	8/30/11 P	Dry Residue Weight, g	2.2573	8/30/11 A	Dry Residue Weight, g	2.2522	8/30/11 P
Reweigh, Final, g	2.2605	8/31/11 P	Reweigh, Final, g	2.2575	8/31/11 P	Reweigh, Final, g	2.2520	8/31/11 P
Hexane Residue, g	0.0005		Water Residue, g	0.0003		Acetone Residue, g	0.0007	
Hexane Volume, mL	220		Water Volume, mL	202		Acetone Volume, mL	210	
Max. Hexane Residue, g	0.0022		Max. Water Residue, g	0.0020		Max. Acetone Residue, g	0.0017	

In-House Blank Analyses

Type Blank	Hexane		Type Blank	H2O Blank		Type Blank	Acetone	
Beaker Number	*2355*	Dates	Beaker Number	*2599*	Dates	Beaker Number	*2357*	Dates
Tare weight, g	2.2610		Tare weight, g	2.2456		Tare weight, g	2.2579	
Dry Residue Weight, g	2.2613	8/30/11 P	Dry Residue Weight, g	2.2455	8/30/11 A	Dry Residue Weight, g	2.2583	8/30/11 P
Reweigh, Final, g	2.2612	8/31/11 P	Reweigh, Final, g	2.2456	8/31/11 P	Reweigh, Final, g	2.2581	8/31/11 P
Hexane Residue, g	0.0002		Water Residue, g	0.0001		Acetone Residue, g	0.0002	
Hexane Volume, mL	225		Water Volume, mL	250		Acetone Volume, mL	200	
Max. Hexane Residue, g	0.0022		Max. Water Residue, g	0.0025		Max. Acetone Residue, g	0.0016	

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 202

Client #	40942317
Job #	0811-09
# Samples	3 + Blanks

Analysis of Condensible Particulate Recovery

Sample ID Number	**Train Blank**		**Proof Blank**		**Filter Blank**	
Organic						
Beaker Number	*2351*		*2353*		*2352*	
Initial Acetone Volume, mL	118		340		0	
Initial Hexane Volume, mL	178		350		0	
Initial Hexane/Acetone Volume, mL	296		690		0	
Lab Hexane Volume, mL	165	Dates	165	Dates	165	
Final Weight, g	2.2745	8/30/11 P	2.2488	8/30/11 P	2.2661	8/30/11 P
Reweigh, Final, g	2.2742	8/31/11 P	2.2484	8/31/11 P	2.2661	8/31/11 P
Beaker Tare, g	2.2593		2.2456		2.2645	
Net Organic Catch, mg	14.9		2.8		1.5	
Inorganic						
Beaker Number	*9598*	Dates	*2287*	Dates	*19415*	
Final Weight, g	2.2272	8/30/11 A	2.2793	8/30/11 A	2.2431	8/30/11 A
Reweigh, Final, g	2.2271	8/31/11 P	2.2795	8/31/11 P	2.2432	8/31/11 P
Beaker Tare, g	2.2195		2.2788		2.2434	
Sample H2O volume, mL	87.0		430		0	
Added H2O, Filter Extraction, mL	75.0		75.0		75.0	
Removed Pre-aliquot, mL	0.5		0.5		0.5	
Pre-aliquot CF	1.003		1.001		1.007	
Resuspended Volume, mL	100		100		100	
Removed Post-aliquot, mL	0.5		0.5		0.5	
Post-aliquot CF	1.01		1.01		1.01	
Net Inorganic, mg	7.7		0.7		-0.2	
Ammonium Correction, mg	0.0		0.0		0.0	
Corrected Inorganic, mg	7.7		0.7		-0.2	
Condensible Particulate Matter, mg	22.6		3.5		1.3	
TB Corrected CPM, mg			1.5		-0.7	

Client Blank Analyses

Type Blank	**Hexane**	
Beaker Number	*2354*	Dates
Tare weight, g	2.2600	
Dry Residue Weight, g	2.2606	8/30/11 P
Reweigh, Final, g	2.2605	8/31/11 P
Hexane Residue, g	0.0005	
Hexane Volume, mL	220	
Max. Hexane Residue, g	0.0022	

Type Blank	**H2O Blank**	
Beaker Number	*2288*	Dates
Tare weight, g	2.2572	
Dry Residue Weight, g	2.2573	8/30/11 A
Reweigh, Final, g	2.2575	8/31/11 P
Water Residue, g	0.0003	
Water Volume, mL	202	
Max. Water Residue, g	0.0020	

Type Blank	**Acetone**	
Beaker Number	*2356*	Dates
Tare weight, g	2.2513	
Dry Residue Weight, g	2.2522	8/30/11 P
Reweigh, Final, g	2.2520	8/31/11 P
Acetone Residue, g	0.0007	
Acetone Volume, mL	210	
Max. Acetone Residue, g	0.0017	

In-House Blank Analyses

Type Blank	**Hexane**	
Beaker Number	*2355*	Dates
Tare weight, g	2.2610	
Dry Residue Weight, g	2.2613	8/30/11 P
Reweigh, Final, g	2.2612	8/31/11 P
Hexane Residue, g	0.0002	
Hexane Volume, mL	225	
Max. Hexane Residue, g	0.0022	

Type Blank	**H2O Blank**	
Beaker Number	*2599*	Dates
Tare weight, g	2.2456	
Dry Residue Weight, g	2.2455	8/30/11 A
Reweigh, Final, g	2.2456	8/31/11 P
Water Residue, g	0.0001	
Water Volume, mL	250	
Max. Water Residue, g	0.0025	

Type Blank	**Acetone**	
Beaker Number	*2357*	Dates
Tare weight, g	2.2579	
Dry Residue Weight, g	2.2583	8/30/11 P
Reweigh, Final, g	2.2581	8/31/11 P
Acetone Residue, g	0.0002	
Acetone Volume, mL	200	
Max. Acetone Residue, g	0.0016	

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 202

Client #	40942317
Job #	0811-09
# Samples	3 + Blanks

MDL 0.09 (mg Ammonium)
MDL 0.26 (mg Sulfate)
Blank titrant amount (Vtb) 0.04
NH4OH normality 0.1

Lot # Sigma Aldrich 318620

Sample ID.	Volume Resuspended (mL)	Titration Aliquot Vol (mL)	NH_4OH Titration Vol (mL)	Aliquot Factor (mL rec'd/aliq mL)	SO4 Catch (mg)	Ammonium equivalent (mg)
Train Blank	100	99.5	0.05	1.01	0.26 ND	0.09 ND
Run D2	100	99.5	0.37	1.01	1.59	0.56
Run D4	100	99.5	0.38	1.01	1.64	0.58
Run D5	100	99.5	0.39	1.01	1.69	0.60
Proof Blank	100	99.5	0.06	1.01	0.26 ND	0.09 ND
Filter Blank	100	99.5	0.05	1.01	0.26 ND	0.09 ND

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 5

Client #	40942317
Job #	0811-09
# Samples	3 runs and blanks

Custody

Steve Eckard of Enthalpy Analytical, Inc. received the samples on 7/30/11 at 7.7°C after being relinquished by URS Corporation - Austin. No apparent container problems were noted upon receipt. Prior to analysis, the samples were kept under lock with access only to authorized personnel of Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for particulate matter using the analytical procedures in EPA Method 5, Determination of Particulate Matter Emissions from Stationary Sources (40 CFR Part 60, Appendix A).

The filter factions were weighed on Balance 2 (Mettler Model AB265-S, serial # 1125163272). The rinse fractions were weighed on Balance 8 (Sartorius Model ME 5-F, Serial # 23104965). Both balances are certified by Mettler Toledo through July 30, 2012.

QC Notes

One acetone blank and one filter blank were received and analyzed with these samples.

The catch weights were adjusted by a corresponding reagent blank correction value. A mathematically determined (theoretical) maximum value was calculated and compared with the actual value measured for the blank. The lower of the two values was used as the blank correction value, which was then factored by the sample volume divided by the blank volume, and subtracted from the sample catch weight.

Reporting Notes

Gravimetric analyses are considered to be accurate to ±0.5 mg. Negative catch weights between 0 and negative 0.5 mg are set regared as zero and no investigation is undertaken. Negative catch weights less than negative 0.5 mg are investigated.

The catch weight for the filter fraction of sample ***M5-DFB*** is negative 1.2mg. The filter appeared to be damaged; however, their were no filter pieces visible in the rinse fraction. The total particulate reported includes the negative value for the filter fration.

These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method and/or the NELAC Standard have been previously noted in this narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corporation - Austin
Analyst	KTH
Parameters	EPA Method 202

Client #	40942317
Job #	0811-09
# Samples	3 Runs and Blanks

Custody

Steve Eckard of Enthalpy Analytical, Inc. received the samples on 7/30/11 at 7.7°C after being relinquished by URS Corporation - Austin. The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for Condensible Particulate Matter using the analytical procedures in EPA Method 202, Dry Impimger Method for Determining Condensible Particulate Emissions from Stationary Sources.

All sample fractions were weighed on Balance 8 (Sartorius Model ME 5-F, Serial # 23104965) and on Balance 2 (Mettler Model AB265-S, serial # 1125163272), both certified by Mettler Toledo through July 30, 2012.

The water fractions were all received with very large volumes. Multiple beakers were used for the samples, to speed up the dry down process. The beaker contents were then transferred into one beaker with 100-mL DIUF H2O for titration.

QC Notes

A train blank, proof blank and filter blank were received with these samples.

The method specifies blank corrections are accomplished by subtracting the particulate mass determined in the 'Field Train Blank' or 2 mg (whichever is less) from the sample weight.

The inorganic results for the samples were corrected for the ammonium ions used to precipitate the sulfate, per the formula in the Method (Section 12.2.1).

When the pH of the samples was measured to be 7.0 or greater with the pH meter, no titrant was added.

Reporting Notes

These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method and/or the NELAC Standard have been previously noted in this narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-M5/202-PNR-Ace	PNR - Acetone	7/15/11 2130	X						
BP-WV-D2-M5/202-FPM Filt	Filter for Filterable PM		X						
BP-WV-D2-M5/202-CPM Filt	Filter for Condensable PM			X					
BP-WV-D2-M5/202-CondA	Condensate - Bottle A			X					Combine for single analysis.
BP-WV-D2-M5/202-CondB	Condensate - Bottle B			X					
BP-WV-D2-M5/202-CondC	Condensate - Bottle C			X					
BP-WV-D2-M5/202-CondD	Condensate - Bottle D			X					
BP-WV-D2-M5/202-CondE	Condensate - Bottle E			X					
BP-WV-D2-M5/202-CondF	Condensate - Bottle F			X					
BP-WV-D2-M5/202-CondG	Condensate - Bottle G			X					
BP-WV-D2-M5/202-BHRns-Ace	Back Half Rinse - Acetone			X					*Also received BHRns-Water Combine for single analysis. LMC 8/1/11
BP-WV-D2-M5/202-BHRns-Hex	Back Half Rinse - Hexane			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by: Nathan Kent	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 8:53 am	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 16.8° Raytek Gun #2
Seal #	Condition Good							

Remarks

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D4-M5/202-PNR-Ace	PNR - Acetone	7/18/11 0438	X						
BP-WV-D4-M5/202-FPM Filt	Filter for Filterable PM		X						
BP-WV-D4-M5/202-CPM Filt	Filter for Condensable PM			X					Combine for single analysis. * Also received Cond H + Cond I LMC 8/1/11
BP-WV-D4-M5/202-CondA	Condensate - Bottle A			X					
BP-WV-D4-M5/202-CondB	Condensate - Bottle B			X					
BP-WV-D4-M5/202-CondC	Condensate - Bottle C			X					
BP-WV-D4-M5/202-CondD	Condensate - Bottle D			X					
BP-WV-D4-M5/202-CondE	Condensate - Bottle E			X					
BP-WV-D4-M5/202-CondF	Condensate - Bottle F			X					
BP-WV-D4-M5/202-CondG	Condensate - Bottle G			X					
BP-WV-D4-M5/202-BHRns-Ace	Back Half Rinse - Acetone			X					Combine for single analysis.
BP-WV-D4-M5/202-BHRns-Hex	Back Half Rinse - Hexane			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 8:55am	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 16.8° Raytek Gun #2
Seal #	Condition Good							

Remarks

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 1 of 2

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D5-M5/202-PNR-Ace	PNR - Acetone	7/27/11 0338	X						
BP-WV-D5-M5/202-FPM Filt	Filter for Filterable PM		X						
BP-WV-D5-M5/202-CPM Filt	Filter for Condensable PM			X					
BP-WV-D5-M5/202-CondA	Condensate - Bottle A			X					Combine for single analysis.
BP-WV-D5-M5/202-CondB	Condensate - Bottle B			X					
BP-WV-D5-M5/202-CondC	Condensate - Bottle C			X					
BP-WV-D5-M5/202-CondD	Condensate - Bottle D			X					
BP-WV-D5-M5/202-CondE	Condensate - Bottle E			X					
BP-WV-D5-M5/202-CondF	Condensate - Bottle F			X					
BP-WV-D5-M5/202-CondG	Condensate - Bottle G			X					
BP-WV-D5-M5/202-CondH	Condensate - Bottle H			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/30/11	1245		7/30/11	1245			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
	8/1/11	8:55 am						16.4° Raytek Gun #2

Seal #	Condition
	Good

Remarks

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 2 of 2

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D5-M5/202-BHRns-Ace	Back Half Rinse - Acetone	7/27/11 0338		X					Combine for single analysis.
BP-WV-D5-M5/202-BHRns-Hex	Back Half Rinse - Hexane			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/30/11	1245		7/30/11	1245			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
	8/1/11	8:56 am						16.4° Raytek Gun #2

Seal #	Condition
	Good

Remarks

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-DFB-M5/202-PNR-Ace	PNR - Acetone	7/24/11 1735	X						
BP-WV-DFB-M5/202-FPM Filt	Filter for Filterable PM		X						
BP-WV-DFB-M5/202-CPM Filt	Filter for Condensable PM			X					
BP-WV-DFB-M5/202-CondA	Condensate - Bottle A			X					Sample ID refers to back half rinse with water.
BP-WV-DFB-M5/202-BHRns-Ace	Back Half Rinse - Acetone			X					Combine for single analysis.
BP-WV-DFB-M5/202-BHRns-Hex	Back Half Rinse - Hexane			X					
BP-WV-DPB-M5/202-Water	Water	7/19/11 2130		X					
BP-WV-DPB-M5/202-Hex	Hexane			X					Combine for single analysis.
BP-WV-DPB-M5/202-Ace	Acetone			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 8:56 am	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 16.8 Raytek Gun#2

Seal #	Condition Good

Remarks

URS

Chain of Custody Record

Samples from Method 5/202 Sampling Trains
from Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Particulate Matter - Gravimetric Determination per EPA Method 5	Condensable Particulate Matter - Gravimetric per EPA Method 202		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-EntRB-M5/202-FPM Filt	Filter for Filterable PM	7/27/11 1330	X						
BP-WV-EntRB-M5/202-CPM Filt	Filter for Condensable PM			X					
BP-WV-EntRB-M5/202-Ace	Acetone		X	X					
BP-WV-EntRB-M5/202-Water	Water			X					
BP-WV-EntRB-M5/202-Hex	Hexane			X					

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
Nathan R	7/30/11	1245		7/30/11	1245			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
	8/1/11	8:56 am						16.8° Raytek Gun #2

Seal #	Condition
	Good

Remarks

This Is The Last Page Of This Report.

Field Data Sheets

Sample Type – **PM & Condensible (Method 5/202)**	Date 7/15/11	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF — n/a	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number – 40942317	Console No. A167041	Operator WDD / DCW	Initial 0.007 @ 20"
Location (Source) – DCU3 ~~REA~~ East	DGMCF 0.990	Nozzle Dia (in) 0.206	Final 0.003 @ 24"
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID M5/202-1	Pitot Tube ID — n/a
Elevation (relative to Barometer) (ft) 0'	Filter No. 03878	Kf n/a	Pitot Tube Leak Check
Nozzle Calib. Caliper ID 700904	0.206 0.205 0.206	Bar. Press. (in. Hg) 29.26	Initial (+) (-) n/a
		Stat. Press. (in. H_2O) n/a	Final (+) (-)

WDD 7/15/11

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	CPM Filter *	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	COND EXIT
P2A	1939	~~48.400~~ 420.079	—	0.01	—	327	323	91	79	107	107	20.0"	68
	1944	420.547	—	0.01	—	320	325	90	86	107	106	22.0"	66
	1949	420.661	—	0.01	—	322	326	90	89	107	105	23.0"	50
	1954	420.825	-	0.01	-	323	327	90	89	107	105	23.0	49
	1959	420.983	-	0.01	-	326	325	86	88	106	105	23.0	48
	2004	421.450	-	0.01	-	328	327	77	84	104	102	23.0	48
	2009	421.285	-	0.01	-	327	327	74	84	104	103	23.0	52
	2014	421.410	-	0.01	-	328	326	73	83	102	100	23.0	51
	2019	421.540	-	0.01	-	327	328	73	81	101	100	23.0	53
	2024	421.635	-	0.01	-	328	327	70	80	100	100	23.0	49
	2029	421.750	-	0.01	-	327	326	67	80	99	98	24.0	64
	2034	421.845	-	0.01	-	329	327	66	79	98	96	24.0	52
	2039	421.940	-	0.01	-	327	326	67	79	97	97	24.0	55
	2044	422.020	-	0.01	-	328	326	67	78	96	94	24.0	54
	2049	422.100	-	0.01	-	327	325	69	78	96	95	24.0	58
	2054	422.190	-	0.01	-	326	324	70	74	95	93	24.0	58
	2059	422.270	-	0.01	-	325	324	71	74	95	93	24.0*	58
	2104	422.370	-	0.01	-	325	324	71	74	94	92	24.0	51
	2109	422.455	-	0.01	-	325	323	73	74	94	93	24.0	51
	2114	422.700	-	0.01	-	326	325	73	74	93	92	24.0	59
	2119	422.643	-	0.01	-	326	325	74	74	93	91	24.0	60
	2124	422.758	-	0.01	-	326	322	75	74	93	90	24.0	62
STOP	2130	422.933											

Comments:

*** Remember to record Final CPM Filter Temperature**

SDS-36: PM & Condensibles by EPA Methods 5/202
Per EM SOP-047
Revision Date: April 2011

Sample Type – **PM & Condensible (Method 5/202)**	Date 7/16/11	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF —— n/a	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number – 40942317	Console No. A167041	Operator WDD	Initial 0.008 @ 20"
Location (Source) – DCU3 P3A (West)	DGMCF 1.001	Nozzle Dia (in) 0.206	Final 0.003 @ 26"
Duct Dimension(s) 8"	ΔH@ 1.950	Nozzle ID M5/202-1	Pitot Tube ID
Elevation (relative to Barometer) (ft) —— 0'	Filter No. 3871	Kf —— n/a	Pitot Tube Leak Check
Nozzle Calib. Caliper ID 700904 0.207 0.206 0.205		Bar. Press. (in. Hg) 29.38	Initial (+) (-)
		Stat. Press. (in. H2O) n/a	Final (+) (-)

WDD 7/16/11

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Condenser ~~Stack~~	Probe	Filter	CPM Filter *	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)
P3A	1322	426.425		0.01	57 ~~302~~	302	324	59	84	94	92	24.0"
	1327	426.885		0.01	57 ~~305~~	305	325	59	84	94	92	24.0"
	1332	426.992		0.01	55	305	325	57	82	94	92	23.0"
	1337	427.003		0.01	54	291*	326	57	85	95	92	23.0"
	1342	427.216		0.01	58	290	325	57	87	96	93	23.0"
	1347	427.331		0.01	55	291	324	57	88	97	93	23.0"
	1352	427.432		0.01	58	291	329	60	88	97	94	23.0"
	1357	427.530		0.01	59	291	323	66	85	97	95	23.0"
	1402	427.616		0.01	57	291	324	66	85	98	95	23.0"
	1407	427.711		0.01	56	290	323	63	87	98	96	23.0"
	1412	427.794		0.01	58	290	323	61	86	98	96	23.0"
	1417	427.862		0.01	59	292	323	62	85	99	96	23.0"
	1422	427.949		0.01	60	293	324	62	84	99	96	23.0"
	1427	428.010		0.01	63	295	325	63	84	98	96	23.0"
	1432	428.082		0.01	67	298	325	60	84	98	96	23.0"
	1437	428.151		0.01	73	300	326	61	84	98	96	23.0"
	1442	428.214		0.01	77	302	325	60	84	98	96	23.0"
	1447	428.283		0.01	88	303	326	60	85	98	96	23.0"
	1452	428.340		0.01	92	306	327	59	86	98	96	23.0"
	1457	428.417		0.01	110	308	327	65	88	99	96	23.0"
	1502	428.473		0.01	95	310	324	76	90	99	97	23.0"
	1507	428.555		0.01	121	311	324	78	89	100	97	23.0"
	1512	428.615		0.01	115	312	325	80	89	100	97	23.0"
STOP	1517	428.707		0.01	140	313	326	81	89	100	97	—

Comments: * Trying to better insulate probe.
N₂ Purge start: 1713
@ 16 L/min Stop: 1813

Remember to record Final CPM Filter Temperature

SDS-36: PM & Condensibles by EPA Methods 5/202
Per EM SOP-047
Revision Date: April 2011

Sample Type – **PM & Condensible (Method 5/202)**	Date 7/18/11	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number – 40942317	Console No. A167041	Operator DCW	Initial 0.007 @ 21
Location (Source) – DCU3 West Vent	DGMCF n/a	Nozzle Dia (in) 0.206	Final 0.004 @ 21
Duct Dimension(s) 8"	ΔH@ n/a	Nozzle ID M5/202-1	Pitot Tube ID n/a
Elevation (relative to Barometer) (ft) 0	Filter No. 3874	Kf n/a	Pitot Tube Leak Check
Nozzle Calib. Caliper ID 700904 — 0.205 0.206 0.206		Bar. Press. (in. Hg) 29.38	Initial (+) n/a (-) n/a
		Stat. Press. (in. H₂O) n/a	Final (+) n/a (-) n/a

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) COND ~~Stack~~	Probe	Filter	CPM Filter *	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)
P3A	220	430.845	~~321~~ ~~324~~	~~324~~ 0.01	56	321	324	86	81	89	88	20
	225	431.475	~~30~~	0.01	53	301	324	85	80	89	87	20
	230	431.700	–	0.01	52	295	324	81	83	88	89	20
	235	431.980	–	0.01	54	293	326	83	82	88	86	20
	240	432.160	–	0.01	56	293	326	69	82	88	87	20
	245	432.470	–	0.01	58	293	326	67	~~58~~ 81	88	85	20
	250	432.560	–	0.01	53	293	325	~~67~~ 61	81	88	85	20
	255	432.810	–	0.01	57	293	325	69	81	88	85	20
	300	432.980	–	0.01	64	292	326	74	82	89	87	20
	305	433.271	–	0.01	55	291	326	63	80	89	86	20
	310	433.445	–	0.01	56	292	326	70	80	90	87	20
	315	433.600	–	0.01	53	292	326	61	80	90	86	20
	320	433.810	–	0.01	54	292	326	70	80	90	88	20
	325	434.030	–	0.01	54	292	325	65	82	90	87	20
	330	434.235	–	0.01	68	293	326	65	76	~~89~~ 91	~~91~~ 88	20
	335	434.430	–	0.01	67	296	326	74	84	91	87	20
	340	434.600	–	0.01	55	302	326	63	84	90	88	20
	345	434.840	–	0.01	58	306	326	71	84	91	89	20
	350	435.025	–	0.01	62	308	326	61	84	90	87	20
	355	435.210	–	0.01	68	310	327	57	83	91	88	20
	400	435.430	–	0.01	66	311	326	63	82	91	88	20
	405	435.600	–	0.01	57	313	326	75	83	91	89	20
	410	435.800	–	0.01	58	313	327	78	84	90	87	20
	415	435.910	–	0.01	61	314	327	65	84	90	89	20
	420	436.060	–	0.01	65	314	327	72	83	90	87	20
	425	436.235	–	0.01	62	316	320	79	83	90	88	20
	430	436.400	–	0.01	65	316	320	60	83	90	88	20
	0435	436.482	–	0.01	52	316	321	70	83	90	87	20
STOP	0438	436.578	–	–	–	–	–	62	–	–	–	–

Comments:

*** Remember to record Final CPM Filter Temperature**

SDS-36: PM & Condensibles by EPA Methods 5/202
Per EM-SOP-047
Revision Date: April 2011

7/27/11 kmm 7/27/11

Sample Type – **PM & Condensible (Method 5/202)**	Date ~~July 26th 2011~~	Condition 0	Page 1	of 1	
Plant Name – BP-Husky Toledo	PTCF 0.84	Run 5	Sampling Train Leak Rate (ft³ @ "Hg)		
Project Number - 40942317	Console No. A161398	Operator DCW	Initial	0.004 @ 20"	
Location (Source) – DCU3 West Vents	DGMCF 1.011	Nozzle Dia (in) 0.205	Final	0.005 @ 20"	
Duct Dimension(s) 8"	ΔH@ 1.856	Nozzle ID MS/202-1	Pitot Tube ID		
Elevation (relative to Barometer) (ft) ~~West~~ 0	Filter No. —	Kf N/A	Pitot Tube Leak Check		
Nozzle Calib.		Bar. Press. (in. Hg) 29.10	Initial	(+) n/a	(-)
Caliper ID 700904	0.204 0.204 0.206	Stat. Press. (in. H₂O) n/a	Final	(+)	(-)

Point	5-min Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	2 Probe	3 Filter	1 CPM Filter *	4 Imp Exit	6 DGM In	7 DGM Out	Vacuum (in. Hg)	5 Cond.
3A	0129	34.840	-	0.05	N/A	343	336	80	81	95	96	16.0	41
	0134	35.17	-	0.02		306	338	78	86	95	97	16.5	49
	0139	35.30	-	0.01		307	338	73	87	95	95	18.5	49
	0144	35.38	-	0.01		307	339	70	88	95	95	18.5	50
	0149	35.50	-	0.01		307	342	66	88	95	95	19.0	52
	0154	35.59	-	0.01		306	329	72	88	95	95	19.0	51
	0159	35.66	-	0.01		306	318	76	89	95	95	19.0	53
	0204	35.75	-	0.01		306	322	80	89	95	95	19.0	55
	0209	35.83	-	0.01		307	321	80	89	95	95	19.0	51
	0214	35.90	-	0.01		306	321	78	88	95	95	19.0	52
	0219	35.97	-	0.01		307	322	72	88	95	94	19.0	58
	0224	36.04	-	0.01		307	319	77	89	95	94	19.0	57
	0229	36.10	-	0.01		307	318	80	89	95	94	19.0	57
	0234	36.16	-	0.01		307	318	75	89	94	94	19.0	59
	0239	36.22	-	0.01		306	319	71	89	94	94	19.0	60
	0244	36.27	-	0.01		305	318	68	89	94	94	19.0	60
	0249	36.33	-	0.01		306	319	68	89	94	94	19.0	61
	0254	36.37	-	0.01		307	320	68	88	94	94	19.0	59
	0259	36.43	-	0.01		308	321	71	88	94	94	19.0	59
	0304	36.49	-	0.01		310	321	76	88	94	94	19.0	57
	0309	36.55	-	0.01		311	321	76	88	94	93	19.0	57
	0314	36.60	-	0.01		312	319	75	88	94	93	19.0	55
	0319	36.66	-	0.01		313	320	73	88	93	93	19.0	53
	0324	36.72	-	0.01		313	324	70	88	93	93	19.0	54
	0329	36.78	-	0.01		313	321	65	88	93	92	19.0	54
	0334	36.84	-	0.01		312	327	54 66	88	93	93	19.0	54
STOP	0338	36.870						71					

Comments:

*** Remember to record Final CPM Filter Temperature**

SDS-36: PM & Condensibles by EPA Methods 5/202
Per EM SOP-047
Revision Date: April 2011

Sample Type – **PM & Condensible (Method 5/202)**	Date 7/26/11	Condition FB	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF NA	Run FB	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A167041	Operator NC	Initial see @
Location (Source) – DCU3	DGMCF 0.990	Nozzle Dia (in) NA	Final Below
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID NA	Pitot Tube ID
Elevation (relative to Barometer) (ft) 0	Filter No. 3873	Kf NA	Pitot Tube Leak Check
Nozzle Calib.		Bar. Press. (in. Hg) NA	Initial (+) NA
Caliper ID NA	NA	Stat. Press. (in. H_2O) NA	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	CPM Filter *	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)
	1733	484.101	@ 15" =		0.004							
		484.191										
	1735	484.191	@ 15" =		0.006							
		484.461										

Comments:

* Remember to record Final CPM Filter Temperature

SDS-36: PM & Condensibles by EPA Methods 5/202
Per EM SOP-047
Revision Date: April 2011

Sample Recovery Sheets

Project No. 40942317

Recovered by (Initials) DCW

Balance ID PE6000

Particulate Matter (incl. Condensible)

EPA Method 5/202

Condition No. D

Run No. 2

Date: 7/15/11

O — — KO Fatty ~~2651.9~~ 3291.4 993.1 = 2298.3

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	- Initial Wt (g)	= Net Gain (g)
1	--		KO Fatty	3468.0	937.7	2530.3
2	--		Mod Fatty	2651.9	1004.7	1647.2
	Teflon-Coated CPM Filter	--	--	--	--	--
3	--		KO	605.6	604.7	0.9
4	Zinc Acetate	200	G/S	791.4	812.4	-21
5	Zinc Acetate	200	G/S	804.3	818.4	-14.1
6	--		KO	647.6	610.0	37.6
4	Silica Gel	~ 300g	Mod	935.4	921.2	14.2
			--		Total Net Gain (g)	6493.4

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-___-_____-M5/202-PNR		Probe and Nozzle Rinse
BP-___-_____-M5/202-Filt	see sample logbook	Filter
BP-___-_____-M5/202-WtRns		Water Rinse
BP-___-_____-M5/202-OrgRns		Organic Rinse
BP-___-_____-M5/202-CPMFilt		CPM Filter

Comments Purge @ 16 L/min 0153-0253, iced
ZnA cold box

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone into PNR sample bottle.

✓ Disconnect transfer line. Rinse two times with water into water rinse sample bottle. Rinse two times with acetone and two times with hexane into the organic rinse sample bottle.

✓ Transfer bottle(s) to laboratory with impinger train.

IN LABORATORY

✓ Purge with nitrogen for one hour at >14 liters per minute. Record start and end times on the data sheet. Start 0153 Stop 0253

✓ Separate filter holder and place filter in clean pre-rinsed glass petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.

✓ Rinse the back half of the filter holder and any connecting glassware two times each with acetone and hexane into the organic rinse sample bottle.

✓ Separate CPM filter holder and place CPM filter in clean pre-rinsed glass petri dish. Complete CPM-Filt sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour the contents of the first ~~two~~ 3 impingers into the water rinse catch bottle(s). Rinse impingers, connecting glassware. And the front half of the CPM filter holder two times with water into the same bottles. Complete water rinse sample label.

✓ Rinse the first ~~two~~ 3 impingers, connecting glassware, and the front half of the CPM filter holder once with acetone and twice with hexane into the organic rinse sample bottle(s)

✓ Log samples into logbook and store appropriately.

RDS-47 - PM and Condensibles by EPA Method 5/202
Per EM SOP-047

Project No. 40942317

Recovered by (Initials) WDD

Balance ID PE6000

Particulate Matter (incl. Condensible)

EPA Method 5/202

Condition No. D

Run No. 3

Date: 7/10/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	- Initial Wt (g)	= Net Gain (g)
0	—	—	KO Fatty	3377.2	996.9	2380.3
1	--		KO Fatty	~~3377.2~~ 3478.6	938.9	2539.7
2	--		Mod Fatty	3381.5	1005.5	2376.0
	Teflon-Coated CPM Filter	--	--	--	--	--
3	--		KO	1096.8	605.4	491.4
4	Zinc Acetate	200	G/S	741.3	906.5	-165.2
5	Zinc Acetate	200	G/S	732.6	849.9	-117.3
6	--		KO	893.7	612.3	281.4
4	Silica Gel	~ 300g	Mod	943.6	935.2	8.4
					Total Net Gain (g)	7794.7

WDD 7/10/11

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-~~D3~~ WV-D3-M5/202-PNR	1	Probe and Nozzle Rinse
BP-__-__-M5/202-Filt	1	Filter
BP-__-__-M5/202-WtRns	0	Water Rinse
BP-__-__-M5/202-OrgRns	2	Organic Rinse
BP-✓-✓-M5/202-CPMFilt	1	CPM Filter
BP-WV-D3-M5/202-Cond	9	Condensate

Comments

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone into PNR sample bottle.

✓ Disconnect transfer line. Rinse two times with water into water rinse sample bottle. Rinse two times with acetone and two times with hexane into the organic rinse sample bottle.

✓ Transfer bottle(s) to laboratory with impinger train.

IN LABORATORY

✓ Purge with nitrogen for one hour at >14 liters per minute. Record start and end times on the data sheet. Start 1713 Stop 1813

✓ Separate filter holder and place filter in clean pre-rinsed glass petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.

✓ Rinse the back half of the filter holder and any connecting glassware two times each with acetone and hexane into the organic rinse sample bottle.

✓ Separate CPM filter holder and place CPM filter in clean pre-rinsed glass petri dish. Complete CPM-Filt sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour the contents of the first two impingers into the water rinse catch bottle(s). Rinse impingers, connecting glassware. And the front half of the CPM filter holder two times with water into the same bottles. Complete water rinse sample label.

✓ Rinse the first two impingers, connecting glassware, and the front half of the CPM filter holder once with acetone and twice with hexane into the organic rinse sample bottle(s)

✓ Log samples into logbook and store appropriately.

RDS-47 - PM and Condensibles by EPA Method 5/202
Per EM SOP-047

Project No. 40942317
Recovered by (Initials) DCW
Balance ID PE 6000

Particulate Matter (incl. Condensible)

EPA Method 5/202

Condition No. D
Run No. 4
Date: 7/18/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1	--		KO Fatty	3361.9	-	993.5	=	2368.4
2	--		~~Mod~~ KO Fatty	3470.8	-	939.5	=	2531.3
	Teflon-Coated CPM Filter	--	--	--	-	--	=	--
5	--		KO	1121.6	-	608.4	=	544.6
6	Zinc Acetate	200	G/S	870.9	-	911.5	=	-40.6
7	Zinc Acetate	200	G/S	687.0	-	834.2	=	-147.2
8	--		KO	643.3	-	612.6	=	30.7
9	Silica Gel	~ 300g	Mod	950.3	-	943.9	=	6.4
				Total Net Gain (g)				

3 Mod Fatty 3356.1 - 1006.3 = 2349.8
4 KO 1043.2 657.7 = 384.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-D4-M5/202-PNR	1	Probe and Nozzle Rinse
BP-WV-___-M5/202-Filt	1	Filter
BP-___-___-M5/202-WtRns	9	Water Rinse
BP-___-___-M5/202-OrgRns	1	Organic Rinse
BP-___-___-M5/202-CPMFilt	1	CPM Filter

Comments 406.2
- 448.6
42.4 Add to #5 Imp.

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone into PNR sample bottle.
✓ Disconnect transfer line. Rinse two times with water into water rinse sample bottle. Rinse two times with acetone and two times with hexane into the organic rinse sample bottle.
✓ Transfer bottle(s) to laboratory with impinger train.

IN LABORATORY

✓ Purge with nitrogen for one hour at >14 liters per minute. Record start and end times on the data sheet. Start 1907 Stop ______
✓ Separate filter holder and place filter in clean pre-rinsed glass petri dish. Complete Filt sample label.
✓ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.
✓ Rinse the back half of the filter holder and any connecting glassware two times each with acetone and hexane into the organic rinse sample bottle.
✓ Separate CPM filter holder and place CPM filter in clean pre-rinsed glass petri dish. Complete CPM-Filt sample label.
✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.
✓ Pour the contents of the first two impingers into the water rinse catch bottle(s). Rinse impingers, connecting glassware. And the front half of the CPM filter holder two times with water into the same bottles. Complete water rinse sample label.
✓ Rinse the first two impingers, connecting glassware, and the front half of the CPM filter holder once with acetone and twice with hexane into the organic rinse sample bottle(s)
✓ Log samples into logbook and store appropriately.

RDS-47 - PM and Condensibles by EPA Method 5/202
Per EM SOP-047

Project No. 40942317

Recovered by (Initials) KMM

Balance ID PE6000

Particulate Matter (incl. Condensible)

EPA Method 5/202

Condition No. D

Run No. 5

Date: 7/27/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1			KO Fatty	3481.0	-	976.8	=	2504.2
2	--		KO Fatty	3390.3	-	949.6	=	2440.7
3	--		Mod Fatty	3242.3	-	994.9	=	2247.4
4	--		KO	947.3	-	569.9	=	377.4
	Teflon-Coated CPM Filter	--	--	--	-	--	=	--
5	--		KO	576.1	-	575.9	=	0.2
6	Zinc Acetate	200	G/S	695.0	-	863.7	=	-168.7
7	Zinc Acetate	200	G/S	759.6	-	904.7	=	-145.1
8	--		KO	917.5	-	605.8	=	311.7
9	Silica Gel	~ 300g	Mod	1014.0	-	1001.1	=	12.9
						Total Net Gain (g)		7580.7

Sample Log

Sample ID Number	Description
BP-NV-DS-M5/202-PNR	Probe and Nozzle Rinse
BP-_-_-M5/202-Filt FPM	Filter
BP-_-_-M5/202-~~WtRns~~ Cond	Water Rinse
BP-_-_-M5/202-~~OrgRns~~ BHRns ← Ace ← Hex	Organic Rinse
BP-_-_-M5/202-CPMFilt	CPM Filter

Sample Recovery Checklist

AT LOCATION

- ✓ Rinse and brush probe and nozzle with acetone into PNR sample bottle.
- ✓ Disconnect transfer line. Rinse two times with water into water rinse sample bottle. Rinse two times with acetone and two times with hexane into the organic rinse sample bottle.
- Transfer bottle(s) to laboratory with impinger train.

IN LABORATORY

- ✓ Purge with nitrogen for one hour at >14 liters per minute. Record start and end times on the data sheet. Start 0530 Stop 0632 @ 17.0 Lpm
- ✓ Separate filter holder and place filter in clean pre-rinsed glass petri dish. Complete Filt sample label.
- ✓ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.
- ✓ Rinse the back half of the filter holder and any connecting glassware two times each with acetone and hexane into the organic rinse sample bottle.
- ✓ Separate CPM filter holder and place CPM filter in clean pre-rinsed glass petri dish. Complete CPM-Filt sample label.
- ✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data
- ✓ Pour the contents of the first four impingers into the water rinse catch bottle(s). Rinse impingers, connecting glassware. And the front half of the CPM filter holder two times with water into the same bottles. Complete water rinse sample label.
- ✓ Rinse the first four impingers, connecting glassware, and the front half of the CPM filter holder once with acetone and twice with hexane into the organic rinse sample bottle(s).
- ✓ Discard contents of 6th and 7th impingers (Zinc Acetate).
- ✓ Log samples into logbook and store appropriately.

Comments

Project No. 40942317

Recovered by (Initials) KMM

Balance ID TE4101A

Particulate Matter (incl. Condensible)

EPA Method 5/202

Condition No. D

Run No. FB

Date: 7/26/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1	--		KO Fatty	974.2	-	976.6	=	-2.4
2	--		KO Fatty	946.7	-	950.0	=	-3.3
3	--		Mod Fatty	991.8	-	995.1	=	-3.3
4	--		KO	568.7	-	571.0	=	-2.3
	Teflon-Coated CPM Filter	--	--	--	-	--	=	--
5	--		KO	575.9	-	576.3	=	-0.4
6	Zinc Acetate	200	G/S	863.7	-	863.4	=	0.3
7	Zinc Acetate	200	G/S	904.7	-	904.7	=	0
8	--		KO	605.8	-	605.9	=	-0.1
9	Silica Gel	~ 300g	Mod	1001.1	-	991.6	=	9.5
				Total Net Gain (g)				-2.0

Sample Log

Sample ID Number	Description
BP-WV-FB-M5/202-PNR	Probe and Nozzle Rinse
BP-___-___-M5/202-Filt	Filter
BP-___-___-M5/202-~~WtRns~~ CondA	Water Rinse
BP-___-___-M5/202-~~Org~~ Oil Rns - Ace - Hex	Organic Rinse
BP-___-___-M5/202-CPMFilt	CPM Filter

Sample Recovery Checklist

AT LOCATION

- ✓ Rinse and brush probe and nozzle with acetone into PNR sample bottle.
- ✓ Disconnect transfer line. Rinse two times with water into water rinse sample bottle. Rinse two times with acetone and two times with hexane into the organic rinse sample bottle.
- ✓ Transfer bottle(s) to laboratory with impinger train.

IN LABORATORY

- ✓ Purge with nitrogen for one hour at >14 liters per minute. Record start and end times on the data sheet. Start 1903 Stop 2004 @17 Lpm
- ✓ Separate filter holder and place filter in clean pre-rinsed glass petri dish. Complete Filt sample label.
- ✓ Rinse front half of filter holder with acetone into PNR bottle. Complete probe and nozzle rinse (PNR) sample label.
- ✓ Rinse the back half of the filter holder and any connecting glassware two times each with acetone and hexane into the organic rinse sample bottle.
- ✓ Separate CPM filter holder and place CPM filter in clean pre-rinsed glass petri dish. Complete CPM-Filt sample label.
- ✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data
- ✓ Pour the contents of the first four impingers into the water rinse catch bottle(s). Rinse impingers, connecting glassware. And the front half of the CPM filter holder two times with water into the same bottles. Complete water rinse sample label.
- ✓ Rinse the first four impingers, connecting glassware, and the front half of the CPM filter holder once with acetone and twice with hexane into the organic rinse sample bottle(s).
- ✓ Discard contents of 6th and 7th impingers (Zinc Acetate).
- ✓ Log samples into logbook and store appropriately.

Comments

RDS-47 - PM and Condensibles by EPA Method 5/202
Per EM SOP-047
Revision Date: April 2011

Section F
Method 6C – SO_2

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	

		A2	A3	A4
M308	THC1 Post Test	15.58	14.22	16.32
	THC2 Post Test	15.15	14.46	16.11
	Average Post Test	**15.37**	**14.34**	**16.22**

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 1

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,154.00**	94.00	**0.94%**
High (Span):	9,980.00	**9,801.00**	-179.00	**1.79%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	1.00	5154.00	5047.00	-440.00	-437.05	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	1.00	5004.00	5132.00	92.00	88.90	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.05**	0.05	**0.00%**
Mid:	11.40	**6.47**	-4.93	**0.05%**
High (Span):	23.50	**16.92**	-6.58	**0.07%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.05	-0.03	6.47	6.33	-1.85	-3.32	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.66**	0.18	**0.00%**
High (Span):	19.50	**19.10**	-0.40	**0.00%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	0.00	9.66	9.72	0.11	0.11	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**		
Low:	8,000.00	**8,250.00**		
Mid:	15,000.00	**15,500.00**		
High (Span):	29,900.00	**29,600.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-240.00	-520.00	16200.00	15400.00	2003.00		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 2

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,118.00**	58.00	**0.58%**
High (Span):	9,980.00	**9,869.00**	-111.00	**1.11%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**-4.00**	5118.00	5236.00	**-100.00**	**-95.75**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**4,990.00**	40.00	**0.40%**
High (Span):	9,910.00	**9,832.00**	-78.00	**0.78%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	4990.00	5164.00	**71.00**	**69.22**	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-0.03**	-0.03	**0.00%**
Mid:	11.40	**8.24**	-3.16	**0.03%**
High (Span):	23.50	**18.91**	-4.59	**0.05%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**-0.05**	8.24	4.52	**-6.69**	**-11.86**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.64**	0.16	**0.00%**
High (Span):	19.50	**1.92**	-17.58	**0.18%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**9.64**	0.00	9.75	**-540.00**	**-93907.16**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-6.00**		
Low:	8,000.00	**8,221.00**		
Mid:	15,000.00	**15,640.00**		
High (Span):	29,900.00	**28,724.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-250.00	**-190.00**	17800.00	22400.00	12709.61		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 3

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,095.00**	35.00	**0.35%**
High (Span):	9,980.00	**9,913.00**	-67.00	**0.67%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	0.00	5095.00	0.00	24.00	47.67	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	0.00	5004.00	0.00	60.00	117.74	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	11.40	**12.00**	0.60	**0.01%**
High (Span):	23.50	**22.81**	-0.69	**0.01%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	0.00	12.00	0.00	2.66	5.05	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	9.48	**10.62**	1.14	**0.01%**
High (Span):	19.50	**17.61**	-1.89	**0.02%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.02	0.00	10.62	0.00	-0.37	-0.68	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**2.00**		
Low:	8,000.00	**8,156.00**		
Mid:	15,000.00	**14,941.00**		
High (Span):	29,900.00	**29,453.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
29.00	31.00	19100.00	15000.00	2170.00		

Test Run D2

SO2 Calibration Data Summary

Project ID:	40942317
Date:	15-Jul
Instrument Make/Model:	Ametek 921M
ID Number:	AC-921-9467-1
Calibration Span Value (diluted):	100
Calibration Span Value:	9,980
Analyzer Operating Range:	10,000
Units:	ppmvw
Technician(s):	DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	18:05	0	0	0%
span	CC69815	9,980	18:27	9,801	179	2%
mid-range	AAL8192	5,060	18:30	5,154	94	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	0	27.50	18.39	N/A
span	18:27	9,980	98	27.50	18.26	102
mid-range	18:30	5,060	52	27.50	18.26	98
			Average Pre-Test DR	27.50	18.30	**100**
zero	20:13	0	-3	27.50	18.29	N/A
mid-range	20:20	5,060	50	27.50	18.19	100
			Average Mid-Test DR	27.50	18.24	N/A
zero gas	21:38	0	1	27.50	18.27	N/A
span	21:32	9,980	100	27.50	18.20	100
mid-range	21:27	5,060	51	27.50	18.23	100
			Average Post-Test DR	27.50	18.23	100
			Average Span DR			101
			Average Mid-Range DR			100

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0	20:13	-3	-3%
5,060	5,154	20:20	5,045	-1%
0	0	21:32	1	2%
5,060	5,154	21:27	5,047	-1%

Test Run D3

SO2 Calibration Data Summary

Project ID: 40942317
Date: 16-Jul
Instrument Make/Model: Ametek 921M
ID Number: AC-921-9467-1
Calibration Span Value (diluted): 97
Calibration Span Value: 9,980
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	18:05	-1	1	1%
span	CC69815	9,980	18:27	9,893	87	1%
mid-range	AAL8192	5,060	18:30	5,105	45	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	-1	N/A	18.15	N/A
span	18:27	9,980	96	N/A	18.05	104
mid-range	18:30	5,060	50	N/A	18.02	102
			Average Pre-Test DR	#DIV/0!	18.08	**103**
zero gas	21:38	0	-2	N/A	18.11	N/A
span	21:32	9,980	98	N/A	18.10	102
mid-range	21:27	5,060	52	N/A	18.12	98
			Average Post-Test DR	#DIV/0!	18.11	**100**
			Average Span DR			103
			Average Mid-Range DR			100

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	-1	21:32	-2	0%
5,060	5,105	21:27	5,306	2%

Test Run D4

SO2 Calibration Data Summary

Project ID:	**40942317**
Date:	**18-Jul**
Instrument Make/Model:	**Ametek 921M**
ID Number:	**AC-921-9467-1**
Calibration Span Value (diluted):	**98**
Calibration Span Value:	9,980
Analyzer Operating Range:	**10,000**
Units:	**ppmvw**
Technician(s):	**DC/KMM**

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	**N2**	**0**	00:28	0	0	0%
span	**CC69815**	**9,980**	00:33	9,869	111	1%
mid-range	**AAL8192**	5,060	00:35	5,118	58	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:28	0	0	N/A	18.27	N/A
span	**00:33**	9,980	**97**	N/A	18.28	103
mid-range	**00:35**	5,060	**50**	N/A	18.26	101
Average Pre-Test DR				#DIV/0!	18.25	**102**
zero	02:55	0	-5	43.08	18.74	N/A
mid-range	03:05	5,060	53	43.06	18.81	96
Average Mid-Test DR				43.07	18.77	N/A
zero gas	04:48	0	-4	43.21	19.17	N/A
span	**05:01**	9,980	**101**	43.20	19.12	99
mid-range	**04:56**	5,060	**55**	43.22	19.13	93
Average Post-Test DR				43.21	19.14	**96**
Average Span DR						101
Average Mid-Range DR						96

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0	02:55	-5	-5%
5,060	5,118	03:05	5,065	-1%
0	0	05:01	-4	-4%
5,060	5,118	04:56	5,236	1%

Test Run D5

SO2 Calibration Data Summary

Project ID: 40942317
Date: 26-Jul
Instrument Make/Model: Ametek 921M
ID Number: AC-921-9467-1
Calibration Span Value (diluted): 91
Calibration Span Value: 9,980
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	00:36	0	0	1%
span	CC69815	**9,980**	00:22	9,913	67	1%
mid-range	AAL8192	5,060	00:30	5,095	35	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	**00:36**	0	**0**	50.00	19.33	N/A
span	**00:22**	9,980	**91**	50.01	19.33	110
mid-range	**00:30**	5,060	**47**	50.00	19.35	109
			Average Pre-Test DR	50.00	19.33	**109**
zero gas	**03:41**	0	**0**	49.97	19.56	N/A
span		9,980		0.00	0.00	#DIV/0!
mid-range		5,060		0.00	0.00	#DIV/0!
			Average Post-Test DR	49.97	19.56	**#DIV/0!**
			Average Span DR			#DIV/0!
			Average Mid-Range DR			#REF!

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	0	03:41	0	0%
5,060	5,095	00:00	#DIV/0!	#DIV/0!

Section G

Method 7E – NO_x

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	
M308	THC1 Post Test	15.58	14.22	16.32						
	THC2 Post Test	15.15	14.46	16.11						
	Average Post Test	**15.37**	**14.34**	**16.22**						

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 1

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,154.00**	94.00	**0.94%**
High (Span):	9,980.00	**9,801.00**	-179.00	**1.79%**

System Bias Check: **5060.00** ppm

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**1.00**	**5154.00**	**5047.00**	**-440.00**	**-437.05**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	**1.00**	**5004.00**	**5132.00**	**92.00**	**88.90**	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.05**	0.05	**0.00%**
Mid:	11.40	**6.47**	-4.93	**0.05%**
High (Span):	23.50	**16.92**	-6.58	**0.07%**

System Bias Check: **11.40** ppm

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.05	**-0.03**	**6.47**	**6.33**	**-1.85**	**-3.32**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.66**	0.18	**0.00%**
High (Span):	19.50	**19.10**	-0.40	**0.00%**

System Bias Check: **9.48** ppm

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**0.00**	**9.66**	**9.72**	**0.11**	**0.11**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**		
Low:	8,000.00	**8,250.00**		
Mid:	15,000.00	**15,500.00**		
High (Span):	29,900.00	**29,600.00**		

System Bias Check: **15000.00** ppm

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-240.00	**-520.00**	**16200.00**	**15400.00**	**2003.00**		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 2

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,118.00**	58.00	**0.58%**
High (Span):	9,980.00	**9,869.00**	-111.00	**1.11%**

System Bias Check: **5060.00** ppm

Zero		Upscale		SO_2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**-4.00**	5118.00	5236.00	**-100.00**	**-95.75**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**4,990.00**	40.00	**0.40%**
High (Span):	9,910.00	**9,832.00**	-78.00	**0.78%**

System Bias Check: **4950.00** ppm

Zero		Upscale		NOx Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	4990.00	5164.00	71.00	69.22	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-0.03**	-0.03	**0.00%**
Mid:	11.40	**8.24**	-3.16	**0.03%**
High (Span):	23.50	**18.91**	-4.59	**0.05%**

System Bias Check: **11.40** ppm

Zero		Upscale		O2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**-0.05**	8.24	4.52	**-6.69**	**-11.86**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.64**	0.16	**0.00%**
High (Span):	19.50	**1.92**	-17.58	**0.18%**

System Bias Check: **9.48** ppm

Zero		Upscale		CO2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**9.64**	**0.00**	9.75	**-540.00**	**-93907.16**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-6.00**		
Low:	8,000.00	**8,221.00**		
Mid:	15,000.00	**15,640.00**		
High (Span):	29,900.00	**28,724.00**		

System Bias Check: **15000.00** ppm

Zero		Upscale		THC Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-250.00	**-190.00**	17800.00	22400.00	12709.61		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 3

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,095.00**	35.00	**0.35%**
High (Span):	9,980.00	**9,913.00**	-67.00	**0.67%**

System Bias Check: **5060.00** ppm

Zero		Upscale		SO_2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	0.00	5095.00	0.00	24.00	47.67	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

Zero		Upscale		NOx Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	0.00	5004.00	0.00	60.00	117.74	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	11.40	**12.00**	0.60	**0.01%**
High (Span):	23.50	**22.81**	-0.69	**0.01%**

System Bias Check: **11.40** ppm

Zero		Upscale		O2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	0.00	12.00	0.00	2.66	5.05	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	9.48	**10.62**	1.14	**0.01%**
High (Span):	19.50	**17.61**	-1.89	**0.02%**

System Bias Check: **9.48** ppm

Zero		Upscale		CO2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.02	0.00	10.62	0.00	-0.37	-0.68	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**2.00**		
Low:	8,000.00	**8,156.00**		
Mid:	15,000.00	**14,941.00**		
High (Span):	29,900.00	**29,453.00**		

System Bias Check: **15000.00** ppm

Zero		Upscale		THC Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
29.00	31.00	19100.00	15000.00	2170.00		

Test Run D2
NOx Calibration Data Summary

Project ID: 40942317
Date: 15-Jul
Instrument Make/Model: TECO 42C
ID Number: 211109
Calibration Span Value (diluted): 90
Calibration Span Value: 9,910
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	18:05	1	1	1%
span	CC69815	9,910	18:27	9,804	106	1%
mid-range	AAL8192	4,950	18:30	5,004	54	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	1	27.50	18.39	N/A
span	18:27	9,910	89	27.50	18.26	111
mid-range	18:30	4,950	46	27.50	18.26	109
Average Pre-Test DR				27.50	18.30	**110**
zero	20:13	0	1	27.50	18.29	N/A
mid-range	20:20	4,950	48	27.50	18.19	103
Average Mid-Test DR				27.50	18.24	N/A
zero gas	21:38	0	1	27.50	18.27	N/A
span	21:32	9,910	91	27.50	18.20	109
mid-range	21:27	4,950	47	27.50	18.23	106
Average Post-Test DR				27.50	18.23	107
Average Span DR						110
Average Mid-Range DR						106

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	1	20:13	1	0%
4,950	5,004	20:20	5,276	3%
0	1	21:32	1	0%
4,950	5,004	21:27	5,132	1%

Test Run D3

NOx Calibration Data Summary

Project ID: 40942317
Date: 16-Jul
Instrument Make/Model: TECO 42C
ID Number: 211109
Calibration Span Value (diluted): 89
Calibration Span Value: 9,910
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	18:05	1	1	1%
span	CC69815	9,910	18:27	9,805	105	1%
mid-range	AAL8192	4,950	18:30	5,003	53	1%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	18:05	0	1	N/A	18.15	N/A
span	18:27	9,910	88	N/A	18.05	113
mid-range	18:30	4,950	45	N/A	18.02	110
			Average Pre-Test DR	#DIV/0!	18.08	**112**
zero gas	21:38	0	1	N/A	18.11	N/A
span	21:32	9,910	89	N/A	18.10	112
mid-range	21:27	4,950	45	N/A	18.12	110
			Average Post-Test DR	#DIV/0!	18.11	**111**
			Average Span DR			112
			Average Mid-Range DR			110

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	1	21:32	1	0%
4,950	5,003	21:27	5,030	0%

Test Run D4

NOx Calibration Data Summary

Project ID: 40942317
Date: 18-Jul
Instrument Make/Model: TECO 42C
ID Number: 211109
Calibration Span Value (diluted): 93
Calibration Span Value: 9,910
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

						2% Limit
	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	System Cal Error (% of Span)
zero	N2	0	00:28	0	0	0%
span	CC69815	9,910	00:33	9,832	78	1%
mid-range	AAL8192	4,950	00:35	4,990	40	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:28	0	0	N/A	18.27	N/A
span	00:33	9,910	92	N/A	18.28	108
mid-range	00:35	4,950	47	N/A	18.26	106
			Average Pre-Test DR	#DIV/0!	18.25	**107**
zero	02:55	0	1	43.08	18.74	N/A
mid-range	03:05	4,950	52	43.06	18.81	96
			Average Mid-Test DR	43.07	18.77	N/A
zero gas	04:48	0	0	43.21	19.17	N/A
span	05:01	9,910	99	43.20	19.12	100
mid-range	04:56	4,950	54	43.22	19.13	92
			Average Post-Test DR	43.21	19.14	**96**
			Average Span DR			104
			Average Mid-Range DR			98

System Drift Test Results

				3% Limit
Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	Drift (% of Span)
0	0	02:55	1	1%
4,950	4,990	03:05	4,940	-1%
0	0	05:01	0	0%
4,950	4,990	04:56	5,164	2%

Test Run D5

NOx Calibration Data Summary

Project ID: 40942317
Date: 26-Jul
Instrument Make/Model: TECO 42C
ID Number: 211109
Calibration Span Value (diluted): 93
Calibration Span Value: 9,910
Analyzer Operating Range: 10,000
Units: ppmvw
Technician(s): DC/KMM

System Calibration Error Test Results

	Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	2% Limit System Cal Error (% of Span)
zero	N2	0	00:36	1	1	1%
span	CC69815	9,910	00:22	9,818	92	1%
mid-range	AAL8192	4,950	00:30	4,997	47	0%

Dilution Ratio Results

	Time	Certified Value	CEM Response (Diluted)	Dilution System Gas Pressure (PSI)	Dilution System Vacuum (In. Hg)	Dilution Ratio
zero	00:36	0	**1**	50.00	19.33	N/A
span	00:22	9,910	**92**	50.01	19.33	107
mid-range	00:30	4,950	**47**	50.00	19.35	105
		Average Pre-Test DR		50.00	19.33	**106**
zero gas	03:41	0	1	49.97	19.56	N/A
span		9,910				#DIV/0!
mid-range		4,950				#DIV/0!
		Average Post-Test DR		49.97	19.56	**#DIV/0!**
		Average Span DR				#DIV/0!
		Average Mid-Range DR				#REF!

System Drift Test Results

Certified Value	System Cal Error CEMS Response	Time	Post-test CEMS Response	3% Limit Drift (% of Span)
0	1	03:41	1	0%
4,950	4,997	00:00	#DIV/0!	#DIV/0!

Section H
Method 15A – TRS

Spreadsheet Calculations

BP-Husky DCU3 Vent Test

Method 15A

Data Entered By: ***dcw***
Data Checked By: ***csg***

Run No.	C1-S	C1-S-H2S	C1-A	C1-A-H2S	C2-S	C2-S-H2S	C2-A	C2-A-H2S	C3-S	C3-S-H2S	C3-A	C3-A-H2S
Date	7/18/2011	7/18/2011	7/18/2011	7/18/2011	7/19/2011	7/19/2011	7/19/2011	7/19/2011	7/20/2011	7/20/2011	7/20/2011	7/20/2011
Time Start	20:29	22:08	20:29	22:08	14:23	15:43	14:23	15:43	09:05	10:57	09:05	10:57
Time Finish	21:29	22:38	21:29	22:38	15:20	16:13	15:20	16:08	09:53	11:27	09:45	11:27
Stack Diameter (ft)	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667
Dry Gas Meter Calibration (Yd)	1.014	1.014	0.987	0.987	1.014	1.014	0.987	0.987	1.014	1.014	0.987	0.987
Barometric Pressure ("Hg)	29.22	29.22	29.22	29.22	29.16	29.16	29.16	29.16	29.08	29.08	29.08	29.08
Height of Sampling Location (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Average Static Pressure ("H2O)	12.29	12.29	12.29	12.29	12.80	12.80	12.80	12.80	36.14	36.14	36.14	36.14
Corrected Barometric Pressure ("Hg)	29.22	29.22	29.22	29.22	29.16	29.16	29.16	29.16	29.08	29.08	29.08	29.08
Initial Meter Reading (L)	3988.1	4177.00	14.88	72.65	4257	4372.71	0.00	0	4497.4	4592.52	0	0
Final Meter Reading (L)	4112.2	4241	44.88	88.54	4372.56	4432.15	31.80	12.69	4588.11	4651.94	22.8	15.583
Meter Volume (L)	124.100	64.000	29.999	15.885	115.560	59.440	31.800	12.690	90.710	59.420	22.800	15.583
Average delta H (" H2O)	2.18	2.30	50.00	50.00	2.25	2.20	50.77	53.62	2.11	2.20	35.57	51.53
Average DGM Temp (F)	105.8	106.9	103.7	103.2	104.8	107.8	106.2	109.2	98.9	105.9	100.2	106.6
Test Duration (minutes)	60	30	60	30	57	30	57	25	48	30	40	30
Meter Volume (dsL)	115.321	59.369	30.495	16.162	107.360	54.924	32.179	12.854	84.913	54.941	22.468	15.746
Average Sample Rate (L/min)	2.068	2.133	0.500	0.530	2.027	1.981	0.558	0.508	1.890	1.981	0.570	0.519

Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H	Delta H
2.2	2.4	50	50	2.2	2.2	54	53.1	2.2	2.2	40.5	52.4
2.1	2.4	50	50	2.3	2.2	54	53.2	2.2	2.2	40.5	51.5
2.1	2.4	50	50	2.5	2.2	54	53.5	2.2	2.2	40.5	51.2
2.1	2.2	50	50	2.4	2.2	52.3	54.7	2.2	2.2	39.7	51.2
2.2	2.2	50	50	2.2	2.2	52.4	53.6	2.2	2.2	34.2	51.7
2.2	2.2	50	50	2.2	2.2	49.9		2.1	2.2	30.2	51.2
2.2		50		2.2		49.3		2.2		30.2	
2.2		50		2.2		49.2		2.2		32.5	
2.2		50		2.2		48.5		2.2		31.8	
2.2		50		2.2		48.5		1.4			
2.2		50		2.2		48.6					
2.2		50		2.2		48.5					
2.2	**2.3**	**50.0**	**50.0**	**2.3**	**2.2**	**50.8**	**53.6**	**2.1**	**2.2**	**35.6**	**51.5**

Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps		Meter Temps	
In	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**
104	109	107	107	105	104	103	102	102	102	108	107	103	103	109	108	98	98	105	105	101	100	106	105
105	104	107	107	102	102	104	103	102	102	108	107	105	104	110	109	98	98	106	105	101	100	106	104
105	105	107	106	105	104	103	102	103	102	108	107	106	104	109	109	98	98	106	105	101	100	107	106
105	105	107	107	105	104	104	103	104	103	108	107	106	105	110	109	99	99	107	106	100	100	108	107
106	105	107	107	105	104	105	102	105	104	109	108	106	105	110	109	99	99	107	106	100	100	108	107
106	105	107	107	105	105	105	102	105	104	109	108	107	106			99	99	107	106	100	100	108	107
106	106			105	104			106	105			107	106			99	99			100	100		
106	106			103	102			106	105			108	107			100	99			100	100		
106	106			104	103			107	106			108	107			100	99			101	100		
107	106			103	102			107	106			108	107			100	99						
106	106			104	103			108	107			108	107										
107	106			102	103			108	107			108	107										
105.75		**106.92**		**103.67**		**103.17**		**104.83**		**107.83**		**106.17**		**109.20**		**98.85**		**105.92**		**100.22**		**106.58**	

Barium-Thorin Titration Data	C1-S	C1-S-H2S	C1-A	C1-A-H2S	C2-S	C2-S-H2S	C2-A	C2-A-H2S	C3-S	C3-S-H2S	C3-A	C3-A-H2S
Sample Volume (mL)	145.3	164.3	N/A	N/A	148.4	160.5	N/A	N/A	111.3	80.8	N/A	N/A
Aliquot Volume (mL)	20.0	20.0			20.0	20.0			20.0	20.0		
Average Volume of $BaCl_2$ (mL)	1.275	5.375			2.400	5.150			1.700	8.850		
Volume of $BaCl_2$ Blank (mL)	0.1	0.1			0.1	0.1			0.10	0.10		
Normality of $BaCl_2$ (meq/mL)	0.009997	0.009997			0.009997	0.009997			0.009997	0.009997		
SO_2 (meq/mL)	12,025	12,025			12,025	12,025			12,025	12,025		
Sampling System Dilution Ratio	18.7	18.7			17.3	17.3			18.3	18.3		
Concentration of H_2S Recovery Gas (ppmvd)	N/A	2,014			N/A	2,014			N/A	2,014		
Raw Concentration of TRS as SO_2 (ppmvd)	226	2,252			471	2,000			314	1,986		
Recovery Efficiency (%)	N/A	112			N/A	99			N/A	99		
Average Moisture Concentration (%)	99.6	N/A			99.0	N/A			99.7	N/A		
Average Moisture Concentration - Diluted (%)	5.33				5.73				5.44			
Corrected Concentration of TRS as SO_2 (ppmvw)	214				444				297			
Corrected Concentration of TRS as SO_2 (ppmvd)	55,875				43,771				112,296			

Field Data Sheets

Sample Type – **Method 15A** (Sample)	Date 7/18/11	Condition/Run: C1	Page 1 of 2
Plant Name – BP-Husky	Sample DGM ID: 80-~~10240~~ 10204-1	Sample DGMCF: 0.994	Sampling Train Leak Check
Project Number – 40942317	Air DGM ID: 80-011309-2	Air DGMCF: 0.987	Initial 0 @ 10"
Location (Source) – DCU3 East Vent	Barometer ID BP-2	Comb. Tube ID: 1	Final 0 @ 3
Elevation (relative to Barometer) (ft)	Bar. Press. (in. Hg) 29.22	Furnace ID: URS-1	Duct Dimension(s) 8'

Point	Clock Time	Volume (L)	At Orifice ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube °C	DGM In	DGM Out	
P4	2029	3988.1	2.2	250/250	1122	104	109	2
	2034	3998.1	2.1	250/250	1094	105	104	2
	2039	4009.0	2.1	250/250	1098	105	105	2
	2044	4020.1	2.1	250/250	1092	~~113~~ 105	105	2
	2049	4029.7	2.2	250/250	1093	106	105	2
	2054	4040.5	2.2	250/250	1086	106	105	2
	2059	4050.1	2.2	250/250	1094	106	106	2
	2104	4060.5	2.2	~~23~~ 250/250	1090	106	106	2
	2109	4070.1	2.2	250/250	1096	106	106	2
	2114	4080.5	2.2	250/250	1092	107	106	2
	2119	4091.0	2.2	250/250	1077	106	106	2
	2124	4101.4	2.2	250/250	1083	107	106	2
STOP	2129	4112.2						
H2S	2208	4177.0	2.4	250/250	1067	107	107	~~24~~ 2
	2213	4187.3	2.4	250/250	1070	107	107	2
	2218	4197.7	2.4	250/250	1106	107	106	2
	2223	4208.0	2.2	250/250	1112	107	107	2
	2228	4219.1	2.2	250/250	1100	107	107	2
	2233	4229.5	2.2	250/250	1112	107	107	2
STOP	2238	4241.0	~~2.2~~	~~250~~				

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

5/1.5 0 @ 6" leak test H_2S (pre)

0 @ 4" leak test H_2S (pro)

Sample Type – **Method 15A** (Air)	Date 7/18/11	Condition/Run: C1	Page 2 of 2
Plant Name – BP-Husky	Sample DGM ID: n/a	Sample DGMCF: n/a	Sampling Train Leak Check
Project Number – 40942317	Air DGM ID: 80-011309-2	Air DGMCF: 0.987	Initial n/a
Location (Source) – DCU3 East Vent	Barometer ID BP-2	Comb. Tube ID: 1	Final n/a
Elevation (relative to Barometer) (ft)	Bar. Press. (in. Hg) 29.22	Furnace ID:	Duct Dimension(s) 8"

Point	Clock Time	Volume (L)	At Orifice ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube	DGM In	DGM Out	
P4	2029	14.880	5.0	—	—	105	104	2
P4	2034	17.120	5.0	—	—	102	102	2
↓	2039	19.562	5.0	—	—	105	104	2
	2044	21.970	5.0	—	—	105	104	2
	2049	24.122	5.0	—	—	105	104	2
	2054	26.263	5.0	—	—	105	105	2
	2059	28.653	5.0	—	—	105	104	2
	2104	31.100	5.0	—	—	103	102	2
	2109	33.014	5.0	—	—	104	103	2
	2114	36.100	5.0	—	—	103	102	2
	2119	39.037	5.0	—	—	104	103	2
	2124	41.880	5.0	—	—	102	103	2
STOP	2129	44.879	—	—	—	—	—	—
H2S	2208	72.651	5.0	—	—	103	102	2
↓	2213	75.102	5.0	—	—	104	103	2
	2218	77.655	5.0	—	—	103	102	2
	2223	80.420	5.0	—	—	104	103	2
	2228	83.061	5.0	—	—	105	102	2
	2233	85.746	5.0	—	—	105	102	2
STOP	2238	88.536	5.0	—	—	—	—	—

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

ΔH is '50', not '5.0' for each data point

Sample Type – **Method 15A**	Date 07 19 11	Condition/Run: C2	Page 1 of 2
Plant Name – BP-Husky	Sample DGM ID: 80-10204-1	Sample DGMCF: 0.994	Sampling Train Leak Check
Project Number – 40942317	Air DGM ID: n/a	Air DGMCF: n/a	Initial 0.02 @ 5"
Location (Source) – DCU3	Barometer ID BP-2	Comb. Tube ID: 2	Final 0.01 @ 3"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.16	Furnace ID: URS-1	Duct Dimension(s) 8"

Point	Clock Time	Volume (L) 4257.0	At Orifice ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube	DGM In	DGM Out	
P4	1423	~~4257.0~~	2.2	250	1100	102	102	1
	1428	426.6	2.3	250	1100	102	102	1
	1433	4276	2.5	250	1100	103	102	1
	1438	4289	2.4	250	1100	104	103	1
	1443	4299.7	2.2	250	1100	105	104	1
	1448	4309.6	2.2	250	1100	105	104	1
	1453	4319.4	2.2	250	1100	106	105	1
	1458	4329.2	2.2	250	1100	106	105	1
	1503	4339.1	2.2	250	1100	107	106	1
	1508	4348.6	2.2	250	1100	107	106	1
	1513	4358.4	2.2	250	1100	108	107	1
	1518	4366.0	2.2	250	1101	108	107	
stop	1523	4372.56				initial	leak check	0.01@5"
P4	1543	4372.71	2.2	250	1100	108	107	1
	1548	4382.5	2.2	250	1100	108	107	1
	1553	4392.4	2.2	250	1100	108	107	1
	1558	4402.3	2.2	250	1100	106	107	1
	1603	4402.1	2.2	250	1100	109	108	1
	1608	4422.2	2.2	250	1100	109	108	1
stop	1613	4432.15						
						final	leak check	0.01@3"

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

Sample Type – **Method 15A**	Date 7-19-11	Condition/Run: C2	Page 2 of 2
Plant Name – BP-Husky	Sample DGM ID: n/a	Sample DGMCF: n/a	Sampling Train Leak Check
Project Number – 40942317	Air DGM ID: 80-01139-2	Air DGMCF: 0.987	Initial n/a
Location (Source) – DCU3	Barometer ID BP-2	Comb. Tube ID: 2	Final n/a
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.16	Furnace ID: VRS-1	Duct Dimension(s) 8"

Point	Clock Time	Volume (L)	At Orifice ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube	DGM In	DGM Out	
P4	1423	0	54.0	—	—	103	103	1
↓	1428	1.94	54.0	—	—	105	104	1
	1433	4.79	54.0	—	—	106	104	1
	1438	9.0	52.3	—	—	106	105	1
	1443	11.6	52.4	—	—	106	105	1
	1448	14.4	49.9	—	—	107	106	1
	1453	17.1	49.3	—	—	107	106	1
	1458	19.9	49.2	—	—	108	107	1
	1503	22.5	48.5	—	—	108	107	1
	1508	25.0	48.5	—	—	108	107	1
	1513	27.6	48.6	—	—	108	107	1
	1518	30.1	48.5	—	—	108	107	1
Stop	1520	31.8	—	—	—	—	—	
P4	1543	0	53.1	—	-	109	108	1
↓	1548	2.43	53.2	—	-	110	109	1
	1553	4.79	53.5	—	-	109	109	1
	1558	7.71	54.7	—	-	110	109	1
	1603	10.2	53.6	—	-	110	109	1
Stop	1608	12.69	—	—	—	—	—	

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

Sample Type – **Method 15A**	Date 07 20 11	Condition/Run: C3	Page 1 of 2
Plant Name – BP-Husky	Sample DGM ID: 80-10204-1	Sample DGMCF: 0.994	Sampling Train Leak Check
Project Number – 40942317	Air DGM ID: n/a	Air DGMCF: n/a	Initial 0.01 @ 5
Location (Source) – DCU3	Barometer ID BP-2	Comb. Tube ID: 2	Final 0.01 @ 4
Elevation (relative to Barometer) (ft)	Bar. Press. (in. Hg) 29.08	Furnace ID: VRS-1	Duct Dimension(s) 8"

Point	Clock Time	Volume (L)	At Orifice ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube	DGM In	DGM Out	
P4	0905	4497.40	2.2	250	1090	98	98	1
	0910	4507.4	2.2	250	1090	98	98	1
	0915	4517.5	2.2	250	1090	98	98	1
	0920	4527.5	2.2	250	1090	99	99	1
	0925	4537.3	2.2	250	1090	99	99	1
	0930	4547.1	2.1	250	1090	99	99	1
	0935	4557.2	2.2	250	1090	99	99	1
	0940	4567.4	2.2	250	1090	100	99	1
	0945	4577.5	2.2	250	1090	100	99	1
	0950	4584.2	1.4	250	1090	100	99	1
Stop	0953	4588.11						
						initial leak:	0.01 @ 5"	
P4	CS1 ~~4592.52~~			CS1				
	1057	4592.52	2.2	~~10~~250	1090	105	105	1
	1102	4601.6	2.2	250	1090	106	105	1
	1107	4611.8	2.2	250	1090	106	105	1
	1112	4621.8	2.2	250	1090	107	106	1
	1117	4631.8	2.2	250	1090	107	106	1
	1122	4641.9	2.2	250	1090	107	106	1
Stop	1127	4651.94						
						final leak:	0.01 @ 4"	

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

Sample Type – **Method 15A**	Date 07 20 11		Condition/Run: C3	Page	2 of 2	
Plant Name – BP-Husky	Sample DGM ID: ~~80-011509-2~~ C56		Sample DGMCF: ~~0.987~~ C56	Sampling Train Leak Check		
Project Number – 40942317	Air DGM ID: 80-011309-2		Air DGMCF: 0.987	Initial N/A		
Location (Source) – DCU3	Barometer ID BP-2		Comb. Tube ID: n/a	Final n/a		
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.06		Furnace ID: n/a	Duct Dimension(s) 8"		

Point	Clock Time	Volume (L)	At Orifice ΔH (in. H$_2$O)	Temperature (°F)				Vacuum (in. Hg)
				Heated Line	Comb. Tube	DGM In	DGM Out	
P4	0905	0	405	—	—	101	100	1
	0910	2.25	40.5	—		101	100	1
	0915	5.1	40.5	—		101	100	1
	0920	7.8	39.7	—		100	100	1
	0925	10.7	34.2	—		100	100	1
	0930	14.7	30.2	—		100	100	1
	0935	17.6	30.2	—		100	100	1
	0940	20.4	32.5	—		100	100	1
STOP	0945	22.8	31.8	—		101	100	1
P4	1057	0	52.4	—		106	105	1
	1102	2.25	51.5	—		106	104	1
	1107	4.75	51.2	—		107	106	1
	1112	7.35	51.2	—		108	107	1
	1117	9.7	51.7	—		108	107	1
	1122	12.4	51.2	—		108	107	1
Stop	1127	15.583	—	—	—	—	—	

Comments: Air @ 0.5+/-0.05 L/min, Sample @ 2.0+/-0.2 L/min, Comb. Tube @ 2,012+/-90F, 30 min. H2S check

Sample Recovery Sheets

Project No. 40942317
Recovered by (Initials): CSG

EPA Method 15A
(TRS as SO_2)

Condition No. C
Run No. 1
Date: 7/18/11
CSG 8/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-C1-M15A-Cond	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 145.3 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: ~~1.30~~ mL n/a
CSG 8/24/11

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.00997 N. Record titration volume: 1.3 mL

✓ Repeat titration procedure. Record titration volume: 1.25 mL

✓ Record average titration volume: 1.275 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

Project No. 40947317
Recovered by (Initials): CSG

EPA Method 15A
(TRS as SO_2)

Condition No. C
Run No. 1-H2S
Date: 7/18/11
CSG 8/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-C1-M15A-Cond-H2S	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 164.3 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: n/a mL

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.009947 N. Record titration volume: 5.35 mL

✓ Repeat titration procedure. Record titration volume: 5.40 mL

✓ Record average titration volume: 5.375 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

Project No. 40942317
Recovered by (Initials): CSG

EPA Method 15A
(TRS as SO_2)

Condition No. C
Run No. 2
Date: 7/19/11
CSG 8/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP_WV_C2-M15A-Cond	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 148.4 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: n/a mL

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.00997 N. Record titration volume: 2.40 mL

✓ Repeat titration procedure. Record titration volume: 2.40 mL

✓ Record average titration volume: 2.40 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

Project No. 40942317
Recovered by (Initials): CSG

EPA Method 15A
(TRS as SO_2)

Condition No. C
Run No. 2-H2S
Date: 7/19/11
CSG 8/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-C2-M15A-Cond-H2S	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 160.5 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: n/a mL

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.00997 N. Record titration volume: 5.15 mL

✓ Repeat titration procedure. Record titration volume: 5.15 mL

✓ Record average titration volume: 5.15 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

Project No. 40942317

Recovered by (Initials): CS6

EPA Method 15A
(TRS as SO_2)

Condition No. C

Run No. 3

Date: 9/20/11
CS6 5/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV C3-M15A-Cond	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 111.3 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: n/a mL

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.009997 N. Record titration volume: 1.70 mL

✓ Repeat titration procedure. Record titration volume: 1.70 mL

✓ Record average titration volume: 1.70 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

RDS-X TRS as SO_2 by EPA Method 15A
Revision Date:
Reviewed on:

Project No. 40942317
Recovered by (Initials): CSG

EPA Method 15A
(TRS as SO_2)

Condition No. C
Run No. 3-H_2S
Date: 7/20/11
CSG 8/24/11

Impinger Preparation

Impinger No.	Contents	Volume (mL)	Configuration
1	3% H2O2	20	Midget impinger
2	3% H2O2	20	Midget impinger
3	empty	-	Midget impinger
4	Silica Gel	~ 20g	Midget impinger

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-C3-M15A-Cond-H_2S	1	Condensate and rinse

Sample Recovery Checklist

AT LOCATION

✓ Drain the ice bath. Disconnect the impingers from the probe and vacuum line, and cover openings with Teflon tape.

IN LABORATORY

✓ Disassemble sample train.

✓ Transfer contents of 3% H2O2 impingers into sample bottle. Rinse impingers 1, 2 and 3 and all connecting lines with DI water into the sample bottle.

✓ Log samples into logbook and store samples appropriately.

Sample Analysis Checklist

IN LABORATORY

✓ Transfer the contents of the sample bottle into a 100 mL volumetric flask and dilute to exactly 100 mL with DI water. If alternative diluted sample volume is obtained, record volume: 80.8 mL

✓ Pipette a 20 mL aliquot of the diluted sample into a 250 mL flask and add 80 mL of isopropanol plus 2 to 4 drops of thorin indicator. If alternative aliquot volume is used, record volume: n/a mL

✓ Titrate to pink endpoint using 0.0100 N barium perchlorate standard solution. If alternative barium perchlorate standard solution normality is used, record normality: 0.009997 N. Record titration volume: 8.85 mL

✓ Repeat titration procedure. Record titration volume: 8.85 mL

✓ Record average titration volume: 8.85 mL

✓ Do replicate titrations agree within 1% or 0.2 mL (whichever is larger)? [✓ Y] / N

✓ Prepare a blank for each series of samples. Titrate to pink endpoint. Record blank titration volume: 0.1 mL

Section I
Method 18 – H_2S, COS, and CS_2

Laboratory Report

URS Corporation

9400 Amberglen Blvd
Austin, TX 78729

BP Husky Refining, LLC – DCU3
Toledo, OH
Project # 40942317

Analytical Report
(0711-08R2)

EPA Method 18 (Bags)
EPA Method 18 (Bag Condensate)

1,3-Butadiene, Acetonitrile, Acrolein, Acetone, Acrylonitrile, Pentane, Methylene chloride, Hexane, Benzene, Trichloroethene, Toluene, 1,2-Dibromoethane, Tetrachloroethene, and Carbon disulfide

EPA Method 18 (Adsorbents)

Acetonitrile, Acrylonitrile, Methyl t-butyl ether, 2-Nitropropane, Isooctane, Methyl isobutyl ketone, Chlorobenzene, Ethylbenzene, m/p-Xylene, Styrene, o-Xylene, Cumene, and Nitrobenzene

EPA Method 308

Methanol

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road, Durham, NC 27703 – 5518
800-1 Capitola Drive, Durham, NC 27713

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 971 pages.

Valgena Respass

QA Review Performed by – Valgena Respass

Report Issued: 09/23/2011

Summary of Results

Company	URS Corp - Austin
Analyst	STG
Parameters	EPA Method 18

Client #	40942317
Job #	**0711-08**
# Samples	**3 bags**

Compound	Sample ID / Sample Concentration (ppm)		
	BP-WV-A2-M18b-BagA	***BP-WV-A3-M18-Bag***	***BP-WV-A3-M18-Bag***
Carbon Disulfide	0.0454 ND	0.0454 ND	0.0454 ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

Compound	Sample ID / Catch Weight (ug)
	BP-WV-A2-M18b-BagACond
Carbon disulfide	4.25 ND

Results

Company	URS Corp - Austin
Analyst	STG
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 0.0454 (ppm)
LOQ 0.626 (ppm)
Compound Carbon Disulfide

Lower Curve Limit 0.626 (ppm)
Upper Curve Limit 7.80 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	007B0901.D	007B0902.D	007B0903.D	GC125P028_POST_0711-08S.M	NA	NA	NA	NA	0.0454	0.0454	0.0454	0.0	0.0454	1	0.0454	ND
BP-WV-A3-M18-Bag	007B0201.D	007B0202.D	007B0203.D	GC125P030_POST_CS2.M	NA	NA	NA	NA	0.0454	0.0454	0.0454	0.0	0.0454	1	0.0454	ND
BP-WV-A3-M18-Bag	007B0101.D	007B0102.D	007B0103.D	GC125P031_POST_CS2.M	NA	NA	NA	NA	0.0454	0.0454	0.0454	0.0	0.0454	1	0.0454	ND
Blank	007B0501.D	007B0502.D	007B0503.D	GC125P028_POST_0711-08S.M	NA	NA	NA	NA	0.0454	0.0454	0.0454	0.0	0.0454	1	0.0454	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.100 (ug/mL)
LOQ 0.252 (ug/mL)
Compound Carbon disulfide

Lower Curve Limit 0.252 (ug/mL)
Upper Curve Limit 4.99 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	080B8101.D	080B8102.D	080B8103.D	GC116P49.M	NA	NA	NA	NA	0.100	0.100	0.100	0.0	0.100	1	42.5	4.25	ND
RB H2O	079B8001.D	079B8002.D	079B8003.D	GC116P49.M	NA	NA	NA	NA	0.100	0.100	0.100	0.0	0.100	1	1.00	0.100	ND
M18b-A2-BagACond #MS	006BA703.D	006BA704.D	006BA705.D	GC116P49.M	2.22	2.22	2.23	0.3	2.22	2.21	2.27	1.6	2.24	1	2.14	4.79	
															Spike Amount (ug)	5.04	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	95.0%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corporation
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 Bags & 1 Spike

Custody

Thorne Gregory of Enthalpy Analytical, Inc. received one sample on 7/23/11; Heather Tarjeft received one sample on 7/24/11, and one sample on 7/25/11, after being relinquished by URS Corporation of Austin, TX. All samples were received at ambient temperature and in good condition. Samples ***BP-WV-A3-M18-Bag*** and ***BP-WV-A4-M18-Bag*** were received without chain-of-custody documentation. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for 1,3-butadiene, acetonitrile, acrolein, acetone, acrylonitrile, pentane, methylene chloride (dichloromethane), hexane, benzene, trichloroethene, toluene, 1,2-dibromoethane, and tetrachloroethene using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. All target analytes were referenced to certified gas phase standards.

The Agilent Technologies Model 6890, Gas Chromatograph "Gummo" (S/N US00028451) was equipped with Flame Ionization Detector and a Rtx-1 30m x 0.32mm x 4.0um (S/N 869999) capillary column, for these analyses.

Calibration

The calibration curves are included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method GC114P165.M is included in the Calibration Curve Chromatograms section of this report.

Enthalpy Analytical Narrative Summary
(continued)

QC Notes As required by the method, a recovery study was performed on a bag sample. The bag sample ***BP-WV-A3-M18-Bag*** was spiked with 1-3 butadiene, acrolein, acetone, methylene chloride, hexane, benzene, trichloroethene, and toluene on 7/27/11 at 9:31 PM, held for the appropriate time, then analyzed. The recovery efficiency values met the method-required limits of 70 to 130% for each analyte. The recovery efficiency values were used to adjust the associated sample results following equation 18-7 from section 12.8 for the spiked analytes. The remaining compounds were unadjusted as indicated on the Summary results page.

All sample preparation and analytical holding times specified in the method were met.

Reporting Notes These analytical results are reported on a wet basis. The user of this report should determine the percent moisture in the sample and correct the reported value to ppmvd as appropriate.

These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method or NELAC Standard have been previously noted in the report narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corporation
Analyst	MGM
Parameters	EPA Method 16 - Type

Client #	40942317
Job #	0711-08
# Samples	3 Bags

Custody

Thorne Gregory of Enthalpy Analytical, Inc. received one sample on 7/23/11; Heather Tarjeft received one sample on 7/24/11, and one sample on 7/25/11, after being relinquished by URS Corporation of Austin, TX. All samples were received at ambient temperature and in good condition. Samples ***BP-WV-A3-M18-Bag*** and ***BP-WV-A4-M18-Bag*** were received without chain-of-custody documentation. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for carbon disulfide using the Hewlett Packard Model 5890, Series II Gas Chromatograph "Zeppo" (S/N 3235A4448X) equipped with a Flame Photometric Detector and a Restek Rtx-1 60m x 0.53mm x 5.0um (S/N 663119) capillary column.

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Carbon dioxide was were referenced to gas phase standards prepared by certified permeation devices.

Calibration

The calibration curves are included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method, FPDTEST2.M, is included in the Calibration Curve Chromatograms section of this report.

QC Notes

None.

Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18 Bag Cond FID

Client #	40942317
Job #	0711-08
# Samples	1 Run and 1 Spike

Custody

Steve Eckard received the sample on 7/30/11 after being relinquished by URS Corporation of Austin. The sample was received at 3.9°C in good condition. Prior to, during, and after analysis, the sample was kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The sample was analyzed for 1,3-butadiene, pentane, acrolein, acetone, dichloromethane (methylene chloride), hexane, benzene, trichloroethene, toluene, tetrachloroethene, and 1,2-dibromoethane using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

The Agilent Technologies Model 6890N, Gas Chromatograph "Veronica" (S/N US10645052) was equipped with a Flame Ionization Detector and a Restek Rtx-624 105 m x 0.53 mm x 3.0 um (S/N 1032767) column, for these analyses.

Calibration

The calibration curve is included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (GC118P140.M) is included in the Calibration Curve Chromatograms section of this report.

QC Notes

No target compounds were detected in the analyses of the laboratory reagent water blank.

A matrix spike was prepared using an aliquot of the sample. The matrix spike recovery values are presented in the Results section of this report and ranged from 54.8 to 105%.

Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18 Bag Cond

Client #	40942317
Job #	0711-08
# Samples	1

Custody

Steve Eckard received the sample on 7/30/11 after being relinquished by URS Corporation - Austin. The sample was received at 3.9°C in good condition. Prior to, during, and after analysis, the sample was kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The sample was analyzed for carbon disulfide using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Carbon disulfide was referenced to certified reference materials.

The Hewlett Packard Model 5890, Series II Gas Chromatograph "Oscar" (S/N 2938A25721) was equipped with a Flame Photometric Detector and a Restek Stabilwax 30 m x 0.53 mm x 1.5 um column (S/N 1033248), for these analyses.

Calibration

The calibration curve is included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (GC116P49.M) is included in the Calibration Curve Chromatograms section of this report.

QC Notes

Carbon disulfide was not identified act a concentration above the detection limit in the analysis of the lab blank.

A matrix spike was prepared using an aliquot of the sample. The recovery value was 95.2%.

Enthalpy Analytical Narrative Summary
(continued)

Reporting Notes The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	
M308	THC1 Post Test	15.58	14.22	16.32						
	THC2 Post Test	15.15	14.46	16.11						
	Average Post Test	**15.37**	**14.34**	**16.22**						

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Pre-Test Calibration Data

Run Nos.	Date	H2S Calibration Injections								COS Calibration Injections								CS2 Calibration Injections							
		Calibration Gas Conc. (ppmv)	1		2		3		Average	Calibration Gas Conc. (ppmv)	1		2		3		Average	Calibration Gas Conc. (ppmv)	1		2		3		Average
			Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts		Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts		Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts
C1/C2	7/19/11	29.9	2,500	1.6	2,437	0.9	2,441	0.7	2,459	29.9	5,155	2.0	5,008	0.9	4,997	1.1	5,053	29.9	6,511	2.07	6,299	1.25	6,326	0.82	6,379
		19.9	1,004	1.0	1,027	1.2	1,012	0.2	1,015	19.9	2,256	0.1	2,276	0.9	2,232	1.0	2,254	19.9	2,802	0.44	2,794	0.14	2,774	0.58	2,790
		9.95	180	0.3	183	1.6	178	1.3	181	9.95	483	0.9	483	1.0	469	2.0	478	9.95	610	0.79	607	0.28	599	1.07	605
C3	7/20/11	19.9	1,050	1.8	1,005	2.6	1,040	0.8	1,032	19.9	2,357	3.4	2,209	3.1	2,272	0.3	2,279	19.9	2,946	4.16	2,776	1.86	2,764	2.30	2,829
		29.9	2,446	1.0	2,550	3.2	2,416	2.2	2,471	29.9	4,815	0.2	4,954	2.6	4,711	2.4	4,827	29.9	6,155	0.81	6,217	1.83	5,944	2.64	6,105
		9.95	181	0.3	182	0.9	178	1.2	180	9.95	489	0.7	488	0.5	480	1.2	486	9.95	600	3.08	574	1.30	572	1.79	582

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Post-Test Calibration Data

Run Nos.	Date	Calibration Gas Conc. (ppmv)	Sequence	H2S Calibration Injections									Calibration Gas Conc. (ppmv)	Sequence	COS Calibration Injections									Calibration Gas Conc. (ppmv)	Sequence	CS2 Calibration Injections								
				1		2		3							1		2		3							1		2		3				
				Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Average (1-3) Area Counts	Average (Pre/Post) Area Counts	RPD (%)			Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Average (1-3) Area Counts	Average (Pre/Post) Area Counts	RPD (%)			Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Average (1-3) Area Counts	Average (Pre/Post) Area Counts	RPD (%)
C1/C2	7/19/11	19.9	Pre-Test Cal	1,004	1.0	1,027	1.2	1,012	0.2	1,015	1,035	4.0	19.9	Pre-Test Cal	2,256	0.1	2,276	0.9	2,232	1.0	2,254	2,238	1.4	19.9	Pre-Test Cal	2,802	0.4	2,794	0.1	2,774	0.6	2,790	2,815	1.8
			Post-Test Cal	1,014	4.0	1,073	1.6	1,082	2.4	1,056				Post-Test Cal	2,175	2.1	2,239	0.8	2,252	1.3	2,222				Post-Test Cal	2,742	3.5	2,856	0.6	2,923	2.9	2,841		
C3	7/20/11	19.9	Pre-Test Cal	1,050	1.8	1,003	2.6	1,040	0.8	1,032	1,034	0.4	19.9	Pre-Test Cal	2,357	3.4	2,209	3.1	2,272	0.3	2,279	2,311	2.8	19.9	Pre-Test Cal	2,946	4.2	2,776	1.9	2,764	2.3	2,829	2,811	1.3
			Post-Test Cal	1,028	0.7	1,015	2.0	1,064	2.7	1,036				Post-Test Cal	2,350	0.3	2,302	1.8	2,378	1.5	2,343				Post-Test Cal	2,802	0.3	2,765	1.0	2,813	0.7	2,793		

Spreadsheet Calculations

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Raw Results Summary

					H2S Sample Injections					COS Sample Injections					CS2 Sample Injections				
Run No.	**Sample I.D.**	**Date**	**Injection Time (hh:mm)**	**Injection I.D.**	**Conc. (ppmvw)**	**Average Conc. (ppmvw)**	**RPD (%)**	**Standard Deviation**	**RSD (%)**	**Conc. (ppmvw)**	**Average Conc. (ppmvw)**	**RPD (%)**	**Standard Deviation**	**RSD (%)**	**Conc. (ppmvw)**	**Average Conc. (ppmvw)**	**RPD (%)**	**Standard Deviation**	**RSD (%)**
C1	BP-WV-C1-M18b-TRSA	7/19/11	16:59	fpd-58.CHR	6.36	6.54	2.63	0.179	2.73	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			17:08	fpd-59.chr	6.72		2.83			<1.16		N/A			<1.16		N/A		
			17:22	fpd-60.chr	6.52		0.201			<1.16		N/A			<1.16		N/A		
	BP-WV-C1-M18b-H2S	7/19/11	23:38	fpd-65.CHR	98.1	99.4	1.28	1.60	1.61	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			23:42	fpd-66.chr	98.8		0.536			<1.16		N/A			<1.16		N/A		
			23:44	fpd-67.CHR	101		1.81			<1.16		N/A			<1.16		N/A		
C2	BP-WV-C2-M18b-TRSA	7/19/11	22:41	fpd-62.chr	20.8	20.9	0.343	0.138	0.659	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			22:54	fpd-63.chr	20.8		0.416			<1.16		N/A			<1.16		N/A		
			23:04	fpd-64.CHR	21.1		0.760			<1.16		N/A			<1.16		N/A		
	BP-WV-C2-M18b-H2S	7/20/11	23:59	fpd-69.CHR	109	110	1.12	1.10	1.00	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			00:02	fpd-70.CHR	111		0.810			<1.16		N/A			<1.16		N/A		
			00:06	fpd-71.CHR	110		0.313			<1.16		N/A			<1.16		N/A		
C3	BP-WV-C3-M18b-TRSA	7/20/11	17:46	fpd-96.chr	7.17	6.87	4.43	0.309	4.50	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			17:55	fpd-97.chr	6.55		4.57			<1.16		N/A			<1.16		N/A		
			18:07	fpd-98.CHR	6.88		0.136			<1.16		N/A			<1.16		N/A		
	BP-WV-C3-M18b-H2S	7/20/11	18:32	fpd-101.CHR	102	106	3.53	3.24	3.06	<1.16	<1.16	N/A	N/A	N/A	<1.16	<1.16	N/A	N/A	N/A
			18:35	fpd-102.CHR	108		1.88			<1.16		N/A			<1.16		N/A		
			18:39	fpd-103.CHR	108		1.65			<1.16		N/A			<1.16		N/A		
C1 (Spike)	BP-WV-C1-M18b-TRSA (Spike)	7/20/11	17:18	fpd-93.chr	8.10	8.25	1.90	0.176	2.13	3.30	3.25	1.36	0.0593	1.82	2.29	2.18	5.29	0.104	4.79
			17:27	fpd-94.chr	8.22		0.412			3.27		0.713			2.09		4.04		
			17:37	fpd-95.chr	8.44		2.31			3.18		2.07			2.15		1.26		

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Corrected Results Summary

Run No.	Date	Sampling Interval (h:mm)	H2S Sample Injections				
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Bag Recovery Study (%)	Corrected Average Conc. X DR (ppmvw)
C1	7/18/11	20:29-21:29	6.54	18.7	122	70.4	173
C2	7/19/11	14:25-15:17	20.9	17.3	361	70.4	512
C3	7/20/11	9:06-9:47	6.87	18.3	126	70.4	179

Run No.	Date	Sampling Interval (h:mm)	COS Sample Injections				
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Bag Recovery Study (%)	Corrected Average Conc. (ppmvw)
C1	7/18/11	20:29-21:29	<1.16	18.7	<21.6	97.0	<22.3
C2	7/19/11	14:25-15:17	<1.16	17.3	<20.0	97.0	<20.6
C3	7/20/11	9:06-9:47	<1.16	18.3	<21.2	97.0	<21.9

				ppmvd	ppmvd	ppmvw	ppmvw	lbs/hr	lbs/hr	tpy	tpy
<	1.16	21.6	22.3	5828.506	<5,830	21.6	<21.6	1.07	<1.07	0.806905	<0.807
<	1.16	20.0	20.6	1858.589	<1,860			0.52	<0.522	0.393997	<0.394
<	1.16	21.2	21.9	8088.78	<8,090			0.99	<0.987	0.744264	<0.744
<			avg	5258.625	<5,260			0.86	<0.860	0.65	<0.648

Run No.	Date	Sampling Interval (h:mm)	CS2 Sample Injections				
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Bag Recovery Study (%)	Corrected Average Conc. (ppmvw)
C1	7/18/11	20:29-21:29	<1.16	18.7	<21.7	89.2	<24.4
C2	7/19/11	14:25-15:17	<1.16	17.3	<20.1	89.2	<22.5
C3	7/20/11	9:06-9:47	<1.16	18.3	<21.3	89.2	<23.9

				ppmvd	ppmvd	avg	avg	lbs/hr	lbs/hr	tpy	tpy
<	1.16	21.7	24.4	6359.717	<6,360	23.6	<23.6	1.48	<1.48	1.114841	<1.11
<	1.16	20.1	22.5	2027.982	<2,030			0.72	<0.722	0.544357	<0.544
<	1.16	21.3	23.9	8825.994	<8,830			1.36	<1.36	1.028296	<1.03
<			ppmvd	5737.898	<5,740			1.19	<1.19	0.90	<0.896

Run No.	Date	Sampling Interval (h:mm)	H2S System Recovery Study Injections						
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Bag Recovery Study (%)	Corrected Average Conc. X DR (ppmvw)	Calibration Gas (ppmv)	System Recovery Study (%)
C1	7/18/11	21:45-22:08	99.4	18.7	1,856	70.4	2,635	2,014	131
C2	7/19/11	15:28-15:43	110	17.3	1,900	70.4	2,697	2,014	134
C3	7/20/11	10:19-10:34	106	18.3	1,942	70.4	2,756	2,014	137

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Method Detection Limits

Method Detection Limit		
Injection	Injection I.D.	H2S
		19.9 ppmv
		ln(AC)
1	fpd-43.CHR	6.91
2	fpd-44.CHR	6.93
3	fpd-45.chr	6.92
4	fpd-73.CHR	6.92
5	fpd-74.CHR	6.98
6	fpd-75.CHR	6.99
7	fpd-79.chr	6.96
Average ln(AC)		6.94
St. Dev. ln(AC)		0.0297
St. Dev. X 3.143		0.0932
Slope		0.419
Intercept		0.115
MDL (ppmv)		**1.17**

Method Detection Limit		
Injection	Injection I.D.	COS
		19.9 ppmv
		ln(AC)
1	fpd-43.CHR	7.72
2	fpd-44.CHR	7.73
3	fpd-45.chr	7.71
4	fpd-73.CHR	7.68
5	fpd-74.CHR	7.71
6	fpd-75.CHR	7.72
7	fpd-79.chr	7.77
Average ln(AC)		7.72
St. Dev. ln(AC)		0.0241
St. Dev. X 3.143		0.0759
Slope		0.464
Intercept		-0.572
MDL (ppmv)		**1.16**

Method Detection Limit		
Injection	Injection I.D.	CS2
		19.9 ppmv
		ln(AC)
1	fpd-43.CHR	7.94
2	fpd-44.CHR	7.94
3	fpd-45.chr	7.93
4	fpd-73.CHR	7.92
5	fpd-74.CHR	7.96
6	fpd-75.CHR	7.98
7	fpd-79.chr	7.99
Average ln(AC)		7.95
St. Dev. ln(AC)		0.0271
St. Dev. X 3.143		0.0852
Slope		0.465
Intercept		-0.689
MDL (ppmv)		**1.16**

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Sample Holding Times

Run No.	Sample I.D.	Sampling		Anaylsis		Holding Time (hh:mm)
		Date	Time (hh:mm)	Date	Time (hh:mm)	
C1	BP-WV-C1-M18b-TRSA	7/18/11	20:29-21:29	7/19/11	17:22	19:53
	BP-WV-C1-M18b-TRSA (Spike)	7/19/11	21:45	7/20/11	17:37	19:52
	BP-WV-C1-M18b-H2S	7/18/11	21:45-22:08	7/19/11	23:44	25:36
C2	BP-WV-C2-M18b-TRSA	7/19/11	14:25-15:17	7/19/11	23:04	7:47
	BP-WV-C2-M18b-H2S	7/19/11	15:28-15:43	7/20/11	0:05	8:22
C3	BP-WV-C3-M18b-TRSA	7/20/11	9:06-9:47	7/20/11	18:07	8:20
	BP-WV-C3-M18b-H2S	7/20/11	10:19-10:34	7/20/11	18:39	8:05

Recovery Study Data

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
U.S. EPA Method 205 Data

U.S. EPA Method 205 Field Evaluation - Diluted Calibration Gas

Date	Certified Gas Cylinder I.D.	Predicted Diluted Concentration	Hydrogen Sulfide Injections							Error (%)
			1		2		3		Average	
			ppmv	RPD (%)	ppmv	RPD (%)	ppmv	RPD (%)	ppmv	
7/20/11	AAL1986	29.9	29.3	0.4	29.8	1.3	29.1	0.9	29.4	-1.7
		9.95	9.88	0.0	9.90	0.2	9.86	0.2	9.88	-0.7

Date	Certified Gas Cylinder I.D.	Predicted Diluted Concentration	Carbonyl Sulfide Injections							Error (%)
			1		2		3		Average	
			ppmv	RPD (%)	ppmv	RPD (%)	ppmv	RPD (%)	ppmv	
7/20/11	AAL1986	29.9	29.3	0.1	29.7	1.2	29.0	1.1	29.3	-2.0
		9.95	9.89	0.4	9.87	0.2	9.80	0.6	9.85	-1.0

Date	Certified Gas Cylinder I.D.	Predicted Diluted Concentration	Carbon Disulfide Injections							Error (%)
			1		2		3		Average	
			ppmv	RPD (%)	ppmv	RPD (%)	ppmv	RPD (%)	ppmv	
7/20/11	AAL1986	29.9	29.4	0.4	29.6	0.8	28.9	1.2	29.3	-2.0
		9.95	10.0	1.4	9.79	0.6	9.77	0.8	9.85	-1.0

U.S. EPA Method 205 Field Evaluation - Direct Calibration Gas

Date	Gas Cylinder I.D.	Certified Concentration	Hydrogen Sulfide Injections							Error (%)
			1		2		3		Average	
			ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	
7/24/11	ALM035763	25.9	25.2	1.6	24.9	2.4	26.6	4.1	25.6	-1.3

Date	Gas Cylinder I.D.	Certified Concentration	Carbonyl Sulfide							Error (%)
			1		2		3		Average	
			ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	
7/24/11	ALM035763	25.1	25.2	1.9	23.8	4.0	25.3	2.1	24.8	-1.4

7/24/11	Gas Cylinder I.D.	Certified Concentration	Carbon Disulfide							Error (%)
			1		2		3		Average	
			ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	RPD from Average (%)	ppmv	
	ALM035763	25.2	25.1	0.5	25.0	0.6	25.5	1.2	25.2	0.0

URS Data Printouts

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/19-20/2011
Base Injection Volume (uL) 250

Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		**100**	**100**	**100**
Pre-Test Calibration				
Data and Time				
Injection ID				
Calibration ID				
7/19/2011 12:53:14	AC	2500	5155	6511
fpd-40.chr	ln(AC)	7.82	8.55	8.78
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	955	875	851
	ppmv	29.7	29.8	29.9
7/19/2011 13:05:12 PM	AC	2437	5008	6299
fpd-41.CHR	ln(AC)	7.80	8.52	8.75
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	959	877	854
	ppmv	29.4	29.4	29.5
7/19/2011 13:16:17 PM	AC	2441	4997	6326
fpd-42.CHR	ln(AC)	7.80	8.52	8.75
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	958	878	854
	ppmv	29.4	29.4	29.5
Level 1	Average AC	2459	5053	6379
Cal. Summary	Average ln(AC)	7.81	8.53	8.76
	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	Diluted Cal. Gas ln(ppmv)	3.40	3.40	3.40
	Average ppmv	29.5	29.5	29.6
7/19/2011 13:25:41 PM	AC	1004	2256	2802
fpd-43.CHR	ln(AC)	6.91	7.72	7.94
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	720	644	627
	ppmv	20.3	20.3	20.2
7/19/2011 13:34:05 PM	AC	1027	2276	2794
fpd-44.CHR	ln(AC)	6.93	7.73	7.94
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	717	644	627
	ppmv	20.4	20.4	20.2
7/19/2011 13:43:52 PM	AC	1012	2232	2774
fpd-45.chr	ln(AC)	6.92	7.71	7.93
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	719	645	628
	ppmv	20.3	20.2	20.1
Level 2	Average AC	1015	2254	2790
Cal. Summary	Average ln(AC)	6.92	7.72	7.93
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Average ppmv	20.3	20.3	20.2
7/19/2011 15:31:22 PM	AC	180	483	610
fpd-51.CHR	ln(AC)	5.19	6.18	6.41
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	479	403	388
	ppmv	9.86	9.93	9.94
7/19/2011 15:40:19 PM	AC	183	483	607
fpd-52.chr	ln(AC)	5.21	6.18	6.41
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	477	403	388
	ppmv	9.94	9.93	9.92
7/19/2011 15:49:41 PM	AC	178	469	599
fpd-53.chr	ln(AC)	5.18	6.15	6.39
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	480	404	389
	ppmv	9.82	9.79	9.85
Level 3	Average AC	181	478	605
Cal. Summary	Average ln(AC)	5.20	6.17	6.41
	Diluted Cal. Gas Conc. (ppmv)	10.0	10.0	10.0
	Diluted Cal. Gas ln(ppmv)	2.30	2.30	2.30
	Average ppmv	9.88	9.88	9.90
Calibration Curve		**ln(AC)**	**ln(AC)**	**ln(AC)**
	Level 1	7.81	8.53	8.76
	Level 2	6.92	7.72	7.93
	Level 3	5.20	6.17	6.41
		Diluted Cal. Gas ln(ppmv)	**Diluted Cal. Gas ln(ppmv)**	**Diluted Cal. Gas ln(ppmv)**
	Level 1	3.40	3.40	3.40
	Level 2	2.99	2.99	2.99
	Level 3	2.30	2.30	2.30
Calculated with Excel	**Slope**	0.419	0.464	0.465

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/19-20/2011
Base Injection Volume (uL) 250

Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		100	100	100
	Intercept	0.115	-0.572	-0.689
	r2	0.999	0.999	1.00
Sample Analyses				
Date and Time				
Injection ID				
Sample ID				
Dilution Factor				
7/19/2011 16:58:43 PM	AC	63.2	3.94	0
fpd-58.CHR	ln(AC)	4.15	1.37	0
BP-WV-C1-M18b-TRSA	ppmv	6.36	1.07	0
1				
7/19/2011 17:08:05 PM	AC	72.0	2.24	0
fpd-59.chr	ln(AC)	4.28	0.806	0
BP-WV-C1-M18b-TRSA	ppmv	6.72	0.820	0
1				
7/19/2011 17:22:17 PM	AC	67.0	1.94	0
fpd-60.chr	ln(AC)	4.20	0.662	0
BP-WV-C1-M18b-TRSA	ppmv	6.52	0.768	0
1				
7/19/2011 22:41:01 PM	AC	1073	0	0
fpd-62.chr	ln(AC)	6.98	0	0
BP-WV-C2-M18b-TRSA	ppmv	20.8	0	0
1				
7/19/2011 22:54:24 PM	AC	1071	0	0
fpd-63.chr	ln(AC)	6.98	0	0
BP-WV-C2-M18b-TRSA	ppmv	20.8	0	0
1				
7/19/2011 23:03:30 PM	AC	1102	0	0
fpd-64.CHR	ln(AC)	7.00	0	0
BP-WV-C2-M18b-TRSA	ppmv	21.1	0	0
1				
7/19/2011 23:37:32 PM	AC	930.3	0	0
fpd-65.CHR	ln(AC)	6.84	0	0
BP-WV-C1-M18b-H2S	ppmv	98.1	0	0
5				
7/19/2011 23:41:37 PM	AC	947.1	0	0
fpd-66.chr	ln(AC)	6.85	0	0
BP-WV-C1-M18b-H2S	ppmv	98.8	0	0
5				
7/19/2011 23:44:22 PM	AC	1001.4	0	0
fpd-67.CHR	ln(AC)	6.91	0	0
BP-WV-C1-M18b-H2S	ppmv	101	0	0
5				
7/19/2011 23:57:01 PM	AC	1025	0	0
fpd-68.CHR	ln(AC)	6.93	0	0
BP-WV-C2-M18b-H2S	ppmv	102	0	0
5				
7/19/2011 23:59:49 PM	AC	1191	0	0
fpd-69.CHR	ln(AC)	7.08	0	0
BP-WV-C2-M18b-H2S	ppmv	109	0	0
5				
7/20/2011 '0:02:47 AM	AC	1247	0	0
fpd-70.CHR	ln(AC)	7.13	0	0
BP-WV-C2-M18b-H2S	ppmv	111	0	0
5				
7/20/2011 '0:05:41 AM	AC	1232	0	0
fpd-71.CHR	ln(AC)	7.12	0	0
BP-WV-C2-M18b-H2S	ppmv	110	0	0
5				
Post-Test Calibration				
Date and Time				
Injection ID				
Calibration Gas				
7/20/2011 '0:16:51 AM	AC	1014	2175	2742
fpd-73.CHR	ln(AC)	6.92	7.68	7.92

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/19-20/2011
Base Injection Volume (uL) **250**

Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		**100**	**100**	**100**
19.9 ppmv H2S/COS/CS2	ppmv	20.3	20.0	20.0
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	100	100	100
7/20/2011 '0:25:47 AM	AC	1073	2239	2856
fpd-74.CHR	ln(AC)	6.98	7.71	7.96
19.9 ppmv H2S/COS/CS2	ppmv	20.8	20.2	20.4
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	101	100	100
7/20/2011 '0:36:01 AM	AC	1082	2252	2923
fpd-75.CHR	ln(AC)	6.99	7.72	7.98
19.9 ppmv H2S/COS/CS2	ppmv	20.9	20.3	20.6
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	101	100	101

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 12:53	fpd-40.chr	30 ppm TRS
0	ppm	7/20/2011 12:53	fpd-40.chr	30 ppm TRS
0	ppm	7/21/2011 12:53	fpd-40.chr	30 ppm TRS
0	ppm	7/22/2011 12:53	fpd-40.chr	30 ppm TRS
0	ppm	7/23/2011 12:53	fpd-40.chr	30 ppm TRS

7/19/2011 12:53 2499.601 5154.809 2729.662 2190.264 6510.719
fpd-40.chr
30 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 13:05:12 PM	fpd-41.CHR	30 ppm TRS
0	ppm	7/19/2011 13:05:12 PM	fpd-41.CHR	30 ppm TRS
0	ppm	7/19/2011 13:05:12 PM	fpd-41.CHR	30 ppm TRS
0	ppm	7/19/2011 13:05:12 PM	fpd-41.CHR	30 ppm TRS
0	ppm	7/19/2011 13:05:12 PM	fpd-41.CHR	30 ppm TRS

7/19/2011 13:05:12 P 2437.082 5007.607 2669.928 2145.676 6298.838
fpd-41.CHR
30 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 13:16:17 PM	fpd-42.CHR	30 ppm TRS
0	ppm	7/19/2011 13:16:17 PM	fpd-42.CHR	30 ppm TRS
0	ppm	7/19/2011 13:16:17 PM	fpd-42.CHR	30 ppm TRS
0	ppm	7/19/2011 13:16:17 PM	fpd-42.CHR	30 ppm TRS
0	ppm	7/19/2011 13:16:17 PM	fpd-42.CHR	30 ppm TRS

7/19/2011 13:16:17 P 2441.47 4996.829 2690.849 2154.303 6326.42
fpd-42.CHR
30 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 13:25:41 PM	fpd-43.CHR	20 ppm TRS
0	ppm	7/19/2011 13:25:41 PM	fpd-43.CHR	20 ppm TRS
0	ppm	7/19/2011 13:25:41 PM	fpd-43.CHR	20 ppm TRS
0	ppm	7/19/2011 13:25:41 PM	fpd-43.CHR	20 ppm TRS
0	ppm	7/19/2011 13:25:41 PM	fpd-43.CHR	20 ppm TRS

7/19/2011 13:25:41 P 1004.363 2255.539 1164.142 979.6125 2802.268
fpd-43.CHR
20 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 13:34:05 PM	fpd-44.CHR	20 ppm TRS
0	ppm	7/19/2011 13:34:05 PM	fpd-44.CHR	20 ppm TRS
0	ppm	7/19/2011 13:34:05 PM	fpd-44.CHR	20 ppm TRS
0	ppm	7/19/2011 13:34:05 PM	fpd-44.CHR	20 ppm TRS
0	ppm	7/19/2011 13:34:05 PM	fpd-44.CHR	20 ppm TRS

7/19/2011 13:34:05 P 1027.181 2275.651 1173.717 974.0683 2794.107
fpd-44.CHR
20 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 13:43:52 PM	fpd-45.chr	20 ppm TRS
0	ppm	7/19/2011 13:43:52 PM	fpd-45.chr	20 ppm TRS
0	ppm	7/19/2011 13:43:52 PM	fpd-45.chr	20 ppm TRS
0	ppm	7/19/2011 13:43:52 PM	fpd-45.chr	20 ppm TRS
0	ppm	7/19/2011 13:43:52 PM	fpd-45.chr	20 ppm TRS

7/19/2011 13:43:52 P 1012.462 2231.566 1162.542 963.184 2773.86
fpd-45.chr
20 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 15:31:22 PM	fpd-51.CHR	10 ppm TRS
0	ppm	7/19/2011 15:31:22 PM	fpd-51.CHR	10 ppm TRS
0	ppm	7/19/2011 15:31:22 PM	fpd-51.CHR	10 ppm TRS
0	ppm	7/19/2011 15:31:22 PM	fpd-51.CHR	10 ppm TRS
0	ppm	7/19/2011 15:31:22 PM	fpd-51.CHR	10 ppm TRS

7/19/2011 15:31:22 P 180.0043 482.5494 259.446 235.3875 609.9565
fpd-51.CHR
10 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 15:40:19 PM	fpd-52.chr	10 ppm TRS
0	ppm	7/19/2011 15:40:19 PM	fpd-52.chr	10 ppm TRS
0	ppm	7/19/2011 15:40:19 PM	fpd-52.chr	10 ppm TRS
0	ppm	7/19/2011 15:40:19 PM	fpd-52.chr	10 ppm TRS
0	ppm	7/19/2011 15:40:19 PM	fpd-52.chr	10 ppm TRS

7/19/2011 15:40:19 P 183.3272 482.8884 261.417 236.8626 606.832
fpd-52.chr
10 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 15:49:41 PM	fpd-53.chr	10 ppm TRS
0	ppm	7/19/2011 15:49:41 PM	fpd-53.chr	10 ppm TRS
0	ppm	7/19/2011 15:49:41 PM	fpd-53.chr	10 ppm TRS
0	ppm	7/19/2011 15:49:41 PM	fpd-53.chr	10 ppm TRS
0	ppm	7/19/2011 15:49:41 PM	fpd-53.chr	10 ppm TRS

7/19/2011 15:49:41 P 178.2188 468.7171 252.1642 232.4836 598.652
fpd-53.chr
10 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 16:21:02 PM	fpd-54.CHR	25 ppm TRS
0	ppm	7/19/2011 16:21:02 PM	fpd-54.CHR	25 ppm TRS
0	ppm	7/19/2011 16:21:02 PM	fpd-54.CHR	25 ppm TRS
0	ppm	7/19/2011 16:21:02 PM	fpd-54.CHR	25 ppm TRS
0	ppm	7/19/2011 16:21:02 PM	fpd-54.CHR	25 ppm TRS

7/19/2011 16:21:02 P 1354.067 3194.666 1536.314 1434.717 4187.028
fpd-54.CHR
25 ppm TRS

External	Units	Analysis date	Data file	Sample
0	ppm	7/19/2011 16:29:14 PM	fpd-55.CHR	25 ppm TRS
0	ppm	7/19/2011 16:29:14 PM	fpd-55.CHR	25 ppm TRS
0	ppm	7/19/2011 16:29:14 PM	fpd-55.CHR	25 ppm TRS
0	ppm	7/19/2011 16:29:14 PM	fpd-55.CHR	25 ppm TRS
0	ppm	7/19/2011 16:29:14 PM	fpd-55.CHR	25 ppm TRS

7/19/2011 16:29:14 P 1854.864 3753.298 1800.312 1535.983 4537.334
fpd-55.CHR
25 ppm TRS

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 16:39:09 PM	fpd-56.CHR	25 ppm TRS	7/19/2011 16:39:09 P	1941.913	3739.01	1814.277	1527.355	4709.944
0	ppm	7/19/2011 16:39:09 PM	fpd-56.CHR	25 ppm TRS	fpd-56.CHR					
0	ppm	7/19/2011 16:39:09 PM	fpd-56.CHR	25 ppm TRS	25 ppm TRS					
0	ppm	7/19/2011 16:39:09 PM	fpd-56.CHR	25 ppm TRS						
0	ppm	7/19/2011 16:39:09 PM	fpd-56.CHR	25 ppm TRS						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 16:49:21 PM	fpd-57.CHR	25 ppm TRS	7/19/2011 16:49:21 P	1972.835	3725.33	1827.472	1524.897	4741.351
0	ppm	7/19/2011 16:49:21 PM	fpd-57.CHR	25 ppm TRS	fpd-57.CHR					
0	ppm	7/19/2011 16:49:21 PM	fpd-57.CHR	25 ppm TRS	25 ppm TRS					
0	ppm	7/19/2011 16:49:21 PM	fpd-57.CHR	25 ppm TRS						
0	ppm	7/19/2011 16:49:21 PM	fpd-57.CHR	25 ppm TRS						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 16:58:43 PM	fpd-58.CHR	run C1	7/19/2011 16:58:43 P	63.1676	3.937	0	0	0
0	ppm	7/19/2011 16:58:43 PM	fpd-58.CHR	run C1	fpd-58.CHR					
0	ppm	7/19/2011 16:58:43 PM	fpd-58.CHR	run C1	run C1					
0	ppm	7/19/2011 16:58:43 PM	fpd-58.CHR	run C1						
0	ppm	7/19/2011 16:58:43 PM	fpd-58.CHR	run C1						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 17:08:05 PM	fpd-59.chr	run C1	7/19/2011 17:08:05 P	71.956	2.2385	0	0	0
0	ppm	7/19/2011 17:08:05 PM	fpd-59.chr	run C1	fpd-59.chr					
0	ppm	7/19/2011 17:08:05 PM	fpd-59.chr	run C1	run C1					
0	ppm	7/19/2011 17:08:05 PM	fpd-59.chr	run C1						
0	ppm	7/19/2011 17:08:05 PM	fpd-59.chr	run C1						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 17:22:17 PM	fpd-60.chr	run C1	7/19/2011 17:22:17 P	66.9934	1.9387	0	0	0
0	ppm	7/19/2011 17:22:17 PM	fpd-60.chr	run C1	fpd-60.chr					
0	ppm	7/19/2011 17:22:17 PM	fpd-60.chr	run C1	run C1					
0	ppm	7/19/2011 17:22:17 PM	fpd-60.chr	run C1						
0	ppm	7/19/2011 17:22:17 PM	fpd-60.chr	run C1						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 22:41:01 PM	fpd-62.chr	run C2	7/19/2011 22:41:01 P	1072.911	0	0	0	0
0	ppm	7/19/2011 22:41:01 PM	fpd-62.chr	run C2	fpd-62.chr					
0	ppm	7/19/2011 22:41:01 PM	fpd-62.chr	run C2	run C2					
0	ppm	7/19/2011 22:41:01 PM	fpd-62.chr	run C2						
0	ppm	7/19/2011 22:41:01 PM	fpd-62.chr	run C2						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 22:54:24 PM	fpd-63.chr	run C2	7/19/2011 22:54:24 P	1071.03	0	0	0	0
0	ppm	7/19/2011 22:54:24 PM	fpd-63.chr	run C2	fpd-63.chr					
0	ppm	7/19/2011 22:54:24 PM	fpd-63.chr	run C2	run C2					
0	ppm	7/19/2011 22:54:24 PM	fpd-63.chr	run C2						
0	ppm	7/19/2011 22:54:24 PM	fpd-63.chr	run C2						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:03:30 PM	fpd-64.CHR	run C2	7/19/2011 23:03:30 P	1101.502	0	0	0	0
0	ppm	7/19/2011 23:03:30 PM	fpd-64.CHR	run C2	fpd-64.CHR					
0	ppm	7/19/2011 23:03:30 PM	fpd-64.CHR	run C2	run C2					
0	ppm	7/19/2011 23:03:30 PM	fpd-64.CHR	run C2						
0	ppm	7/19/2011 23:03:30 PM	fpd-64.CHR	run C2						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:37:32 PM	fpd-65.CHR	run C1 H2S rec 1:5	7/19/2011 23:37:32 P	930.33	0	0	0	0
0	ppm	7/19/2011 23:37:32 PM	fpd-65.CHR	run C1 H2S rec 1:5	fpd-65.CHR					
0	ppm	7/19/2011 23:37:32 PM	fpd-65.CHR	run C1 H2S rec 1:5	run C1 H2S rec 1:5					
0	ppm	7/19/2011 23:37:32 PM	fpd-65.CHR	run C1 H2S rec 1:5						
0	ppm	7/19/2011 23:37:32 PM	fpd-65.CHR	run C1 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:41:37 PM	fpd-66.chr	run C1 H2S rec 1:5	7/19/2011 23:41:37 P	947.0798	0	0	0	0
0	ppm	7/19/2011 23:41:37 PM	fpd-66.chr	run C1 H2S rec 1:5	fpd-66.chr					
0	ppm	7/19/2011 23:41:37 PM	fpd-66.chr	run C1 H2S rec 1:5	run C1 H2S rec 1:5					
0	ppm	7/19/2011 23:41:37 PM	fpd-66.chr	run C1 H2S rec 1:5						
0	ppm	7/19/2011 23:41:37 PM	fpd-66.chr	run C1 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:44:22 PM	fpd-67.CHR	run C1 H2S rec 1:5	7/19/2011 23:44:22 P	1001.386	0	0	0	0
0	ppm	7/19/2011 23:44:22 PM	fpd-67.CHR	run C1 H2S rec 1:5	fpd-67.CHR					
0	ppm	7/19/2011 23:44:22 PM	fpd-67.CHR	run C1 H2S rec 1:5	run C1 H2S rec 1:5					
0	ppm	7/19/2011 23:44:22 PM	fpd-67.CHR	run C1 H2S rec 1:5						
0	ppm	7/19/2011 23:44:22 PM	fpd-67.CHR	run C1 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:57:01 PM	fpd-68.CHR	run C2 H2S rec 1:5	7/19/2011 23:57:01 P	1024.784	0	0	0	0
0	ppm	7/19/2011 23:57:01 PM	fpd-68.CHR	run C2 H2S rec 1:5	fpd-68.CHR					
0	ppm	7/19/2011 23:57:01 PM	fpd-68.CHR	run C2 H2S rec 1:5	run C2 H2S rec 1:5					
0	ppm	7/19/2011 23:57:01 PM	fpd-68.CHR	run C2 H2S rec 1:5						
0	ppm	7/19/2011 23:57:01 PM	fpd-68.CHR	run C2 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/19/2011 23:59:49 PM	fpd-69.CHR	run C2 H2S rec 1:5	7/19/2011 23:59:49 P	1190.591	0	0	0	0
0	ppm	7/19/2011 23:59:49 PM	fpd-69.CHR	run C2 H2S rec 1:5	fpd-69.CHR					
0	ppm	7/19/2011 23:59:49 PM	fpd-69.CHR	run C2 H2S rec 1:5	run C2 H2S rec 1:5					
0	ppm	7/19/2011 23:59:49 PM	fpd-69.CHR	run C2 H2S rec 1:5						
0	ppm	7/19/2011 23:59:49 PM	fpd-69.CHR	run C2 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:02:47 AM	fpd-70.CHR	run C2 H2S rec 1:5	7/20/2011 '0:02:47 A	1246.955	0	0	0	0
0	ppm	7/20/2011 '0:02:47 AM	fpd-70.CHR	run C2 H2S rec 1:5	fpd-70.CHR					
0	ppm	7/20/2011 '0:02:47 AM	fpd-70.CHR	run C2 H2S rec 1:5	run C2 H2S rec 1:5					
0	ppm	7/20/2011 '0:02:47 AM	fpd-70.CHR	run C2 H2S rec 1:5						
0	ppm	7/20/2011 '0:02:47 AM	fpd-70.CHR	run C2 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:05:41 AM	fpd-71.CHR	run C2 H2S rec 1:5	7/20/2011 '0:05:41 A	1232.325	0	0	0	0
0	ppm	7/20/2011 '0:05:41 AM	fpd-71.CHR	run C2 H2S rec 1:5	fpd-71.CHR					
0	ppm	7/20/2011 '0:05:41 AM	fpd-71.CHR	run C2 H2S rec 1:5	run C2 H2S rec 1:5					
0	ppm	7/20/2011 '0:05:41 AM	fpd-71.CHR	run C2 H2S rec 1:5						
0	ppm	7/20/2011 '0:05:41 AM	fpd-71.CHR	run C2 H2S rec 1:5						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:08:39 AM	fpd-72.CHR	20 ppm TRS	7/20/2011 '0:08:39 A	938.7077	2010.082	1061.443	992.55	2624.845
0	ppm	7/20/2011 '0:08:39 AM	fpd-72.CHR	20 ppm TRS	fpd-72.CHR					
0	ppm	7/20/2011 '0:08:39 AM	fpd-72.CHR	20 ppm TRS	20 ppm TRS					
0	ppm	7/20/2011 '0:08:39 AM	fpd-72.CHR	20 ppm TRS						
0	ppm	7/20/2011 '0:08:39 AM	fpd-72.CHR	20 ppm TRS						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:16:51 AM	fpd-73.CHR	20 ppm TRS	7/20/2011 '0:16:51 A	1014.038	2175.449	1155.074	905.1115	2742.14
0	ppm	7/20/2011 '0:16:51 AM	fpd-73.CHR	20 ppm TRS	fpd-73.CHR					
0	ppm	7/20/2011 '0:16:51 AM	fpd-73.CHR	20 ppm TRS	20 ppm TRS					
0	ppm	7/20/2011 '0:16:51 AM	fpd-73.CHR	20 ppm TRS						
0	ppm	7/20/2011 '0:16:51 AM	fpd-73.CHR	20 ppm TRS						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:25:47 AM	fpd-74.CHR	20 ppm TRS	7/20/2011 '0:25:47 A	1072.731	2239.29	1195.952	948.9406	2856.496
0	ppm	7/20/2011 '0:25:47 AM	fpd-74.CHR	20 ppm TRS	fpd-74.CHR					
0	ppm	7/20/2011 '0:25:47 AM	fpd-74.CHR	20 ppm TRS	20 ppm TRS					
0	ppm	7/20/2011 '0:25:47 AM	fpd-74.CHR	20 ppm TRS						
0	ppm	7/20/2011 '0:25:47 AM	fpd-74.CHR	20 ppm TRS						

External	Units	Analysis date	Data file	Sample						
0	ppm	7/20/2011 '0:36:01 AM	fpd-75.CHR	20 ppm TRS	7/20/2011 '0:36:01 A	1081.76	2251.714	1203.153	967.4432	2923.267
0	ppm	7/20/2011 '0:36:01 AM	fpd-75.CHR	20 ppm TRS	fpd-75.CHR					
0	ppm	7/20/2011 '0:36:01 AM	fpd-75.CHR	20 ppm TRS	20 ppm TRS					
0	ppm	7/20/2011 '0:36:01 AM	fpd-75.CHR	20 ppm TRS						
0	ppm	7/20/2011 '0:36:01 AM	fpd-75.CHR	20 ppm TRS						

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/20-24/2011

Base Injection Volume (uL)	250			
Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		100	100	100
Pre-Test Calibration				
Data and Time				
Injection ID				
Calibration ID				
7/20/2011 14:21:07	AC	1050	2357	2946
fpd-79.chr	ln(AC)	6.96	7.77	7.99
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	715	641	623
	ppmv	20.6	20.8	20.9
7/20/2011 14:31:37	AC	1005	2209	2776
fpd-80.chr	ln(AC)	6.91	7.70	7.93
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	720	646	627
	ppmv	20.2	20.2	20.3
7/20/2011 14:41:15	AC	1040	2272	2764
fpd-81.chr	ln(AC)	6.95	7.73	7.92
19.9 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	RF	716	644	628
	ppmv	20.5	20.5	20.3
Level 1	Average AC	1032	2279	2829
Cal. Summary	Average ln(AC)	6.94	7.73	7.95
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Average ppmv	20.4	20.5	20.5
7/20/2011 14:53:59	AC	2446	4815	6155
fpd-82.chr	ln(AC)	7.80	8.48	8.73
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	958	882	857
	ppmv	29.3	29.3	29.4
7/20/2011 15:02:27	AC	2550	4954	6217
fpd-83.chr	ln(AC)	7.84	8.51	8.74
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	953	879	856
	ppmv	29.8	29.7	29.6
7/20/2011 15:14:04	AC	2416	4711	5944
fpd-84.chr	ln(AC)	7.79	8.46	8.69
29.9 ppm H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	RF	960	884	860
	ppmv	29.1	29.0	28.9
Level 2	Average AC	2471	4827	6105
Cal. Summary	Average ln(AC)	7.81	8.48	8.72
	Diluted Cal. Gas Conc. (ppmv)	29.9	29.9	29.9
	Diluted Cal. Gas ln(ppmv)	3.40	3.40	3.40
	Average ppmv	29.4	29.3	29.3
7/20/2011 15:24:40	AC	181	489	600
fpd-85.CHR	ln(AC)	5.20	6.19	6.40
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	479	402	389
	ppmv	9.88	9.89	9.99
7/20/2011 15:33:26	AC	182	488	574
fpd-86.chr	ln(AC)	5.20	6.19	6.35
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	478	402	392
	ppmv	9.90	9.87	9.79
7/20/2011 15:43:24	AC	178	480	572
fpd-87.chr	ln(AC)	5.18	6.17	6.35
9.95 ppmv H2S/COS/CS2	Diluted Cal. Gas Conc. (ppmv)	9.95	9.95	9.95
	RF	480	403	392
	ppmv	9.82	9.80	9.77
Level 3	Average AC	180	486	582
Cal. Summary	Average ln(AC)	5.19	6.19	6.37
	Diluted Cal. Gas Conc. (ppmv)	10.0	10.0	10.0
	Diluted Cal. Gas ln(ppmv)	2.30	2.30	2.30
	Average ppmv	9.86	9.85	9.85
Calibration Curve		**ln(AC)**	**ln(AC)**	**ln(AC)**
	Level 1	6.94	7.73	7.95
	Level 2	7.81	8.48	8.72
	Level 3	5.19	6.19	6.37
		Diluted Cal. Gas ln(ppmv)	**Diluted Cal. Gas ln(ppmv)**	**Diluted Cal. Gas ln(ppmv)**
	Level 1	2.99	2.99	2.99
	Level 2	3.40	3.40	3.40
	Level 3	2.30	2.30	2.30
Calculated with Excel	**Slope**	0.417	0.475	0.464

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/20-24/2011
Base Injection Volume (uL) 250

Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		100	100	100
	Intercept	0.122	-0.648	-0.664
	r2	0.998	0.998	0.998
Sample Analyses **Date and Time** **Injection ID** **Sample ID** **Dilution Factor**				
07/20/11 05:46 PM	AC	83.9	1.97	0
fpd-96.chr	ln(AC)	4.43	0.68	0
BP-WV-C3-M18b-TRSA	ppmv	7.17	0.72	0
1				
07/20/11 05:55 PM	AC	67.6	2.06	0
fpd-97.chr	ln(AC)	4.21	0.723	0
BP-WV-C3-M18b-TRSA	ppmv	6.55	0.737	0
1				
07/20/11 06:07 PM	AC	75.9	1.43	0
fpd-98.CHR	ln(AC)	4.33	0.357	0
BP-WV-C3-M18b-TRSA	ppmv	6.88	0.620	0
1				
07/20/11 06:32 PM	AC	1035	0	0
fpd-101.CHR	ln(AC)	6.94	0	0
BP-WV-C3-M18b-H2S	ppmv	102	0	0
5				
07/20/11 06:35 PM	AC	1180	0	0
fpd-102.CHR	ln(AC)	7.07	0	0
BP-WV-C3-M18b-H2S	ppmv	108	0	0
5				
07/20/11 06:39 PM	AC	1173	0	0
fpd-103.CHR	ln(AC)	7.07	0	0
BP-WV-C3-M18b-H2S	ppmv	108	0	0
5				
Post-Test Calibration **Date and Time** **Injection ID** **Calibration Gas**				
07/24/11 03:50 PM	AC	1028	2350	2802
fpd-110.CHR	ln(AC)	6.94	7.76	7.94
19.9 ppmv H2S/COS/CS2	ppmv	20.4	20.8	20.4
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	88.8	91.5	91.1
07/24/11 04:00 PM	AC	1015	2302	2765
fpd-111.CHR	ln(AC)	6.92	7.74	7.92
19.9 ppmv H2S/COS/CS2	ppmv	20.3	20.6	20.3
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	88.6	91.3	90.9
07/24/11 04:09 PM	AC	1064	2378	2813
fpd-112.CHR	ln(AC)	6.97	7.77	7.94
19.9 ppmv H2S/COS/CS2	ppmv	20.7	20.9	20.5
	Diluted Cal. Gas Conc. (ppmv)	19.9	19.9	19.9
	Diluted Cal. Gas ln(ppmv)	2.99	2.99	2.99
	Recovery (%)	89.2	91.7	91.1
U.S. EPA Method 205 Evaluation **Date and Time** **Injection ID** **Calibration Gas**				
07/24/11 05:31 PM	AC	1701		
fpd-114.CHR	ln(AC)	7.44		
25 ppmv H2S/COS/CS2	ppmv	25.2		
	Direct Cal. Gas Conc. (ppmv)	25.9		
	Direct Cal. Gas ln(ppmv)	3.25		
07/24/11 05:47 PM	AC	1667		
fpd-115.CHR	ln(AC)	7.42		
25 ppmv H2S/COS/CS2	ppmv	24.9		
	Direct Cal. Gas Conc. (ppmv)	25.9		
	Direct Cal. Gas ln(ppmv)	3.25		
07/24/11 06:10 PM	AC	1947		
fpd-116.CHR	ln(AC)	7.57		

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/20-24/2011

Base Injection Volume (uL)	**250**			
Analyte		**H2S**	**COS**	**CS2**
Cal. Gas Concentration (ppmv)		**100**	**100**	**100**
25 ppmv H2S/COS/CS2	ppmv	26.6		
	Direct Cal. Gas Conc. (ppmv)	25.9		
	Direct Cal. Gas ln(ppmv)	3.25		
07/24/11 04:28 PM	AC		3526	4354
fpd-113.CHR	ln(AC)		8.17	8.38
25 ppmv H2S/COS/CS2	ppmv		25.2	25.1
	Direct Cal. Gas Conc. (ppmv)		25.1	25.2
	Direct Cal. Gas ln(ppmv)		3.22	3.23
07/24/11 05:31 PM	AC		3107	4346
fpd-114.CHR	ln(AC)		8.04	8.38
25 ppmv H2S/COS/CS2	ppmv		23.8	25.0
	Direct Cal. Gas Conc. (ppmv)		25.1	25.2
	Direct Cal. Gas ln(ppmv)		3.22	3.23
07/24/11 06:10 PM	AC		3534	4517
fpd-116.CHR	ln(AC)		8.17	8.42
25 ppmv H2S/COS/CS2	ppmv		25.3	25.5
	Direct Cal. Gas Conc. (ppmv)		25.1	25.2
	Direct Cal. Gas ln(ppmv)		3.22	3.23
Recovery Study Analyses				
Date and Time				
Injection ID				
Sample ID				
Dilution Factor				
07/20/11 05:18 PM	AC	112	48.3	25.1
fpd-93.chr	ln(AC)	4.72	3.88	3.22
BP-WV-C1-M18b-TRSA (Spike)	ppmv	8.10	3.30	2.29
1				
07/20/11 05:27 PM	AC	116	47.7	20.5
fpd-94.chr	ln(AC)	4.76	3.86	3.02
BP-WV-C1-M18b-TRSA (Spike)	ppmv	8.22	3.27	2.09
1				
07/20/11 05:37 PM	AC	124	44.9	21.8
fpd-95.chr	ln(AC)	4.82	3.81	3.08
BP-WV-C1-M18b-TRSA (Spike)	ppmv	8.44	3.18	2.15
1				
Recovery Study Summary	Average AC	118	47.0	22.5
	Average ppm (post-spike)	8.25	3.25	2.18
	Average ppmv (pre-spike)	6.54	0.885	0
	Average ppmv (all samples)	11.4	#DIV/0!	0
	Theoretical spike ppmv	2.44	2.44	2.44
	Spike/All Samples (%)	21.3	#DIV/0!	#DIV/0!
	Recovery (%)	70.4	97	89

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 14:21	fpd-79.chr	20 ppm TRS	7/20/2011 14:21	1050.06	2357.18	1347.825	1137.529	2946.488
0 ppm	7/20/2011 14:21	fpd-79.chr	20 ppm TRS	fpd-79.chr					
0 ppm	7/20/2011 14:21	fpd-79.chr	20 ppm TRS	20 ppm TRS					
0 ppm	7/20/2011 14:21	fpd-79.chr	20 ppm TRS						
0 ppm	7/20/2011 14:21	fpd-79.chr	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 14:31	fpd-80.chr	20 ppm TRS	7/20/2011 14:31	1005.163	2208.53	1211.314	1055.234	2776.13
0 ppm	7/20/2011 14:31	fpd-80.chr	20 ppm TRS	fpd-80.chr					
0 ppm	7/20/2011 14:31	fpd-80.chr	20 ppm TRS	20 ppm TRS					
0 ppm	7/20/2011 14:31	fpd-80.chr	20 ppm TRS						
0 ppm	7/20/2011 14:31	fpd-80.chr	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 14:41	fpd-81.chr	20 ppm TRS	7/20/2011 14:41	1039.97	2271.544	1199.699	1006.654	2763.876
0 ppm	7/20/2011 14:41	fpd-81.chr	20 ppm TRS	fpd-81.chr					
0 ppm	7/20/2011 14:41	fpd-81.chr	20 ppm TRS	20 ppm TRS					
0 ppm	7/20/2011 14:41	fpd-81.chr	20 ppm TRS						
0 ppm	7/20/2011 14:41	fpd-81.chr	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 14:53	fpd-82.chr	30 ppm TRS	7/20/2011 14:53	2446.139	4815.406	2685.291	2183.139	6155.216
0 ppm	7/20/2011 14:53	fpd-82.chr	30 ppm TRS	fpd-82.chr					
0 ppm	7/20/2011 14:53	fpd-82.chr	30 ppm TRS	30 ppm TRS					
0 ppm	7/20/2011 14:53	fpd-82.chr	30 ppm TRS						
0 ppm	7/20/2011 14:53	fpd-82.chr	30 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 15:02	fpd-83.chr	30 ppm TRS	7/20/2011 15:02	2550.121	4953.834	2668.657	2129.885	6217.251
0 ppm	7/20/2011 15:02	fpd-83.chr	30 ppm TRS	fpd-83.chr					
0 ppm	7/20/2011 15:02	fpd-83.chr	30 ppm TRS	30 ppm TRS					
0 ppm	7/20/2011 15:02	fpd-83.chr	30 ppm TRS						
0 ppm	7/20/2011 15:02	fpd-83.chr	30 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 15:14	fpd-84.chr	30 ppm TRS	7/20/2011 15:14	2415.796	4710.872	2580.101	2061.77	5944.006
0 ppm	7/20/2011 15:14	fpd-84.chr	30 ppm TRS	fpd-84.chr					
0 ppm	7/20/2011 15:14	fpd-84.chr	30 ppm TRS	30 ppm TRS					
0 ppm	7/20/2011 15:14	fpd-84.chr	30 ppm TRS						
0 ppm	7/20/2011 15:14	fpd-84.chr	30 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 15:24	fpd-85.CHR	10 ppm TRS	7/20/2011 15:24	180.9118	489.2768	252.524	236.7816	599.9403
0 ppm	7/20/2011 15:24	fpd-85.CHR	10 ppm TRS	fpd-85.CHR					
0 ppm	7/20/2011 15:24	fpd-85.CHR	10 ppm TRS	10 ppm TRS					
0 ppm	7/20/2011 15:24	fpd-85.CHR	10 ppm TRS						
0 ppm	7/20/2011 15:24	fpd-85.CHR	10 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 15:33	fpd-86.chr	10 ppm TRS	7/20/2011 15:33	181.92	487.8608	245.2874	221.9102	574.4549
0 ppm	7/20/2011 15:33	fpd-86.chr	10 ppm TRS	fpd-86.chr					
0 ppm	7/20/2011 15:33	fpd-86.chr	10 ppm TRS	10 ppm TRS					
0 ppm	7/20/2011 15:33	fpd-86.chr	10 ppm TRS						
0 ppm	7/20/2011 15:33	fpd-86.chr	10 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 15:43	fpd-87.chr	10 ppm TRS	7/20/2011 15:43	178.2082	479.8401	249.8147	223.1862	571.5826
0 ppm	7/20/2011 15:43	fpd-87.chr	10 ppm TRS	fpd-87.chr					
0 ppm	7/20/2011 15:43	fpd-87.chr	10 ppm TRS	10 ppm TRS					
0 ppm	7/20/2011 15:43	fpd-87.chr	10 ppm TRS						
0 ppm	7/20/2011 15:43	fpd-87.chr	10 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 16:01	fpd-88.chr	25 ppm TRS	7/20/2011 16:01	1563.778	3151.7	1532.011	1356.676	4052.416
0 ppm	7/20/2011 16:01	fpd-88.chr	25 ppm TRS	fpd-88.chr					
0 ppm	7/20/2011 16:01	fpd-88.chr	25 ppm TRS	25 ppm TRS					
0 ppm	7/20/2011 16:01	fpd-88.chr	25 ppm TRS						
0 ppm	7/20/2011 16:01	fpd-88.chr	25 ppm TRS						

External Units	Analysis date	Data file	Sample

0 ppm	7/20/2011 16:16	fpd-89.chr	25 ppm TRS	7/20/2011 16:16	1574.517	2887.107	1565.916	1347.894	4090.056
0 ppm	7/20/2011 16:16	fpd-89.chr	25 ppm TRS	fpd-89.chr					
0 ppm	7/20/2011 16:16	fpd-89.chr	25 ppm TRS	25 ppm TRS					
0 ppm	7/20/2011 16:16	fpd-89.chr	25 ppm TRS						
0 ppm	7/20/2011 16:16	fpd-89.chr	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 16:30	fpd-90.chr	25 ppm TRS	7/20/2011 16:30	1554.48	2905.546	1576.418	1366.053	4096.504
0 ppm	7/20/2011 16:30	fpd-90.chr	25 ppm TRS	fpd-90.chr					
0 ppm	7/20/2011 16:30	fpd-90.chr	25 ppm TRS	25 ppm TRS					
0 ppm	7/20/2011 16:30	fpd-90.chr	25 ppm TRS						
0 ppm	7/20/2011 16:30	fpd-90.chr	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 16:43	fpd-91.chr	25 ppm TRS	7/20/2011 16:43	1580.268	2934.757	1592.182	1346.882	4077.409
0 ppm	7/20/2011 16:43	fpd-91.chr	25 ppm TRS	fpd-91.chr					
0 ppm	7/20/2011 16:43	fpd-91.chr	25 ppm TRS	25 ppm TRS					
0 ppm	7/20/2011 16:43	fpd-91.chr	25 ppm TRS						
0 ppm	7/20/2011 16:43	fpd-91.chr	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:06	fpd-92.chr	spiked bag (C1)	7/20/2011 17:06	113.1611	55.7501	15.4924	18.218	57.6546
0 ppm	7/20/2011 17:06	fpd-92.chr	spiked bag (C1)	fpd-92.chr					
0 ppm	7/20/2011 17:06	fpd-92.chr	spiked bag (C1)	spiked bag (C1)					
0 ppm	7/20/2011 17:06	fpd-92.chr	spiked bag (C1)						
0 ppm	7/20/2011 17:06	fpd-92.chr	spiked bag (C1)						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:18	fpd-93.chr	spiked bag (C1)	7/20/2011 17:18	112.3531	48.3192	11.807	12.3199	25.0672
0 ppm	7/20/2011 17:18	fpd-93.chr	spiked bag (C1)	fpd-93.chr					
0 ppm	7/20/2011 17:18	fpd-93.chr	spiked bag (C1)	spiked bag (C1)					
0 ppm	7/20/2011 17:18	fpd-93.chr	spiked bag (C1)						
0 ppm	7/20/2011 17:18	fpd-93.chr	spiked bag (C1)						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:27	fpd-94.chr	spiked bag (C1)	7/20/2011 17:27	116.4704	47.6734	10.8471	11.2749	20.5213
0 ppm	7/20/2011 17:27	fpd-94.chr	spiked bag (C1)	fpd-94.chr					
0 ppm	7/20/2011 17:27	fpd-94.chr	spiked bag (C1)	spiked bag (C1)					
0 ppm	7/20/2011 17:27	fpd-94.chr	spiked bag (C1)						
0 ppm	7/20/2011 17:27	fpd-94.chr	spiked bag (C1)						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:37	fpd-95.chr	spiked bag (C1)	7/20/2011 17:37	124.2429	44.9384	11.5401	10.0438	21.8242
0 ppm	7/20/2011 17:37	fpd-95.chr	spiked bag (C1)	fpd-95.chr					
0 ppm	7/20/2011 17:37	fpd-95.chr	spiked bag (C1)	spiked bag (C1)					
0 ppm	7/20/2011 17:37	fpd-95.chr	spiked bag (C1)						
0 ppm	7/20/2011 17:37	fpd-95.chr	spiked bag (C1)						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:46	fpd-96.chr	run C3	7/20/2011 17:46	83.9256	1.971	0	0	0
0 ppm	7/20/2011 17:46	fpd-96.chr	run C3	fpd-96.chr					
0 ppm	7/20/2011 17:46	fpd-96.chr	run C3	run C3					
0 ppm	7/20/2011 17:46	fpd-96.chr	run C3						
0 ppm	7/20/2011 17:46	fpd-96.chr	run C3						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 17:55	fpd-97.chr	run C3	7/20/2011 17:55	67.6176	2.0616	0	0	0
0 ppm	7/20/2011 17:55	fpd-97.chr	run C3	fpd-97.chr					
0 ppm	7/20/2011 17:55	fpd-97.chr	run C3	run C3					
0 ppm	7/20/2011 17:55	fpd-97.chr	run C3						
0 ppm	7/20/2011 17:55	fpd-97.chr	run C3						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 18:07	fpd-98.CHR	run C3	7/20/2011 18:07	75.885	1.4294	0	0	0
0 ppm	7/20/2011 18:07	fpd-98.CHR	run C3	fpd-98.CHR					
0 ppm	7/20/2011 18:07	fpd-98.CHR	run C3	run C3					
0 ppm	7/20/2011 18:07	fpd-98.CHR	run C3						
0 ppm	7/20/2011 18:07	fpd-98.CHR	run C3						

External Units	Analysis date	Data file	Sample						
0 ppm	7/20/2011 18:18	fpd-99.CHR	run C3 H2S rec 1:5	7/20/2011 18:18	979.0818	0	0	0	0

```
           0 ppm       7/20/2011 18:18 fpd-99.CHR    run C3 H2S rec 1:5  fpd-99.CHR
           0 ppm       7/20/2011 18:18 fpd-99.CHR    run C3 H2S rec 1:5  run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:18 fpd-99.CHR    run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:18 fpd-99.CHR    run C3 H2S rec 1:5

External Units  Analysis date          Data file     Sample
           0 ppm       7/20/2011 18:32 fpd-101.CHR   run C3 H2S rec 1:5  7/20/2011 18:32  1035.161         0         0         0         0
           0 ppm       7/20/2011 18:32 fpd-101.CHR   run C3 H2S rec 1:5  fpd-101.CHR
           0 ppm       7/20/2011 18:32 fpd-101.CHR   run C3 H2S rec 1:5  run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:32 fpd-101.CHR   run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:32 fpd-101.CHR   run C3 H2S rec 1:5

External Units  Analysis date          Data file     Sample
           0 ppm       7/20/2011 18:35 fpd-102.CHR   run C3 H2S rec 1:5  7/20/2011 18:35  1179.575         0         0         0         0
           0 ppm       7/20/2011 18:35 fpd-102.CHR   run C3 H2S rec 1:5  fpd-102.CHR
           0 ppm       7/20/2011 18:35 fpd-102.CHR   run C3 H2S rec 1:5  run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:35 fpd-102.CHR   run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:35 fpd-102.CHR   run C3 H2S rec 1:5

External Units  Analysis date          Data file     Sample
           0 ppm       7/20/2011 18:39 fpd-103.CHR   run C3 H2S rec 1:5  7/20/2011 18:39  1173.302         0         0         0         0
           0 ppm       7/20/2011 18:39 fpd-103.CHR   run C3 H2S rec 1:5  fpd-103.CHR
           0 ppm       7/20/2011 18:39 fpd-103.CHR   run C3 H2S rec 1:5  run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:39 fpd-103.CHR   run C3 H2S rec 1:5
           0 ppm       7/20/2011 18:39 fpd-103.CHR   run C3 H2S rec 1:5

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 14:37 fpd-104.CHR   20 ppm TRS          7/24/2011 14:37  523.2714  1644.402         0         0         0
           0 ppm       7/24/2011 14:37 fpd-104.CHR   20 ppm TRS          fpd-104.CHR
           0 ppm       7/24/2011 14:37 fpd-104.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 14:37 fpd-104.CHR   20 ppm TRS
           0 ppm       7/24/2011 14:37 fpd-104.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 14:49 fpd-105.CHR   20 ppm TRS          7/24/2011 14:49  767.8282  2040.319  1061.408  1003.227  2520.428
           0 ppm       7/24/2011 14:49 fpd-105.CHR   20 ppm TRS          fpd-105.CHR
           0 ppm       7/24/2011 14:49 fpd-105.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 14:49 fpd-105.CHR   20 ppm TRS
           0 ppm       7/24/2011 14:49 fpd-105.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 15:05 fpd-106.CHR   20 ppm TRS          7/24/2011 15:05  816.0592  2077.124   1084.98   997.482  2555.706
           0 ppm       7/24/2011 15:05 fpd-106.CHR   20 ppm TRS          fpd-106.CHR
           0 ppm       7/24/2011 15:05 fpd-106.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 15:05 fpd-106.CHR   20 ppm TRS
           0 ppm       7/24/2011 15:05 fpd-106.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 15:14 fpd-107.CHR   20 ppm TRS          7/24/2011 15:14   954.213  2295.587  1168.988  1030.965  2721.253
           0 ppm       7/24/2011 15:14 fpd-107.CHR   20 ppm TRS          fpd-107.CHR
           0 ppm       7/24/2011 15:14 fpd-107.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 15:14 fpd-107.CHR   20 ppm TRS
           0 ppm       7/24/2011 15:14 fpd-107.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 15:33 fpd-108.CHR   20 ppm TRS          7/24/2011 15:33  847.2251  2123.763  1111.723  1011.601  2672.412
           0 ppm       7/24/2011 15:33 fpd-108.CHR   20 ppm TRS          fpd-108.CHR
           0 ppm       7/24/2011 15:33 fpd-108.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 15:33 fpd-108.CHR   20 ppm TRS
           0 ppm       7/24/2011 15:33 fpd-108.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 15:42 fpd-109.CHR   20 ppm TRS          7/24/2011 15:42  997.8774  2338.148  1198.327  1037.578  2783.619
           0 ppm       7/24/2011 15:42 fpd-109.CHR   20 ppm TRS          fpd-109.CHR
           0 ppm       7/24/2011 15:42 fpd-109.CHR   20 ppm TRS          20 ppm TRS
           0 ppm       7/24/2011 15:42 fpd-109.CHR   20 ppm TRS
           0 ppm       7/24/2011 15:42 fpd-109.CHR   20 ppm TRS

External Units  Analysis date          Data file     Sample
           0 ppm       7/24/2011 15:50 fpd-110.CHR   20 ppm TRS          7/24/2011 15:50  1028.402  2350.478  1218.497  1031.493  2802.297
           0 ppm       7/24/2011 15:50 fpd-110.CHR   20 ppm TRS          fpd-110.CHR
```

0 ppm	7/24/2011 15:50	fpd-110.CHR	20 ppm TRS	20 ppm TRS					
0 ppm	7/24/2011 15:50	fpd-110.CHR	20 ppm TRS						
0 ppm	7/24/2011 15:50	fpd-110.CHR	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 16:00	fpd-111.CHR	20 ppm TRS	7/24/2011 16:00	1015.443	2302.107	1198.501	1013.122	2765.435
0 ppm	7/24/2011 16:00	fpd-111.CHR	20 ppm TRS	fpd-111.CHR					
0 ppm	7/24/2011 16:00	fpd-111.CHR	20 ppm TRS	20 ppm TRS					
0 ppm	7/24/2011 16:00	fpd-111.CHR	20 ppm TRS						
0 ppm	7/24/2011 16:00	fpd-111.CHR	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 16:09	fpd-112.CHR	20 ppm TRS	7/24/2011 16:09	1063.81	2377.838	1238.847	1032.778	2812.567
0 ppm	7/24/2011 16:09	fpd-112.CHR	20 ppm TRS	fpd-112.CHR					
0 ppm	7/24/2011 16:09	fpd-112.CHR	20 ppm TRS	20 ppm TRS					
0 ppm	7/24/2011 16:09	fpd-112.CHR	20 ppm TRS						
0 ppm	7/24/2011 16:09	fpd-112.CHR	20 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 16:28	fpd-113.CHR	25 ppm TRS	7/24/2011 16:28	1760.68	3525.526	1720.02	1532.55	4354.331
0 ppm	7/24/2011 16:28	fpd-113.CHR	25 ppm TRS	fpd-113.CHR					
0 ppm	7/24/2011 16:28	fpd-113.CHR	25 ppm TRS	25 ppm TRS					
0 ppm	7/24/2011 16:28	fpd-113.CHR	25 ppm TRS						
0 ppm	7/24/2011 16:28	fpd-113.CHR	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 17:31	fpd-114.CHR	25 ppm TRS	7/24/2011 17:31	1701.392	3107.397	1703.932	1511.846	4345.537
0 ppm	7/24/2011 17:31	fpd-114.CHR	25 ppm TRS	fpd-114.CHR					
0 ppm	7/24/2011 17:31	fpd-114.CHR	25 ppm TRS	25 ppm TRS					
0 ppm	7/24/2011 17:31	fpd-114.CHR	25 ppm TRS						
0 ppm	7/24/2011 17:31	fpd-114.CHR	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 17:47	fpd-115.CHR	25 ppm TRS	7/24/2011 17:47	1667.394	3068.01	1508.241	1309.957	3809.29
0 ppm	7/24/2011 17:47	fpd-115.CHR	25 ppm TRS	fpd-115.CHR					
0 ppm	7/24/2011 17:47	fpd-115.CHR	25 ppm TRS	25 ppm TRS					
0 ppm	7/24/2011 17:47	fpd-115.CHR	25 ppm TRS						
0 ppm	7/24/2011 17:47	fpd-115.CHR	25 ppm TRS						

External Units	Analysis date	Data file	Sample						
0 ppm	7/24/2011 18:10	fpd-116.CHR	25 ppm TRS	7/24/2011 18:10	1947.147	3534.195	1771.267	1547.084	4516.685
0 ppm	7/24/2011 18:10	fpd-116.CHR	25 ppm TRS	fpd-116.CHR					
0 ppm	7/24/2011 18:10	fpd-116.CHR	25 ppm TRS	25 ppm TRS					
0 ppm	7/24/2011 18:10	fpd-116.CHR	25 ppm TRS						
0 ppm	7/24/2011 18:10	fpd-116.CHR	25 ppm TRS						

Section J
Method 18 – Methane and Ethane

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	

		A2	A3	A4
M308	THC1 Post Test	15.58	14.22	16.32
	THC2 Post Test	15.15	14.46	16.11
	Average Post Test	**15.37**	**14.34**	**16.22**

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

Run Nos.	Date	Methane Calibration Injections (1,000 ppmv)								Ethane Calibration Injections (1,010 ppmv)							
			1		2		3		Average		1		2		3		Average
		Injection Volume (uL)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	Injection Volume (uL)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts
A2/A3/A4	7/24/2011 21:23-22:19	550	535	1.1	544	0.5	545	0.6	541	550	988	1.1	1,004	0.5	1,006	0.7	1,000
		1,050	941	0.5	945	0.1	952	0.6	946	1,050	1,738	0.6	1,746	0.1	1,759	0.6	1,748
		2,050	1,870	0.1	1,872	0.0	1,875	0.1	1,873	2,050	3,454	0.1	3,456	0.1	3,466	0.2	3,459
A2/A3/A4, Recovery Study	7/25/2011 16:41-17:41	550	503	0.2	500	0.5	504	0.3	502	550	944	0.0	941	0.4	947	0.4	944
		1,050	906	0.3	908	0.0	910	0.2	908	1,050	1,702	0.3	1,707	0.0	1,712	0.3	1,707
		2,050	1,824	0.2	1,833	0.3	1,825	0.1	1,827	2,050	3,440	0.4	3,459	0.2	3,462	0.2	3,454

Run Nos.	Date & Time	Injection Volume (uL)	Sequence	Methane Calibration Injections (1,000 ppmv)									Ethane Calibration Injections (1,010 ppmv)								
				1		2		3					1		2		3				
				Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Average (1-3) Area Counts	Average (Pre/Post) Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Area Counts	RPD (%)	Average (1-3) Area Counts	Average (Pre/Post) Area Counts	RPD (%)
A2/A3/A4	7/25 1:33	1050	Pre-Test Cal	941	0.503	945	0.1004	952	0.604	946	922	**5.24**	1,738	0.567	1,746	0.0709	1,759	0.638	1,748	1,714	3.90
			Post-Test Cal	899	0.146	896	0.149	898	0.003	898			1,682	0.08	1,678	0.137	1,682	0.053	1,681		
A2/A3/A4	7/25 19:36	1050	Pre-Test Cal	906	0.266	908	0.0214	910	0.244	908	898	2.26	1,702	0.269	1,707	0.0226	1,712	0.291	1,707	1,688	2.19
			Post-Test Cal	879	0.924	890	0.269	893	0.655	888			1,653	1.02	1,672	0.143	1,684	0.877	1,670		
Recovery Study	7/26 15:19	1050	Pre-Test Cal	906	0.266	908	0.0214	910	0.244	908	896	2.63	1,702	0.269	1,707	0.0226	1,712	0.291	1,707	1,690	2.05
			Post-Test Cal	881	0.389	883	0.115	889	0.504	884			1,666	0.393	1,671	0.0812	1,680	0.474	1,672		

Spreadsheet Calculations

Run No.	Date	Injection Time (hh:mm)	Injection I.D.	Methane Sample Injections						Ethane Sample Injections					
				Injection Volume (uL)	Conc. (ppmvw)	Average Conc. (ppmvw)	RPD (%)	Standard Deviation	RSD (%)	Injection Volume (uL)	Conc. (ppmvw)	Average Conc. (ppmvw)	RPD (%)	Standard Deviation	RSD (%)
A2	7/24/11		fid-47.CHR	2050	181	169	6.70	9.84	5.81	2050	19.0	18.5	2.78	0.484	2.62
			fid-48.chr	2050	164		3.10			2050	18.4		0.345		
			fid-49.chr	2050	163		3.59			2050	18.0		2.43		
A3	7/24/11		fid-51.CHR	1050	1,186	1,187	0.0785	2.02	0.170	1050	134	134	0.0335	0.281	0.209
			fid-52.chr	1050	1,189		0.195			1050	135		0.190		
			fid-53.CHR	1050	1,185		0.117			1050	134		0.224		
A4	7/25/11		fid-77.CHR	2050	164	161	2.02	3.48	2.17	2050	27.3	26.8	1.81	0.506	1.89
			fid-78.CHR	2050	161		0.266			2050	26.8		0.152		
			fid-79.CHR	2050	157		2.29			2050	26.3		1.96		

Run No.	Date	Sampling Interval (h:mm)	Methane Sample Injections						
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Recovery Study (%)	Corrected Average Conc. X DR (ppmvw)	Average THC Analyzer Response Factor	Methane/ Propane Equivalent Conc. (ppmvw)
A2	7/21/11	20:58-22:40	169	21.3	3,609	79.8	4,521	1	1,507
A3	7/24/11	19:55-21:25	1,187	21.3	25,304	79.8	31,700	1	10,567
A4	7/25/11	14:40-15:40	161	16.8	2,703	79.8	3,387	1	1,129

Run No.	Date	Sampling Interval (h:mm)	Ethane Sample Injections						
			Average Conc. (ppmvw)	Average Dilution Ratio (DR)	Average Conc. X DR (ppmvw)	Average Recovery Study (%)	Corrected Average Conc. (ppmvw)	Average THC Analyzer Response Factor	Ethane/ Propane Equivalent Conc. (ppmvw)
A2	7/21/11	20:58-22:40	18.5	21.3	393	102	387	1	258
A3	7/24/11	19:55-21:25	134	21.3	2,865	102	2,822	1	1,881
A4	7/25/11	14:40-15:40	26.8	16.8	451	102	444	1	296

Method Detection Limit		
Injection	Injection I.D.	Methane
		268 ppmv
		(AC)
1	fid-70.CHR	906
2	fid-71.CHR	908
3	fid-72.CHR	910
4	fid-80.CHR	879
5	fid-81.CHR	890
6	fid-82.CHR	893
7	fid-91.CHR	881
Average AC		895
St. Dev. AC		12.8
St. Dev. X 3.143		40.1
Cal. Slope		1.82
Cal. Intercept		0
MDL		**22.0**

Method Detection Limit		
Injection	Injection I.D.	Ethane
		271 ppmv
		(AC)
1	fid-70.CHR	1,702
2	fid-71.CHR	1,707
3	fid-72.CHR	1,712
4	fid-80.CHR	1,653
5	fid-81.CHR	1,672
6	fid-82.CHR	1,684
7	fid-91.CHR	1,666
Average AC		1,685
St. Dev. AC		22.6
St. Dev. X 3.143		70.9
Cal. Slope		3.40
Cal. Intercept		0
MDL		**20.9**

BP-Husky DCU3 Vent
Refinery ICR
GC/FID
Sample Analysis Times

Run No.	Sample I.D.	Sampling		Anaylsis		Holding Time (hh:mm)
		Date	Time (hh:mm)	Date	Time (hh:mm)	
A2	BP-WV-A2-M18b-BagB	7/24/11	20:58-22:40	7/24/11	23:45	1:05
A3	BP-WV-A3-M18b-BagB	7/24/11	19:55-21:25	7/25/11	01:05	3:40
A4	BP-WV-A4-M18b-BagB	7/25/11	14:40-15:40	7/25/11	18:39	2:59
A4	BP-WV-A4-M18b-BagB (Spike)	7/25/11	20:30	7/26/11	14:31	18:01

URS Data Printouts

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/24-26/11
Base Injection Volume (uL) **2050**

Analyte		**methane**	**ethane**
Cal. Gas Concentration (ppmv)		**1000**	**1010**
Pre-Test Calibration **Data and Time** **Injection ID** **Injection Volume (uL)**			
7/25/2011 16:41:31 PM	AC	503	944
fid-67.CHR	Cal. Gas Conc. (ppmv)	268	271
550	RF	1093	588
	ppmv	277	278
7/25/2011 16:49:13 PM	AC	500	941
fid-68.CHR	Cal. Gas Conc. (ppmv)	268	271
550	RF	1100	590
	ppmv	275	277
7/25/2011 16:53:36 PM	AC	504	947
fid-69.CHR	Cal. Gas Conc. (ppmv)	268	271
550	RF	1091	586
	ppmv	277	279
Level 1	Average AC	502	944
Cal. Summary	Average ppmv	276	278
7/25/2011 17:01:40 PM	AC	906	1702
fid-70.CHR	Cal. Gas Conc. (ppmv)	512	517
1050	RF	1160	623
	ppmv	498	501
7/25/2011 17:05:32 PM	AC	908	1707
fid-71.CHR	Cal. Gas Conc. (ppmv)	512	517
1050	RF	1156	621
	ppmv	499	502
7/25/2011 17:11:25 PM	AC	910	1712
fid-72.CHR	Cal. Gas Conc. (ppmv)	512	517
1050	RF	1154	619
	ppmv	500	504
Level 2	Average AC	908	1707
Cal. Summary	Average ppmv	499	502
7/25/2011 17:19:41 PM	AC	1824	3440
fid-73.CHR	Cal. Gas Conc. (ppmv)	1000	1010
2050	RF	1124	602
	ppmv	1003	1012
7/25/2011 17:34:32 PM	AC	1833	3459
fid-75.CHR	Cal. Gas Conc. (ppmv)	1000	1010
2050	RF	1118	599
	ppmv	1008	1018
7/25/2011 17:40:51 PM	AC	1825	3462
fid-76.CHR	Cal. Gas Conc. (ppmv)	1000	1010
2050	RF	1123	598
	ppmv	1004	1018
Level 3	Average AC	1827	3454
Cal. Summary	Average ppmv	1005	1016
Calibration Curve		**Cal. Gas Conc. (ppmv)**	
	Zero	0	0
	Level 1	268	271
	Level 2	512	517
	Level 3	1000	1010
		Average AC	
	Zero	0	0
	Level 1	502	944
	Level 2	908	1707
	Level 3	1827	3454
Calculated with Excel			
	Slope	1.82	3.41
	Intercept	-0.721	-5.17
	r2	1.00	0.999
Calculated with PeakSimple	**Slope**	1.82	3.40
(forced zero intercept)	**Intercept**	0	0

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/24-26/11
Base Injection Volume (uL) **2050**

Analyte		methane	ethane
Cal. Gas Concentration (ppmv)		1000	1010
Sample Analyses			
Date and Time			
Injection ID			
Sample ID			
Injection Volume (uL)			
Dilution Factor			
7/24/2011 22:34:32 PM	AC	329	64.5
fid-47.CHR	ppmv	181	19.0
BP-WV-A2-M18b-BagB			
2050			
1			
7/24/2011 23:18:11 PM	AC	299	62.5
fid-48.chr	ppmv	164	18.4
BP-WV-A2-M18b-BagB			
2050			
1			
7/24/2011 23:45:07 PM	AC	297	61.2
fid-49.chr	ppmv	163	18.0
BP-WV-A2-M18b-BagB			
2050			
1			
7/25/2011 '00:26:39 AM	AC	1105	234
fid-51.CHR	ppmv	1186	134
BP-WV-A3-M18b-BagB			
1050			
1			
7/25/2011 '00:46:23 AM	AC	1108	234
fid-52.chr	ppmv	1189	135
BP-WV-A3-M18b-BagB			
1050			
1			
07/25/11 01:05 AM	AC	1104	233
fid-53.CHR	ppmv	1185	134
BP-WV-A3-M18b-BagB			
1050			
1			
7/25/2011 17:46:05 PM	AC	298	92.8
fid-77.CHR	ppmv	164	27.3
BP-WV-A4-M18b-BagB			
2050			
1			
7/25/2011 18:11:04 PM	AC	293	91.3
fid-78.CHR	ppmv	161	26.8
BP-WV-A4-M18b-BagB			
2050			
1			
7/25/2011 18:39:25 PM	AC	285	89.3
fid-79.CHR	ppmv	157	26.3
BP-WV-A4-M18b-BagB			
2050			
1			

Post-Test Calibration			
Date and Time			
Injection ID			
Calibration Gas			
Injection Volume (uL)			
Dilution Factor			
7/25/2011 19:19:36 PM	AC	879	1653
fid-80.CHR	ppmv	483	486
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	96.9	96.8
1050	Cal. Gas Conc. (ppmv)	512	517
1			
7/25/2011 19:31:11 PM	AC	890	1672
fid-81.CHR	ppmv	489	492
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	98.0	98.0
1050	Cal. Gas Conc. (ppmv)	512	517
1			
7/25/2011 19:35:43 PM	AC	893	1684
fid-82.CHR	ppmv	491	496
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	98.4	98.7
1050	Cal. Gas Conc. (ppmv)	512	517
1			

BP-Husky DCU3 Vent
Refinery ICR Source Test
GC/FID Results
Runs A2/A3/A4

Project: BP-Husky DCU3 Vent
Location: Oregon, OH
Date: 7/24-26/11
Base Injection Volume (uL) **2050**

Analyte		**methane**	**ethane**
Cal. Gas Concentration (ppmv)		**1000**	**1010**
Recovery Study Analyses			
Date and Time			
Injection ID			
Sample ID			
Injection Volume (uL)			
Dilution Factor			
7/26/2011 13:32:41 PM	AC	419	387
fid-88.CHR	ppmv	230	114
BP-WV-A4-M18b-BagB (Spike)			
2050			
1			
7/26/2011 14:02:32 PM	AC	410	379
fid-89.CHR	ppmv	225	111
BP-WV-A4-M18b-BagB (Spike)			
2050			
1			
7/26/2011 14:30:47 PM	AC	411	379
fid-90.CHR	ppmv	226	112
BP-WV-A4-M18b-BagB (Spike)			
2050			
1			
Recovery Study Summary	Average AC	413	382
	Average ppm (post-spike)	227	112
	Average ppmv (pre-spike)	161	26.8
	Average ppmv (all samples)	506	59.9
	Theoretical spike ppmv	83.3	84.2
	Spike/All Samples (%)	16.5	141
	Recovery (%)	79.8	102
Post-Test Calibration			
Date and Time			
Injection ID			
Calibration Gas			
Injection Volume (uL)			
Dilution Factor			
7/26/2011 15:09:08 PM	AC	881	1666
fid-91.CHR	ppmv	484	490
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	97.0	97.6
1050	Cal. Gas Conc. (ppmv)	512	517
1			
7/26/2011 15:13:13 PM	AC	883	1671
fid-92.CHR	ppmv	486	492
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	97.3	97.9
1050	Cal. Gas Conc. (ppmv)	512	517
1			
7/26/2011 15:19:32 PM	AC	889	1680
fid-93.CHR	ppmv	489	494
1,000 ppm methane/1,010 ppm ethane	Recovery (%)	97.9	98.4
1050	Cal. Gas Conc. (ppmv)	512	517
1			

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	388.8628	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6	07/25/11 12:30 PM	388.8628	700.9294	1084.9724	1465.4417	1948.2123	2956.2828
C2	1.068	700.9294	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6	fid-57.CHR						
C3	2.305	1084.9724	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.588	1465.4417	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6							
C5	6.988	1948.2123	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6							
C6	9.45	2956.2828	0.00	ppm	07/25/11 12:30 PM	fid-57.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	385.5910	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6	7/25/2011 14:09:15 F	385.5910	695.4339	1079.1805	1454.9037	1923.9256	2898.4136
C2	1.07	695.4339	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6	fid-58.CHR						
C3	2.305	1079.1805	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.586	1454.9037	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6							
C5	6.985	1923.9256	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6							
C6	9.443	2898.4136	0	ppm	7/25/2011 14:09:15 PM	fid-58.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.678	385.3416	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6	7/25/2011 14:23:23 F	385.3416	693.1550	1073.9016	1448.3380	1913.7079	2880.8226
C2	1.065	693.1550	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6	fid-59.CHR						
C3	2.296	1073.9016	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.576	1448.3380	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6							
C5	6.975	1913.7079	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6							
C6	9.43	2880.8226	0	ppm	7/25/2011 14:23:23 PM	fid-59.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.648	211.1366	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6	7/25/2011 14:40:50 F	211.1366	379.0268	589.2969	799.7612	1088.2546	1838.4828
C2	1.035	379.0268	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6	fid-60.CHR						
C3	2.28	589.2969	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6	0.55 ml 50 ppm C1-C6						
C4	4.576	799.7612	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6							
C5	6.98	1088.2546	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6							
C6	9.435	1838.4828	0.00	ppm	7/25/2011 14:40:50 PM	fid-60.CHR	0.55 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.646	210.0458	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	7/25/2011 14:55:56 F	210.0458	376.8724	585.2643	793.5447	1067.8346	1771.5814
C2	1.033	376.8724	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	fid-61.CHR						
C3	2.276	585.2643	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	0.55 ml 50 ppm C1-C6						
C4	4.571	793.5447	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							
C5	6.975	1067.8346	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							
C6	9.428	1771.5814	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.646	210.0458	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	7/25/2011 14:55:56 F	210.0458	376.8724	585.2643	793.5447	1067.8346	1771.5814
C2	1.033	376.8724	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	fid-61.CHR						
C3	2.276	585.2643	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6	0.55 ml 50 ppm C1-C6						
C4	4.571	793.5447	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							
C5	6.975	1067.8346	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							
C6	9.428	1771.5814	0.00	ppm	7/25/2011 14:55:56 PM	fid-61.CHR	0.55 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.746	743.9638	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6	7/25/2011 15:29:42 F	743.9638	1344.9808	2087.7494	2801.5273	3591.6164	4827.4007
C2	1.128	1344.9808	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6	fid-62.CHR						
C3	2.341	2087.7494	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6	2.05 ml 50 ppm C1-C6						
C4	4.596	2801.5273	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6							
C5	6.983	3591.6164	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6							
C6	9.435	4827.4007	0.00	ppm	7/25/2011 15:29:42 PM	fid-62.CHR	2.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.748	745.5210	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6	7/25/2011 15:45:27 F	745.5210	1347.2832	2087.9338	2805.3552	3592.8434	4684.7365
C2	1.128	1347.2832	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6	fid-63.CHR						
C3	2.34	2087.9338	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6	2.05 ml 50 ppm C1-C6						
C4	4.593	2805.3552	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6							
C5	6.981	3592.8434	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6							
C6	9.431	4684.7365	0.00	ppm	7/25/2011 15:45:27 PM	fid-63.CHR	2.05 ml 50 ppm C1-C6							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.755	741.6040	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6	7/25/2011 16:02:26 F	741.6040	1338.4158	2076.3633	2787.0178	3573.7903	4679.5320
C2	1.133	1338.4158	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6	fid-64.CHR						
C3	2.343	2076.3633	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6	2.05 ml 50 ppm C1-C6						
C4	4.595	2787.0178	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6							
C5	6.981	3573.7903	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6							
C6	9.433	4679.5320	0.00	ppm	7/25/2011 16:02:26 PM	fid-64.CHR	2.05 ml 50 ppm C1-C6							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.753	735.4670	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6	7/25/2011 16:23:25 F	735.4670	1327.7212	2058.9389	2766.8970	3550.6389	4702.9178
C2	1.133	1327.7212	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6	fid-65.CHR						
C3	2.345	2058.9389	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6	2.05 ml 50 ppm C1-C6						
C4	4.598	2766.8970	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6							
C5	6.986	3550.6389	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6							
C6	9.436	4702.9178	0.00	ppm	7/25/2011 16:23:25 PM	fid-65.CHR	2.05 ml 50 ppm C1-C6							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.65	503.0396	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME	7/25/2011 16:41:31 F	503.0396	944.0880	0.0000	0.0000	0.0000	0.0000
C2	1.035	944.0880	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME	fid-67.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME	0.55 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 16:41:31 PM	fid-67.CHR	0.55 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.65	499.8852	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME	7/25/2011 16:49:13 F	499.8852	940.7880	0.0000	0.0000	0.0000	0.0000
C2	1.036	940.7880	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME	fid-68.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME	0.55 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 16:49:13 PM	fid-68.CHR	0.55 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.648	503.9163	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME	7/25/2011 16:53:36 F	503.9163	947.4258	0.0000	0.0000	0.0000	0.0000
C2	1.035	947.4258	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME	fid-69.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME	0.55 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 16:53:36 PM	fid-69.CHR	0.55 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.678	905.5332	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME	7/25/2011 17:01:40 F	905.5332	1702.3096	0.0000	0.0000	0.0000	0.0000
C2	1.065	1702.3096	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME	fid-70.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 17:01:40 PM	fid-70.CHR	1.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	908.1410	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME	7/25/2011 17:05:32 F	908.1410	1706.5096	0.0000	0.0000	0.0000	0.0000
C2	1.066	1706.5096	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME	fid-71.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 17:05:32 PM	fid-71.CHR	1.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.68	910.1656	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME	7/25/2011 17:11:25 F	910.1656	1711.8646	0.0000	0.0000	0.0000	0.0000
C2	1.065	1711.8646	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME	fid-72.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME							

C6	0	0.0000	0.00	ppm	7/25/2011 17:11:25 PM	fid-72.CHR	1.05 ml 1000 ppm ME						

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample						
C1	0.753	1823.8928	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME	7/25/2011 17:19:41 F	1823.8928	3440.4594	0.0000	0.0000	0.0000	0.0000
C2	1.133	3440.4594	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME	fid-73.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME	2.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 17:19:41 PM	fid-73.CHR	2.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.755	1832.8568	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME	7/25/2011 17:34:32 F	1832.8568	3458.8550	0.0000	0.0000	0.0000	0.0000
C2	1.135	3458.8550	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME	fid-75.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME	2.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 17:34:32 PM	fid-75.CHR	2.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.761	1825.4554	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME	7/25/2011 17:40:51 F	1825.4554	3461.6206	0.0000	0.0000	0.0000	0.0000
C2	1.14	3461.6206	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME	fid-76.CHR						
C3	0	0.0000	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME	2.05 ml 1000 ppm ME						
C4	0	0.0000	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME							
C5	0	0.0000	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME							
C6	0	0.0000	0.00	ppm	7/25/2011 17:40:51 PM	fid-76.CHR	2.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.75	298.0232	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4	7/25/2011 17:46:05 F	298.0232	92.7605	129.5680	18.3705	6.9896	11.9803
C2	1.011	92.7605	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4	fid-77.CHR						
C3	2.341	129.5680	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4	2.05 ml run A4						
C4	4.446	18.3705	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4							
C5	6.996	6.9896	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4							
C6	9.428	11.9803	0.00	ppm	7/25/2011 17:46:05 PM	fid-77.CHR	2.05 ml run A4							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.748	292.8873	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4	7/25/2011 18:11:04 F	292.8873	91.2540	126.6128	17.8495	2.9048	3.3569
C2	1.013	91.2540	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4	fid-78.CHR						
C3	2.335	126.6128	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4	2.05 ml run A4						
C4	4.43	17.8495	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4							
C5	6.98	2.9048	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4							
C6	9.433	3.3569	0.00	ppm	7/25/2011 18:11:04 PM	fid-78.CHR	2.05 ml run A4							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.745	285.4163	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4	7/25/2011 18:39:25 F	285.4163	89.3310	123.5838	17.4169	2.7107	3.7100
C2	1.006	89.3310	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4	fid-79.CHR						
C3	2.335	123.5838	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4	2.05 ml run A4						
C4	4.43	17.4169	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4							
C5	6.98	2.7107	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4							
C6	9.441	3.7100	0	ppm	7/25/2011 18:39:25 PM	fid-79.CHR	2.05 ml run A4							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.676	879.4697	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME	7/25/2011 19:19:36 F	879.4697	1652.8250	0.0000	0.0000	0.0000	0.0000
C2	1.061	1652.8250	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME	fid-80.CHR						
C3	0	0.0000	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0	ppm	7/25/2011 19:19:36 PM	fid-80.CHR	1.05 ml 1000 ppm ME							

Compı	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.68	890.0570	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME	7/25/2011 19:31:11 F	890.0570	1672.2328	0.0000	0.0000	0.0000	0.0000
C2	1.065	1672.2328	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME	fid-81.CHR						
C3	0	0.0000	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME							

C5	0	0.0000	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0	ppm	7/25/2011 19:31:11 PM	fid-81.CHR	1.05 ml 1000 ppm ME							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.678	893.4814	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME	7/25/2011 19:35:43 F	893.4814	1684.4880	0.0000	0.0000	0.0000	0.0000
C2	1.063	1684.4880	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME	fid-82.CHR						
C3	0	0.0000	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0	ppm	7/25/2011 19:35:43 PM	fid-82.CHR	1.05 ml 1000 ppm ME							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.68	369.7816	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6	7/25/2011 19:40:04 F	369.7816	666.6182	1026.7406	1381.2794	1788.7609	2621.3426
C2	1.065	666.6182	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6	fid-83.CHR						
C3	2.301	1026.7406	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.585	1381.2794	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6							
C5	6.985	1788.7609	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6							
C6	9.44	2621.3426	0	ppm	7/25/2011 19:40:04 PM	fid-83.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.678	372.5242	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6	7/25/2011 19:53:56 F	372.5242	669.7028	1036.0956	1394.0026	1812.6994	2590.7337
C2	1.063	669.7028	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6	fid-84.CHR						
C3	2.296	1036.0956	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.576	1394.0026	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6							
C5	6.976	1812.6994	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6							
C6	9.43	2590.7337	0	ppm	7/25/2011 19:53:56 PM	fid-84.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.678	370.6784	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6	7/25/2011 20:07:36 F	370.6784	666.0666	1030.0824	1385.9406	1802.2612	2625.1698
C2	1.063	666.0666	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6	fid-85.CHR						
C3	2.296	1030.0824	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6	1.05 ml 50 ppm C1-C6						
C4	4.575	1385.9406	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6							
C5	6.975	1802.2612	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6							
C6	9.43	2625.1698	0	ppm	7/25/2011 20:07:36 PM	fid-85.CHR	1.05 ml 50 ppm C1-C6							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.751	418.6084	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)	7/26/2011 13:32:41 F	418.6084	386.6995	123.8941	22.1893	7.0974	6.1437
C2	1.016	386.6995	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)	fid-88.CHR						
C3	2.348	123.8941	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)	2.05 ml spiked bag (A4)						
C4	4.448	22.1893	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)							
C5	6.996	7.0974	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)							
C6	9.46	6.1437	0	ppm	7/26/2011 13:32:41 PM	fid-88.CHR	2.05 ml spiked bag (A4)							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.756	409.7794	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)	7/26/2011 14:02:32 F	409.7794	378.9753	122.1286	21.6106	7.1183	6.1854
C2	1.02	378.9753	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)	fid-89.CHR						
C3	2.353	122.1286	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)	2.05 ml spiked bag (A4)						
C4	4.445	21.6106	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)							
C5	7.005	7.1183	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)							
C6	9.47	6.1854	0	ppm	7/26/2011 14:02:32 PM	fid-89.CHR	2.05 ml spiked bag (A4)							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.748	410.7970	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)	7/26/2011 14:30:47 F	410.7970	379.4344	122.2882	21.2411	7.1118	6.0828
C2	1.016	379.4344	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)	fid-90.CHR						
C3	2.348	122.2882	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)	2.05 ml spiked bag (A4)						
C4	4.445	21.2411	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)							
C5	7.008	7.1118	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)							
C6	9.451	6.0828	0	ppm	7/26/2011 14:30:47 PM	fid-90.CHR	2.05 ml spiked bag (A4)							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	880.9792	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME	7/26/2011 15:09:08 F	880.9792	1665.6660	0.0000	0.0000	0.0000	0.0000
C2	1.07	1665.6660	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME	fid-91.CHR						
C3	0	0.0000	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						

C4	0	0.0000	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME
C5	0	0.0000	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME
C6	0	0.0000	0	ppm	7/26/2011 15:09:08 PM	fid-91.CHR	1.05 ml 1000 ppm ME

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	883.3978	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME	7/26/2011 15:13:13 F	883.3978	1670.8839	0.0000	0.0000	0.0000	0.0000
C2	1.07	1670.8839	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME	fid-92.CHR						
C3	0	0.0000	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						
C4	0	0.0000	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME							
C5	0	0.0000	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME							
C6	0	0.0000	0	ppm	7/26/2011 15:13:13 PM	fid-92.CHR	1.05 ml 1000 ppm ME							

Comp	Retent	Area	External	Units	Analysis date	Data file	Sample							
C1	0.681	888.8794	0	ppm	7/26/2011 15:19:32 PM	fid-93.CHR	1.05 ml 1000 ppm ME	7/26/2011 15:19:32 F	888.8794	1680.1763	0.0000	0.0000	0.0000	0.0000
C2	1.07	1680.1763	0	ppm	7/26/2011 15:19:32 PM	fid-93.CHR	1.05 ml 1000 ppm ME	fid-93.CHR						
C3	0	0.0000	0	ppm	7/26/2011 15:19:32 PM	fid-93.CHR	1.05 ml 1000 ppm ME	1.05 ml 1000 ppm ME						

Section K

Method 18 – VOC

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	

M308	THC1 Post Test	15.58	14.22	16.32
	THC2 Post Test	15.15	14.46	16.11
	Average Post Test	**15.37**	**14.34**	**16.22**

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

Bag Sampling

Laboratory Report

URS Corporation

9400 Amberglen Blvd
Austin, TX 78729

BP Husky Refining, LLC – DCU3
Toledo, OH

Project # 40942317

Analytical Report
(0711-08R2)

EPA Method 18 (Bags)
EPA Method 18 (Bag Condensate)

1,3-Butadiene, Acetonitrile, Acrolein, Acetone, Acrylonitrile, Pentane, Methylene chloride, Hexane, Benzene, Trichloroethene, Toluene, 1,2-Dibromoethane, Tetrachloroethene, and Carbon disulfide

EPA Method 18 (Adsorbents)

Acetonitrile, Acrylonitrile, Methyl t-butyl ether, 2-Nitropropane, Isooctane, Methyl isobutyl ketone, Chlorobenzene, Ethylbenzene, m/p-Xylene, Styrene, o-Xylene, Cumene, and Nitrobenzene

EPA Method 308

Methanol

Enthalpy Analytical, Inc.

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road, Durham, NC 27703 – 5518
800-1 Capitola Drive, Durham, NC 27713

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 971 pages.

Valgena Respass

QA Review Performed by – Valgena Respass

Report Issued: 09/23/2011

Summary of Results

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

Compound	Sample ID / Adjusted Concentration (ppm)		
	BP-WV-A2-M18b-BagA	***BP-WV-A3-M18-Bag***	***BP-WV-A4-M18-Bag***
1,3-Butadiene	0.253 ND	0.253 ND	0.253 ND
Acetonitrile**	1.12 ND	1.12 ND	1.12 ND
Acrolein	0.344 ND	0.344 ND	0.344 ND
Acetone	0.409 ND	0.409 ND	0.409 ND
Acrylonitrile**	0.319 ND	0.319 ND	0.319 ND
Pentane**	0.257 ND	0.313 J	0.269 J
Methylene chloride	0.959 ND	0.959 ND	4.17
Hexane	0.231 ND	0.231 ND	0.252 J
Benzene	0.268 ND	1.72 J	0.268 ND
Trichloroethene	0.379 ND	0.379 ND	0.379 ND
Toluene	0.334 ND	6.13 J	0.910 J
1,2 Dibromoethane**	0.257 ND	0.257 ND	0.257 ND
Tetrachloroethene**	0.291 ND	0.291 ND	0.291 ND

Results have not been adjusted

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

Compound	Sample ID / Catch Weight (ug)
	BP-WV-A2-M18b-BagACond
1,3-Butadiene	12.8 ND
Pentane	20.1 ND
Acrolein	12.8 ND
Acetone	7.6 ND
Dichloromethane	22.2 ND
Hexane	9.2 ND
Benzene	10.9 ND
Trichloroethylene	12.4 ND
Toluene	21.4 ND
Tetrachloroethylene	58.9 ND
1,2-Dibromoethane	29.7 ND

Results

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.282 (ppm)
LOQ 2.57 (ppm)
Compound 1,3-Butadiene

Lower Curve Limit 2.57 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.282	0.282	0.282	0.0	0.282	1	112	0.253	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.282	0.282	0.282	0.0	0.282	1	112	0.253	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.282	0.282	0.282	0.0	0.282	1	112	0.253	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.282	0.282	0.282	0.0	0.282	1	100	0.282	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	2.62	2.62	2.62	0.1	7.84	7.99	7.85	1.2	7.89	1	100	7.89	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	2.62	2.62	2.62	0.1	96.9	96.5	96.8	0.2	96.7	1	100	96.7	
																102.8	
																94.1%	

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 1.12 (ppm)
LOQ 4.85 (ppm)
Compound Acetonitrile

Lower Curve Limit 4.85 (ppm)
Upper Curve Limit 250 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	1.12	1.12	1.12	0.0	1.12	1	1.12	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	1.12	1.12	1.12	0.0	1.12	1	1.12	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	1.12	1.12	1.12	0.0	1.12	1	1.12	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	1.12	1.12	1.12	0.0	1.12	1	1.12	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	NA	NA	NA	NA	1.12	1.12	1.12	0.0	1.12	1	1.12	ND

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 0.283 (ppm)
LOQ 2.57 (ppm)
Compound Acrolein

Lower Curve Limit 2.57 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.283	0.283	0.283	0.0	0.283	1	82.3	0.344	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.283	0.283	0.283	0.0	0.283	1	82.3	0.344	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.283	0.283	0.283	0.0	0.283	1	82.3	0.344	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.283	0.283	0.283	0.0	0.283	1	100	0.283	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	3.59	3.59	3.59	0.0	5.59	5.99	5.64	4.3	5.74	1	100	5.74	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	3.59	3.59	3.59	0.0	92.4	92.3	92.4	0.0	92.4	1	100	92.4	
																102.8	
																89.8%	

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 0.415 (ppm)
LOQ 4.99 (ppm)
Compound Acetone

Lower Curve Limit 4.99 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.415	0.415	0.415	0.0	0.415	1	101	0.409	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.415	0.415	0.415	0.0	0.415	1	101	0.409	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.415	0.415	0.415	0.0	0.415	1	101	0.409	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.415	0.415	0.415	0.0	0.415	1	100	0.415	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	3.70	3.70	3.70	0.1	6.90	7.28	6.79	4.1	6.99	1	100	6.99	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	3.70	3.70	3.70	0.0	93.4	93.6	93.3	0.2	93.4	1	100	93.4	
																102.8	
																90.9%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.319 (ppm)
LOQ 4.97 (ppm)
Compound Acrylonitrile

Lower Curve Limit 4.97 (ppm)
Upper Curve Limit 256 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.319	0.319	0.319	0.0	0.319	1	0.319	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.319	0.319	0.319	0.0	0.319	1	0.319	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.319	0.319	0.319	0.0	0.319	1	0.319	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.319	0.319	0.319	0.0	0.319	1	0.319	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	NA	NA	NA	NA	0.319	0.319	0.319	0.0	0.319	1	0.319	ND
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	4.11	4.11	4.11	0.0	86.1	86.0	86.0	0.1	86.0	1	86.0	
															102.4	
															84.0%	

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 0.257 (ppm)
LOQ 2.57 (ppm)
Compound Pentane

Lower Curve Limit 2.57 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	4.19	4.20	4.20	0.2	0.316	0.321	0.301	3.7	0.313	1	0.313	J
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	4.18	NA	0.257	0.257	0.294	9.1	0.269	1	0.269	J
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	4.19	4.20	4.189	0.239	0.413	0.399	0.269	25.4	0.360	1	0.360	J
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	4.19	4.19	4.19	0.0	97.6	97.6	97.8	0.2	97.7	1	97.7	
															102.8	
															95.0%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.958 (ppm)
LOQ 2.57 (ppm)
Compound Methylene chloride

Lower Curve Limit 2.57 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.958	0.958	0.958	0.0	0.958	1	100	0.959	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.958	0.958	0.958	0.0	0.958	1	100	0.959	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	4.55	4.52	4.49	1.3	4.04	4.32	4.14	3.6	4.17	1	100	4.17	
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.958	0.958	0.958	0.0	0.958	1	100	0.958	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	4.50	4.50	4.50	0.1	7.10	6.91	6.84	2.2	6.95	1	100	6.95	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	4.51	4.51	4.50	0.0	96.1	96.6	96.7	0.3	96.4	1	100	96.4	
																102.8	
																93.8%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.259 (ppm)
LOQ 2.57 (ppm)
Compound Hexane

Lower Curve Limit 2.57 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.259	0.259	0.259	0.0	0.259	1	112	0.231	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.259	0.259	0.259	0.0	0.259	1	112	0.231	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	5.77	NA	NA	NA	0.331	0.259	0.259	16.9	0.283	1	112	0.252	J
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.259	0.259	0.259	0.0	0.259	1	100	0.259	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	5.78	5.78	5.78	0.0	7.83	7.87	7.77	0.7	7.82	1	100	7.82	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	5.78	5.78	5.78	0.0	98.2	98.4	97.6	0.5	98.1	1	100	98.1	
																102.8	
																95.4%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.256 (ppm)
LOQ 2.56 (ppm)
Compound Benzene

Lower Curve Limit 2.56 (ppm)
Upper Curve Limit 256 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.256	0.256	0.256	0.0	0.256	1	95.4	0.268	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	6.50	6.50	6.50	0.0	1.64	1.58	1.69	3.4	1.64	1	95.4	1.72	J
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.256	0.256	0.256	0.0	0.256	1	95.4	0.268	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.256	0.256	0.256	0.0	0.256	1	100	0.256	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	6.49	6.49	6.49	0.0	8.37	8.31	8.27	0.7	8.32	1	100	8.32	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	6.50	6.50	6.50	0.0	97.2	97.1	97.4	0.2	97.2	1	100	97.2	
																102.4	
																94.9%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.401 (ppm)
LOQ 4.97 (ppm)
Compound Trichloroethene

Lower Curve Limit 4.97 (ppm)
Upper Curve Limit 256 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.401	0.401	0.401	0.0	0.401	1	106	0.379	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.401	0.401	0.401	0.0	0.401	1	106	0.379	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.401	0.401	0.401	0.0	0.401	1	106	0.379	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.401	0.401	0.401	0.0	0.401	1	100	0.401	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	6.89	6.89	6.89	0.0	7.54	7.48	7.37	1.2	7.46	1	100	7.46	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	6.89	6.89	6.89	0.0	93.9	93.8	93.9	0.1	93.9	1	100	93.9	
																102.4	
																91.7%	

Company	URS Corp - Austin
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 bags

MDL 0.256 (ppm)
LOQ 4.97 (ppm)
Compound Toluene

Lower Curve Limit 4.97 (ppm)
Upper Curve Limit 256 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Rec Eff (%)	Adj Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.256	0.256	0.256	0.0	0.256	1	76.6	0.334	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	7.57	7.57	7.57	0.0	4.78	4.73	4.58	2.4	4.70	1	76.6	6.13	J
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	7.56	7.56	7.56	0.0	0.743	0.667	0.682	6.5	0.697	1	76.6	0.910	J
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.256	0.256	0.256	0.0	0.256	1	100	0.256	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	7.56	7.56	7.56	0.0	10.1	10.0	10.0	0.7	10.0	1	100	10.0	
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	7.57	7.56	7.56	0.0	93.1	92.9	93.1	0.2	93.0	1	100	93.0	
																102.4	
																90.8%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.257 (ppm)
LOQ 4.99 (ppm)
Compound 1,2 Dibromoethane

Lower Curve Limit 4.99 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	0.257	ND
gc119p176 #I4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	7.84	7.84	7.84	0.0	90.7	90.4	90.5	0.2	90.6	1	90.6	
															102.8	
															88.1%	

Company URS Corp - Austin
Analyst MGM
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 3 bags

MDL 0.291 (ppm)
LOQ 4.99 (ppm)
Compound Tetrachloroethene

Lower Curve Limit 4.99 (ppm)
Upper Curve Limit 257 (ppm)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ppm)	Conc # 2 (ppm)	Conc # 3 (ppm)	% Diff Conc	Avg Conc (ppm)	DF	Sample Conc (ppm)	Qual
BP-WV-A2-M18b-BagA	023B0401.D	023B0402.D	023B0403.D	GC114P165.M	NA	NA	NA	NA	0.291	0.291	0.291	0.0	0.291	1	0.291	ND
BP-WV-A3-M18-Bag	020B0301.D	020B0302.D	020B0303.D	GC114P165.M	NA	NA	NA	NA	0.291	0.291	0.291	0.0	0.291	1	0.291	ND
BP-WV-A4-M18-Bag	018B0701.D	018B0702.D	018B0703.D	GC114P165.M	NA	NA	NA	NA	0.291	0.291	0.291	0.0	0.291	1	0.291	ND
N2 Blank	017B1301.D	017B1302.D	017B1303.D	GC114P165.M	NA	NA	NA	NA	0.291	0.291	0.291	0.0	0.291	1	0.291	ND
BP-WV-A3-M18-Bag S&R	019B0801.D	019B0802.D	019B0803.D	GC114P165.M	NA	NA	NA	NA	0.291	0.291	0.291	0.0	0.291	1	0.291	ND
gc119p176 #l4 LCS	026B1401.D	026B1402.D	026B1403.D	GC114P165.M	7.98	7.98	7.98	0.0	93.6	93.4	93.7	0.2	93.5	1	93.5	
															102.8	
															91.0%	

v 2.13 Validated by MSS 4/14/11

Company	URS Corp - Austin
Analyst	MGM
Parameters	Bag Spike & Recovery

Client #	40942317
Job #	0711-08
Unspiked Sample ID	BP-WV-A3-M18-Bag

% Recovery = (T - U) / S x 100

T = after spike concentration U = before spike concentration S = theoretical spike concentration

	1-3 Butadiene			Acrolein			Acetone		
	MW 54.090			MW 56.063			MW 58.079		
What was the conc of the bag before spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
U' (before spiking)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Avg ppm	0.00		Avg ppm	0.00		Avg ppm	0.00	
What was added to the bag?									
	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #1	0	0		0	0		0	0	
uL Added	0			0			0		
	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #2	0	0		0	0		0	0	
uL Added	0			0			0		
	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #3	0	0		0	0		0	0	
uL Added	0			0			0		
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #1	508	29.76	66.5	501	29.76	66.5	495	29.76	66.5
Volume Added (mL)	40.0	Total ug	45.6	40.0	Total ug	46.6	40.0	Total ug	47.7
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #2	0	29.76	66.5	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0	0	Total ug	0.0
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #3	0	29.76	66.5	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0	0	Total ug	0.0
Total Vol (mL) vaporized	0.0			0.0			0.0		
Total Vol (mL) added as gas	40.0			40.0			40.0		
Other volume (mL) Added	0			0			0		

What volume was in the bag before spiking?

Wedge Volume 2.826 (L)

Total Vol. After Spiking 2,866 (mL)

Sampled	7/24/11 12:00 AM		Hours
		Delta	59:06:00
Analyzed	7/26/11 11:06 AM		
Spiked	7/27/11 9:31 AM		Hours
		Delta	61:27:00
Spike Analyzed	7/29/11 10:58 PM		
Spike hold equal to or greater than original hold			YES

	1-3 Butadiene	Acrolein	Acetone
Ending Volume in Bag (mL)	2,866		
Original volume in the bag (mL)	2,826	2,826	2,826
Total volume added (mL)	40	40	40
Dilution Factor caused by addition	1.01	1.01	1.01
Dilution Adjusted Base Conc (ppm) "U"	0.00	0.00	0.00
Theoretical Spike Conc (ppm) "S"	7.07	6.97	6.89

	1-3 Butadiene			Acrolein			Acetone		
What was the conc of the bag after spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
	7.84	7.99	7.85	5.59	5.99	5.64	6.90	7.28	6.79
Final Concentration (ppm) "T"	Avg ppm	7.89		Avg ppm	5.74		Avg ppm	6.99	
RECOVERY %		112 %			82.3 %			101 %	

v 2.13 Validated by MSS 4/14/11

Company	URS Corp - Austin
Analyst	MGM
Parameters	Bag Spike & Recovery

Client #	40942317
Job #	0711-08
Unspiked Sample ID	BP-WV-A3-M18-Bag

% Recovery = (T - U) / S x 100

T = after spike concentration U = before spike concentration S = theoretical spike concentration

	Methylene chloride MW 84.933			Hexane MW 86.177			Benzene MW 78.113		
What was the conc of the bag before spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
U' (before spiking)	0.00	0.00	0.00	0.00	0.00	0.00	1.64	1.58	1.69
	Avg ppm	0.00		Avg ppm	0.00		Avg ppm	1.64	
What was added to the bag?									
Liquid Spike #1	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
	0	0		0	0		0	0	
uL Added	0			0			0		
Liquid Spike #2	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
	0	0		0	0		0	0	
uL Added	0			0			0		
Liquid Spike #3	ug/mL	Total ug		ug/mL	Total ug		ug/mL	Total ug	
	0	0		0	0		0	0	
uL Added	0			0			0		
Gas Spike #1	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
	500	29.76	66.5	501	29.76	66.5	505	29.76	66.5
Volume Added (mL)	40.0	Total ug	70.4	40.0	Total ug	71.6	40.0	Total ug	65.4
Gas Spike #2	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
	0	29.76	66.5	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0	0	Total ug	0.0
Gas Spike #3	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
	0	29.76	66.5	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0	0	Total ug	0.0
Total Vol (mL) vaporized	0.0			0.0			0.0		
Total Vol (mL) added as gas	40.0			40.0			40.0		
Other volume (mL) Added	0			0			0		

What volume was in the bag before spiking?

Wedge Volume	2,826	(L)	Sampled	6/9/11 1:12 PM	Delta	Hours 59:06:00	
			Analyzed	6/13/11 1:42 PM			
			Spiked	6/15/11 1:30 PM	Delta	Hours 61:27:00	
			Spike Analyzed	7/29/11 10:58 PM			
Total Vol. After Spiking	2,866	(mL)	Spike hold equal to or greater than original hold				YES

		Methylene chloride	Hexane	Benzene
Ending Volume in Bag (mL)	2,866			
Original volume in the bag (mL)		2,826	2,826	2,826
Total volume added (mL)		40.0	40.0	40.0
Dilution Factor caused by addition		1.01	1.01	1.01
Dilution Adjusted Base Conc (ppm) "U"		0.00	0.00	1.61
Theoretical Spike Conc (ppm) "S"		6.96	6.97	7.03

	Methylene chloride			Hexane			Benzene		
What was the conc of the bag after spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
	7.10	6.91	6.84	7.83	7.87	7.77	8.37	8.31	8.27
Final Concentration (ppm) "T"	Avg ppm	6.95		Avg ppm	7.82		Avg ppm	8.32	
RECOVERY %		100 %			112 %			95.4 %	

v 2.13 Validated by MSS 4/14/11

Company	URS Corp - Austin
Analyst	MGM
Parameters	Bag Spike & Recovery

Client #	40942317
Job #	0711-08
Unspiked Sample ID	BP-WV-A3-M18-Bag

% Recovery = (T - U) / S x 100

T = after spike concentration

U = before spike concentration

S = theoretical spike concentration

	Trichloroethene MW 131.388			Toluene MW 92.140		
What was the conc of the bag before spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
U' (before spiking)	0.00	0.00	0.00	4.78	4.73	4.58
	Avg ppm	0.00		Avg ppm	4.70	
What was added to the bag?						
	ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #1	0	0		0	0	
uL Added	0			0		
	ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #2	0	0		0	0	
uL Added	0			0		
	ug/mL	Total ug		ug/mL	Total ug	
Liquid Spike #3	0	0		0	0	
uL Added	0			0		
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #1	507	29.76	66.5	508	29.76	66.5
Volume Added (mL)	40.0	Total ug	110.4	40.0	Total ug	77.6
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #2	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0
	Conc. ppm	Pbar (inHg)	T (F)	Conc. ppm	Pbar (inHg)	T (F)
Gas Spike #3	0	29.76	66.5	0	29.76	66.5
Volume Added (mL)	0	Total ug	0.0	0	Total ug	0.0
Total Vol (mL) vaporized	0.0			0.0		
Total Vol (mL) added as gas	40.0			40.0		
Other volume (mL) Added	0			0		

What volume was in the bag before spiking?

Wedge Volume 2.826 (L)

Total Vol. After Spiking 2,866 (mL)

Sampled	7/24/11 12:00 AM	Delta	Hours 59:06:00
Analyzed	7/26/11 11:06 AM		
Spiked	7/27/11 9:31 AM	Delta	Hours 61:27:00
Spike Analyzed	7/29/11 10:58 PM		
Spike hold equal to or greater than original hold			YES

	Trichloroethene	Toluene
Ending Volume in Bag (mL)	2,866	
Original volume in the bag (mL)	2,826	2,826
Total volume added (mL)	40.0	40.0
Dilution Factor caused by addition	1.01	1.01
Dilution Adjusted Base Conc (ppm) "U"	0.00	4.63
Theoretical Spike Conc (ppm) "S"	**7.06**	**7.07**

What was the conc of the bag after spiking?	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)	Inj 1 (ppm)	Inj 2 (ppm)	Inj 3 (ppm)
	7.54	7.48	7.37	10.1	10.0	10.0
Final Concentration (ppm) "T"	Avg ppm	7.46		Avg ppm	10.0	
RECOVERY %		106	%		76.6	%

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.301 (ug/mL)
LOQ 2.20 (ug/mL)
Compound 1,3-Butadiene

Lower Curve Limit 2.20 (ug/mL)
Upper Curve Limit 183 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.301	0.301	0.301	0.0	0.301	1	42.5	12.8	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	4.46	4.46	4.46	0.0	8.05	8.43	8.70	4.1	8.39	1	2.14	18.0	
															Spike Amount (ug)	22.0	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	81.6%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.301	0.301	0.301	0.0	0.301	1	1.00	0.301	ND

Company URS Corp - Austin
Analyst JBB
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 1

MDL 0.473 (ug/mL)
LOQ 1.25 (ug/mL)
Compound Pentane

Lower Curve Limit 1.25 (ug/mL)
Upper Curve Limit 104 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.473	0.473	0.473	0.0	0.473	1	42.5	20.1	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	5.47	5.47	5.47	0.0	5.51	5.29	5.45	2.3	5.42	1	2.14	11.6	
															Spike Amount (ug)	12.5	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	92.8%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.473	0.473	0.473	0.0	0.473	1	1.00	0.473	ND

Company URS Corp - Austin
Analyst JBB
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 1

MDL 0.300 (ug/mL)
LOQ 1.65 (ug/mL)
Compound Acrolein

Lower Curve Limit 1.65 (ug/mL)
Upper Curve Limit 138 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.300	0.300	0.300	0.0	0.300	1	42.5	12.8	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	6.00	6.00	6.00	0.0	6.55	7.06	7.03	4.8	6.88	1	2.14	14.7	
															Spike Amount (ug)	16.5	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	89.1%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.300	0.300	0.300	0.0	0.300	1	1.00	0.300	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.178 (ug/mL)
LOQ 1.58 (ug/mL)
Compound Acetone

Lower Curve Limit 1.58 (ug/mL)
Upper Curve Limit 132 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.178	0.178	0.178	0.0	0.178	1	42.5	7.57	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	6.16	6.16	6.16	0.0	6.15	5.62	5.76	5.3	5.84	1	2.14	12.5	
															Spike Amount (ug)	15.8	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	79.2%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.178	0.178	0.178	0.0	0.178	1	1.00	0.178	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.522 (ug/mL)
LOQ 2.64 (ug/mL)
Compound Dichloromethane

Lower Curve Limit 2.64 (ug/mL)
Upper Curve Limit 221 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.522	0.522	0.522	0.0	0.522	1	42.5	22.2	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	6.59	6.59	6.59	0.0	12.2	12.2	12.3	0.9	12.2	1	2.14	26.2	
															Spike Amount (ug)	26.5	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	98.7%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.522	0.522	0.522	0.0	0.522	1	1.00	0.522	ND

Company URS Corp - Austin
Analyst JBB
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 1

MDL 0.216 (ug/mL)
LOQ 1.31 (ug/mL)
Compound Hexane

Lower Curve Limit 1.31 (ug/mL)
Upper Curve Limit 109 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.216	0.216	0.216	0.0	0.216	1	42.5	9.18	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	6.95	6.95	6.95	0.0	3.38	3.34	3.35	0.9	3.36	1	2.14	7.18	
															Spike Amount (ug)	13.1	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	54.8%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.216	0.216	0.216	0.0	0.216	1	1.00	0.216	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.257 (ug/mL)
LOQ 1.74 (ug/mL)
Compound Benzene

Lower Curve Limit 1.74 (ug/mL)
Upper Curve Limit 146 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	42.5	10.9	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	8.41	8.41	8.41	0.0	8.54	8.46	8.65	1.1	8.55	1	2.14	18.3	
															Spike Amount (ug)	17.5	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	105%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.257	0.257	0.257	0.0	0.257	1	1.00	0.257	ND

Company URS Corp - Austin
Analyst JBB
Parameters EPA Method 18

Client # 40942317
Job # 0711-08
Samples 1

MDL 0.292 (ug/mL)
LOQ 2.92 (ug/mL)
Compound Trichloroethylene

Lower Curve Limit 2.92 (ug/mL)
Upper Curve Limit 244 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.292	0.292	0.292	0.0	0.292	1	42.5	12.4	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	8.88	8.88	8.88	0.0	13.8	13.6	13.9	1.3	13.8	1	2.14	29.4	
															Spike Amount (ug)	29.3	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	101%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.292	0.292	0.292	0.0	0.292	1	1.00	0.292	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.504 (ug/mL)
LOQ 1.72 (ug/mL)
Compound Toluene

Lower Curve Limit 1.72 (ug/mL)
Upper Curve Limit 144 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.504	0.504	0.504	0.0	0.504	1	42.5	21.4	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	9.86	9.86	9.86	0.0	7.65	7.61	7.87	2.1	7.71	1	2.14	16.5	
															Spike Amount (ug)	17.3	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	95.6%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.504	0.504	0.504	0.0	0.504	1	1.00	0.504	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 1.39 (ug/mL)
LOQ 3.22 (ug/mL)
Compound Tetrachloroethylene

Lower Curve Limit 3.22 (ug/mL)
Upper Curve Limit 269 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	1.39	1.39	1.39	0.0	1.39	1	42.5	58.9	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	10.28	10.28	10.28	0.0	12.8	11.9	12.4	3.7	12.4	1	2.1	26.5	
															Spike Amount (ug)	32.3	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	82.1%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	1.39	1.39	1.39	0.0	1.39	1	1.00	1.39	ND

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	1

MDL 0.699 (ug/mL)
LOQ 4.31 (ug/mL)
Compound 1,2-Dibromoethane

Lower Curve Limit 4.31 (ug/mL)
Upper Curve Limit 360 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
BP-WV-A2-M18b-BagACond	010F2403.D	010F2404.D	010F2405.D	GC118P140.M	NA	NA	NA	NA	0.699	0.699	0.699	0.0	0.699	1	42.5	29.7	ND
Bag COND #MS	097F1503.D	097F1504.D	097F1505.D	GC118P140.M	10.70	10.70	10.70	0.0	20.4	20.5	21.3	2.5	20.7	1	2.14	44.4	
															Spike Amount (ug)	43.2	
															Native Amount (ug)	0.00	
															Spike Recovery (%)	103%	
RB H2O	009F2303.D	009F2304.D	009F2305.D	GC118P140.M	NA	NA	NA	NA	0.699	0.699	0.699	0.0	0.699	1	1.00	0.699	ND

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corporation
Analyst	MGM
Parameters	EPA Method 18

Client #	40942317
Job #	0711-08
# Samples	3 Bags & 1 Spike

Custody

Thorne Gregory of Enthalpy Analytical, Inc. received one sample on 7/23/11; Heather Tarjeft received one sample on 7/24/11, and one sample on 7/25/11, after being relinquished by URS Corporation of Austin, TX. All samples were received at ambient temperature and in good condition. Samples ***BP-WV-A3-M18-Bag*** and ***BP-WV-A4-M18-Bag*** were received without chain-of-custody documentation. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for 1,3-butadiene, acetonitrile, acrolein, acetone, acrylonitrile, pentane, methylene chloride (dichloromethane), hexane, benzene, trichloroethene, toluene, 1,2-dibromoethane, and tetrachloroethene using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. All target analytes were referenced to certified gas phase standards.

The Agilent Technologies Model 6890, Gas Chromatograph "Gummo" (S/N US00028451) was equipped with Flame Ionization Detector and a Rtx-1 30m x 0.32mm x 4.0um (S/N 869999) capillary column, for these analyses.

Calibration

The calibration curves are included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method GC114P165.M is included in the Calibration Curve Chromatograms section of this report.

Enthalpy Analytical Narrative Summary

(continued)

QC Notes

As required by the method, a recovery study was performed on a bag sample. The bag sample ***BP-WV-A3-M18-Bag*** was spiked with 1-3 butadiene, acrolein, acetone, methylene chloride, hexane, benzene, trichloroethene, and toluene on 7/27/11 at 9:31 PM, held for the appropriate time, then analyzed. The recovery efficiency values met the method-required limits of 70 to 130% for each analyte. The recovery efficiency values were used to adjust the associated sample results following equation 18-7 from section 12.8 for the spiked analytes. The remaining compounds were unadjusted as indicated on the Summary results page.

All sample preparation and analytical holding times specified in the method were met.

Reporting Notes

These analytical results are reported on a wet basis. The user of this report should determine the percent moisture in the sample and correct the reported value to ppmvd as appropriate.

These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method or NELAC Standard have been previously noted in the report narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corporation
Analyst	MGM
Parameters	EPA Method 16 - Type

Client #	40942317
Job #	0711-08
# Samples	3 Bags

Custody

Thorne Gregory of Enthalpy Analytical, Inc. received one sample on 7/23/11; Heather Tarjeft received one sample on 7/24/11, and one sample on 7/25/11, after being relinquished by URS Corporation of Austin, TX. All samples were received at ambient temperature and in good condition. Samples ***BP-WV-A3-M18-Bag*** and ***BP-WV-A4-M18-Bag*** were received without chain-of-custody documentation. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for carbon disulfide using the Hewlett Packard Model 5890, Series II Gas Chromatograph "Zeppo" (S/N 3235A4448X) equipped with a Flame Photometric Detector and a Restek Rtx-1 60m x 0.53mm x 5.0um (S/N 663119) capillary column.

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Carbon dioxide was were referenced to gas phase standards prepared by certified permeation devices.

Calibration

The calibration curves are included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method, FPDTEST2.M, is included in the Calibration Curve Chromatograms section of this report.

QC Notes

None.

Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18 Bag Cond FID

Client #	40942317
Job #	0711-08
# Samples	1 Run and 1 Spike

Custody

Steve Eckard received the sample on 7/30/11 after being relinquished by URS Corporation of Austin. The sample was received at 3.9°C in good condition. Prior to, during, and after analysis, the sample was kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The sample was analyzed for 1,3-butadiene, pentane, acrolein, acetone, dichloromethane (methylene chloride), hexane, benzene, trichloroethene, toluene, tetrachloroethene, and 1,2-dibromoethane using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

The Agilent Technologies Model 6890N, Gas Chromatograph "Veronica" (S/N US10645052) was equipped with a Flame Ionization Detector and a Restek Rtx-624 105 m x 0.53 mm x 3.0 um (S/N 1032767) column, for these analyses.

Calibration

The calibration curve is included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (GC118P140.M) is included in the Calibration Curve Chromatograms section of this report.

QC Notes

No target compounds were detected in the analyses of the laboratory reagent water blank.

A matrix spike was prepared using an aliquot of the sample. The matrix spike recovery values are presented in the Results section of this report and ranged from 54.8 to 105%.

Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

Enthalpy Analytical Narrative Summary

Company	URS Corp - Austin
Analyst	JBB
Parameters	EPA Method 18 Bag Cond

Client #	40942317
Job #	0711-08
# Samples	1

Custody

Steve Eckard received the sample on 7/30/11 after being relinquished by URS Corporation - Austin. The sample was received at 3.9°C in good condition. Prior to, during, and after analysis, the sample was kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The sample was analyzed for carbon disulfide using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

All samples and standards were introduced directly to the column using an automated multi-port Valco gas sampling valve equipped with a stainless steel loop. Carbon disulfide was referenced to certified reference materials.

The Hewlett Packard Model 5890, Series II Gas Chromatograph "Oscar" (S/N 2938A25721) was equipped with a Flame Photometric Detector and a Restek Stabilwax 30 m x 0.53 mm x 1.5 um column (S/N 1033248), for these analyses.

Calibration

The calibration curve is included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (GC116P49.M) is included in the Calibration Curve Chromatograms section of this report.

QC Notes

Carbon disulfide was not identified act a concentration above the detection limit in the analysis of the lab blank.

A matrix spike was prepared using an aliquot of the sample. The recovery value was 95.2%.

Enthalpy Analytical Narrative Summary
(continued)

Reporting Notes The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

Volatile Organics from Method 18 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	VOCs by GC/FID	Methanol by GC/FID	Spiked Train	Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M18b-BagACond	Bag Sample A - Condensate	7/21/11 2220	X						

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
Nathan Pechart	7/30/11	1245		7/30/11	1245			

Received by:	Date	Time	Relinquished by:	Date	Time

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
	8/1/11	3:50pm						2.4° Raytek Gun #2

Seal #	Condition
	Good

Remarks

URS

Chain of Custody Record

Volatile Organics from Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	VOCs by GC/FID	Methanol by GC/FID		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M18b-BagA	Bag Sample A	7/21/11 2220	X						Time collected is E.T.

BP-WV-A2-M18b-BagACond - condensate sample will be shipped at a later date

Relinquished by:	Date 7/22	Time 0200	Received by:	Date 7-22-11	Time 1000	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

Results

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.224 (ug/mL)
LOQ 1.57 (ug/mL)
Compound Acetonitrile

Lower Curve Limit 1.57 (ug/mL)
Upper Curve Limit 261 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	100	1.12	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	2.68	2.68	2.68	0.0	19.2	19.3	19.1	0.5	19.2	1	5.00	1	96.0	100	96.0	
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	2.69	2.69	2.69	0.0	3.68	3.51	3.65	2.7	3.61	1	5.00	1	18.0	100	18.0	
																			114	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	78.6	1.42	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	2.68	2.68	2.68	0.0	2.81	2.81	2.76	1.3	2.79	1	5.00	1	14.0	78.6	17.8	
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
																			17.8	
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	78.6	1.42	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
																			1.42	ND
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	100	1.12	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	2.68	2.68	2.68	0.0	13.8	13.2	13.5	2.4	13.5	1	5.00	1	67.5	100	67.5	
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	2.71	NA	NA	NA	1.89	0.224	0.224	142.4	0.778	1	5.00	1	3.89	100	3.89	J
																			71.4	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	78.6	1.42	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	78.6	1.42	ND
																			1.42	ND
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	100	1.12	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	2.68	2.68	2.68	0.0	13.7	14.6	13.7	4.1	14.0	1	5.00	1	70.0	100	70.0	
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
																			70.0	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1.24	1.38	100	1.12	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40042317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.224 (ug/mL)
LOQ 1.57 (ug/mL)
Compound Acetonitrile

Lower Curve Limit 1.57 (ug/mL)
Upper Curve Limit 261 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
																		% Difference	NA	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	2.68	2.68	2.68	0.0	13.4	13.4	13.4	0.3	13.4	1	5.00	1	67.0	100	67.0	
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.224	0.224	0.224	0.0	0.224	1	5.00	1	1.12	100	1.12	ND

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.196 (ug/mL)
LOQ 1.57 (ug/mL)
Compound Acrylonitrile

Lower Curve Limit 1.57 (ug/mL)
Upper Curve Limit 1,571 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1.235	1.21	100	0.980	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	3.17	3.17	3.17	0.0	23.1	22.9	22.8	0.6	22.9	1	5.00	1	115	100	115	
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			115	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1.235	1.21	100	0.980	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			0.980	ND
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1.235	1.21	100	0.980	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			0.980	ND
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	3.18	NA	0.196	0.196	0.322	35.2	0.238	1	5.00	1.235	1.47	100	1.19	J
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	3.18	3.18	3.18	0.1	0.676	0.739	0.836	11.4	0.750	1	5.00	1	3.75	100	3.75	J
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	3.17	3.17	3.17	0.0	20.7	20.0	20.1	2.3	20.3	1	5.00	1	101	100	101	
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			106	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1.235	1.21	100	0.980	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			0.980	ND
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	3.18	3.19	NA	NA	0.449	0.427	0.196	45.1	0.357	1	5.00	1.235	2.21	100	1.79	J
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	3.19	3.20	3.19	0.4	0.837	0.625	0.679	17.3	0.714	1	5.00	1	3.57	100	3.57	J
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	NA	3.18	NA	NA	0.196	0.561	0.196	76.6	0.318	1	5.00	1	1.59	100	1.59	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	3.17	3.17	3.17	0.0	18.8	19.6	19.0	2.3	19.1	1	5.00	1	95.7	100	95.7	
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
																			103	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1.235	1.21	100	0.980	ND
																% Difference			NA	
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	3.18	3.18	3.18	0.1	0.909	0.759	0.877	10.5	0.848	1	5.00	1	4.24	100	4.24	J
																% Difference			13.1%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.196 (ug/mL)
LOQ 1.57 (ug/mL)
Compound Acrylonitrile

Lower Curve Limit 1.57 (ug/mL)
Upper Curve Limit 1,571 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	3.17	3.17	3.17	0.0	20.2	20.5	20.4	0.9	20.3	1	5.00	1	102	100	102	
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.196	0.196	0.196	0.0	0.196	1	5.00	1	0.980	100	0.980	ND

Company	URS Corp - Austin	Client #	40942317
Analyst	KMT	Job #	0711-08
Parameters	EPA Method 18 Adsorbents	# Samples	3 Collocated Runs

MDL 0.148 (ug/mL)
LOQ 1.48 (ug/mL)
Compound MTBE

Lower Curve Limit 1.48 (ug/mL)
Upper Curve Limit 1,476 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	100	0.740	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
																			0.740	ND
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	91.2	0.811	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
																			0.811	ND
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	91.2	0.811	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	4.09	NA	0.148	0.148	0.620	103.0	0.305	1	5.00	1	1.53	91.2	1.67	J
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
																			1.67	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	100	0.740	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	4.05	4.05	4.05	0.1	1.28	1.23	1.24	2.5	1.25	1	5.00	1	6.26	100	6.26	J
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	4.05	4.05	4.05	0.0	0.731	0.724	0.661	6.3	0.706	1	5.00	1	3.53	100	3.53	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	4.05	4.05	4.05	0.0	2.69	2.66	2.68	0.8	2.68	1	5.00	1	13.4	100	13.4	
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
																			23.2	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	91.2	0.811	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	91.2	0.811	ND
																			0.811	ND
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	100	0.740	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	4.05	4.05	4.05	0.1	0.799	0.643	0.704	11.7	0.716	1	5.00	1	3.58	100	3.58	J
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	4.05	4.05	4.05	0.1	0.613	0.592	0.648	4.9	0.618	1	5.00	1	3.09	100	3.09	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	4.05	4.05	4.05	0.0	2.41	2.37	2.41	1.0	2.39	1	5.00	1	12.0	100	12.0	
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
																			18.6	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1.235	0.914	100	0.740	ND
																% Difference			NA	
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	4.05	4.05	4.05	0.1	1.04	1.03	0.948	5.9	1.01	1	5.00	1	5.04	100	5.04	J
																% Difference			19.6%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.148 (ug/mL)
LOQ 1.48 (ug/mL)
Compound MTBE

Lower Curve Limit 1.48 (ug/mL)
Upper Curve Limit 1,476 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	4.05	4.05	4.05	0.0	2.72	2.63	2.78	3.1	2.71	1	5.00	1	13.5	100	13.5	
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.148	0.148	0.148	0.0	0.148	1	5.00	1	0.740	100	0.740	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	4.05	4.05	4.05	0.0	4.25	4.39	4.36	1.9	4.33	1	5.00	1	21.7	100	21.7	
														Spike Amount (ug)					22.1	
														Spike Recovery (%)					97.8%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	4.05	4.05	4.05	0.0	4.29	4.26	4.33	0.8	4.29	1	5.00	1	21.5	100	21.5	
														Spike Amount (ug)					22.1	
														Spike Recovery (%)					97.0%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.193 (ug/mL)
LOQ 1.93 (ug/mL)
Compound 2-Nitropropane

Lower Curve Limit 1.93 (ug/mL)
Upper Curve Limit 1,936 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	5.28	5.28	5.28	0.0	1.36	1.43	1.43	3.2	1.41	1	5.00	1	7.04	100	7.04	J
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	5.28	5.28	5.28	0.0	1.10	1.02	1.08	4.1	1.07	1	5.00	1	5.34	100	5.34	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	5.23	5.33	5.23	1.8	0.839	0.399	0.849	42.6	0.696	1	5.00	1	3.48	100	3.48	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			15.9	J
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	5.27	5.28	5.27	0.0	0.399	0.385	0.358	6.0	0.381	1	5.00	1	1.90	100	1.90	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	5.33	5.32	5.33	0.0	0.754	0.587	0.763	16.3	0.701	1	5.00	1	3.51	100	3.51	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	5.27	NA	NA	0.193	0.218	0.193	8.4	0.201	1	5.00	1	1.01	100	1.01	J
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			6.42	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	5.33	5.33	NA	0.193	0.355	0.328	33.9	0.292	1	5.00	1	1.46	100	1.46	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			1.46	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	5.27	5.28	5.28	0.0	2.72	2.81	2.98	5.1	2.84	1	5.00	1	14.2	100	14.2	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	5.28	5.28	5.28	0.0	1.01	1.01	0.893	8.0	0.971	1	5.00	1	4.85	100	4.85	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			19.0	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	5.33	5.32	5.33	0.0	0.285	0.240	0.244	11.2	0.256	1	5.00	1	1.28	100	1.28	J
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			1.28	J
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	5.28	5.28	5.28	0.0	1.97	1.90	1.94	1.7	1.94	1	5.00	1	9.69	100	9.69	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	5.28	5.28	5.28	0.0	0.945	0.925	1.13	13.2	1.00	1	5.00	1	5.00	100	5.00	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	NA	5.23	NA	NA	0.193	0.207	0.193	4.9	0.198	1	5.00	1	0.99	100	0.99	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
																			15.7	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1.235	1.19	100	0.965	ND
																% Difference			NA	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.193 (ug/mL)
LOQ 1.93 (ug/mL)
Compound 2-Nitropropane

Lower Curve Limit 1.93 (ug/mL)
Upper Curve Limit 1,936 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	5.27	5.28	5.28	0.0	2.83	2.90	2.98	2.7	2.90	1	5.00	1	14.5	100	14.5	
																% Difference			2.4%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.193	0.193	0.193	0.0	0.193	1	5.00	1	0.965	100	0.965	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	5.28	5.28	5.28	0.0	5.36	5.45	5.37	1.0	5.39	1	5.00	1	27.0	100	27.0	
																Spike Amount (ug)			29.1	
																Spike Recovery (%)			92.8%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	5.28	5.28	5.28	0.0	5.22	5.28	5.28	0.8	5.26	1	5.00	1	26.3	100	26.3	
																Spike Amount (ug)			29.1	
																Spike Recovery (%)			90.5%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.138 (ug/mL)
LOQ 1.38 (ug/mL)
Compound Isooctane

Lower Curve Limit 1.38 1377
Upper Curve Limit 261 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	100	0.690	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	5.49	5.49	5.49	0.0	4.35	4.48	4.52	2.2	4.45	1	5.00	1	22.3	100	22.3	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	5.49	5.49	5.49	0.0	0.619	0.601	0.600	2.0	0.606	1	5.00	1	3.03	100	3.03	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	5.49	5.49	5.49	0.1	0.539	0.557	0.522	3.3	0.539	1	5.00	1	2.70	100	2.70	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
																			28.0	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	103	0.668	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	5.50	NA	NA	NA	0.282	0.138	0.138	51.6	0.186	1	5.00	1	0.930	103	0.900	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	5.49	5.50	5.50	0.091	0.200	0.371	0.534	45.6	0.369	1	5.00	1	1.84	103	1.78	J
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
																			2.68	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	103	0.668	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
																			0.668	ND
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	100	0.690	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	5.49	5.49	5.49	0.0	4.54	4.67	4.48	2.4	4.56	1	5.00	1	22.8	100	22.8	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	5.49	5.49	5.49	0.1	0.282	0.239	0.240	11.4	0.254	1	5.00	1	1.27	100	1.27	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	5.49	5.49	5.49	0.05	0.161	0.157	0.146	5.4	0.154	1	5.00	1	0.772	100	0.772	J
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
																			24.9	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	103	0.668	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	103	0.668	ND
																			0.668	ND
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	100	0.690	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	5.49	5.49	5.49	0.0	4.43	4.38	4.44	0.9	4.42	1	5.00	1	22.1	100	22.1	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	5.49	5.49	5.49	0.0	0.303	0.341	0.328	6.4	0.324	1	5.00	1	1.62	100	1.62	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	5.49	5.49	5.49	0.1	0.275	0.523	0.285	44.9	0.361	1	5.00	1	1.80	100	1.80	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
																			25.5	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1.235	0.852	100	0.690	ND
																		% Difference	NA	

Company	URS Corp - Austin	Client #	40942317
Analyst	KMT	Job #	0711-08
Parameters	EPA Method 18 Adsorbents	# Samples	3 Collocated Runs

MDL 0.138 (ug/mL)
LOQ 1.38 (ug/mL)
Compound Isooctane

Lower Curve Limit 1.38 1377
Upper Curve Limit 261 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	5.49	5.49	5.49	0.0	4.58	4.49	4.63	1.7	4.56	1	5.00	1	22.8	100	22.8	
																		% Difference	0.0%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	5.487	NA	NA	0.138	0.184	0.138	20.1	0.153	1	5.00	1	0.767	100	0.767	J
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.138	0.138	0.138	0.0	0.138	1	5.00	1	0.690	100	0.690	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	5.49	5.49	5.49	0.0	4.71	4.79	4.72	1.1	4.74	1	5.00	1	23.7	100	23.7	
																		Spike Amount (ug)	24.1	
																		Spike Recovery (%)	98.3%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	5.49	5.49	5.49	0.0	4.68	4.71	4.73	0.6	4.71	1	5.00	1	23.5	100	23.5	
																		Spike Amount (ug)	24.1	
																		Spike Recovery (%)	97.6%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.159 (ug/mL)
LOQ 1.59 (ug/mL)
Compound MIBK

Lower Curve Limit 1.59 (ug/mL)
Upper Curve Limit 1,592 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1.235	0.982	100	0.795	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	5.78	5.78	5.78	0.0	3.60	3.73	3.75	2.5	3.69	1	5.00	1	18.5	100	18.5	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	5.79	5.79	5.79	0.0	0.545	0.525	0.572	4.5	0.547	1	5.00	1	2.74	100	2.74	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	5.79	5.79	5.79	0.0	0.258	0.246	0.257	3.1	0.254	1	5.00	1	1.27	100	1.27	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
																			22.5	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1.235	0.982	96.5	0.824	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	NA	5.80	NA	NA	0.159	0.191	0.159	12.7	0.170	1	5.00	1	0.849	96.5	0.879	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
																			0.879	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1.235	0.982	96.5	0.824	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	5.78	5.78	5.78	0.0	0.202	0.212	0.183	7.9	0.199	1	5.00	1	0.996	96.5	1.03	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
																			1.03	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	5.78	NA	NA	NA	0.166	0.159	0.159	2.9	0.161	1	5.00	1.235	0.997	100	0.807	J
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	5.78	5.78	5.78	0.0	4.33	4.43	4.31	1.7	4.36	1	5.00	1	21.8	100	21.8	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	5.79	5.78	5.78	0.1	0.321	0.294	0.272	8.6	0.296	1	5.00	1	1.48	100	1.48	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	5.79	5.79	NA	NA	0.181	0.171	0.159	6.7	0.170	1	5.00	1	0.852	100	0.852	J
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
																			24.9	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1.235	0.982	96.5	0.824	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	96.5	0.824	ND
																			0.824	ND
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	5.79	NA	NA	0.159	0.173	0.159	5.7	0.164	1	5.00	1.235	1.01	100	0.819	J
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	5.78	5.78	5.78	0.0	4.06	4.08	4.12	0.8	4.09	1	5.00	1	20.4	100	20.4	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	5.79	5.78	5.79	0.0	0.421	0.322	0.252	26.9	0.332	1	5.00	1	1.66	100	1.66	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	NA	5.78	5.79	NA	0.159	0.219	0.178	18.1	0.185	1	5.00	1	0.926	100	0.926	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
																			23.8	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1.235	0.982	100	0.795	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.159 (ug/mL)
LOQ 1.59 (ug/mL)
Compound MIBK

Lower Curve Limit 1.59 (ug/mL)
Upper Curve Limit 1,592 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	5.78	5.78	5.78	0.0	4.36	4.27	4.39	1.6	4.34	1	5.00	1	21.7	100	21.7	
																		% Difference	0.4%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	5.78	NA	0.159	0.159	0.164	2.3	0.161	1	5.00	1	0.804	100	0.804	J
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.159	0.159	0.159	0.0	0.159	1	5.00	1	0.795	100	0.795	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	5.78	5.78	5.78	0.0	4.49	4.65	4.57	1.8	4.57	1	5.00	1	22.9	100	22.9	
																		Spike Amount (ug)	23.9	
																		Spike Recovery (%)	95.8%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	5.78	5.78	5.78	0.0	4.53	4.54	4.55	0.2	4.54	1	5.00	1	22.7	100	22.7	
																		Spike Amount (ug)	23.9	
																		Spike Recovery (%)	95.0%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.221 (ug/mL)
LOQ 2.21 (ug/mL)
Compound Chlorobenzene

Lower Curve Limit 2.21 (ug/mL)
Upper Curve Limit 2,212 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	6.92	NA	NA	NA	0.237	0.221	0.221	4.8	0.226	1	5.00	1.235	1.40	100	1.13	J
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	6.92	6.92	6.92	0.0	9.31	9.88	10.1	4.7	9.77	1	5.00	1	48.9	100	48.9	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	6.92	6.92	6.92	0.0	0.900	0.661	0.813	16.5	0.791	1	5.00	1	3.96	100	3.96	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	6.92	6.92	6.92	0.0	0.313	0.325	0.347	5.7	0.328	1	5.00	1	1.64	100	1.64	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	6.92	6.92	NA	0.221	0.273	0.230	13.1	0.241	1	5.00	1	1.21	100	1.21	J
																			56.8	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.221	0.221	0.221	0.0	0.221	1	5.00	1.235	1.37	106	1.05	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	6.91	6.91	6.91	0.0	1.72	1.85	1.77	4.2	1.78	1	5.00	1	8.90	106	8.43	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	6.92	6.92	6.92	0.0	0.913	0.299	0.259	88.2	0.490	1	5.00	1	2.45	106	2.32	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	6.92	NA	0.221	0.221	0.259	10.8	0.234	1	5.00	1	1.17	106	1.11	J
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	6.92	NA	NA	0.221	0.260	0.221	11.0	0.234	1	5.00	1	1.17	106	1.11	J
																			13.0	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.221	0.221	0.221	0.0	0.221	1	5.00	1.235	1.37	106	1.05	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	6.92	6.92	6.92	0.0	0.429	0.619	0.699	26.3	0.582	1	5.00	1	2.91	106	2.76	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	6.92	NA	NA	NA	0.793	0.221	0.221	92.6	0.412	1	5.00	1	2.06	106	1.95	J
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	6.92	NA	NA	NA	0.285	0.221	0.221	17.6	0.242	1	5.00	1	1.21	106	1.15	J
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	6.92	6.92	6.92	0.1	0.238	0.245	0.280	10.2	0.254	1	5.00	1	1.27	106	1.20	J
																			7.06	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	6.92	NA	0.221	0.221	0.284	17.4	0.242	1	5.00	1.235	1.50	100	1.21	J
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	6.92	6.92	6.92	0.0	6.34	6.86	6.35	5.3	6.51	1	5.00	1	32.6	100	32.6	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	6.92	6.92	6.92	0.0	0.456	0.385	0.365	13.3	0.402	1	5.00	1	2.01	100	2.01	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.221	0.221	0.221	0.0	0.221	1	5.00	1	1.11	100	1.11	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	6.92	6.92	NA	0.221	0.236	0.238	4.6	0.232	1	5.00	1	1.16	100	1.16	J
																			36.9	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	6.92	6.92	6.92	0.1	0.261	0.303	0.278	8.0	0.281	1	5.00	1.235	1.74	106	1.33	J
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	6.92	6.92	6.92	0.0	0.559	0.817	0.837	24.3	0.738	1	5.00	1	3.69	106	3.49	J
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	6.92	6.92	NA	NA	0.277	0.248	0.221	11.4	0.249	1	5.00	1	1.24	106	1.18	J
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	6.92	NA	NA	0.221	0.249	0.221	8.1	0.230	1	5.00	1	1.15	106	1.09	J
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	6.92	6.92	6.92	0.0	0.265	0.269	0.267	0.8	0.267	1	5.00	1	1.33	106	1.26	J
																			8.36	J
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	6.92	NA	NA	NA	0.235	0.221	0.221	4.0	0.226	1	5.00	1.235	1.39	100	1.13	J
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	6.92	6.92	6.92	0.0	7.14	7.65	7.69	4.8	7.49	1	5.00	1	37.5	100	37.5	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	6.92	6.92	6.92	0.0	0.437	0.580	0.533	15.4	0.517	1	5.00	1	2.58	100	2.58	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	6.92	6.92	6.92	0.0	0.430	0.437	0.399	5.4	0.422	1	5.00	1	2.11	100	2.11	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	6.92	6.92	6.92	0.0	0.249	0.274	0.260	5.0	0.261	1	5.00	1	1.31	100	1.31	J
																			44.6	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	6.92	6.92	6.92	0.0	0.309	0.287	0.292	4.4	0.296	1	5.00	1.235	1.83	100	1.48	J
																		% Difference	22.3%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.221 (ug/mL)
LOQ 2.21 (ug/mL)
Compound Chlorobenzene

Lower Curve Limit 2.21 (ug/mL)
Upper Curve Limit 2,212 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	6.92	6.92	6.92	0.0	6.41	6.36	6.62	2.4	6.46	1	5.00	1	32.3	100	32.3	
																		% Difference	0.8%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	6.92	NA	0.221	0.221	0.273	14.5	0.238	1	5.00	1	1.19	100	1.19	J
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	6.92	6.92	NA	0.221	0.245	0.268	9.6	0.245	1	5.00	1	1.22	100	1.22	J
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	6.92	6.92	NA	0.221	0.288	0.278	15.7	0.262	1	5.00	1	1.31	100	1.31	J
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	6.92	NA	NA	NA	0.256	0.221	0.221	9.9	0.233	1	5.00	1	1.16	100	1.16	J
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	6.92	6.92	6.92	0.0	6.37	6.59	6.40	2.1	6.45	1	5.00	1	32.3	100	32.3	
																		Spike Amount (ug)	33.2	
																		Spike Recovery (%)	97.2%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	6.92	6.92	6.92	0.0	6.43	6.39	6.49	0.9	6.43	1	5.00	1	32.2	100	32.2	
																		Spike Amount (ug)	33.2	
																		Spike Recovery (%)	96.9%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.173 (ug/mL)
LOQ 1.73 (ug/mL)
Compound Ethylbenzene

Lower Curve Limit 1.73 (ug/mL)
Upper Curve Limit 1,731 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	7.04	7.04	7.04	0.0	10.5	10.9	11.1	3.0	10.8	1	5.00	1	54.2	100	54.2	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	7.04	7.04	7.04	0.0	0.214	0.238	0.283	15.7	0.245	1	5.00	1	1.22	100	1.22	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			55.5	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	7.04	NA	0.173	0.173	0.253	26.8	0.200	1	5.00	1.235	1.23	103	0.967	J
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	7.04	7.04	7.04	0.0	5.40	5.47	5.74	3.8	5.54	1	5.00	1	27.7	103	26.8	
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
																			27.8	
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	103	0.838	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	7.04	7.04	7.04	0.0	1.57	1.61	1.70	4.6	1.63	1	5.00	1	8.14	103	7.89	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	7.04	NA	NA	NA	0.229	0.173	0.173	19.3	0.192	1	5.00	1	0.958	103	0.927	J
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	7.04	NA	0.173	0.173	0.204	11.3	0.183	1	5.00	1	0.917	103	0.888	J
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
																			9.7	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	7.04	7.04	7.04	0.0	6.46	6.68	6.42	2.4	6.52	1	5.00	1	32.6	100	32.6	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	7.04	7.04	7.04	0.0	0.221	0.201	0.194	7.9	0.205	1	5.00	1	1.03	100	1.03	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			33.6	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	103	0.838	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	7.04	7.04	7.04	0.0	2.09	2.18	2.22	3.4	2.16	1	5.00	1	10.8	103	10.5	
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	103	0.838	ND
																			10.5	
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	7.04	7.04	7.04	0.0	7.57	7.85	7.88	2.5	7.77	1	5.00	1	38.8	100	38.8	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	7.04	7.04	7.04	0.0	0.458	0.271	0.271	37.5	0.333	1	5.00	1	1.67	100	1.67	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	7.04	7.04	7.04	0.0	0.188	0.207	0.195	5.2	0.196	1	5.00	1	0.982	100	0.982	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			41.5	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
																		% Difference	NA	
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	7.04	7.04	7.04	0.0	6.42	6.48	6.70	2.5	6.53	1	5.00	1	32.7	100	32.7	
																		% Difference	0.2%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.173 (ug/mL)
LOQ 1.73 (ug/mL)
Compound Ethylbenzene

Lower Curve Limit 1.73 (ug/mL)
Upper Curve Limit 1,731 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	7.04	NA	NA	NA	0.265	0.173	0.173	30.0	0.204	1	5.00	1	1.02	100	1.02	J
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	7.04	7.04	7.04	0.0	5.07	5.20	5.09	1.6	5.12	1	5.00	1	25.6	100	25.6	
																		Spike Amount (ug)	26.0	
																		Spike Recovery (%)	98.5%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	7.04	7.04	7.04	0.0	5.09	5.06	5.15	1.0	5.10	1	5.00	1	25.5	100	25.5	
																		Spike Amount (ug)	26.0	
																		Spike Recovery (%)	98.1%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.172 (ug/mL)
LOQ 1.72 (ug/mL)
Compound m/p-Xylene

Lower Curve Limit 1.72 (ug/mL)
Upper Curve Limit 1,719 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	100	0.860	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	7.11	7.11	7.11	0.0	35.6	36.0	37.2	2.6	36.3	1	5.00	1	181	100	181	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	7.11	7.11	7.11	0.0	0.404	0.463	0.501	11.5	0.456	1	5.00	1	2.28	100	2.28	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	7.11	7.11	7.11	0.0	0.188	0.202	0.210	5.9	0.200	1	5.00	1	1.00	100	1.00	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	7.11	7.11	7.11	0.0	0.240	0.251	0.272	6.9	0.254	1	5.00	1	1.27	100	1.27	J
																			186	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	89.6	0.960	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	7.11	7.11	7.10	0.0	23.7	23.9	25.1	3.7	24.3	1	5.00	1	121	89.6	135	
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	7.11	7.11	7.11	0.0	0.255	0.225	0.234	7.3	0.238	1	5.00	1	1.19	89.6	1.33	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	7.11	7.11	7.11	0.0	0.216	0.196	0.225	7.6	0.212	1	5.00	1	1.06	89.6	1.19	J
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	7.11	7.11	7.11	0.0	0.205	0.219	0.237	7.7	0.220	1	5.00	1	1.10	89.6	1.23	J
																			139	
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	89.6	0.96	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	7.10	7.10	7.10	0.0	11.6	11.5	11.8	1.3	11.6	1	5.00	1	58.1	89.6	64.8	
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	7.11	7.11	7.11	0.0	0.265	0.212	0.225	13.1	0.234	1	5.00	1	1.17	89.6	1.31	J
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	7.11	7.112	NA	NA	0.188	0.179	0.172	4.8	0.180	1	5.00	1	0.898	89.6	1.00	J
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	7.11	7.11	7.11	0.0	0.243	0.242	0.263	5.6	0.249	1	5.00	1	1.25	89.6	1.39	J
																			68.5	
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	100	0.860	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	7.11	7.11	7.11	0.0	18.3	18.7	18.0	2.1	18.3	1	5.00	1	91.6	100	91.6	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	7.11	7.11	7.11	0.0	0.484	0.452	0.458	4.2	0.465	1	5.00	1	2.32	100	2.32	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	7.11	7.11	7.11	0.0	0.198	0.225	0.210	6.7	0.211	1	5.00	1	1.05	100	1.05	J
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	7.11	7.11	7.11	0.0	0.311	0.288	0.317	5.7	0.306	1	5.00	1	1.53	100	1.53	J
																			96.5	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	89.6	0.96	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	7.11	7.10	7.11	0.0	9.48	9.30	9.22	1.6	9.34	1	5.00	1	46.7	89.6	52.1	
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	89.6	0.96	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	89.6	0.96	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	89.6	0.96	ND
																			52.1	
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	7.111	7.112	7.111	0.014	0.178	0.189	0.173	5.0	0.180	1	5.00	1.235	1.11	100	0.900	J
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	7.11	7.11	7.11	0.0	18.4	18.5	18.7	0.9	18.5	1	5.00	1	92.6	100	92.6	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	7.11	7.11	7.11	0.0	0.502	0.417	0.375	16.4	0.431	1	5.00	1	2.16	100	2.16	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	7.11	7.11	7.11	0.0	0.256	0.238	0.223	7.3	0.239	1	5.00	1	1.19	100	1.19	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	100	0.860	ND
																			96.9	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1.235	1.06	100	0.860	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.172 (ug/mL)
LOQ 1.72 (ug/mL)
Compound m/p-Xylene

Lower Curve Limit 1.72 (ug/mL)
Upper Curve Limit 1,719 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	7.11	7.11	7.11	0.0	18.0	18.2	18.9	2.9	18.3	1	5.00	1	91.7	100	91.7	
																		% Difference	0.1%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	7.11	7.11	7.11	0.0	0.205	0.224	0.217	4.7	0.215	1	5.00	1	1.08	100	1.08	J
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	100	0.860	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	100	0.860	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.172	0.172	0.172	0.0	0.172	1	5.00	1	0.860	100	0.860	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	7.11	7.11	7.11	0.0	8.33	8.53	8.37	1.4	8.41	1	5.00	1	42.0	100	42.0	
																		Spike Amount (ug)	43.0	
																		Spike Recovery (%)	97.9%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	7.11	7.11	7.11	0.0	8.39	8.31	8.47	1.0	8.39	1	5.00	1	41.9	100	41.9	
																		Spike Amount (ug)	43.0	
																		Spike Recovery (%)	97.6%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.181 (ug/mL)
LOQ 1.81 (ug/mL)
Compound Styrene

Lower Curve Limit 1.81 (ug/mL)
Upper Curve Limit 1,810 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	7.27	7.27	7.27	0.0	8.97	9.49	9.64	4.3	9.38	1	5.00	1	46.8	100	46.8	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	7.27	NA	NA	NA	0.299	0.181	0.181	35.7	0.220	1	5.00	1	1.10	100	1.10	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			47.9	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	7.27	7.27	7.27	0.0	0.830	0.907	0.959	7.7	0.899	1	5.00	1	4.49	100	4.49	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	7.27	NA	NA	NA	0.312	0.181	0.181	38.8	0.225	1	5.00	1	1.12	100	1.12	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			5.62	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	7.27	7.27	NA	0.181	0.193	0.215	9.6	0.197	1	5.00	1	0.983	100	0.983	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			0.983	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	7.27	7.27	7.27	0.0	6.56	6.60	6.38	2.1	6.51	1	5.00	1	32.6	100	32.6	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			32.6	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	7.27	7.27	7.27	0.0	0.486	0.625	0.584	14.0	0.565	1	5.00	1	2.83	100	2.83	J
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	7.27	NA	NA	NA	0.264	0.181	0.181	26.6	0.209	1	5.00	1	1.04	100	1.04	J
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			3.87	J
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	7.27	7.27	7.27	0.0	7.82	8.19	8.28	3.4	8.10	1	5.00	1	40.5	100	40.5	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	7.27	NA	NA	NA	0.204	0.181	0.181	8.3	0.189	1	5.00	1	0.944	100	0.944	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
																			41.4	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1.235	1.12	100	0.905	ND
															% Difference				NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.181 (ug/mL)
LOQ 1.81 (ug/mL)
Compound Styrene

Lower Curve Limit 1.81 (ug/mL)
Upper Curve Limit 1,810 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	7.27	7.27	7.27	0.0	6.46	6.54	6.67	1.7	6.56	1	5.00	1	32.8	100	32.8	
																% Difference			0.7%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.181	0.181	0.181	0.0	0.181	1	5.00	1	0.905	100	0.905	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	7.27	7.27	7.27	0.0	5.23	5.35	5.24	1.4	5.27	1	5.00	1	26.3	100	26.3	
																Spike Amount (ug)			27.2	
																Spike Recovery (%)			97.1%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	7.27	7.27	7.27	0.0	5.25	5.24	5.32	0.9	5.27	1	5.00	1	26.3	100	26.3	
																Spike Amount (ug)			27.2	
																Spike Recovery (%)			97.0%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.176 (ug/mL)
LOQ 1.76 (ug/mL)
Compound o-Xylene

Lower Curve Limit 1.76 (ug/mL)
Upper Curve Limit 1,756 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	100	0.880	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	7.32	7.32	7.32	0.0	15.1	15.8	16.0	3.6	15.6	1	5.00	1	78.1	100	78.1	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	7.32	7.32	7.32	0.0	0.496	0.255	0.252	48.4	0.334	1	5.00	1	1.67	100	1.67	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
																			79.8	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	80.3	1.10	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	7.32	7.32	7.32	0.0	10.3	10.6	11.2	4.7	10.7	1	5.00	1	53.4	80.3	66.5	
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	7.32	NA	NA	NA	0.436	0.176	0.176	66.0	0.263	1	5.00	1	1.31	80.3	1.64	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	80.3	1.10	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	7.32	NA	0.176	0.176	0.183	2.6	0.178	1	5.00	1	0.891	80.3	1.11	J
																			69.3	
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	80.3	1.10	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	7.32	7.32	7.32	0.0	1.96	2.03	2.07	2.9	2.02	1	5.00	1	10.1	80.3	12.6	
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	7.317	NA	NA	NA	0.210	0.176	0.176	11.9	0.187	1	5.00	1	0.936	80.3	1.17	J
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	80.3	1.10	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	80.3	1.10	ND
																			13.8	
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	100	0.880	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	7.32	7.32	7.32	0.0	6.85	7.06	6.80	2.3	6.90	1	5.00	1	34.5	100	34.5	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	7.32	7.32	7.32	0.014	0.225	0.231	0.223	2.0	0.226	1	5.00	1	1.13	100	1.13	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	7.316	NA	NA	NA	0.194	0.176	0.176	6.6	0.182	1	5.00	1	0.910	100	0.910	J
																			36.6	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	80.3	1.10	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	7.32	7.32	7.32	0.0	4.09	4.31	4.26	3.1	4.22	1	5.00	1	21.1	80.3	26.3	
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	7.32	NA	NA	NA	0.435	0.176	0.176	65.9	0.262	1	5.00	1	1.31	80.3	1.63	J
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	80.3	1.10	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	80.3	1.10	ND
																			27.9	
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	100	0.880	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	7.32	7.32	7.32	0.0	9.51	9.79	9.89	2.2	9.73	1	5.00	1	48.7	100	48.7	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	7.32	7.32	7.32	0.0	0.374	0.258	0.233	29.7	0.289	1	5.00	1	1.44	100	1.44	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	NA	NA	7.32	NA	0.176	0.176	0.190	5.2	0.181	1	5.00	1	0.903	100	0.903	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
																			51.0	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1.235	1.09	100	0.880	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.176 (ug/mL)
LOQ 1.76 (ug/mL)
Compound o-Xylene

Lower Curve Limit 1.76 (ug/mL)
Upper Curve Limit 1,756 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2001.D	029F2002.D	029F2003.D	GC121P086.M	7.32	7.32	7.32	0.0	6.78	6.88	7.15	3.1	6.94	1	5.00	1	34.7	100	34.7	
																	% Difference		0.5%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.176	0.176	0.176	0.0	0.176	1	5.00	1	0.880	100	0.880	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	7.32	7.32	7.32	0.0	5.19	5.31	5.20	1.5	5.24	1	5.00	1	26.2	100	26.2	
																	Spike Amount (ug)		26.4	
																	Spike Recovery (%)		99.3%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	7.32	7.32	7.32	0.0	5.20	5.18	5.25	0.8	5.21	1	5.00	1	26.1	100	26.1	
																	Spike Amount (ug)		26.4	
																	Spike Recovery (%)		98.9%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
 # Samples 3 Collocated Runs

MDL 0.173 (ug/mL)
LOQ 1.73 (ug/mL)
Compound Cumene

Lower Curve Limit 1.73 (ug/mL)
Upper Curve Limit 1,733 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	7.56	7.56	7.56	0.0	5.83	5.96	6.02	1.8	5.94	1	5.00	1	29.7	100	29.7	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			29.7	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	101	0.860	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	7.56	7.56	7.55	0.1	0.832	0.829	0.890	4.7	0.851	1	5.00	1	4.25	101	4.23	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
																			4.23	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	101	0.860	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
																			0.860	ND
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	7.56	7.56	7.56	0.0	5.29	5.38	5.19	1.8	5.28	1	5.00	1	26.4	100	26.4	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			26.4	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	101	0.860	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	7.56	7.56	7.56	0.0	0.390	0.403	0.364	5.6	0.386	1	5.00	1	1.93	101	1.92	J
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	101	0.860	ND
																			1.92	J
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	7.56	7.56	7.56	0.0	5.89	5.93	5.99	0.9	5.94	1	5.00	1	29.7	100	29.7	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
																			29.7	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1.235	1.07	100	0.865	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.173 (ug/mL)
LOQ 1.73 (ug/mL)
Compound Cumene

Lower Curve Limit 1.73 (ug/mL)
Upper Curve Limit 1,733 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
LD / M18 A3 XAD FH Spk	029F2901.D	029F2902.D	029F2903.D	GC121P086.M	7.56	7.56	7.56	0.0	5.08	5.23	5.41	3.3	5.24	1	5.00	1	26.2	100	26.2	
																		% Difference	0.8%	
LD / M18 A3 CT FH Spk	034F3501.D	034F3502.D	034F3503.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
M18 H2O RB ext	048F4901.D	048F4902.D	048F4903.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
M18 XAD MB	049F5001.D	049F5002.D	049F5003.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
M18 CT MB	050F5101.D	050F5102.D	050F5103.D	GC121P086.M	NA	NA	NA	NA	0.173	0.173	0.173	0.0	0.173	1	5.00	1	0.865	100	0.865	ND
XAD LCS 1	051F5201.D	051F5202.D	051F5203.D	GC121P086.M	7.56	7.56	7.56	0.0	5.15	5.28	5.15	1.7	5.19	1	5.00	1	25.9	100	25.9	
																		Spike Amount (ug)	26.0	
																		Spike Recovery (%)	99.8%	
XAD LCS 2	052F5301.D	052F5302.D	052F5303.D	GC121P086.M	7.56	7.56	7.56	0.0	5.18	5.11	5.20	1.0	5.16	1	5.00	1	25.8	100	25.8	
																		Spike Amount (ug)	26.0	
																		Spike Recovery (%)	99.3%	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Adsorbents

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.240 (ug/mL)
LOQ 2.40 (ug/mL)
Compound Nitrobenzene

Lower Curve Limit 2.40 (ug/mL)
Upper Curve Limit 2,404 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Aliquot Factor	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Cond	009F0901.D	009F0902.D	009F0903.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	100	1.20	ND
BP-WV-A2-M18s-Sorbent XAD-FH	010F1001.D	010F1002.D	010F1003.D	GC121P086.M	8.71	8.71	8.71	0.0	8.95	9.12	9.15	1.3	9.07	1	5.00	1	45.4	100	45.4	
BP-WV-A2-M18s-Sorbent XAD-BH	011F1101.D	011F1102.D	011F1103.D	GC121P086.M	8.71	8.71	8.71	0.0	1.08	0.500	0.571	50.4	0.716	1	5.00	1	3.58	100	3.58	J
BP-WV-A2-M18s-Charcoal CT-FH	012F1201.D	012F1202.D	012F1203.D	GC121P086.M	8.71	8.71	8.71	0.0	0.516	0.549	0.467	8.6	0.511	1	5.00	1	2.55	100	2.55	J
BP-WV-A2-M18s-Charcoal CT-BH	013F1301.D	013F1302.D	013F1303.D	GC121P086.M	8.71	8.71	8.71	0.0	0.804	0.721	0.963	16.1	0.830	1	5.00	1	4.15	100	4.15	J
																			55.6	
BP-WV-A2s-M18s-CondA Cond	014F1401.D	014F1402.D	014F1403.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	102	1.18	ND
BP-WV-A2s-M18s-Sorbent XAD-FH	015F1501.D	015F1502.D	015F1503.D	GC121P086.M	8.69	8.69	8.69	0.0	2.28	2.32	2.44	3.9	2.35	1	5.00	1	11.7	102	11.5	J
BP-WV-A2s-M18s-Sorbent XAD-BH	016F1601.D	016F1602.D	016F1603.D	GC121P086.M	8.71	8.71	8.71	0.0	0.704	0.609	0.590	11.0	0.634	1	5.00	1	3.17	102	3.12	J
BP-WV-A2s-M18s-Charcoal CT-FH	017F1701.D	017F1702.D	017F1703.D	GC121P086.M	8.71	8.71	8.71	0.0	0.484	0.540	0.476	8.0	0.500	1	5.00	1	2.50	102	2.46	J
BP-WV-A2s-M18s-Charcoal CT-BH	020F2001.D	020F2002.D	020F2003.D	GC121P086.M	8.71	8.71	8.71	0.0	0.559	0.606	0.550	6.0	0.572	1	5.00	1	2.86	102	2.81	J
																			19.9	J
BP-WV-A3-M18s-CondA Cond	021F2101.D	021F2102.D	021F2103.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	102	1.18	ND
BP-WV-A3-M18s-Sorbent XAD-FH	022F2201.D	022F2202.D	022F2203.D	GC121P086.M	8.70	NA	NA	NA	0.259	0.240	0.240	5.2	0.246	1	5.00	1	1.23	102	1.21	J
BP-WV-A3-M18s-Sorbent XAD-BH	023F2301.D	023F2302.D	023F2303.D	GC121P086.M	8.71	8.71	8.71	0.0	0.756	0.477	0.502	30.7	0.578	1	5.00	1	2.89	102	2.85	J
BP-WV-A3-M18s-Charcoal CT-FH	024F2401.D	024F2402.D	024F2403.D	GC121P086.M	NA	8.71	NA	NA	0.240	0.250	0.240	2.8	0.243	1	5.00	1	1.22	102	1.20	J
BP-WV-A3-M18s-Charcoal CT-BH	025F2501.D	025F2502.D	025F2503.D	GC121P086.M	8.71	8.71	8.71	0.0	0.344	0.331	0.333	2.4	0.336	1	5.00	1	1.68	102	1.65	J
																			6.91	J
BP-WV-A3s-M18s-CondA Cond	026F2601.D	026F2602.D	026F2603.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	100	1.20	ND
BP-WV-A3s-M18s-Sorbent XAD-FH	028F2801.D	028F2802.D	028F2803.D	GC121P086.M	8.71	8.71	8.71	0.0	8.45	8.77	8.45	2.5	8.56	1	5.00	1	42.8	100	42.8	
BP-WV-A3s-M18s-Sorbent XAD-BH	032F3301.D	032F3302.D	032F3303.D	GC121P086.M	8.71	8.71	8.71	0.0	0.393	0.359	0.426	8.6	0.393	1	5.00	1	1.96	100	1.96	J
BP-WV-A3s-M18s-Charcoal CT-FH	033F3401.D	033F3402.D	033F3403.D	GC121P086.M	8.71	8.71	8.71	0.0	0.377	0.420	0.470	11.4	0.422	1	5.00	1	2.11	100	2.11	J
BP-WV-A3s-M18s-Charcoal CT-BH	035F3601.D	035F3602.D	035F3603.D	GC121P086.M	8.71	8.71	8.71	0.0	0.589	0.558	0.551	4.1	0.566	1	5.00	1	2.83	100	2.83	J
																			49.7	
BP-WV-A4-M18s-CondA Cond	036F3701.D	036F3702.D	036F3703.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	102	1.18	ND
BP-WV-A4-M18s-Sorbent XAD-FH	037F3801.D	037F3802.D	037F3803.D	GC121P086.M	8.69	8.69	8.69	0.0	2.22	2.21	2.18	1.2	2.20	1	5.00	1	11.0	102	10.8	J
BP-WV-A4-M18s-Sorbent XAD-BH	038F3901.D	038F3902.D	038F3903.D	GC121P086.M	8.71	8.71	NA	NA	0.345	0.243	0.240	25.0	0.276	1	5.00	1	1.38	102	1.36	J
BP-WV-A4-M18s-Charcoal CT-FH	039F4001.D	039F4002.D	039F4003.D	GC121P086.M	8.71	8.71	8.71	0.0	0.316	0.244	0.440	32.0	0.333	1	5.00	1	1.67	102	1.64	J
BP-WV-A4-M18s-Charcoal CT-BH	040F4101.D	040F4102.D	040F4103.D	GC121P086.M	8.71	8.71	8.71	0.0	0.328	0.269	0.268	13.8	0.288	1	5.00	1	1.44	102	1.42	J
																			15.3	J
BP-WV-A4s-M18s-CondA Cond	041F4401.D	041F4402.D	041F4403.D	GC121P086.M	8.71	NA	NA	NA	0.285	0.240	0.240	11.8	0.255	1	5.00	1.235	1.58	100	1.28	J
BP-WV-A4s-M18s-Sorbent XAD-FH	044F4501.D	044F4502.D	044F4503.D	GC121P086.M	8.71	8.71	8.71	0.0	9.30	9.25	9.48	1.5	9.34	1	5.00	1	46.7	100	46.7	
BP-WV-A4s-M18s-Sorbent XAD-BH	045F4601.D	045F4602.D	045F4603.D	GC121P086.M	8.71	8.71	8.71	0.0	0.327	0.253	0.251	18.1	0.277	1	5.00	1	1.39	100	1.39	J
BP-WV-A4s-M18s-Charcoal CT-FH	046F4701.D	046F4702.D	046F4703.D	GC121P086.M	8.71	8.71	8.71	0.0	0.264	0.262	0.257	1.8	0.261	1	5.00	1	1.31	100	1.31	J
BP-WV-A4s-M18s-Charcoal CT-BH	047F4801.D	047F4802.D	047F4803.D	GC121P086.M	NA	NA	8.71	NA	0.240	0.240	0.243	0.9	0.241	1	5.00	1	1.21	100	1.21	J
																			51.9	
LD / M18 A3 Cond Spk	027F2701.D	027F2702.D	027F2703.D	GC121P086.M	NA	NA	NA	NA	0.240	0.240	0.240	0.0	0.240	1	5.00	1.235	1.48	100	1.20	ND
																		% Difference	NA	

Company URS Corp - Austin
Analyst KMT
Parameters EPA Method 18 Tubes

Client # 40942317
Job # 0711-08
Samples 3 Collocated Runs

MDL 0.201 (ug/mL)
LOQ 2.01 (ug/mL)
Compound Acrylonitrile

Lower Curve Limit 2.01 (ug/mL)
Upper Curve Limit 2,013 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Raff	067B7601.D	067B7602.D	067B7603.D	GC122P038.M	NA	NA	NA	NA	0.201	0.201	0.201	0.0	0.201	1	42.0	8.44	100	8.44	ND
BP-WV-A2s-M18s-CondA Raff	068B7701.D	068B7702.D	068B7703.D	GC122P038.M	NA	NA	NA	NA	0.201	0.201	0.201	0.0	0.201	1	42.0	8.44	100	8.44	ND
BP-WV-A3-M18s-CondA Raff	069B7801.D	069B7802.D	069B7803.D	GC122P038.M	NA	NA	NA	NA	0.201	0.201	0.201	0.0	0.201	1	42.0	8.44	100	8.44	ND
BP-WV-A3s-M18s-CondA Raff	070B8101.D	070B8102.D	070B8103.D	GC122P038.M	3.78	3.78	3.78	0.1	0.409	0.375	0.371	6.2	0.385	1	42.0	16.2	100	16.2	J
LD / M18 A3 Spk Cond Raff	071B8201.D	071B8202.D	071B8203.D	GC122P038.M	3.78	3.78	3.78	0.1	0.388	0.389	0.336	9.4	0.371	1	42.0	15.6	100	15.6	J
																	% Difference	3.6%	
BP-WV-A4-M18s-CondA Raff	072B8301.D	072B8302.D	072B8303.D	GC122P038.M	NA	NA	NA	NA	0.201	0.201	0.201	0.0	0.201	1	42.0	8.44	100	8.44	ND
BP-WV-A4s-M18s-CondA Raff	073B8401.D	073B8402.D	073B8403.D	GC122P038.M	3.78	3.78	3.78	0.1	0.456	0.402	0.368	11.5	0.409	1	42.0	17.2	100	17.2	J
H2O RB Raff	074B8501.D	074B8502.D	074B8503.D	GC122P038.M	NA	NA	NA	NA	0.201	0.201	0.201	0.0	0.201	1	1.00	0.20	100	0.201	ND
AQ LCS 1 Raff	075B8601.D	075B8602.D	075B8603.D	GC122P038.M	3.77	3.77	3.77	0.0	19.0	18.2	18.7	2.2	18.6	1	10.0	186	100	186	
																	Spike Amount (ug)	236	
																	Spike Recovery (%)	79.0%	
AQ LCS 2 Raff	076B8701.D	076B8702.D	076B8703.D	GC122P038.M	3.77	3.77	3.77	0.0	17.9	18.3	17.5	2.2	17.9	1	10.0	179	100	179	
																	Spike Amount (ug)	236	
																	Spike Recovery (%)	76.1%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Tubes

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.238 (ug/mL)
LOQ 1.96 (ug/mL)
Compound Acetonitrile

Lower Curve Limit 1.96 (ug/mL)
Upper Curve Limit 1,965 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Raff	067B7601.D	067B7602.D	067B7603.D	GC122P038.M	NA	NA	NA	NA	0.238	0.238	0.238	0.0	0.238	1	42.0	10.0	100	10.0	ND
BP-WV-A2s-M18s-CondA Raff	068B7701.D	068B7702.D	068B7703.D	GC122P038.M	3.90	3.90	3.90	0.1	2.15	2.19	2.13	1.5	2.16	1	42.0	90.6	100	90.6	
BP-WV-A3-M18s-CondA Raff	069B7801.D	069B7802.D	069B7803.D	GC122P038.M	NA	NA	NA	NA	0.238	0.238	0.238	0.0	0.238	1	42.0	10.0	100	10.0	ND
BP-WV-A3s-M18s-CondA Raff	070B8101.D	070B8102.D	070B8103.D	GC122P038.M	3.90	3.90	3.90	0.0	2.59	2.68	2.63	1.9	2.63	1	42.0	111	100	111	
LD / M18 A3 Spk Cond Raff	071B8201.D	071B8202.D	071B8203.D	GC122P038.M	3.90	3.90	3.90	0.1	2.71	2.77	2.64	2.5	2.71	1	42.0	114	100	114	
																	% Difference	2.8%	
BP-WV-A4-M18s-CondA Raff	072B8301.D	072B8302.D	072B8303.D	GC122P038.M	NA	NA	NA	NA	0.238	0.238	0.238	0.0	0.238	1	42.0	10.0	100	10.0	ND
BP-WV-A4s-M18s-CondA Raff	073B8401.D	073B8402.D	073B8403.D	GC122P038.M	3.90	3.90	3.90	0.1	2.80	2.74	2.81	1.5	2.78	1	42.0	117	100	117	
H2O RB Raff	074B8501.D	074B8502.D	074B8503.D	GC122P038.M	NA	NA	NA	NA	0.238	0.238	0.238	0.0	0.238	1	1.00	0.238	100	0.238	ND
AQ LCS 1 Raff	075B8601.D	075B8602.D	075B8603.D	GC122P038.M	3.90	3.90	3.90	0.0	21.3	20.8	21.0	1.1	21.0	1	10.0	210	100	210	
																	Spike Amount (ug)	235	
																	Spike Recovery (%)	89.3%	
AQ LCS 2 Raff	076B8701.D	076B8702.D	076B8703.D	GC122P038.M	3.90	3.90	3.90	0.0	20.6	20.9	20.4	1.4	20.6	1	10.0	206	100	206	
																	Spike Amount (ug)	235	
																	Spike Recovery (%)	87.7%	

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Tubes

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

MDL 0.242 (ug/mL)
LOQ 2.42 (ug/mL)
Compound 2-Nitropropane

Lower Curve Limit 2.42 (ug/mL)
Upper Curve Limit 2,420 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Lab ID # 3	Analysis Method	Ret Time (min)	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	Conc # 3 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Rec Eff (%)	Adj Catch Weight (ug)	Qual
BP-WV-A2-M18s-CondA Raff	067B7601.D	067B7602.D	067B7603.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
BP-WV-A2s-M18s-CondA Raff	068B7701.D	068B7702.D	068B7703.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
BP-WV-A3-M18s-CondA Raff	069B7801.D	069B7802.D	069B7803.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
BP-WV-A3s-M18s-CondA Raff	070B8101.D	070B8102.D	070B8103.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
LD / M18 A3 Spk Cond Raff	071B8201.D	071B8202.D	071B8203.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
																	% Difference	NA	
BP-WV-A4-M18s-CondA Raff	072B8301.D	072B8302.D	072B8303.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
BP-WV-A4s-M18s-CondA Raff	073B8401.D	073B8402.D	073B8403.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	42.0	10.2	100	10.2	ND
H2O RB Raff	074B8501.D	074B8502.D	074B8503.D	GC122P038.M	NA	NA	NA	NA	0.242	0.242	0.242	0.0	0.242	1	1.00	0.242	100	0.242	ND

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbent

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Location **BP-Husky Refining, LLC - DCU3: Toledo, OH**

Spike ID **Acetonitrile**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (DSL)	Rec. (%)
BP-WV-A2s-M18s	Sample	14.0	235	30.666	79.1
BP-WV-A2-M18s	Spike	205		40.531	
BP-WV-A3-M18s	Sample	0.00	235	37.914	77.3
BP-WV-A3s-M18s	Spike	182		35.187	
BP-WV-A4-M18s	Sample	0.00	235	34.910	79.4
BP-WV-A4s-M18s	Spike	187		31.474	

Avg Recovery: 78.6

Spike ID **Acrylonitrile**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	0.00	236	30.666	48.7
BP-WV-A2-M18s	Spike	115		40.531	
BP-WV-A3-M18s	Sample	0.00	236	37.914	52.0
BP-WV-A3s-M18s	Spike	122		35.187	
BP-WV-A4-M18s	Sample	0.00	236	34.910	50.8
BP-WV-A4s-M18s	Spike	120		31.474	

Avg Recovery: 50.5

Spike ID **MTBE**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	0.00	22.1	30.666	0.0
BP-WV-A2-M18s	Spike	0.00		40.531	
BP-WV-A3-M18s	Sample	1.53	22.1	37.914	98.3
BP-WV-A3s-M18s	Spike	23.2		35.187	
BP-WV-A4-M18s	Sample	0.00	22.1	34.910	84.2
BP-WV-A4s-M18s	Spike	18.6		31.474	

Avg Recovery: 91.2

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbent

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Location **BP-Husky Refining, LLC - DCU3: Toledo, OH**
Spike ID **2-Nitropropane**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	6.42	29.1	30.666	25.39
BP-WV-A2-M18s	Spike	15.9		40.531	
BP-WV-A3-M18s	Sample	1.46	29.1	37.914	60.9
BP-WV-A3s-M18s	Spike	19.0		35.187	
BP-WV-A4-M18s	Sample	1.28	29.1	34.910	50.0
BP-WV-A4s-M18s	Spike	15.7		31.474	

Avg Recovery: 45.4

Spike ID **Isooctane**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	2.77	24.1	30.666	101
BP-WV-A2-M18s	Spike	28.0		40.531	
BP-WV-A3-M18s	Sample	0.00	24.1	37.914	103
BP-WV-A3s-M18s	Spike	24.9		35.187	
BP-WV-A4-M18s	Sample	0.00	24.1	34.910	106
BP-WV-A4s-M18s	Spike	25.5		31.474	

Avg Recovery: 103

Spike ID **MIBK**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	0.85	23.9	30.666	89.4
BP-WV-A2-M18s	Spike	22.5		40.531	
BP-WV-A3-M18s	Sample	1.00	23.9	37.914	100
BP-WV-A3s-M18s	Spike	24.9		35.187	
BP-WV-A4-M18s	Sample	0.00	23.9	34.910	99.8
BP-WV-A4s-M18s	Spike	23.8		31.474	

Avg Recovery: 96.5

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbent

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Location **BP-Husky Refining, LLC - DCU3: Toledo, OH**
Spike ID **Chlorobenzene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	13.7	33.2	30.666	117
BP-WV-A2-M18s	Spike	56.8		40.531	
BP-WV-A3-M18s	Sample	7.45	33.2	37.914	90.5
BP-WV-A3s-M18s	Spike	36.9		35.187	
BP-WV-A4-M18s	Sample	9.16	33.2	34.910	109
BP-WV-A4s-M18s	Spike	44.6		31.474	

Avg Recovery: 106

Spike ID **Ethylbenzene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	28.7	26.0	30.666	67.6
BP-WV-A2-M18s	Spike	55.5		40.531	
BP-WV-A3-M18s	Sample	10.0	26.0	37.914	93.7
BP-WV-A3s-M18s	Spike	33.6		35.187	
BP-WV-A4-M18s	Sample	10.8	26.0	34.910	122
BP-WV-A4s-M18s	Spike	41.5		31.474	

Avg Recovery: 103

Spike ID **m/p-Xylene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	125	43.0	30.666	49.4
BP-WV-A2-M18s	Spike	186		40.531	
BP-WV-A3-M18s	Sample	61.4	43.0	37.914	91.9
BP-WV-A3s-M18s	Spike	96.5		35.187	
BP-WV-A4-M18s	Sample	46.7	43.0	34.910	128
BP-WV-A4s-M18s	Spike	96.9		31.474	

Avg Recovery: 89.6

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbent

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Location **BP-Husky Refining, LLC - DCU3: Toledo, OH**
Spike ID **Styrene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	5.62	27.2	30.666	149
BP-WV-A2-M18s	Spike	47.9		40.531	
BP-WV-A3-M18s	Sample	0.983	27.2	37.914	117
BP-WV-A3s-M18s	Spike	32.6		35.187	
BP-WV-A4-M18s	Sample	3.87	27.2	34.910	140
BP-WV-A4s-M18s	Spike	41.4		31.474	

Avg Recovery: 135

Spike ID **o-Xylene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	55.6	26.4	30.666	24.0
BP-WV-A2-M18s	Spike	79.8		40.531	
BP-WV-A3-M18s	Sample	11.0	26.4	37.914	99.9
BP-WV-A3s-M18s	Spike	36.6		35.187	
BP-WV-A4-M18s	Sample	22.4	26.4	34.910	117
BP-WV-A4s-M18s	Spike	51.0		31.474	

Avg Recovery: 80.3

Spike ID **Cumene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	4.25	26.0	30.666	92.5
BP-WV-A2-M18s	Spike	29.7		40.531	
BP-WV-A3-M18s	Sample	0.00	26.0	37.914	102
BP-WV-A3s-M18s	Spike	26.4		35.187	
BP-WV-A4-M18s	Sample	1.93	26.0	34.910	107
BP-WV-A4s-M18s	Spike	29.7		31.474	

Avg Recovery: 101

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 18 Adsorbent

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Location **BP-Husky Refining, LLC - DCU3: Toledo, OH**
Spike ID **Nitrobenzene**

Sample ID	Type	Catch Weight (ug)	Spike AMT (ug)	Sample Vol (L)	Rec. (%)
BP-WV-A2s-M18s	Sample	20.3	36.1	30.666	80.1
BP-WV-A2-M18s	Spike	55.6		40.531	
BP-WV-A3-M18s	Sample	7.02	36.1	37.914	120
BP-WV-A3s-M18s	Spike	49.7		35.187	
BP-WV-A4-M18s	Sample	15.5	36.1	34.910	105
BP-WV-A4s-M18s	Spike	51.9		31.474	

Avg Recovery: 102

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corporation
Analyst	KMT
Parameters	EPA Method 18 Adsorbents

Client #	40942317
Job #	0711-08
# Samples	3 Collocated Runs

Custody

Steve Eckard of Enthalpy Analytical, Inc. received the samples on 7/30/11 at 3.9 °C after being relinquished by URS Corporation of Austin, TX. The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for acetonitrile, acrylonitrile, methyl tert-butyl ether (MTBE), 2-nitropropane, isooctane, methyl isobutyl ketone (MIBK), chlorobenzene, ethylbenzene, m/p-xylene, styrene, o-xylene, cumene, and nitrobenzene using the analytical procedures in EPA Method 18, Measurement of Gaseous Organic Compound Emissions by Gas Chromatography (40 CFR Part 60, Appendix A).

Each sample train consisted of a knockout impinger, a SKC XAD-4 (Cat# 226-93) sample tube, and a SKC Charcoal (Cat# 226-16) sample tube. Each sample tube was divided into front half (FH) and back half (BH) fractions. Each fraction was desorbed using 5 mL of low-benzene carbon disulfide.

The condensate samples were received with zero headspace. An 8 mL aliquot was removed and archived. The remaining condensate was extracted with carbon disulfide. The carbon disulfide and aqueous layers were separated and analyzed seperately. The aqueous fraction is termed the raffinate.

The preparation technican observed that the tube fractions for sample ***BP-WV-A2-M18s*** were labeled incorrectly. That is, the spikes tubes were labeled as ***BP-WV-A2-M18s*** and the unspiked tubes as ***BP-WV-A2s-M18s***. The samples have been labeled as received in the Results and Sample Chromatogram sections of the report; however, the the values have been applied correctly.

The Hewlett Packard Model 6890, Gas Chromatograph "Lucy" (S/N US00039147) equipped with a Flame Ionization Detector and a Restek Rtx-1 30 m x 0.32 mm x 4.0 um (S/N 450928) capillary column was used for the extract analyses.

The Hewlett Packard Model 5890, Series II Gas Chromatograph "Teller" (S/N 3033A31174) equipped with a Flame Ionization Detector and a Restek Stabilwax 30 m x 0.32 mm x 0.5 um (S/N 964070) capillary column was used for the raffinate analysis.

Enthalpy Analytical Narrative Summary
(continued)

Calibration

The calibration curves are included in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition methods (GC121P086.M, GC121P086B.M, and GC122P038.M) are included in the Calibration Curve Chromatograms section of this report.

QC Notes

A spike recovery study was performed for the compounds of interest during the field test. The laboratory prepared aqueous spikes for acetonitrile and acrylonitrile, at 235 µg and 236 µg, respectively. The lab provided XAD-2 tubes spiked with the remaining compounds of interest. Each tube was spiked with 22.1 µg of MTBE, 29.1 µg of 2-nitropropane, 24.1 µg of isooctane, 23.9 µg of MIBK, 33.2 µg of chlorobenzene, 26.0 µg of ethylbenzene, 43.0 µg of p-xylene, 27.2 µg of styrene, 26.4 µg of o-xylene, 26.0 µg of cumene, and 36.1 µg of nitrobenzene.

The collocated spike runs exhibited passing recovery efficiency values (i.e. values between 70 - 130%) for most of the compounds. The passing recovery efficiency values were used to adjust the associated sample results for those compounds.

The recovery value for MTBE was calculated using only ***BP-WV-A3-M18s*** and ***BP-WV-A4-M18s***. The recovery efficiency values for acrylonitrile, 2-nitropropane and styrene did not meet criteria. The recovery values for these compounds were 50.5%, 45.4% and 135%, respectively. These results have been reported as measured (i.e. not adjusted).

Two of the spiked-XAD tubes were retained and desorbed and analyzed in the same manner as the samples. They have been reported as ***XAD LCS 1 and XAD LCS 2***, and exhibited recovery values ranging from 92.8% to 99.8%.

Enthalpy Analytical Narrative Summary
(continued)

QC Notes (continued) Two aqueous LCSs were extracted in the sample manor as the condensate samples. The raffinate fraction of the LCSs were analyzed with the sample raffinate fractions and exhibited recovery values ranging from 76.1 to 89.3 for acetonitrile and acrylonitrile.

Reporting Notes The m- and p- xylene isomers are inseparable and indistinguishable with the equipment and conditions used for this analyis. These two isomers have virtually identical responses. Therefore the instrument was calibrated using p-xylene. Any results shown are accurate representatations of the total of m-xylene and p-xylene present in the sample, though specifics about these two individual isomers cannot be given. The sample chromatograms and calibration table are labeled as p-xylene. The asociated results tables have been changed to reflect both isomers.

These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method or NELAC Standard have been previously noted in the report narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

Volatile Organics from Method 18 Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	VOCs by GC/FID	Methanol by GC/FID	Spiked Train	Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A4-M18s-CondA	Condensate - Bottle A	7/25/11 1540	X						
BP-WV-A4-M18s-Sorbent	Sorbent		X						
BP-WV-A4-M18s-Charcoal	Charcoal		X						
BP-WV-A4s-M18s-CondA	Condensate - Bottle A	7/25/11 1540	X		X				
BP-WV-A4s-M18s-Sorbent	Sorbent		X		X				
BP-WV-A4s-M18s-Charcoal	Charcoal		X		X				

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 7:50pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 2.4° Raytek Gun #2
Seal #:	Condition Good							

Remarks

URS

Chain of Custody Record

Volatile Organics from Method 18 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	**Sample Matrix**	Date/Time	VOCs by GC/FID	Methanol by GC/FID	Spiked Train	Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A3-M18s-CondA	Condensate - Bottle A	7/24/11 2103	X						
BP-WV-A3-M18s-Sorbent	Sorbent		X						
BP-WV-A3-M18s-Charcoal	Charcoal		X						
BP-WV-A3s-M18s-CondA	Condensate - Bottle A	7/24/11 2103	X		X				
BP-WV-A3s-M18s-Sorbent	Sorbent		X		X				
BP-WV-A3s-M18s-Charcoal	Charcoal		X		X				

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time	
Received by:	Date	Time	Relinquished by:	Date	Time				
Received for Lab by:	Date 8/1/11	Time 3:50p	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 2.4°	Raytek Gun #2
Seal #	Condition Good								
Remarks									

URS

Chain of Custody Record

Volatile Organics from Method 18 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	VOCs by GC/FID	Methanol by GC/FID	Spiked Train	Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M18s-CondA	Condensate - Bottle A	7/21/11 2208	X						
BP-WV-A2-M18s-Sorbent	Sorbent		X						
BP-WV-A2-M18s-Charcoal	Charcoal		X						
BP-WV-A2s-M18s-CondA	Condensate - Bottle A	7/21/11 2207	X		X				
BP-WV-A2s-M18s-Sorbent	Sorbent		X		X				
BP-WV-A2s-M18s-Charcoal	Charcoal		X		X				

Relinquished by: Nathan Reichert	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 3:50 pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 24° Raytek Gun #2
Seal #:	Condition Good							

Remarks

Spreadsheet Calculations

BP-Husky DCU3 Vent Test

Method 18 (Sorbent)

Data Entered By: *dcw*
Data Checked By:

Run No.	A2	A2-S	A3	A3-S	A4	A4-S
Date	7/21/2011	7/21/2011	7/24/2011	7/24/2011	7/25/2011	7/25/2011
Time Start	20:57	20:57	19:55	19:55	14:40	14:40
Time Finish	22:08	22:07	21:03	21:03	15:40	15:40
Stack Diameter (ft)	0.6667	0.6667	0.6667	0.6667	0.6667	0.6667
Dry Gas Meter Calibration (Yd)	0.987	0.994	0.987	0.994	0.987	0.994
Barometric Pressure ("Hg)	29.00	29.00	29.16	29.16	29.2	29.2
Height of Sampling Location (ft)	0	0	0	0	0	0
Static Pressure ("H2O)	3.21	3.21	3.41	3.41	18.96	18.96
Corrected Barometric Pressure ("Hg)	29.00	29.00	29.16	29.16	29.2	29.2
Initial Meter Reading (L)	21.058	4654.70	58.973	4704.50	101.432	4745
Final Meter Reading (L)	55.809	4700.14	100.56	4742.84	140.346	4779.8
Meter Volume (L)	34.751	45.440	41.583	38.340	38.914	34.800
Average delta H (" H2O)	0.10	1.27	0.50	0.50	0.50	0.50
Average DGM Temp (F)	112.5	112.1	97.8	98.0	107.6	107.0
Test Duration (minutes)	71	70	68	68	60	60
Meter Volume (dsL)	30.666	40.531	37.914	35.187	34.910	31.474
Average Sample Rate (L/min)	0.489	0.649	0.612	0.564	0.649	0.580

Delta H	**Delta H**	**Delta H**	**Delta H**	**Delta H**	**Delta H**
0.1	1.3	0.5	0.5	0.5	0.5
0.1	1.3	0.5	0.5	0.5	0.5
0.1	1.2	0.5	0.5	0.5	0.5
0.1	1.2	0.5	0.5	0.5	0.5
0.1	1.2	0.5	0.5	0.5	0.5
0.1	1.2	0.5	0.5	0.5	0.5
0.1	1.2	0.5	0.5	0.5	0.5
0.1	1.4	0.5	0.5	0.5	0.5
0.1	1.3	0.5	0.5	0.5	0.5
0.1	1.4	0.5	0.5	0.5	0.5
0.1	1.3	0.5	0.5	0.5	0.5
0.1	1.3	0.5	0.5	0.5	0.5
0.1	1.3	0.5	0.5		0.5
0.1	1.2	0.5	0.5		
0.1	**1.3**	**0.5**	**0.5**	**0.5**	**0.5**

Meter Temps		**Meter Temps**		**Meter Temps**		**Meter Temps**		**Meter Temps**		**Meter Temps**	
In	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**	**In**	**Out**
113	111	110	110	98	98	97	94	107	106	105	104
113	111	110	110	98	98	97	96	108	106	104	104
112	112	110	110	98	98	97	96	108	107	105	104
112	111	110	110	98	97	97	96	108	107	105	105
112	111	111	110	99	97	99	97	108	107	106	105
112	111	111	111	98	97	98	97	108	107	106	106
113	112	112	113	98	97	98	98	108	108	107	107
113	112	112	113	98	97	99	98	108	107	108	107
114	112	113	113	98	97	99	98	108	108	109	108
114	112	113	113	99	97	100	98	109	108	110	109
114	112	114	113	99	97	100	99	109	108	110	109
114	113	115	114	99	97	100	99			110	110
114	113	115	114	98	97	100	99			110	110
115	113	115	115	98	97	100	99				
112.54		**112.14**		**97.75**		**98.04**		**107.64**		**107.04**	

Field Data Sheets

Sample Type – **Method 18** (un-spiked)	Start Time 20:57	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2208	Run 2	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 71	Operator K.E.N	Initial 0.00 @ 10" Hg
Date 7/21/11	Critical Orifice No. 80-011309	~~Pre~~-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 East Vent 3A	Bar. Press. (in. H_2O) 29.00	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point P2A ~~P3A~~	5-min Clock Time 20	Volume 021(e)058	K.E.N ΔH (in. H_2O)	Temperature (°F) n/a Stack	 ~~Critical Orifice~~	 Heat trace	 In	 Out	Vacuum (in. Hg)
P3A N ↓ A	~~08~~:57	~~021~~058	~~.0~~0.1	N ↓ A	~~.5~~	255	113	111	1
	21:03	024.453	~~.0~~0.1		~~.5~~	255	113	111	1
	21:08	025.808	0.1		~~.5~~	255	112	112	1
	21:13	027.341	0.1		~~.5~~	254	112	111	1
	21:18	028.833	0.1		~~.5~~	255	112	111	1
	21:23	030.302	0.1		~~.5~~	255	112	111	1
	21:28	032.484	0.1		~~.5~~	255	113	112	1
	21:33	035.338	0.1		~~.5~~	255	113	112	1
	21:38	038.163	0.1		~~.5~~	255	114	112	1
	21:43	040.986	0.1		~~.5~~	255	114	112	1
	21:48	043.828	0.1		~~.5~~	253	114	112	1
	21:53	046.708	0.1		~~.5~~	235	114	113	1
	21:58	050.119	0.1		~~.5~~	268	114	113	1
	22:03	052.979	0.1		~~.5~~	262	115	113	1
STOP	22:08	055.809							
N ↓ A				N ↓ A					

Comments: Yd = 0.987 post-test leak test = 0.00 @ 3"

Tube#3507301494

Charcoal=3822201875

DC 7/21/11

Sample Type – **Method 18** (spiked)	Start Time 2057	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2207	Run 2	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 70	Operator DCW	Initial 0.00 @15"
Date 7/21/11	Critical Orifice No. 80-102-04	~~Pre~~-test Flow Ved	Duct Dimension(s) 8"
Location (Source) – DCU3 East Vent	Bar. Press. (in. H₂O) 29.00	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point ~~P3A P2A~~	Clock Time	Volume (L)	ΔH (in. H₂O)	Temperature (°F) Stack	Critical Orifice	Heat trace 260	In	Out	Vacuum (in. Hg)
P3A	2057	4654.7	~~0.5~~ 1.3	—	~~0.5~~	255	110	110	3.0
	2102	4658.0	~~0.5~~ 1.3		~~0.5~~	259	110	110	3.0
	2107	4661.90	1.2		~~0.5~~	259	110	110	3.0
	2112	4665.50	1.2		—	260	110	110	3.0
	2117	4668.50	1.2		—	260	111	110	3.0
	2122	4672.90	1.2		—	260	111	111	3.0
	2127	4676.10	1.2		—	260	~~112~~	113	3.0
	2132	4679.10	1.4		—	244	112	113	3.0
	2137	4682.70	1.3		—	229	113	113	3.0
	2142	4685.80	1.4			225	113	113	3.0
	2147	4689.30	1.3		—	224	114	113	2.5
	2152	4692.10	1.3		—	225	115	114	2.5
	2157	4695.95	1.3		—	223	115	114	2.5
	2202	4698.85	1.2		—	223	115	115	2.5
STOP	2207	~~0470.014~~							
		4700.14							

Comments: #3507302025 post test leak test = 0.00 @5"

Charcoal – 3822202010

DGMCF = 0.994

SDS-29: Adsorbent Tubes by Method 18
Revision Date: July 2008
Reviewed: July 2010

Sample Type – **Method 18** - Reg	Start Time 19:55	Condition A	Page	1 of 1
Plant Name – BP-Husky Toledo	End Time 21:03	Run 3	Sampling Train Leak Check	
Project Number – 40942317	Duration (min) 68	Operator K·E·N	Initial	0.00@15"
Date 7-24-11	Critical Orifice No. 80-011307	Pre-test Flow Yes	Duct Dimension(s) 8"	
Location (Source) – DCU3 East	Bar. Press. (in. H_2O) ~~29.30~~ 29.16	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0	

Point	5-min Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)					Vacuum (in. Hg)
				Stack	n/a ~~Critical Orifice~~	Heat trace	In	Out	
		~~56.~~			—	~~255~~	~~98~~	~~98~~	6
P3A	19:55	58.973	0.5	N/A	~~.02~~	255	98	98	6
	20:00	62.698	0.5		~~.02~~	255	98	98	6
	20:05	66.312	0.5		~~.02~~	255	98	98	6
	20:10	69.942	0.5		~~.02~~	254	98	97	6
	20:15	73.255	0.5		~~.02~~	255	99	97	4
	20:20	76.093	0.5		~~.02~~	255	98	97	4
	20:25	78.889	0.5		~~.02~~	254	98	97	4
	20:30	81.683	0.5		~~.02~~	255	98	97	4
	20:35	84.443	0.5		~~.02~~	255	98	97	4
	20:40	87.282	0.5		~~.02~~	256	99	97	4
	20:45	90.067	0.5		~~.02~~	255	99	97	4
	20:50	92.853	0.5		~~.02~~	255	99	97	4
	20:55	95.650	0.5		~~.02~~	256	98	97	4
98.477	21:00	~~98.477~~	0.5		~~.02~~	255	98	97	4
21:03	~~21:05~~	100.556							

Comments: Tube # - 201825 First numbers rubbed off

Charcoal # - 3507301593

final leak rate = 0.00 @ 10" DGMCF: 0.987

Sample Type – **Method 18** spiked	Date 7-24-11	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 3	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-10204-1	Operator RF	Initial 0.00 @15"
Location (Source) – DCU3 E	Barometer ID BP-2	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) ~~29.30~~ 29.16	Post-test Flow	

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F) Stack	Temperature (°F) ~~Critical Orifice~~ Hot trace	Temperature (°F) DGM In	Temperature (°F) DGM Out	Vacuum (in. Hg)
P3A	1955	4704.5	0.5	--	265	97	94	3
	2000	4707.4	0.5	--	--	97	96	3
	2005	4710.3	0.5	--	--	97	96	3
	2010	4713.5	0.5	--	--	97	96	2
	2015	4716.5	0.5	--	--	99	97	2
	2020	4719.3	0.5	--	--	98	97	2
	2025	4722.1	0.5	--	--	98	98	2
	2030	4724.7	0.5	--	--	99	98	2
	2035	4727.4	0.5	--	--	99	98	2
	2040	4730.0	0.5	--	--	100	98	2
	2045	4732.8	0.5	--	--	100	99	2
	2050	4735.5	0.5	--	--	100	99	2
	2055	4738.2	0.5	--	--	100	99	2
	2100	4740.8	0.5	--	--	100	99	2
STOP	2103	4742.84						
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Comments: Sorbent Trap Pair ID: 3507302069 Spiked
3822201925
final leak rate = 0.00 @5"
DGMCF = 0.994

Sample Type – **Method 18** (unspiked)	Start Time 14:40	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 1540	Run 4	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 60	Operator K·E·N	Initial 0.000 @ 15"
Date 7/25/11	Critical Orifice No. 80-011309-2	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 West	Bar. Press. (in. H_2O) 29.20	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	5-min. Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F) Stack	Critical Orifice	Heat trace	In	Out	Vacuum (in. Hg)
12A	14:40	101.432	0.5	N A		255	IN 106	OUT	4
	14:45	107.065	0.5			254	107	106	4
	14:50	110.854	0.5			254	108	106	2
	14:55	114.329	0.5			256	108	107	2
	15:00	117.682	0.5			255	108	107	2
	15:05	120.619	0.5			254	108	107	2
	15:10	123.467	0.5			256	108	107	2
	15:15	126.252	0.5			255	108	108	2
	15:20	129.024	0.5			255	108	107	2
	15:25	131.829	0.5			255	108	108	2
	15:30	134.637	0.5			256	109	108	2
	15:35	137.422	0.5			255	109	108	2
stop	15:40	~~140.346~~							
	~~15:45~~	140.346							

Comments: 3507301433 – 3822201783 Char.

DGMCF = 0.987

post-test leak rate = 0.0005"

SDS-29: Adsorbent Tubes by Method 18
Revision Date: July 2008
Reviewed: July 2010

Sample Type – **Method 18** spiked	Date 7/25/11	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 4	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-10204-1	Operator EDF	Initial 0@15"
Location (Source) – DCU3 West Vent	Barometer ID BP-2	Pre-test Flow Ved	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.20	Post-test Flow n/a	final leak rate = 0.005"

EF 7/25/11

Point	Clock Time	Volume (L)	ΔH (in. H₂O)	Temperature (°F)				Vacuum (in. Hg)
				Stack	Heat Trace ~~Critical Orifice~~	DGM In	DGM Out	
P2A ~~1440~~	1440 ~~1745.0~~	4745.0	0.5	--	265	105	104	2
	14:45	4748.4	0.5	--	266	104	104	2
	14:50	4751.3	0.5	--	265	105	104	2
	14:55	4754.2	0.5	--	264	105	105	2
	15:00	4757.1	0.5	--	264	106	105	2
	15:05	4759.9	0.5	--	265	106	106	2
	15:10	4762.6	0.5	--	266	107	107	2
	15:15	4765.5	0.5	--	265	108	107	2
	15:20	4768.3	0.5	--	265	109	108	2
	15:25	4771.2	0.5	--	265	110	109	2
	15:30	4774.1	0.5	--	265	110	109	2
	15:35	4777.0	0.5	--	265	110	110	2
STOP	15:40	4779.8	0.5	--	265	110	110	2
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Comments: Sorbent Trap Pair ID: T=3507301657

C=3022201846

DGMCF: ~~0.987~~ 0.994

DC 7/21/11

Sample Type – **Method 18** (spiked)	Start Time 2057	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2207	Run 2	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 70	Operator DOW	Initial 0.00 @15"
Date 7/21/11	Critical Orifice No. 80-102-04	Pre-test Flow Ved	Duct Dimension(s) 8"
Location (Source) – DCU3 East Vent	Bar. Press. (in. H_2O) 29.00	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F) 260					Vacuum (in. Hg)
				Stack	Critical Orifice	Heat trace	In	Out	
~~P3A P2A~~ P3A	2057	4654.7	~~0.5~~ 1.3	—	~~0.5~~	255	110	110	3.0
	2102	4658.0	~~0.5~~ 1.3		~~0.5~~	259	110	110	3.0
	2107	4661.90	1.2		~~0.5~~	259	110	110	3.0
	2112	4665.50	1.2		—	260	110	110	3.0
	2117	4668.50	1.2		—	260	111	110	3.0
	2122	4672.90	1.2		—	260	111	111	3.0
	2127	4676.10	1.2		—	260	112	113	3.0
	2132	4679.10	1.4		—	244	112	113	3.0
	2137	4682.70	1.3		—	229	113	113	3.0
	2142	4685.80	1.4			225	113	113	3.0
	2147	4689.30	1.3		—	224	114	113	2.5
	2152	4692.10	1.3		—	225	115	114	2.5
	2157	4695.95	1.3		—	223	115	114	2.5
	2202	4698.85	1.2		—	223	115	115	2.5
STOP	2207	~~0472.019~~							
		4700.14							

Comments: #3507302025 post test leak test = 0.00 @5"
Charcoal – 3822202010
DGMCF = 0.994

Sample Type – **Method 18** - Reg	Start Time 19:55	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 21:03	Run 3	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 68	Operator K·E·N	Initial 0.00@15"
Date 7-24-11	Critical Orifice No. 80-011307	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 East	Bar. Press. (in. H_2O) ~~29.30~~ 29.16	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	5-min Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)					Vacuum (in. Hg)
				Stack	n/a ~~Critical Orifice~~	Heat trace	In	Out	
		~~56.~~			—	~~255~~	~~98~~	~~98~~	6
P3A	19:55	58.973	0.5	N/A	~~.02~~	255	98	98	6
	20:00	62.698	0.5		~~.02~~	255	98	98	6
	20:05	66.312	0.5		~~.02~~	255	98	98	6
	20:10	69.942	0.5		~~.02~~	254	98	97	6
	20:15	73.255	0.5		~~.02~~	255	99	97	4
	20:20	76.093	0.5		~~.02~~	255	98	97	4
	20:25	78.889	0.5		~~.02~~	254	98	97	4
	20:30	81.683	0.5		~~.02~~	255	98	97	4
	20:35	84.443	0.5		~~.02~~	255	98	97	4
	20:40	87.282	0.5		~~.02~~	256	99	97	4
	20:45	90.067	0.5		~~.02~~	255	99	97	4
	20:50	92.853	0.5		~~.02~~	255	99	97	4
	20:55	95.650	0.5		~~.02~~	256	98	97	4
98.477	21:00	~~98.477~~	0.5		~~.02~~	255	98	97	4
21:03	~~21:05~~	100.556							

Comments: Tube # - 201825 First numbers rubbed off
Charcoal # - 3507301593
final leak rate = 0.00 @ 10" DGMCF: 0.987

SDS-29: Adsorbent Tubes by Method 18
Revision Date: July 2008
Reviewed: July 2010

Sample Type – **Method 18** spiked	Date 7-24-11	Condition 4	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 3	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-10204-1	Operator RF	Initial 0.00 @15"
Location (Source) – DCU3 E	Barometer ID BP-2	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) ~~29.30~~ 29.16	Post-test Flow	

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Stack	Hot trace ~~Critical Orifice~~	DGM In	DGM Out	
P3A	1955	4704.5	0.5	--	265	97	94	3
	2000	4707.4	0.5	--	--	97	96	3
	2005	4710.3	0.5	--	--	97	96	3
	2010	4713.5	0.5	--	--	97	96	2
	2015	4716.5	0.5	--	--	99	97	2
	2020	4719.3	0.5	--	--	98	97	2
	2025	4722.1	0.5	--	--	98	98	2
	2030	4724.7	0.5	--	--	99	98	2
	2035	4727.4	0.5	--	--	99	98	2
	2040	4730.0	0.5	--	--	100	98	2
	2045	4732.8	0.5	--	--	100	99	2
	2050	4735.5	0.5	--	--	100	99	2
	2055	4738.2	0.5	--	--	100	99	2
	2100	4740.8	0.5	--	--	100	99	2
STOP	2103	4742.84						
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Comments: Sorbent Trap Pair ID: 3507302069 Spiked
3822201925
final leak rate = 0.00 @5" DGMCF = 0.994

SDS-29: Adsorbent Tubes by Method 18
Per EM SOP-036
Revision Date: June 2011

Sample Type – **Method 18** (unspiked)	Start Time 14:40	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 1540	Run 4	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 60	Operator K·E·N	Initial 0.000 @ 15"
Date 7/25/11	Critical Orifice No. 80-011309-2	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 West	Bar. Press. (in. H_2O) 29.20	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	5-min. Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)					Vacuum (in. Hg)
				Stack	Critical Orifice	Heat trace	In	Out	
?2A	14:40	101.432	0.5	N A		255	IN 106	OUT	4
	14:45	107.065	0.5			254	108	108	4
	14:50	110.854	0.5			254	108	106	2
	14:55	114.329	0.5			256	108	107	2
	15:00	117.682	0.5			255	108	107	2
	15:05	120.619	0.5			254	108	107	2
	15:10	123.467	0.5			256	108	107	2
	15:15	126.252	0.5			255	108	108	2
	15:20	129.024	0.5			255	108	107	2
	15:25	131.829	0.5			255	108	108	2
	15:30	134.637	0.5			256	109	108	2
	15:35	137.422	0.5			255	109	108	2
stop	15:40	~~140.346~~							
	~~15:45~~	140.346							

Comments: 3507301433 – 3822201783 Char.
DGMCF = 0.987
post-test leak rate = 0.0005"

Sample Type – **Method 18** spiked	Date 7/25/11	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 4	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-10204-1	Operator EDF	Initial 0@15"
Location (Source) – DCU3 West Vent	Barometer ID BP-2	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.20	Post-test Flow n/a	final leak rate = 0.005"

JF 7/25/11

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Heat Trace Temperature (°F)				Vacuum (in. Hg)
				Stack	~~Critical Orifice~~	DGM In	DGM Out	
P2A ~~1440~~	1440 ~~4745.0~~	4745.0	0.5	--	265	105	104	2
↓	14:45	4748.4	0.5	--	266	104	104	2
	14:50	4751.3	0.5	--	265	105	104	2
	14:55	4754.2	0.5	--	264	105	105	2
	15:00	4757.1	0.5	--	264	106	105	2
	15:05	4759.9	0.5	--	265	106	106	2
	15:10	4762.6	0.5	--	266	107	107	2
	15:15	4765.5	0.5	--	265	108	107	2
	15:20	4768.3	0.5	--	265	109	108	2
	15:25	4771.2	0.5	--	265	110	109	2
	15:30	4774.1	0.5	--	265	110	109	2
	15:35	4777.0	0.5	--	265	110	110	2
STOP	15:40	4779.8	0.5	--	265	110	110	2
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Comments: Sorbent Trap Pair ID: T=350730/657
C=3022201846
DGMCF: ~~0.987~~ 0.994

SDS-29: Adsorbent Tubes by Method 18
Per EM SOP-036
Revision Date: June 2011

Section L
Method 25A – VOC

Calibration Data

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	

M308	THC1 Post Test	15.58	14.22	16.32
	THC2 Post Test	15.15	14.46	16.11
	Average Post Test	**15.37**	**14.34**	**16.22**

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 1

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,154.00**	94.00	**0.94%**
High (Span):	9,980.00	**9,801.00**	-179.00	**1.79%**
System Bias Check:		**5060.00** ppm		

Zero		Upscale		SO$_2$ Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	1.00	5154.00	5047.00	-440.00	-437.05	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**
System Bias Check:		**4950.00** ppm		

Zero		Upscale		NOx Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	1.00	5004.00	5132.00	92.00	88.90	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.05**	0.05	**0.00%**
Mid:	11.40	**6.47**	-4.93	**0.05%**
High (Span):	23.50	**16.92**	-6.58	**0.07%**
System Bias Check:		**11.40** ppm		

Zero		Upscale		O2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.05	-0.03	6.47	6.33	-1.85	-3.32	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.66**	0.18	**0.00%**
High (Span):	19.50	**19.10**	-0.40	**0.00%**
System Bias Check:		**9.48** ppm		

Zero		Upscale		CO2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	0.00	9.66	9.72	0.11	0.11	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**		
Low:	8,000.00	**8,250.00**		
Mid:	15,000.00	**15,500.00**		
High (Span):	29,900.00	**29,600.00**		
System Bias Check:		**15000.00** ppm		

Zero		Upscale		THC Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-240.00	-520.00	16200.00	15400.00	2003.00		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 2

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,118.00**	58.00	**0.58%**
High (Span):	9,980.00	**9,869.00**	-111.00	**1.11%**
System Bias Check:		**5060.00** ppm		

				SO_2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**-4.00**	5118.00	5236.00	**-100.00**	**-95.75**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**4,990.00**	40.00	**0.40%**
High (Span):	9,910.00	**9,832.00**	-78.00	**0.78%**
System Bias Check:		**4950.00** ppm		

				NOx Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	4990.00	5164.00	71.00	69.22	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-0.03**	-0.03	**0.00%**
Mid:	11.40	**8.24**	-3.16	**0.03%**
High (Span):	23.50	**18.91**	-4.59	**0.05%**
System Bias Check:		**11.40** ppm		

				O2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**-0.05**	8.24	4.52	**-6.69**	**-11.86**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	9.48	**9.64**	0.16	**0.00%**
High (Span):	19.50	**1.92**	-17.58	**0.18%**
System Bias Check:		**9.48** ppm		

				CO2 Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**9.64**	0.00	9.75	**-540.00**	**-93907.16**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**-6.00**		
Low:	8,000.00	**8,221.00**		
Mid:	15,000.00	**15,640.00**		
High (Span):	29,900.00	**28,724.00**		
System Bias Check:		**15000.00** ppm		

				THC Run Average		
Zero		Upscale		Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
-250.00	**-190.00**	17800.00	22400.00	12709.61		

IRM CALIBRATION AND RUN AVERAGE DATA - RUN 3

SO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.00**	0.00	**0.00%**
Mid:	5,060.00	**5,095.00**	35.00	**0.35%**
High (Span):	9,980.00	**9,913.00**	-67.00	**0.67%**

System Bias Check: **5060.00** ppm

Zero		Upscale		SO_2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
0.00	**0.00**	**5095.00**	**0.00**	**24.00**	**47.67**	

NOx Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**1.00**	1.00	**0.01%**
Mid:	4,950.00	**5,004.00**	54.00	**0.54%**
High (Span):	9,910.00	**9,804.00**	-106.00	**1.06%**

System Bias Check: **4950.00** ppm

Zero		Upscale		NOx Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
1.00	**0.00**	**5004.00**	**0.00**	**60.00**	**117.74**	

O2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	11.40	**12.00**	0.60	**0.01%**
High (Span):	23.50	**22.81**	-0.69	**0.01%**

System Bias Check: **11.40** ppm

Zero		Upscale		O2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.00	**0.00**	**12.00**	**0.00**	**2.66**	**5.05**	

CO2 Calibration/Test Run Data

Level	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**0.02**	0.02	**0.00%**
Mid:	9.48	**10.62**	1.14	**0.01%**
High (Span):	19.50	**17.61**	-1.89	**0.02%**

System Bias Check: **9.48** ppm

Zero		Upscale		CO2 Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	%w	Wet	
0.02	**0.00**	**10.62**	**0.00**	**-0.37**	**-0.68**	

THC Calibration/Test Run Data

	Tag Value	Cal Error Response	Difference	Cal Error
Zero:	0.00	**2.00**		
Low:	8,000.00	**8,156.00**		
Mid:	15,000.00	**14,941.00**		
High (Span):	29,900.00	**29,453.00**		

System Bias Check: **15000.00** ppm

Zero		Upscale		THC Run Average		
				Raw	Corrected	
Initial	Final	Initial	Final	ppmw	Wet	
29.00	**31.00**	**19100.00**	**15000.00**	**2170.00**		

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A2
THC1 Calibration Data Summary

Project ID=	40942317
Date=	21-Jul
Instrument ID=	Thermo 51C-HT
ID Number=	Buddy
Calibration Span Value (direct)=	10,000
Calibration Span Value (diluted)=	1,500
Analyzer Operating Range:	10,000
Units=	ppmvw as propane
Technicians=	KMM

EPA Method 25A Calibration Error Test Results (direct)

					5% limit	
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)	Percent of Span
N2	0	19:01	-1	1	n/a	n/a
CC352385	8,000	19:12	8,256	256	3.2%	83%
CC62892	5,010	19:14	5,195	185	3.7%	52%
CC16718	3,020	19:17	3,191	171	5.7%	32%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

					5% limit
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)
N2	0	20:17	-4	4	n/a
CC261620	29,900	20:08	29,770	130	0.4%
CC261608	15,000	20:10	15,022	22	0.1%
CC352385	8,000	20:12	8,024	24	0.3%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC1 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	20:08	1,446	20.7	96%
CC261608	15,000	20:10	730	20.6	49%
CC352385	8,000	20:12	390	20.5	26%
			Average	20.6	

EPA Method 25A Calibration Drift Test (diluted)

						3% Limit
Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	Drift (% of Span)
N2	0	20:17	-4	22:44	-7	0.0%
CC352385	8,000	20:12	8,024	22:55	7,593	-4.3%

THC1 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	22:52	1,365	21.9	91%
CC261608	15,000	22:53	684	21.9	46%
CC352385	8,000	22:55	369	21.7	25%
			Average	21.8	

THC1 Post-Test Dilution Ratio - Probe 3, M308, M18

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC62892	5,010	23:04	325	15.4	4%
CC352385	8,000	23:05	508	15.8	6%
			Average	15.6	

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A2
THC2 Calibration Data Summary

Project ID=	**40942317**
Date=	**21-Jul**
Instrument ID=	**J.U.M. 3-300A**
ID Number=	**207745**
Calibration Span Value (direct)=	**30,000**
Calibration Span Value (diluted)=	**1,525**
Analyzer Operating Range:	**100,000**
Units=	**ppmvw as propane**
Technicians=	**KMM**

EPA Method 25A Calibration Error Test Results (direct)

					5% limit	
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)	Percent of Span
N2	**0**	**19:01**	**0**	0	n/a	n/a
CC261620	**29,900**	**19:03**	**29,608**	292	1.0%	99%
CC261608	**15,000**	**19:05**	**15,548**	548	3.7%	52%
CC352385	**8,000**	**19:12**	**8,254**	254	3.2%	28%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

					5% limit
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)
N2	0	**20:17**	**-11**	11	n/a
CC261620	29,900	**20:08**	29,900	0	0.0%
CC261608	15,000	**20:10**	14,990	10	0.1%
CC352385	8,000	**20:12**	8,005	5	0.1%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC2 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	20:08	**1,520**	19.7	100%
CC261608	15,000	20:10	**762**	19.7	50%
CC352385	8,000	20:12	407	19.7	27%
			Average	**19.7**	

EPA Method 25A Calibration Drift Test (diluted)

						3% Limit
Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	Drift (% of Span)
N2	0	20:17	-11	**22:44**	**-23**	0.0%
CC352385	8,000	20:12	8,005	22:55	7,512	-1.6%

THC2 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	22:52	1,460	20.5	96%
CC261608	15,000	22:53	721	20.8	47%
CC352385	8,000	22:55	382	21.0	25%
			Average	**20.7**	

THC2 Post-Test Dilution Ratio - Probe 3, M308, M18

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC62892	5,010	23:04	327	15.3	1%
CC352385	8,000	23:05	533	15.0	2%
			Average	**15.2**	

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A3
THC1 Calibration Data Summary

Project ID= 40942317
Date= 24-Jul
Instrument ID= Thermo 51C-HT
ID Number= Buddy
Analyzer Operating Range: 10,000
Calibration Span Value (direct)= 9,000
Calibration Span Value (diluted)= 1,500
Units= ppmvw as propane
Technicians= KMM

EPA Method 25A Calibration Error Test Results (direct)

					5% limit	
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)	Percent of Span
N2	0	19:05	-1	1	n/a	n/a
CC352385	8,000	19:13	7,889	111	1.4%	88%
CC62892	5,010	19:15	4,998	12	0.2%	56%
CC16718	3,020	19:17	3,077	57	1.9%	34%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

					5% limit
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)
N2	0	19:40	-4	4	n/a
CC261620	29,900	19:31	29,785	115	0.4%
CC261608	15,000	19:33	14,970	30	0.2%
CC352385	8,000	19:35	8,047	47	0.6%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC1 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	19:31	1,410	21.2	94%
CC261608	15,000	19:33	709	21.2	47%
CC352385	8,000	19:35	381	21.0	25%
			Average	21.1	

EPA Method 25A Calibration Drift Test (diluted)

						3% Limit
Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	Drift (% of Span)
N2	0	19:40	-4	21:19	2	0.1%
CC352385	8,000	19:35	8,047	21:35	8,216	1.9%

THC1 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	21:32	2,143	14.0	143%
CC261608	15,000	21:34	1,091	13.8	73%
CC352385	8,000	21:35	601	13.3	40%
			Average	13.7	

THC1 Post-Test Dilution Ratio - Dilution Probe 3 (M18, M308)

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	21:54	2,042	14.6	41%
CC62892	5,010	21:55	363	13.8	7%
			Average	14.2	

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A3
THC2 Calibration Data Summary

Project ID= 40942317
Date= 24-Jul
Instrument ID= J.U.M. 3-300A
ID Number= 207745
Analyzer Operating Range: 100,000
Calibration Span Value (direct)= 30,000
Calibration Span Value (diluted)= 1,394
Units= ppmvw as propane
Technicians= KMM

EPA Method 25A Calibration Error Test Results (direct)

					5% limit	
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)	Percent of Span
N2	0	19:05	-6	6	n/a	n/a
CC261620	29,900	19:10	28,724	1176	3.9%	96%
CC261608	15,000	19:11	15,640	640	4.3%	52%
CC352385	8,000	19:13	8,221	221	2.8%	27%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

					5% limit
Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	Cal Error (% of Value)
N2	0	19:40	-12	12	n/a
CC261620	29,900	19:31	29,986	86	0.3%
CC261608	15,000	19:33	14,930	70	0.5%
CC352385	8,000	19:35	8,014	14	0.2%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC2 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	19:31	1,393	21.5	100%
CC261608	15,000	19:33	694	21.6	50%
CC352385	8,000	19:35	372	21.5	27%
			Average	21.5	

EPA Method 25A Calibration Drift Test (diluted)

						3% Limit
Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	Drift (% of Span)
N2	0	19:40	-12	21:29	-9	0.0%
CC352385	8,000	19:35	8,014	21:35	8,090	0.3%

THC2 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	21:32	2,092	14.3	150%
CC261608	15,000	21:34	1,050	14.3	75%
CC352385	8,000	21:35	569	14.1	41%
			Average	14.2	

THC2 Post-Test Dilution Ratio - Dilution Probe 3 (M18, M308)

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	21:54	2,032	14.7	14%
CC62892	5,010	21:55	353	14.2	2%
			Average	14.5	

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A4
THC1 Calibration Data Summary

Project ID= 40942317
Date= 25-Jul
Instrument ID= Thermo 51C-HT
ID Number= Buddy
Analyzer Operating Range: 10,000
Calibration Span Value (direct)= 9,000
Calibration Span Value (diluted)= 2,300
Units= ppmvw as propane
Technicians= KMM

EPA Method 25A Calibration Error Test Results (direct)

Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	5% limit Cal Error (% of Value)	Percent of Span
N2	0	11:09	-4	4	n/a	n/a
CC352385	8,000	10:54	8,009	9	0.1%	89%
CC62892	5,010	10:56	4,832	178	3.6%	54%
CC16718	3,020	10:59	2,987	33	1.1%	33%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	5% limit Cal Error (% of Value)
N2	0	11:26	-1	1	n/a
CC261620	29,900	11:28	29,419	481	1.6%
CC261608	15,000	11:29	14,933	67	0.4%
CC352385	8,000	11:31	8,170	170	2.1%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC1 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	11:28	2,174	13.8	95%
CC261608	15,000	11:29	1,103	13.6	48%
CC352385	8,000	11:31	604	13.3	26%
			Average	13.5	

EPA Method 25A Calibration Drift Test (diluted)

Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	3% Limit Drift (% of Span)
N2	0	11:26	-1	15:43	-1	0.0%
CC352385	8,000	11:31	8,170	15:54	8,174	0.0%

THC1 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	15:51	1,736	17.2	75%
CC261608	15,000	15:52	877	17.1	38%
CC352385	8,000	15:54	481	16.6	21%
			Average	17.0	

THC1 Post-Test Dilution Ratio; Dilution Probe 3: M308, M18

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC16718	3,020	15:59	187	16.1	4%
CC352385	8,000	16:00	484	16.5	10%
			Average	16.3	

URS
Total Hydrocarbon Analyzer
Calibration Data

Test Run A4

THC2 Calibration Data Summary

Project ID= 40942317
Date= 25-Jul
Instrument ID= J.U.M. 3-300A
ID Number= 207745
Analyzer Operating Range: 100,000
Calibration Span Value (direct)= 30,000
Calibration Span Value (diluted)= 2,277
Units= ppmvw as propane
Technicians= KMM

EPA Method 25A Calibration Error Test Results (direct)

Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	5% limit Cal Error (% of Value)	Percent of Span
N2	0	11:09	6	6	n/a	n/a
CC261620	29,900	10:48	28,608	1292	4.3%	95%
CC261608	15,000	10:49	15,334	334	2.2%	51%
CC352385	8,000	10:54	8,049	49	0.6%	27%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

EPA Method 25A Calibration Error Test Results (diluted)

Cylinder ID	Certified Value	Time	CEM Response	Absolute Difference	5% limit Cal Error (% of Value)
N2	0	11:26	2	2	n/a
CC261620	29,900	11:28	29,453	447	1.5%
CC261608	15,000	11:29	14,941	59	0.4%
CC352385	8,000	11:31	8,156	156	2.0%

Note: Operator may use either mid or low C_3H_8 standard for hourly drift checks, per URS SOP-27.

THC2 Pre-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	11:28	2,235	13.4	98%
CC261608	15,000	11:29	1,134	13.2	50%
CC352385	8,000	11:31	619	12.9	27%
			Average	13.2	

EPA Method 25A Calibration Drift Test (diluted)

Cylinder ID	Certified Value	Time	Cal. Error CEMS Response	Time	Drift CEMS Response	3% Limit Drift (% of Span)
N2	0	11:26	2	15:43	2	0.0%
CC352385	8,000	11:31	8,156	15:54	8,172	0.1%

THC2 Post-Test Dilution Ratio

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC261620	29,900	15:51	1,768	16.9	78%
CC261608	15,000	15:52	892	16.8	39%
CC352385	8,000	15:54	490	16.3	22%
			Average	16.7	

THC2 Post-Test Dilution Ratio; Dilution Probe 3: M308, M18

Cylinder ID	Certified Value	Time	CEM Response	Dilution Ratio	Percent of Span
CC16718	3,020	15:59	188	16.1	1%
CC352385	8,000	16:00	496	16.1	3%
			Average	16.1	

<u>Section M</u>
Method 26A – HCl, Cl_2, and HF

Laboratory Report

URS Corporation

9400 Amberglen Blvd
Austin, TX 78729

BP-Husky Refining LLC - DCU3
Toledo, OH

Project # 40942317
PO # 253716.US

Analytical Report
(0711-09)

EPA Method 26A

Hydrogen chloride, Hydrogen fluoride
Chloride

EPA OTM 29

Hydrogen cyanide

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
800-1 Capitola Drive Durham, NC 27713

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 190 pages.

Bonnie L Evans

QA Review Performed by – Bonnie L Evans

Report Issued: 09/14/2011

Summary of Results

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A H2SO4

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 3 Blanks

Compound	Sample ID / Catch Weight (ug)		
		BP-WV	
	M26A-C1-AcdImp	***M26A-C2-AcdImp***	***M26A-C3-AcdImp***
Hydrogen fluoride	1,680 ND	1,139 ND	1,526 ND
Hydrogen chloride	1,640 ND	1,112 ND	259,550
	M26A-CFB-AcdImp	***M26A-EntRB-H2SO4 Soln***	***M26A-EntRB-Water***
Hydrogen fluoride	220 ND	125 ND	6.42 ND
Hydrogen chloride	215 ND	122 ND	6.27 ND

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A NaOH

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 2 Blanks

Compound	Sample ID / Catch Weight (ug)		
	M26A-C1-AlkImp	***BP-WV M26A-C2-AlkImp***	***M26A-C3-AlkImp***
Chloride	296 ND	86.0 ND	69.6 ND
	M26A-CFB-AlkImp	***M26A-EntRB-NaOH Soln***	
Chloride	64.8 ND	40.8 ND	

Results

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (H2SO4)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 3 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Hydrogen fluoride as Fluoride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Acid Conversion Factor	Catch Weight (ug)	Qual
M26A-C1-AcdImp	041-3501.D	041-3502.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	7,978	1.053	1,680	ND
M26A-C2-AcdImp	044-3801.D	044-3802.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	5,407	1.053	1,139	ND
M26A-C3-AcdImp	045-3901.D	045-3902.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	7,248	1.053	1,526	ND
M26A-CFB-AcdImp	046-4001.D	046-4002.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	1,045	1.053	220	ND
M26A-EntRB-H2SO4 Soln	047-4101.D	047-4102.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	594	1.053	125	ND
M26A-EntRB-Water	048-4201.D	048-4202.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	305	1.053	6.42	ND
MS/M26A-C1-AcdImp	042-3601.D	042-3602.D	HPLC63PG6.M	2.67	2.67	0.0	3.45	3.45	0.1	3.45	1	10.0	1.053	36.3	
													Spike Amount (ug)	31.6	
													Native Amount (ug)	0.00	
													Spike Recovery (%)	115%	
MSD/M26A-C1-AcdImp	043-3701.D	043-3702.D	HPLC63PG6.M	2.67	2.67	0.0	3.50	3.45	0.8	3.47	1	10.0	1.053	36.6	
													Spike Amount (ug)	31.6	
													Native Amount (ug)	0.00	
													Spike Recovery (%)	116%	

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (H2SO4)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 3 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Hydrogen fluoride as Fluoride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Acid Conversion Factor	Catch Weight (ug)	Qual
0.01N H2SO4/NaOH RB	007-0801.D	007-0802.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	1.053	0.0211	ND
0.01N H2SO4/NaOH RB	007-3401.D	007-3402.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	1.053	0.0211	ND
HPLC63pg6 #SS	006-0701.D	006-0702.D	HPLC63PG6.M	2.66	2.66	0.0	1.30	1.30	0.3	1.30	1	1.00	1.053	1.37	
													Spike Amount (ug)	1.32	
													Spike Recovery (%)	104%	
HPLC63pg6 #SS	006-3301.D	006-3302.D	HPLC63PG6.M	2.67	2.67	0.0	1.28	1.29	0.0	1.29	1	1.00	1.053	1.35	
													Spike Amount (ug)	1.32	
													Spike Recovery (%)	103%	

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (H2SO4)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 3 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Hydrogen chloride as Chloride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Acid Conversion Factor	Catch Weight (ug)	Qual
M26A-C1-AcdImp	041-3501.D	041-3502.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	7,978	1.028	1,640	ND
M26A-C2-AcdImp	044-3801.D	044-3802.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	5,407	1.028	1,112	ND
M26A-C3-AcdImp	045-3901.D	045-3902.D	HPLC63PG6.M	3.52	3.52	0.1	3.48	3.48	0.0	3.48	10	7,248	1.028	259,550	
M26A-CFB-AcdImp	046-4001.D	046-4002.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	1,045	1.028	215	ND
M26A-EntRB-H2SO4 Soln	047-4101.D	047-4102.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	594	1.028	122	ND
M26A-EntRB-Water	048-4201.D	048-4202.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	305	1.028	6.27	ND
MS/M26A-C1-AcdImp	042-3601.D	042-3602.D	HPLC63PG6.M	3.52	3.53	0.1	2.91	2.91	0.0	2.91	1	10.0	1.028	29.9	
													Spike Amount (ug)	30.8	
													Native Amount (ug)	0.00	
													Spike Recovery (%)	97.1%	
MSD/M26A-C1-AcdImp	043-3701.D	043-3702.D	HPLC63PG6.M	3.53	3.53	0.0	2.94	2.91	0.4	2.93	1	10.0	1.028	30.1	
													Spike Amount (ug)	30.8	
													Native Amount (ug)	0.00	
													Spike Recovery (%)	97.5%	

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (H2SO4)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 3 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Hydrogen chloride as Chloride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Acid Conversion Factor	Catch Weight (ug)	Qual
0.01N H2SO4/NaOH RB	007-0801.D	007-0802.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	1.028	0.0206	ND
0.01N H2SO4/NaOH RB	007-3401.D	007-3402.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	1.028	0.0206	ND
HPLC63pg6 #SS	006-0701.D	006-0702.D	HPLC63PG6.M	3.52	3.52	0.0	2.38	2.37	0.2	2.38	1	1.00	1.028	2.44	
													Spike Amount (ug)	2.57	
													Spike Recovery (%)	95.1%	
HPLC63pg6 #SS	006-3301.D	006-3302.D	HPLC63PG6.M	3.53	3.53	0.1	2.36	2.36	0.0	2.36	1	1.00	1.028	2.43	
													Spike Amount (ug)	2.57	
													Spike Recovery (%)	94.6%	

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (NaOH)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 2 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Chloride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
M26A-C1-AlkImp	049-4301.D	049-4302.D	HPLC63PG6CL.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	1,478	296	ND
M26A-C2-AlkImp	052-4801.D	052-4802.D	HPLC63PG6CL.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	430	86.0	ND
M26A-C3-AlkImp	053-4901.D	053-4902.D	HPLC63PG6CL.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	348	69.6	ND
M26A-CFB-AlkImp	054-5001.D	054-5002.D	HPLC63PG6CL.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	324	64.8	ND
M26A-EntRB-NaOH Soln	055-5101.D	055-5102.D	HPLC63PG6CL.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	10	204	40.8	ND
MS/M26A-C1-AlkImp	050-4401.D	050-4402.D	HPLC63PG6CL.M	3.51	3.51	0.0	2.93	2.94	0.2	2.94	1	10.0	29.4	
												Spike Amount (ug)	30.0	
												Native Amount (ug)	0.00	
												Spike Recovery (%)	97.9%	
MSD/M26A-C1-AlkImp	051-4701.D	051-4702.D	HPLC63PG6CL.M	3.51	3.51	0.0	2.96	2.93	0.5	2.95	1	10.0	29.5	
												Spike Amount (ug)	30.0	
												Native Amount (ug)	0.00	
												Spike Recovery (%)	98.3%	

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A (NaOH)

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 2 Blanks

MDL 0.0200 (ug/mL)
LOQ 0.200 (ug/mL)
Compound Chloride

Lower Curve Limit 0.200 (ug/mL)
Upper Curve Limit 15.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
0.01N H_2SO_4/NaOH RB	007-0801.D	007-0802.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	0.0200	ND
0.01N H_2SO_4/NaOH RB	007-3401.D	007-3402.D	HPLC63PG6.M	NA	NA	NA	0.0200	0.0200	0.0	0.0200	1	1.00	0.0200	ND
HPLC63pg6 #SS	006-0701.D	006-0702.D	HPLC63PG6.M	3.52	3.52	0.0	2.38	2.37	0.2	2.38	1	1.00	2.38	
												Spike Amount (ug)	2.50	
												Spike Recovery (%)	95.1%	
HPLC63pg6 #SS	006-3301.D	006-3302.D	HPLC63PG6.M	3.53	3.53	0.1	2.36	2.36	0.0	2.36	1	1.00	2.36	
												Spike Amount (ug)	2.50	
												Spike Recovery (%)	94.6%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA Method 26A

Client #	40942317
Job #	0711-09
# Samples	3 Runs, 5 Blanks

Custody

Steve Eckard received the samples on 7/30/11 at 27.5°C after being relinquished by URS Corporation of Austin, TX. Lindsey Chatterton logged in the samples on 8/1/11 at 23.6°C in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for hydrogen chloride (HCl) as chloride, hydrogen fluoride (HF) as fluoride, and chloride using the analytical procedures in EPA Method 26A, Determination of Hydrogen Halide and Halogen Emissions from Stationary Sources Isokinetic Method (40 CFR Part 60, Appendix A).

For the runs with multiple containers received, proportional aliquots of the sample were taken and combined for a single analysis per run.

The samples were analyzed following the procedures in Section 11.0, Analytical Procedures. All samples and standards are prepared, stored, and analyzed using high-density polyethylene containers.

The Metrohm 861 Compact IC ("Smithers" S/N 1861002007189) was equipped with a Metrohm 861 Conductivity Detector and a Metrosep A Supp 5 - 110/4.0mm (S/N # 7908289) column.

Calibration

The calibration curves are located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method Metrohm.M is included in the Calibration Curve Chromatograms section of this report.

Enthalpy Analytical Narrative Summary

(continued)

QC Notes

As required in Section 7.2.2, Absorbing Solution Blanks, client-provided reagent blanks were analyzed. Additionally, a quality control check sample was analyzed at the same time as the blanks and samples. All method required acceptance criteria were met.

The target analytes were not identified above the MDL in the analyses of the method blanks and client blanks.

A confirmation analysis was performed using an aliquot of the sample, ***M26A-C3-AcdImp***. The data confirmed the initial result. The initial result was reported.

A matrix spike and matrix spike duplicate (MS and MSD) were prepared using aliquots of the samples ***M26A-C1-AcdImp*** and ***M26A-C1-AlkImp***. The recovery values ranged from 97.1% to 116%.

Second source standards (#SS) were prepared and used as Laboratory Control Samples and analyzed with the samples. The recovery values ranged from 94.6% to 104%.

All sample preparation and analytical holding times specified in the method were met. Section 13.2, Sample Stability, specifies an analytical holding time of four weeks.

Reporting Notes

The H_2SO_4 matrix samples were analyzed for Cl^- and F^- but are reported as HCl and HF. The results were converted using an acid conversion factor of 1.028 for HCl and 1.053 for HF.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

Samples from Method 26A Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	HCl, Cl2, and HF by HPLC/Ion Chromatography			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C1-M26A-AcdImpA	Sulfuric Acid Impinger Catch - Bottle A	7/18/11 2236	X						Combine for single analysis.
BP-WV-C1-M26A-AcdImpB	Sulfuric Acid Impinger Catch - Bottle B		X						
BP-WV-C1-M26A-AcdImpC	Sulfuric Acid Impinger Catch - Bottle C		X						
BP-WV-C1-M26A-AcdImpD	Sulfuric Acid Impinger Catch - Bottle D		X						
BP-WV-C1-M26A-AcdImpE	Sulfuric Acid Impinger Catch - Bottle E		X						
BP-WV-C1-M26A-AcdImpF	Sulfuric Acid Impinger Catch - Bottle F		X						
BP-WV-C1-M26A-AcdImpG	Sulfuric Acid Impinger Catch - Bottle G		X						
BP-WV-C1-M26A-AlkImp	Sodium Hydroxide Impinger Catch		X						Combine for single analysis. Check sample for sulfide ions prior to analysis, which may interfere with sodium thiosulfate addition.
BP-WV-C1-M26A-AlkImpB	Sodium Hydroxide Impinger Catch - Bottle B		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

RG #2 27.5 °C

Relinquished by: Nathan Reh	Date 7/30/11	Time 1245	Received by:	Date 7/30	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 1:53pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 23.6° Raytek Gun #2

Seal #	Condition Good	

Remarks:

URS

Chain of Custody Record

Samples from Method 26A Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	HCl, Cl2, and HF by HPLC/Ion Chromatography			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C2-M26A-AcdImpA	Sulfuric Acid Impinger Catch - Bottle A	7/19/11 1520	X						Combine for single analysis.
BP-WV-C2-M26A-AcdImpB	Sulfuric Acid Impinger Catch - Bottle B		X						
BP-WV-C2-M26A-AcdImpC	Sulfuric Acid Impinger Catch - Bottle C		X						
BP-WV-C2-M26A-AlkImp	Sodium Hydroxide Impinger Catch		X						Check sample for sulfide ions prior to analysis, which may interfere with sodium thiosulfate addition.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 1:54 pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 23.6°	Raytek Gun #2
Seal #	Condition Good								

Remarks

URS

Chain of Custody Record

Samples from Method 26A Sampling Trains

Page 1 of 1

Project DCU3

Site BP-Husky Toledo

Project Number 40942317

Prepared by URS Corporation

Sample ID Code	Sample Matrix	Date/Time	HCl, Cl2, and HF by HPLC/Ion Chromatography			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C3-M26A-AcdImpA	Sulfuric Acid Impinger Catch - Bottle A	7/20/11 0953	X						Combine for single analysis.
BP-WV-C3-M26A-AcdImpB	Sulfuric Acid Impinger Catch - Bottle B		X						
BP-WV-C3-M26A-AcdImpC	Sulfuric Acid Impinger Catch - Bottle C		X						
BP-WV-C3-M26A-AcdImpD	Sulfuric Acid Impinger Catch - Bottle D		X						
BP-WV-C3-M26A-AlkImp	Sodium Hydroxide Impinger Catch		X						Check sample for sulfide ions prior to analysis, which may interfere with sodium thiosulfate addition.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 1:54pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 23.6° Raytek Gun #2

Seal #

Condition Good

Remarks

URS

Chain of Custody Record

Samples from Method 26A Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	HCl, Cl2, and HF by HPLC/Ion Chromatography				Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-CFB-M26A-AcdImpA	Sulfuric Acid Impinger Catch - Bottle A	7/20/11 ~~0953~~ 0300	X							
BP-WV-CFB-M26A-AlkImp	Sodium Hydroxide Impinger Catch		X							
BP-WV-EntRB-M26A-Water	Water	7/24/11 1330	X							
BP-WV-EntRB-M26A-NaOH Soln	Sodium Hydroxide Solution		X							
BP-WV-EntRB-M26A-H2SO4 Soln	Sulfuric Acid Solution		X							

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 1:55pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 23.6° Raytek Gun #2
Seal #	Condition Good							

Remarks

Field Data Sheets

Sample Type: **HCl, Cl₂ (EPA Method 26A)**	Start Time 20:29	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2236	Run 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Duration (min) 127	Operator K.EN	Initial 0.004 @ 20"
Date July 18th 2011	PTCF n/a	Nozzle Dia (in) 0.206	Final 0.004 @ 22"
Location (Source) – DCU3 3.A	Console No. A167041	Nozzle ID M26A-1	Pitot Tube ID n/a
Duct Dimension(s) 8"	DGMCF 0.990	Kf N/A	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0	ΔH@ 1.937	Bar. Press. (in. H₂O) 29.22	Initial (+) (-)
Nozzle Calib. 0.206 0.205 0.206		Stat. Press. (in. H₂O) n/a	Final (+) n/a (-)
			Filter No. n/a

Point	5 min Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)						Vacuum (in. Hg)	Conden (5)
					Stack	Probe	Filter	4 Imp Exit	DGM In	DGM Out		
P3B	20:29	439.073	~~.01~~	0.01	N/A	334	321	57	96	95	20"	78
	20:34	439.498	~~.01~~	0.01		334	321	69	95	93	20"	77
	20:39	439.561	~~.01~~	0.01		320	320	83	95	93	20"	64
	20:44	439.597	~~.01~~	0.01		320	322	90	96	93	20"	65
	20:49	439.633	~~.01~~	0.01		319	321	90	96	93	20"	64
	20:54	439.700	~~.01~~	0.01		320	320	90	95	94	20"	62
	20:59	439.823	~~.01~~	0.01		319	321	89	96	94	20"	63
	21:04	439.929	~~.01~~	0.01		320	320	90	95	93	20"	59
	21:09	439.949	~~.01~~	0.01		319	319	90	96	93	20"	58
	21:14	439.995	~~.01~~	0.01		273	316	90	96	94	20"	65
	21:19	440.058	~~.01~~	0.01		272	317	90	96	94	20"	63
	21:24	440.100	~~.01~~	0.01		271	317	90	96	94	20"	56
	21:29	440.171	~~.01~~	0.01		271	317	89	96	94	20"	59
	21:34	440.218	~~.01~~	0.01		270	332	90	96	94	20"	64
	21:39	440.280	~~.01~~	0.01		270	331	90	97	94	20"	62
	21:44	440.335	~~.01~~	0.01		269	333	90	97	94	20"	58
	21:49	440.377	~~.01~~	0.01		267	334	89	97	94	20"	60
	21:54	440.435	~~.01~~	0.01		269	332	91	97	94	20"	61
	21:59	440.470	~~.01~~	0.01		268	332	91	97	94	20"	63
	22:04	440.513	~~.01~~	0.01		269	334	91	97	94	20"	61
	22:09	440:575	~~.01~~	0.01		270	333	91	97	94	20"	61
	22:14	440:605	~~.01~~	0.01		270	332	92	97	94	20"	59
	22:19	440 649	~~.01~~	0.01		270	333	92	97	94	20"	62
	22:24	440.898	~~.01~~	0.01		270	334	91	97	95	20"	57
	22:29	440.722	~~.01~~	0.01		270	334	92	98	96	20"	54
	22:34	440.778	~~.01~~	0.01		270	332	91	98	95	20"	58
22:36	~~22:39~~	440.801										

Comments:

SDS-20: HCl, Cl₂ by EPA Method 26
Revision Date: January 2008
Reviewed: July 2010

Sample Type: **HCl, Cl₂ (EPA Method 26A)**	Start Time 1423	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 1520	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Duration (min) 57	Operator WDD	Initial 0.003 @ 21"
Date 7/19/11	PTCF — n/a	Nozzle Dia (in) 0.187	Final 0.004 @ 25"
Location (Source) – DCU3 West	Console No. A167041	Nozzle ID M26A-2	Pitot Tube ID — n/a
Duct Dimension(s) 8"	DGMCF 0.990	Kf —	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0'	ΔH@ 1.937	Bar. Press. (in. H₂O) 29.16	Initial (+) — (-) — N/A
Nozzle Calib. 0.184 0.187 0.189		Stat. Press. (in. H₂O) — n/a	Final (+) — (-) —
			Filter No.

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Condenser ~~Stack~~	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	
P2A	1423	444.880	n/a	0.01	52	322	330	91	100	98	21.0"	
	1428	445.336		0.01	50	309	330	91	100	98	21.0"	
	1433	445.471		0.01	47	312	329	91	100	97	19.0"	
	1438	445.638		0.01	44	316	330	90	100	97	20.0"	
	1443	445.904		0.01	46	316	330	88	100	97	23.0"	
	1448	446.082		0.01	46	317	331	85	101	98	23.0"	
	1453	446.234		0.01	47	317	330	83	101	98	23.0"	
	1458	446.371		0.01	47	317	330	77	101	98	23.0"	
	1503	446.481		0.01	48	318	330	74	101	98	23.0"	
	1508	446.616		0.01	49	318	330	73	102	99	23.0"	
	1513	446.810		0.01	46	320	330	71	102	99	23.0"	
	1518	447.032		0.01	46	322	330	67	104	99	23.0"	
STOP	1520	447.113										

Comments: Baronmeter: BP-2

SDS-20: HCl, Cl₂ by EPA Method 26
Revision Date: January 2008
Reviewed: July 2010

Sample Type: **HCl, Cl_2 (EPA Method 26A)**	Start Time 0905	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 0950	Run 3	Sampling Train Leak Rate (ft^3 @ "Hg)
Project Number - 40942317	Duration (min) 45	Operator WDD	Initial .004 @ 20"
Date July 20th 2011	PTCF — n/a	Nozzle Dia (in) 0.187	Final 0.007 @ 20"
Location (Source) – DCU3 East	Console No. A167041	Nozzle ID WZWA-2	Pitot Tube ID — n/a
Duct Dimension(s) 8"	DGMCF 0.990	Kf N/A	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0'	ΔH@ 1.937	Bar. Press. (in. H_2O) 29.08	Initial (+) n/a (-)
700904 Nozzle Calib. 0.186 0.187 0.189		Stat. Press. (in. H_2O) n/a	Final (+) (-)
			Filter No. n/a

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Condenser ~~Stack~~	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)
P2A	0905	453.591	n/a	0.01	53 ~~N/A~~	328	329	81	96	94	20.0"
	0910	453.934		0.01	54	326	328	82	95	93	20.0"
	0915	453.988		0.01	58	317	327	83	95	92	20.0"
	0920	454.051		0.01	54	312	326	86	94	92	20.0"
	0925	454.163		0.01	60	311	326	87	94	92	20.0"
	0930	454.271		0.01	58	239*	326	88	94	91	20
	0935	454.345		0.01	58	239	326	87	94	91	20
	0940	454.469		0.01	60	238	324	89	94	91	20.0"
	0945	454.588		0.01	62	237	324	89	94	91	20.0"
STOP	0950	454.703									
~~STOP~~	~~0953~~	~~454.940~~									

wp 7/20/11

Comments: * Probe wet?

SDS-20: HCl, Cl_2 by EPA Method 26
Revision Date: January 2008
Reviewed: July 2010

Sample Type: **HCl, Cl_2 (EPA Method 26A)**	Start Time n/a	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time n/a	Run 3FB	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Duration (min) n/a	Operator RF	Initial 0.004 @ 20"
Date July 20th 2011	PTCF n/a	Nozzle Dia (in) n/a	Final n/a @
Location (Source) – DCU3	Console No. A167041	Nozzle ID n/a	Pitot Tube ID n/a
Duct Dimension(s) 8"	DGMCF 0.990	Kf N/A	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) n/a	ΔH@ 1.937	Bar. Press. (in. H_2O) n/a	Initial (+) (-)
Nozzle Calib. ● n/a ● n/a ● n/a		Stat. Press. (in. H_2O) n/a	Final (+) n/a (-)
			Filter No. n/a

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	
					N/A							

Comments:

Sample Recovery Sheets

Project No. 40942317

Recovered by (Initials) NK

HCl/Cl2

EPA Method 26A

Condition No. C

Run No. 1

Date: 7/18/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1	--		KO Fatty	3377.6		952.2	=	2425.4
2	0.1 N H2SO4	200	KO Fatty	3476.3	-	1180.7	=	2295.6
3	0.1 N H2SO4	200	G/S Fatty	3179.7	-	1222.3	=	1957.4
4	0.1 N H2SO4	100	G/S	906.1	-	760.2	=	145.9
5	0.1 N NaOH	100	Mod	931.7	-	758.1	=	173.6
6	0.1 N NaOH	100	Mod	911.9	-	746.8	=	165.1
7	--		KO	896.9	-	610.3	=	286.6
8	Zinc Acetate	200	G/S	834.4	-	837.3	=	-2.9
9	Zinc Acetate	200	G/S	855.8	-	852.8	=	3.0
10	--		KO	580.2	-	578.5	=	1.7
11	Silica Gel	~ 300g	Mod	962.5	-	955.5	=	7.0
				Total Net Gain (g) =				7458.4

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-_____-_______-M26A-AcdImp		Acid Impinger Catch & Rinse
BP-_____-_______-M26A-AlkImp		Alkaline Impinger Catch & Rinse

see sample logbook

Sample Recovery Checklist

AT LOCATION

✓ Disconnect transfer line, and rinse three times with DI water into acid impinger catch bottle. Transfer bottle to laboratory with impinger train.

IN LABORATORY

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour contents of the 1st, 2nd, 3rd, and 4th (containing acid) impingers into the Acid impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete acid impinger sample label.

✓ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete alkaline impinger sample label.

✓ Discard contents of 8th and 9th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments

no visible moisture seen in filter or probe → no post-test purge performed

Project No. 40942317
Recovered by (Initials) DCW

HCl/Cl2
EPA Method 26A

Condition No. C
Run No. 2
Date: 7/19/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1	0.1 N H$_2$SO$_4$	200	KO Fatty	3450.3	-	1175.2	=	2275.1
2	0.1 N H2SO4	200	KO Fatty	2783.6		1156.5	=	1627.1
3	0.1 N H2SO4	200	G/S Fatty	1219.9	-	1219.2	=	0.7
4	0.1 N H2SO4	100	G/S	765.5	-	766.8	=	-1.3
5	0.1 N NaOH	100	Mod	760.1	-	760.9	=	-0.8
6	0.1 N NaOH	100	Mod	748.3		747.9	=	0.4
7	--		KO	609.7	-	609.3	=	0.4
8	Zinc Acetate	200	G/S	763.5	-	873.1	=	-109.6
9	Zinc Acetate	200	G/S	778.0	-	405.6	=	-127.6
10	--		KO	757.7	-	574.7	=	183
11	Silica Gel	~ 300g	Mod	1024.3	-	960.8	=	63.5
				Total Net Gain (g)			=	3910.9

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-____-____-M26A-AcdImp	see sample logbook	Acid Impinger Catch & Rinse
BP-____-____-M26A-AlkImp		Alkaline Impinger Catch & Rinse

Sample Recovery Checklist

AT LOCATION

✓ Disconnect transfer line, and rinse three times with DI water into acid impinger catch bottle. Transfer bottle to laboratory with impinger train.

IN LABORATORY

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour contents of the 1st, 2nd, 3rd, and 4th (containing acid) impingers into the Acid impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete acid impinger sample label.

✓ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete alkaline impinger sample label.

✓ Discard contents of 8th and 9th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments

no visible moisture observed on filter or probe → no post-test purge

Project No. 40942317

Recovered by (Initials) NR

HCl/Cl2
EPA Method 26A

Condition No. C

Run No. 3

Date: 7/20/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)
1	0.1 N H_2SO_4	200	KO Fatty	3487.6	-	~~3450.3~~ 1177.6	=	2310.0
2	0.1 N H2SO4	200	KO Fatty	3356.7	-	1145.9	=	2210.8
3	0.1 N H2SO4	200	G/S Fatty	2729.3	-	1212.5	=	1516.8
4	0.1 N H2SO4	100	G/S	764.7	-	765.1	=	-0.4
5	0.1 N NaOH	100	Mod	770.4	-	770.0	=	0.4
6	0.1 N NaOH	100	Mod	756.7	-	756.4	=	0.3
7	--		KO	615.7	-	609.7	=	6.0
8	Zinc Acetate	200	G/S	901.6	-	883.5	=	18.1
9	Zinc Acetate	200	G/S	863.9	-	888.9	=	-25.0
10	--		KO	577.7	-	577.4	=	0.3
11	Silica Gel	~ 300g	Mod	988.5	-	981.3	=	7.2
				Total Net Gain (g) =				6044.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-C3-M26A-AcdImp	4	Acid Impinger Catch & Rinse
BP-WV-C3-M26A-AlkImp	1	Alkaline Impinger Catch & Rinse

Sample Recovery Checklist

AT LOCATION

✓ Disconnect transfer line, and rinse three times with DI water into acid impinger catch bottle. Transfer bottle to laboratory with impinger train.

IN LABORATORY

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour contents of the 1st, 2nd, 3rd, and 4th (containing acid) impingers into the Acid impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete acid impinger sample label.

✓ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete alkaline impinger sample label.

✓ Discard contents of 8th and 9th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments

ambient air purge not performed → no moisture visible on filter even though probe temp dropped < 275F

Project No. 40942317

Recovered by (Initials) KMW

HCl/Cl2
EPA Method 26A

Condition No. C

Run No. FB

Date: 7/20/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt (g)	=	Net Gain (g)	
1	0.1 N H_2SO_4	200	KO Fatty	1150.7	-	1154.7	=	-4.0	
2	0.1 N H2SO4	200	KO Fatty	1286.6	-	1276.1	=	10.5	
3	0.1 N H2SO4	200	G/S Fatty	1197.9 ~~1179.9~~	-	1196.6	=	~~18.7~~	1.3
4	0.1 N H2SO4	100	G/S	750.0	-	750.2	=	~~1.5~~	-0.2
5	0.1 N NaOH	100	Mod	774.3	-	774.5	=	~~-0.2~~	-0.2
6	0.1 N NaOH	100	Mod	767.5	-	767.5	=	~~-0.2~~	0
7	--		KO	615.0	-	615.0	=	0	0
8	Zinc Acetate	200	G/S	854.5	-	854.4	=	0.1	
9	Zinc Acetate	200	G/S	847.6	-	861.5	=	~~0.1~~	-13.9
10	--		KO	614.2	-	614.1	=	0.1	
11	Silica Gel	~ 300g	Mod	926.3	-	916.1	=	10.2	
				Total Net Gain (g)			=	3.9	

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-____-_____-M26A-AcdImp		Acid Impinger Catch & Rinse
BP-____-_____-M26A-AlkImp		Alkaline Impinger Catch & Rinse

See sample logbook

Sample Recovery Checklist

AT LOCATION

✓ Disconnect transfer line, and rinse three times with DI water into acid impinger catch bottle. Transfer bottle to laboratory with impinger train.

IN LABORATORY

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section of this data sheet.

✓ Pour contents of the 1st, 2nd, 3rd, and 4th (containing acid) impingers into the Acid impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete acid impinger sample label.

✓ Pour the contents of the 5th and 6th impingers (containing NaOH) into the alkaline impinger catch bottle(s). Rinse impingers and connecting glassware with deionized water into the same bottle(s). Complete alkaline impinger sample label.

✓ Discard contents of 8th and 9th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments

Section N
Method 29 – Metals

Laboratory Report

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

August 22, 2011

TestAmerica Project Number: G1H080437
PO/Contract: Work Order: 253720.US

Chris Weber
URS Corporation
9400 Amberglen Blvd
Austin, TX 78729

Dear Mr. Weber,

This report contains the analytical results for the samples received under chain of custody by TestAmerica on August 5, 2011. These samples are associated with your 40942317 DCU3 project.

The test results in this report meet all NELAC requirements for parameters that accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916) 374-4333.

Sincerely,

Robert Weidenfeld
Project Manager

880 Riverside Parkway West Sacramento, CA 95605 **tel** 916.373.5600 **fax** 916.372.1059 **www.testamericainc.com**

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TestAmerica West Sacramento Project Number G1H080437

Case Narrative

TestAmerica West Sacramento Project Number G1H080437

General Comments
It should be noted that the sample fractions reported as matrix spikes are actually post spikes not separate aliquots taken individually through the digestion process.

As requested, run 3 is on hold and was not digested or analyzed.

The lab received an acetone rinse for runs 2, 4, and 5. This rinse was taken to dryness, reconstituted with nitric acid, digested, analyzed and reported as a separate back half analytical fraction.

AIR, ICPMS, Front Half
Samples: 1, 4, 7, 10, 12
The post spike/post spike duplicate performed on front half sample -001 (run 2 front half) has a recovery for antimony above the stated control limits. The associated laboratory control samples have an acceptable recovery for this analyte demonstrating good method performance. The high recovery is most likely due to the sample matrix.

AIR, ICPMS, Front Half
Samples: 2, 5, 8, 11, 13
The post spikes performed on back half sample -002 (run 2 back half) have recoveries outside of control limits for beryllium, cadmium, chromium, cobalt, manganese, and nickel. The associated laboratory control samples have acceptable recoveries for all target analytes demonstrating good method performance. These anomalous spike recoveries are most likely due to the sample matrix. It should be noted that the lab received approximately 7 liters of back half impinger volume. The entire 7 liters was taken to a final volume of 150 ml following digestion.

There are no additional anomalies associated with this project.

TestAmerica Laboratories West Sacramento Certifications/Accreditations

Certifying State	Certificate #	Certifying State	Certificate #
A2LA (DoD-ELAP)	2928-01	New Mexico	NA
Alaska	UST-055	New York*	11666
Arizona	AZ0708	Oregon*	CA 200005
Arkansas	88-0691	Pennsylvania*	68-1272
California*	01119CA	South Carolina	87014
Colorado	NA	Texas*	T104704399-08-TX
Connecticut	PH-0691	UCMR	CA00044
Florida*	E87570	US Fish & Wildlife	LE148388-0
Georgia	960	USDA Foreign Plant	37-82605
Guam	10-009r	USDA Foreign Soil	P330-09-00055
Hawaii	NA	Utah*	QUAN1
Illinois*	002701	Virginia	178
Kansas*	E-10375	Washington	C581
Louisiana*	01944	West Virginia	9930C, 334
Michigan	9947	Wisconsin	998204680
Nevada	CA44	Wyoming	8TMS-Q
New Jersey*	CA005		

*NELAP accredited. A more detailed parameter list is available upon request. *Updated 5/25/2011*

QC Parameter Definitions

QC Batch: The QC batch consists of a set of up to 20 field samples that behave similarly (i.e., same matrix) and are processed using the same procedures, reagents, and standards at the same time.

Method Blank: An analytical control consisting of all reagents, which may include internal standards and surrogates, and is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD): An aliquot of blank matrix spiked with known amounts of representative target analytes. The LCS (and LCSD as required) is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects. If an LCSD is performed, it may also be used to evaluate the precision of the process.

Duplicate Sample (DU): Different aliquots of the same sample are analyzed to evaluate the precision of an analysis.

Surrogates: Organic compounds not expected to be detected in field samples, which behave similarly to target analytes. These are added to every sample within a batch at a known concentration to determine the efficiency of the sample preparation and analytical process.

Matrix Spike and Matrix Spike Duplicate (MS/MSD): An MS is an aliquot of a matrix fortified with known quantities of specific compounds and subjected to an entire analytical procedure in order to indicate the appropriateness of the method for a particular matrix. The percent recovery for the respective compound(s) is then calculated. The MSD is a second aliquot of the same matrix as the matrix spike, also spiked, in order to determine the precision of the method.

Isotope Dilution: For isotope dilution methods, isotopically labeled analogs (internal standards) of the native target analytes are spiked into the sample at time of extraction. These internal standards are used for quantitation, and monitor and correct for matrix effects. Since matrix effects on method performance can be judged by the recovery of these analogs, there is little added benefit of performing MS/MSD for these methods. MS/MSD are only performed for client or QAPP requirements.

Control Limits: The reported control limits are either based on laboratory historical data, method requirements, or project data quality objectives. The control limits represent the estimated uncertainty of the test results.

SAMPLE SUMMARY

G1H080437

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MLGCT	001	BP-WV-D2-M29-PNR/Filt	07/15/11	21:21
MLGC3	002	BP-WV-D2-M29-NPI (A-G)	07/15/11	21:21
MLGC4	003	BP-WV-D2-M29-Acetone Rinse of NPI	07/15/11	21:21
MLGC5	004	BP-WV-D4-M29-PNR/Filt	07/18/11	16:40
MLGC8	005	BP-WV-D4-M29-NPI (A-I)	07/18/11	16:40
MLGDN	006	BP-WV-D4-M29-Acetone Rinse of NPI	07/18/11	16:40
MLGDQ	007	BP-WV-D5-M29-PNR/Filt	07/27/11	15:39
MLGDR	008	BP-WV-D5-M29-NPI (A-I)	07/27/11	15:39
MLGDT	009	BP-WV-D5-M29-Acetone Rinse of NPI	07/27/11	15:39
MLGD1	010	BP-WV-FB-M29-PNR/Filt	07/26/11	17:47
MLGD6	011	BP-WV-FB-M29-NPI	07/26/11	17:47
MLGD7	012	BP-WV-RB-TASRB-M29-Filt/Nitric Acid	07/27/11	13:30
MLGD9	013	BP-WV-RB-TASRB-M29-NP	07/27/11	13:30

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

EXECUTIVE SUMMARY - Detection Highlights

G1H080437

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
BP-WV-D2-M29-PNR/Filt 07/15/11 21:21	**001**			
Beryllium	0.064 B	0.15	ug	SW846 6020
Cadmium	0.14 B	0.15	ug	SW846 6020
Cobalt	0.28 J	0.15	ug	SW846 6020
Chromium	2.7	0.30	ug	SW846 6020
Manganese	7.9	0.15	ug	SW846 6020
Nickel	5.7	0.30	ug	SW846 6020
Lead	0.68	0.15	ug	SW846 6020
Antimony	0.18 B,J	0.30	ug	SW846 6020
BP-WV-D2-M29-NPI (A-G) 07/15/11 21:21	**002**			
Arsenic	0.41 J	0.30	ug	SW846 6020
Cadmium	0.11 B	0.15	ug	SW846 6020
Cobalt	0.21	0.15	ug	SW846 6020
Chromium	3.8	0.30	ug	SW846 6020
Manganese	8.3	0.15	ug	SW846 6020
Nickel	4.8 J	0.30	ug	SW846 6020
Lead	1.3 J	0.15	ug	SW846 6020
Antimony	0.064 B	0.30	ug	SW846 6020
Selenium	1.9	0.30	ug	SW846 6020
BP-WV-D2-M29-Acetone Rinse of NPI 07/15/11 21:21	**003**			
Cadmium	0.011 B	0.15	ug	SW846 6020
Cobalt	0.023 B	0.15	ug	SW846 6020
Manganese	0.41	0.15	ug	SW846 6020
Nickel	0.098 B,J	0.30	ug	SW846 6020
Lead	0.069 B,J	0.15	ug	SW846 6020
BP-WV-D4-M29-PNR/Filt 07/18/11 16:40	**004**			
Cadmium	0.11 B	0.15	ug	SW846 6020
Cobalt	0.72 J	0.15	ug	SW846 6020
Chromium	4.6	0.30	ug	SW846 6020
Manganese	8.9	0.15	ug	SW846 6020
Nickel	105	0.30	ug	SW846 6020
Lead	1.5	0.15	ug	SW846 6020
Antimony	0.21 B,J	0.30	ug	SW846 6020

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EXECUTIVE SUMMARY - Detection Highlights

G1H080437

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
BP-WV-D4-M29-NPI (A-I) 07/18/11 16:40 005				
Arsenic	1.5 J	0.30	ug	SW846 6020
Cadmium	0.19	0.15	ug	SW846 6020
Cobalt	0.23	0.15	ug	SW846 6020
Chromium	1.9	0.30	ug	SW846 6020
Manganese	10.1	0.15	ug	SW846 6020
Nickel	3.8 J	0.30	ug	SW846 6020
Lead	1.1 J	0.15	ug	SW846 6020
Antimony	0.086 B	0.30	ug	SW846 6020
Selenium	29.9	0.30	ug	SW846 6020
BP-WV-D4-M29-Acetone Rinse of NPI 07/18/11 16:40 006				
Arsenic	0.17 B,J	0.30	ug	SW846 6020
Manganese	0.20	0.15	ug	SW846 6020
Nickel	0.071 B,J	0.30	ug	SW846 6020
Lead	0.038 B,J	0.15	ug	SW846 6020
BP-WV-D5-M29-PNR/Filt 07/27/11 15:39 007				
Cadmium	0.049 B	0.15	ug	SW846 6020
Cobalt	0.98 J	0.15	ug	SW846 6020
Chromium	5.6	0.30	ug	SW846 6020
Manganese	13.4	0.15	ug	SW846 6020
Nickel	6.9	0.30	ug	SW846 6020
Lead	1.0	0.15	ug	SW846 6020
Antimony	0.47 J	0.30	ug	SW846 6020
BP-WV-D5-M29-NPI (A-I) 07/27/11 15:39 008				
Arsenic	0.94 J	0.30	ug	SW846 6020
Cadmium	0.10 B	0.15	ug	SW846 6020
Cobalt	0.14 B	0.15	ug	SW846 6020
Chromium	1.6	0.30	ug	SW846 6020
Manganese	6.8	0.15	ug	SW846 6020
Nickel	5.4 J	0.30	ug	SW846 6020
Lead	61.7 J	0.15	ug	SW846 6020
Antimony	0.22 B	0.30	ug	SW846 6020
Selenium	4.0	0.30	ug	SW846 6020

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EXECUTIVE SUMMARY - Detection Highlights

G1H080437

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
BP-WV-D5-M29-Acetone Rinse of NPI 07/27/11 15:39 009				
Cobalt	0.094 B	0.15	ug	SW846 6020
Chromium	0.88	0.30	ug	SW846 6020
Manganese	3.8	0.15	ug	SW846 6020
Nickel	3.4 J	0.30	ug	SW846 6020
Lead	0.71 J	0.15	ug	SW846 6020
BP-WV-FB-M29-PNR/Filt 07/26/11 17:47 010				
Beryllium	0.024 B	0.15	ug	SW846 6020
Cadmium	0.11 B	0.15	ug	SW846 6020
Cobalt	0.15 J	0.15	ug	SW846 6020
Chromium	4.2	0.30	ug	SW846 6020
Manganese	5.4	0.15	ug	SW846 6020
Nickel	5.7	0.30	ug	SW846 6020
Lead	2.2	0.15	ug	SW846 6020
Antimony	0.26 B,J	0.30	ug	SW846 6020
BP-WV-FB-M29-NPI 07/26/11 17:47 011				
Arsenic	0.23 B,J	0.30	ug	SW846 6020
Cadmium	0.13 B	0.15	ug	SW846 6020
Cobalt	0.042 B	0.15	ug	SW846 6020
Chromium	0.99	0.30	ug	SW846 6020
Manganese	3.7	0.15	ug	SW846 6020
Nickel	0.82 J	0.30	ug	SW846 6020
Lead	73.2 J	0.15	ug	SW846 6020
BP-WV-RB-TASRB-M29-Filt/Nitric Acid 07/27/11 13:30 012				
Cadmium	0.030 B	0.15	ug	SW846 6020
Cobalt	0.0094 Qualifiers: B,J	0.15	ug	SW846 6020
Chromium	1.2	0.30	ug	SW846 6020
Manganese	0.65	0.15	ug	SW846 6020
Nickel	0.53	0.30	ug	SW846 6020
Lead	0.22	0.15	ug	SW846 6020
Antimony	0.030 B,J	0.30	ug	SW846 6020
BP-WV-RB-TASRB-M29-NP 07/27/11 13:30 013				
Arsenic	0.24 B,J	0.30	ug	SW846 6020
Chromium	0.24 B	0.30	ug	SW846 6020
Manganese	0.21	0.15	ug	SW846 6020

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EXECUTIVE SUMMARY - Detection Highlights

G1H080437

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
BP-WV-RB-TASRB-M29-NP 07/27/11 13:30	013			
Nickel	0.14 B,J	0.30	ug	SW846 6020
Lead	0.076 B,J	0.15	ug	SW846 6020

ANALYTICAL METHODS SUMMARY

G1H080437

PARAMETER	ANALYTICAL METHOD
ICP-MS (6020)	SW846 6020

References:

SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

METHOD / ANALYST SUMMARY

G1H080437

ANALYTICAL METHOD	ANALYST	ANALYST ID
SW846 6020	Sabine Hargrave	000071
SW846 6020	Sabine Hargrave	71

References:

SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

Sample Data Sheets

URS Corporation

Client Sample ID: BP-WV-D2-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-001 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGCT1AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	**0.064 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AC**
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	**0.14 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.28 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**2.7**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**7.9**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**5.7**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**0.68**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	**0.18 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGCT1AK**
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	1.8	ug	SW846 6020	08/15-08/18/11	MLGCT1AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-D2-M29-NPI (A-G)

TOTAL Metals

Lot-Sample #...: G1H080437-002 Matrix.......: AIR
Date Sampled...: 07/15/11 Date Received..: 08/05/11

Prep Batch #...: 1228186

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Arsenic	**0.41 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AA**
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND G	0.75	ug	SW846 6020	08/15-08/19/11	MLGC31AC
		Dilution Factor: 5		MDL...........: 0.058		
Cadmium	**0.11 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.21**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**3.8**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**8.3**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**4.8 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**1.3 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGC31AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	**0.064 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AK**
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	**1.9**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AL**
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: BP-WV-D2-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-003 Matrix.......: AIR
Date Sampled...: 07/15/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC41AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGC41AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	**0.011 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC41AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.023 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC41AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC41AF
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**0.41**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC41AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**0.098 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC41AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**0.069 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGC41AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC41AK
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC41AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-D4-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-004 Matrix.......: AIR
Date Sampled...: 07/18/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC51AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGC51AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	**0.11 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.72 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**4.6**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**8.9**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**105**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**1.5**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	**0.21 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AK**
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	2.0	ug	SW846 6020	08/15-08/18/11	MLGC51AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-D4-M29-NPI (A-I)

TOTAL Metals

Lot-Sample #...: G1H080437-005 Matrix.......: AIR
Date Sampled...: 07/18/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**1.5 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.075	**08/15-08/18/11**	**MLGC81AA**
Beryllium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.012	08/15-08/18/11	MLGC81AC
Cadmium	**0.19**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.011	**08/15-08/18/11**	**MLGC81AD**
Cobalt	**0.23**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0086	**08/15-08/18/11**	**MLGC81AE**
Chromium	**1.9**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.14	**08/15-08/18/11**	**MLGC81AF**
Manganese	**10.1**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.013	**08/15-08/18/11**	**MLGC81AG**
Nickel	**3.8 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.015	**08/15-08/18/11**	**MLGC81AH**
Lead	**1.1 J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0099	**08/15-08/19/11**	**MLGC81AJ**
Antimony	**0.086 B**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0054	**08/15-08/18/11**	**MLGC81AK**
Selenium	**29.9**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.26	**08/15-08/18/11**	**MLGC81AL**

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: BP-WV-D4-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-006 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.17 B,J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.075	**08/15-08/18/11**	**MLGDN1AA**
Beryllium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.012	08/15-08/18/11	MLGDN1AC
Cadmium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.011	08/15-08/18/11	MLGDN1AD
Cobalt	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.0086	08/15-08/18/11	MLGDN1AE
Chromium	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.14	08/15-08/18/11	MLGDN1AF
Manganese	**0.20**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.013	**08/15-08/18/11**	**MLGDN1AG**
Nickel	**0.071 B,J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.015	**08/15-08/18/11**	**MLGDN1AH**
Lead	**0.038 B,J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0099	**08/15-08/19/11**	**MLGDN1AJ**
Antimony	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.0054	08/15-08/18/11	MLGDN1AK
Selenium	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.26	08/15-08/18/11	MLGDN1AL

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-D5-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-007 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

Prep Batch #...: 1228184

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Arsenic	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.075	08/15-08/18/11	MLGDQ1AA
Beryllium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.012	08/15-08/18/11	MLGDQ1AC
Cadmium	**0.049 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.011	**08/15-08/18/11**	**MLGDQ1AD**
Cobalt	**0.98 J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0086	**08/15-08/18/11**	**MLGDQ1AE**
Chromium	**5.6**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.14	**08/15-08/18/11**	**MLGDQ1AF**
Manganese	**13.4**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.013	**08/15-08/18/11**	**MLGDQ1AG**
Nickel	**6.9**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.015	**08/15-08/18/11**	**MLGDQ1AH**
Lead	**1.0**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0099	**08/15-08/18/11**	**MLGDQ1AJ**
Antimony	**0.47 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0054	**08/15-08/18/11**	**MLGDQ1AK**
Selenium	ND G	1.4 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.26	08/15-08/18/11	MLGDQ1AL

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-D5-M29-NPI (A-I)

TOTAL Metals

Lot-Sample #...: G1H080437-008 Matrix.......: AIR
Date Sampled...: 07/27/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	0.94 J	0.30	ug	SW846 6020	08/15-08/18/11	MLGDR1AA
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDR1AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	0.10 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGDR1AD
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	0.14 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGDR1AE
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	1.6	0.30	ug	SW846 6020	08/15-08/18/11	MLGDR1AF
		Dilution Factor: 1		MDL............: 0.14		
Manganese	6.8	0.15	ug	SW846 6020	08/15-08/18/11	MLGDR1AG
		Dilution Factor: 1		MDL............: 0.013		
Nickel	5.4 J	0.30	ug	SW846 6020	08/15-08/18/11	MLGDR1AH
		Dilution Factor: 1		MDL............: 0.015		
Lead	61.7 J	0.15	ug	SW846 6020	08/15-08/19/11	MLGDR1AJ
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	0.22 B	0.30	ug	SW846 6020	08/15-08/18/11	MLGDR1AK
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	4.0	0.30	ug	SW846 6020	08/15-08/18/11	MLGDR1AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: BP-WV-D5-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-009 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AA
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDT1AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDT1AD
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.094 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**0.88**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**3.8**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**3.4 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**0.71 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGDT1AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AK
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-FB-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-010 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	0.024 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	0.11 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AD
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	0.15 J	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AE
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	4.2	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AF
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	5.4	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AG
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	5.7	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AH
		Dilution Factor: 1		MDL...........: 0.015		
Lead	2.2	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AJ
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	0.26 B,J	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AK
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	1.5	ug	SW846 6020	08/15-08/18/11	MLGD11AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-FB-M29-NPI

TOTAL Metals

Lot-Sample #...: G1H080437-011 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1228186					
Arsenic	**0.23 B,J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.075	**08/15-08/18/11**	**MLGD61AA**
Beryllium	ND G	0.75 Dilution Factor: 5	ug	SW846 6020 MDL...........: 0.058	08/15-08/19/11	MLGD61AC
Cadmium	**0.13 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.011	**08/15-08/18/11**	**MLGD61AD**
Cobalt	**0.042 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0086	**08/15-08/18/11**	**MLGD61AE**
Chromium	**0.99**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.14	**08/15-08/18/11**	**MLGD61AF**
Manganese	**3.7**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.013	**08/15-08/18/11**	**MLGD61AG**
Nickel	**0.82 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.015	**08/15-08/18/11**	**MLGD61AH**
Lead	**73.2 J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0099	**08/15-08/19/11**	**MLGD61AJ**
Antimony	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.0054	08/15-08/18/11	MLGD61AK
Selenium	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.26	08/15-08/18/11	MLGD61AL

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-RB-TASRB-M29-Filt/Nitric Acid

TOTAL Metals

Lot-Sample #...: G1H080437-012 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD71AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD71AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	**0.030 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.0094 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**1.2**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**0.65**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**0.53**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**0.22**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	**0.030 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AK**
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	1.5	ug	SW846 6020	08/15-08/18/11	MLGD71AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-RB-TASRB-M29-NP

TOTAL Metals

Lot-Sample #...: G1H080437-013 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.24 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AA**
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AD
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AE
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**0.24 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**0.21**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**0.14 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**0.076 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGD91AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD91AK
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD91AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

QC DATA ASSOCIATION SUMMARY

G1H080437

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	SW846 6020		1228184	1228109
002	AIR	SW846 6020		1228186	1228110
003	AIR	SW846 6020		1228186	1228110
004	AIR	SW846 6020		1228184	1228109
005	AIR	SW846 6020		1228186	1228110
006	AIR	SW846 6020		1228186	1228110
007	AIR	SW846 6020		1228184	1228109
008	AIR	SW846 6020		1228186	1228110
009	AIR	SW846 6020		1228186	1228110
010	AIR	SW846 6020		1228184	1228109
011	AIR	SW846 6020		1228186	1228110
012	AIR	SW846 6020		1228184	1228109
013	AIR	SW846 6020		1228186	1228110

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: G1H080437

Matrix.........: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: G1H160000-184	**Prep Batch #...:** 1228184					
Antimony	**0.043 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVG1AK**
		Dilution Factor: 1				
Arsenic	**0.18 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVG1AA**
		Dilution Factor: 1				
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVG1AC
		Dilution Factor: 1				
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVG1AD
		Dilution Factor: 1				
Chromium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLPVG1AF
		Dilution Factor: 1				
Cobalt	**0.011 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVG1AE**
		Dilution Factor: 1				
Lead	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVG1AJ
		Dilution Factor: 1				
Manganese	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVG1AG
		Dilution Factor: 1				
Nickel	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLPVG1AH
		Dilution Factor: 1				
Selenium	ND	1.4	ug	SW846 6020	08/15-08/18/11	MLPVG1AL
		Dilution Factor: 1				
MB Lot-Sample #: G1H160000-186	**Prep Batch #...:** 1228186					
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLPVR1AK
		Dilution Factor: 1				
Arsenic	**0.18 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVR1AA**
		Dilution Factor: 1				
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVR1AC
		Dilution Factor: 1				
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVR1AD
		Dilution Factor: 1				

(Continued on next page)

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: G1H080437 Matrix.........: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Chromium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLPVR1AF
		Dilution Factor: 1				
Cobalt	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVR1AE
		Dilution Factor: 1				
Lead	**0.066 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVR1AJ**
		Dilution Factor: 1				
Manganese	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLPVR1AG
		Dilution Factor: 1				
Nickel	**0.016 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLPVR1AH**
		Dilution Factor: 1				
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLPVR1AL
		Dilution Factor: 1				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: G1H080437 **Matrix.........:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Antimony	30.0	27.6	ug	92		SW846 6020	08/15-08/18/11	1228184
	30.0	27.1	ug	90	1.9	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Arsenic	30.0	27.3	ug	91		SW846 6020	08/15-08/18/11	1228184
	30.0	27.0	ug	90	1.2	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Beryllium	30.0	26.5	ug	88		SW846 6020	08/15-08/18/11	1228184
	30.0	26.5	ug	88	0.07	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Cadmium	30.0	26.7	ug	89		SW846 6020	08/15-08/18/11	1228184
	30.0	26.5	ug	88	0.63	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Chromium	30.0	30.2	ug	101		SW846 6020	08/15-08/18/11	1228184
	30.0	29.8	ug	99	1.4	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Cobalt	30.0	31.7	ug	106		SW846 6020	08/15-08/18/11	1228184
	30.0	31.1	ug	104	1.7	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Lead	30.0	28.5	ug	95		SW846 6020	08/15-08/18/11	1228184
	30.0	28.5	ug	95	0.19	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Manganese	30.0	27.7	ug	92		SW846 6020	08/15-08/18/11	1228184
	30.0	27.3	ug	91	1.4	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Nickel	30.0	27.3	ug	91		SW846 6020	08/15-08/18/11	1228184
	30.0	27.0	ug	90	0.93	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					
Selenium	30.0	28.3	ug	94		SW846 6020	08/15-08/18/11	1228184
	30.0	27.9	ug	93	1.2	SW846 6020	08/15-08/18/11	1228184
			Dilution Factor: 1					

(Continued on next page)

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: G1H080437 **Matrix.........:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	PREP BATCH #
Antimony	30.0	24.4	ug	81		SW846 6020	08/15-08/18/11	1228186
	30.0	25.0	ug	83	2.6	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Arsenic	30.0	25.0	ug	83		SW846 6020	08/15-08/19/11	1228186
	30.0	23.7	ug	79	5.3	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Beryllium	30.0	22.6	ug	75		SW846 6020	08/15-08/18/11	1228186
	30.0	23.0	ug	77	1.4	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Cadmium	30.0	24.6	ug	82		SW846 6020	08/15-08/19/11	1228186
	30.0	23.9	ug	80	2.8	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Chromium	30.0	30.1	ug	100		SW846 6020	08/15-08/18/11	1228186
	30.0	31.6	ug	105	4.8	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Cobalt	30.0	31.3	ug	104		SW846 6020	08/15-08/18/11	1228186
	30.0	32.6	ug	109	4.0	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Lead	30.0	27.3	ug	91		SW846 6020	08/15-08/18/11	1228186
	30.0	28.9	ug	96	5.4	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Manganese	30.0	27.6	ug	92		SW846 6020	08/15-08/18/11	1228186
	30.0	28.9	ug	96	4.8	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Nickel	30.0	26.8	ug	89		SW846 6020	08/15-08/18/11	1228186
	30.0	28.0	ug	93	4.2	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					
Selenium	30.0	21.8	ug	73		SW846 6020	08/15-08/18/11	1228186
	30.0	22.7	ug	76	4.0	SW846 6020	08/15-08/18/11	1228186
			Dilution Factor: 1					

(Continued on next page)

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: G1H080437

Matrix.........: AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	PREP BATCH #

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: G1H080437 **Matrix.........:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Antimony	92	(77 - 110)			SW846 6020	08/15-08/18/11	1228184
	90	(77 - 110)	1.9	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Arsenic	91	(79 - 110)			SW846 6020	08/15-08/18/11	1228184
	90	(79 - 110)	1.2	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Beryllium	88	(70 - 110)			SW846 6020	08/15-08/18/11	1228184
	88	(70 - 110)	0.07	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Cadmium	89	(79 - 110)			SW846 6020	08/15-08/18/11	1228184
	88	(79 - 110)	0.63	(0-16)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Chromium	101	(84 - 110)			SW846 6020	08/15-08/18/11	1228184
	99	(84 - 110)	1.4	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Cobalt	106	(81 - 113)			SW846 6020	08/15-08/18/11	1228184
	104	(81 - 113)	1.7	(0-17)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Lead	95	(86 - 110)			SW846 6020	08/15-08/18/11	1228184
	95	(86 - 110)	0.19	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Manganese	92	(84 - 110)			SW846 6020	08/15-08/18/11	1228184
	91	(84 - 110)	1.4	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Nickel	91	(86 - 110)			SW846 6020	08/15-08/18/11	1228184
	90	(86 - 110)	0.93	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					
Selenium	94	(65 - 110)			SW846 6020	08/15-08/18/11	1228184
	93	(65 - 110)	1.2	(0-15)	SW846 6020	08/15-08/18/11	1228184
		Dilution Factor: 1					

(Continued on next page)

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: G1H080437 **Matrix.........:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #
Antimony	81	(77 - 110)			SW846 6020	08/15-08/18/11	1228186
	83	(77 - 110)	2.6	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Arsenic	83	(79 - 110)			SW846 6020	08/15-08/19/11	1228186
	79	(79 - 110)	5.3	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Beryllium	75	(70 - 110)			SW846 6020	08/15-08/18/11	1228186
	77	(70 - 110)	1.4	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Cadmium	82	(79 - 110)			SW846 6020	08/15-08/19/11	1228186
	80	(79 - 110)	2.8	(0-16)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Chromium	100	(84 - 110)			SW846 6020	08/15-08/18/11	1228186
	105	(84 - 110)	4.8	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Cobalt	104	(81 - 113)			SW846 6020	08/15-08/18/11	1228186
	109	(81 - 113)	4.0	(0-17)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Lead	91	(86 - 110)			SW846 6020	08/15-08/18/11	1228186
	96	(86 - 110)	5.4	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Manganese	92	(84 - 110)			SW846 6020	08/15-08/18/11	1228186
	96	(84 - 110)	4.8	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Nickel	89	(86 - 110)			SW846 6020	08/15-08/18/11	1228186
	93	(86 - 110)	4.2	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					
Selenium	73	(65 - 110)			SW846 6020	08/15-08/18/11	1228186
	76	(65 - 110)	4.0	(0-15)	SW846 6020	08/15-08/18/11	1228186
		Dilution Factor: 1					

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: G1H080437

Matrix.........: AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	PREP-BATCH #

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

MS Lot-Sample #: G1H080437-001 **Prep Batch #...:** 1228184

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Antimony									
	0.18	30.0	35.6 N	ug	118		SW846 6020	08/15-08/18/11	MLGCT1A6
	0.18	30.0	35.2 N	ug	117	0.98	SW846 6020	08/15-08/18/11	MLGCT1A7
			Dilution Factor: 1						
Arsenic									
	ND	30.0	27.8	ug	93		SW846 6020	08/15-08/18/11	MLGCT1AM
	ND	30.0	27.1	ug	90	2.6	SW846 6020	08/15-08/18/11	MLGCT1AN
			Dilution Factor: 1						
Beryllium									
	0.064	30.0	29.5	ug	98		SW846 6020	08/15-08/18/11	MLGCT1AP
	0.064	30.0	29.3	ug	98	0.60	SW846 6020	08/15-08/18/11	MLGCT1AQ
			Dilution Factor: 1						
Cadmium									
	0.14	30.0	29.6	ug	98		SW846 6020	08/15-08/18/11	MLGCT1AR
	0.14	30.0	29.4	ug	98	0.48	SW846 6020	08/15-08/18/11	MLGCT1AT
			Dilution Factor: 1						
Chromium									
	2.7	30.0	35.3	ug	109		SW846 6020	08/15-08/18/11	MLGCT1AW
	2.7	30.0	35.6	ug	110	0.83	SW846 6020	08/15-08/18/11	MLGCT1AX
			Dilution Factor: 1						
Cobalt									
	0.28	30.0	30.8	ug	102		SW846 6020	08/15-08/18/11	MLGCT1AU
	0.28	30.0	30.8	ug	102	0.13	SW846 6020	08/15-08/18/11	MLGCT1AV
			Dilution Factor: 1						
Lead									
	0.68	30.0	33.4	ug	109		SW846 6020	08/15-08/18/11	MLGCT1A4
	0.68	30.0	33.1	ug	108	0.87	SW846 6020	08/15-08/18/11	MLGCT1A5
			Dilution Factor: 1						
Manganese									
	7.9	30.0	39.7	ug	106		SW846 6020	08/15-08/18/11	MLGCT1A0
	7.9	30.0	39.8	ug	106	0.11	SW846 6020	08/15-08/18/11	MLGCT1A1
			Dilution Factor: 1						

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MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Nickel									
	5.7	30.0	35.4	ug	99		SW846 6020	08/15-08/18/11	MLGCT1A2
	5.7	30.0	35.0	ug	97	1.1	SW846 6020	08/15-08/18/11	MLGCT1A3
			Dilution Factor: 1						
Selenium									
	ND	30.0	24.9	ug	83		SW846 6020	08/15-08/18/11	MLGCT1A8
	ND	30.0	24.0	ug	80	3.6	SW846 6020	08/15-08/18/11	MLGCT1A9
			Dilution Factor: 1						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

MS Lot-Sample #: G1H080437-001 **Prep Batch #...:** 1228184

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Antimony	118 N	(77 - 110)			SW846 6020	08/15-08/18/11	MLGCT1A6
	117 N	(77 - 110)	0.98	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1A7
		Dilution Factor: 1					
Arsenic	93	(79 - 110)			SW846 6020	08/15-08/18/11	MLGCT1AM
	90	(79 - 110)	2.6	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1AN
		Dilution Factor: 1					
Beryllium	98	(70 - 110)			SW846 6020	08/15-08/18/11	MLGCT1AP
	98	(70 - 110)	0.60	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1AQ
		Dilution Factor: 1					
Cadmium	98	(79 - 110)			SW846 6020	08/15-08/18/11	MLGCT1AR
	98	(79 - 110)	0.48	(0-16)	SW846 6020	08/15-08/18/11	MLGCT1AT
		Dilution Factor: 1					
Chromium	109	(84 - 110)			SW846 6020	08/15-08/18/11	MLGCT1AW
	110	(84 - 110)	0.83	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1AX
		Dilution Factor: 1					
Cobalt	102	(81 - 113)			SW846 6020	08/15-08/18/11	MLGCT1AU
	102	(81 - 113)	0.13	(0-17)	SW846 6020	08/15-08/18/11	MLGCT1AV
		Dilution Factor: 1					
Lead	109	(86 - 110)			SW846 6020	08/15-08/18/11	MLGCT1A4
	108	(86 - 110)	0.87	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1A5
		Dilution Factor: 1					
Manganese	106	(84 - 110)			SW846 6020	08/15-08/18/11	MLGCT1A0
	106	(84 - 110)	0.11	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1A1
		Dilution Factor: 1					
Nickel	99	(86 - 110)			SW846 6020	08/15-08/18/11	MLGCT1A2
	97	(86 - 110)	1.1	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1A3
		Dilution Factor: 1					
Selenium	83	(65 - 110)			SW846 6020	08/15-08/18/11	MLGCT1A8
	80	(65 - 110)	3.6	(0-15)	SW846 6020	08/15-08/18/11	MLGCT1A9
		Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

MS Lot-Sample #: G1H080437-002 **Prep Batch #...:** 1228186

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Antimony									
	0.064	30.0	24.0	ug	80		SW846 6020	08/15-08/18/11	MLGC31A6
	0.064	30.0	24.1	ug	80	0.30	SW846 6020	08/15-08/18/11	MLGC31A7
			Dilution Factor: 1						
Arsenic									
	0.41	30.0	25.2	ug	83		SW846 6020	08/15-08/18/11	MLGC31AM
	0.41	30.0	25.2	ug	83	0.04	SW846 6020	08/15-08/18/11	MLGC31AN
			Dilution Factor: 1						
Beryllium									
	ND	30.0	20.2 N	ug	67		SW846 6020	08/15-08/18/11	MLGC31AP
	ND	30.0	20.7 N	ug	69	2.0	SW846 6020	08/15-08/18/11	MLGC31AQ
			Dilution Factor: 1						
Cadmium									
	0.11	30.0	23.0 N	ug	76		SW846 6020	08/15-08/18/11	MLGC31AR
	0.11	30.0	22.9 N	ug	76	0.54	SW846 6020	08/15-08/18/11	MLGC31AT
			Dilution Factor: 1						
Chromium									
	3.8	30.0	45.7 N	ug	140		SW846 6020	08/15-08/18/11	MLGC31AW
	3.8	30.0	45.2 N	ug	138	1.0	SW846 6020	08/15-08/18/11	MLGC31AX
			Dilution Factor: 1						
Cobalt									
	0.21	30.0	42.7 N	ug	142		SW846 6020	08/15-08/18/11	MLGC31AU
	0.21	30.0	42.3 N	ug	140	0.95	SW846 6020	08/15-08/18/11	MLGC31AV
			Dilution Factor: 1						
Lead									
	1.3	30.0	30.2	ug	96		SW846 6020	08/15-08/19/11	MLGC31A4
	1.3	30.0	29.3	ug	93	2.8	SW846 6020	08/15-08/19/11	MLGC31A5
			Dilution Factor: 1						
Manganese									
	8.3	30.0	50.5 N	ug	141		SW846 6020	08/15-08/18/11	MLGC31A0
	8.3	30.0	50.1 N	ug	139	0.67	SW846 6020	08/15-08/18/11	MLGC31A1
			Dilution Factor: 1						

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MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Nickel									
	4.8	30.0	39.8 N	ug	117		SW846 6020	08/15-08/18/11	MLGC31A2
	4.8	30.0	39.5 N	ug	116	0.99	SW846 6020	08/15-08/18/11	MLGC31A3
			Dilution Factor: 1						
Selenium									
	1.9	30.0	28.6	ug	89		SW846 6020	08/15-08/18/11	MLGC31A8
	1.9	30.0	28.6	ug	89	0.27	SW846 6020	08/15-08/18/11	MLGC31A9
			Dilution Factor: 1						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: G1H080437 **Matrix.........:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: G1H080437-002 **Prep Batch #...:** 1228186							
Antimony	80	(77 - 110)			SW846 6020	08/15-08/18/11	MLGC31A6
	80	(77 - 110)	0.30	(0-15)	SW846 6020	08/15-08/18/11	MLGC31A7
		Dilution Factor: 1					
Arsenic	83	(79 - 110)			SW846 6020	08/15-08/18/11	MLGC31AM
	83	(79 - 110)	0.04	(0-15)	SW846 6020	08/15-08/18/11	MLGC31AN
		Dilution Factor: 1					
Beryllium	67 N	(70 - 110)			SW846 6020	08/15-08/18/11	MLGC31AP
	69 N	(70 - 110)	2.0	(0-15)	SW846 6020	08/15-08/18/11	MLGC31AQ
		Dilution Factor: 1					
Cadmium	76 N	(79 - 110)			SW846 6020	08/15-08/18/11	MLGC31AR
	76 N	(79 - 110)	0.54	(0-16)	SW846 6020	08/15-08/18/11	MLGC31AT
		Dilution Factor: 1					
Chromium	140 N	(84 - 110)			SW846 6020	08/15-08/18/11	MLGC31AW
	138 N	(84 - 110)	1.0	(0-15)	SW846 6020	08/15-08/18/11	MLGC31AX
		Dilution Factor: 1					
Cobalt	142 N	(81 - 113)			SW846 6020	08/15-08/18/11	MLGC31AU
	140 N	(81 - 113)	0.95	(0-17)	SW846 6020	08/15-08/18/11	MLGC31AV
		Dilution Factor: 1					
Lead	96	(86 - 110)			SW846 6020	08/15-08/19/11	MLGC31A4
	93	(86 - 110)	2.8	(0-15)	SW846 6020	08/15-08/19/11	MLGC31A5
		Dilution Factor: 1					
Manganese	141 N	(84 - 110)			SW846 6020	08/15-08/18/11	MLGC31A0
	139 N	(84 - 110)	0.67	(0-15)	SW846 6020	08/15-08/18/11	MLGC31A1
		Dilution Factor: 1					
Nickel	117 N	(86 - 110)			SW846 6020	08/15-08/18/11	MLGC31A2
	116 N	(86 - 110)	0.99	(0-15)	SW846 6020	08/15-08/18/11	MLGC31A3
		Dilution Factor: 1					
Selenium	89	(65 - 110)			SW846 6020	08/15-08/18/11	MLGC31A8
	89	(65 - 110)	0.27	(0-15)	SW846 6020	08/15-08/18/11	MLGC31A9
		Dilution Factor: 1					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

Raw Data Package

Metals Cover Page

SAMPLE SUMMARY

G1H080437

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MLGCT	001	BP-WV-D2-M29-PNR/Filt	07/15/11	21:21
MLGC3	002	BP-WV-D2-M29-NPI (A-G)	07/15/11	21:21
MLGC4	003	BP-WV-D2-M29-Acetone Rinse of NPI	07/15/11	21:21
MLGC5	004	BP-WV-D4-M29-PNR/Filt	07/18/11	16:40
MLGC8	005	BP-WV-D4-M29-NPI (A-I)	07/18/11	16:40
MLGDN	006	BP-WV-D4-M29-Acetone Rinse of NPI	07/18/11	16:40
MLGDQ	007	BP-WV-D5-M29-PNR/Filt	07/27/11	15:39
MLGDR	008	BP-WV-D5-M29-NPI (A-I)	07/27/11	15:39
MLGDT	009	BP-WV-D5-M29-Acetone Rinse of NPI	07/27/11	15:39
MLGD1	010	BP-WV-FB-M29-PNR/Filt	07/26/11	17:47
MLGD6	011	BP-WV-FB-M29-NPI	07/26/11	17:47
MLGD7	012	BP-WV-RB-TASRB-M29-Filt/Nitric Acid	07/27/11	13:30
MLGD9	013	BP-WV-RB-TASRB-M29-NP	07/27/11	13:30

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Metals Sample Data

URS Corporation

Client Sample ID: BP-WV-D2-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-001 Matrix.......: AIR
Date Sampled...: 07/15/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION- ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.075	08/15-08/18/11	MLGCT1AA
Beryllium	**0.064 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.012	**08/15-08/18/11**	**MLGCT1AC**
Cadmium	**0.14 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.011	**08/15-08/18/11**	**MLGCT1AD**
Cobalt	**0.28 J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0086	**08/15-08/18/11**	**MLGCT1AE**
Chromium	**2.7**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.14	**08/15-08/18/11**	**MLGCT1AF**
Manganese	**7.9**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.013	**08/15-08/18/11**	**MLGCT1AG**
Nickel	**5.7**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.015	**08/15-08/18/11**	**MLGCT1AH**
Lead	**0.68**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0099	**08/15-08/18/11**	**MLGCT1AJ**
Antimony	**0.18 B,J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL...........: 0.0054	**08/15-08/18/11**	**MLGCT1AK**
Selenium	ND G	1.8 Dilution Factor: 1	ug	SW846 6020 MDL...........: 0.26	08/15-08/18/11	MLGCT1AL

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-D2-M29-NPI (A-G)

TOTAL Metals

Lot-Sample #...: G1H080437-002 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.41 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AA**
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND G	0.75	ug	SW846 6020	08/15-08/19/11	MLGC31AC
		Dilution Factor: 5		MDL............: 0.058		
Cadmium	**0.11 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AD**
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.21**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**3.8**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**8.3**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**4.8 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**1.3 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGC31AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	**0.064 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AK**
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	**1.9**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC31AL**
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: BP-WV-D2-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-003 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.075	08/15-08/18/11	MLGC41AA
Beryllium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.012	08/15-08/18/11	MLGC41AC
Cadmium	**0.011 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.011	**08/15-08/18/11**	**MLGC41AD**
Cobalt	**0.023 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0086	**08/15-08/18/11**	**MLGC41AE**
Chromium	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.14	08/15-08/18/11	MLGC41AF
Manganese	**0.41**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.013	**08/15-08/18/11**	**MLGC41AG**
Nickel	**0.098 B,J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.015	**08/15-08/18/11**	**MLGC41AH**
Lead	**0.069 B,J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0099	**08/15-08/19/11**	**MLGC41AJ**
Antimony	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.0054	08/15-08/18/11	MLGC41AK
Selenium	ND	0.30 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.26	08/15-08/18/11	MLGC41AL

NOTE(S):

B Estimated result Result is less than RL

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-D4-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-004 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGC51AA
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGC51AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	**0.11 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AD**
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.72 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**4.6**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**8.9**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**105**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**1.5**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	**0.21 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC51AK**
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND G	2.0	ug	SW846 6020	08/15-08/18/11	MLGC51AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference

URS Corporation

Client Sample ID: BP-WV-D4-M29-NPI (A-I)

TOTAL Metals

Lot-Sample #...: G1H080437-005 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**1.5 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AA**
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGC81AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	**0.19**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AD**
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.23**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**1.9**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**10.1**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**3.8 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**1.1 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGC81AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	**0.086 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AK**
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	**29.9**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGC81AL**
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

J Method blank contamination The associated method blank contains the target analyte at a reportable level.

B Estimated result Result is less than RL

URS Corporation

Client Sample ID: BP-WV-D4-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-006 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.17 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDN1AA**
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDN1AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDN1AD
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDN1AE
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDN1AF
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**0.20**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDN1AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**0.071 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDN1AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**0.038 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGDN1AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDN1AK
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDN1AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-D5-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-007 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDQ1AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDQ1AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	**0.049 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AD**
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	**0.98 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AE**
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	**5.6**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AF**
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	**13.4**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AG**
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	**6.9**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AH**
		Dilution Factor: 1		MDL...........: 0.015		
Lead	**1.0**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AJ**
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	**0.47 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDQ1AK**
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	1.4	ug	SW846 6020	08/15-08/18/11	MLGDQ1AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-D5-M29-NPI (A-I)

TOTAL Metals

Lot-Sample #...: G1H080437-008 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

Prep Batch #...: 1228186

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Arsenic	**0.94 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.075	**08/15-08/18/11**	**MLGDR1AA**
Beryllium	ND	0.15 Dilution Factor: 1	ug	SW846 6020 MDL............: 0.012	08/15-08/18/11	MLGDR1AC
Cadmium	**0.10 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.011	**08/15-08/18/11**	**MLGDR1AD**
Cobalt	**0.14 B**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0086	**08/15-08/18/11**	**MLGDR1AE**
Chromium	**1.6**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.14	**08/15-08/18/11**	**MLGDR1AF**
Manganese	**6.8**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.013	**08/15-08/18/11**	**MLGDR1AG**
Nickel	**5.4 J**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.015	**08/15-08/18/11**	**MLGDR1AH**
Lead	**61.7 J**	**0.15** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0099	**08/15-08/19/11**	**MLGDR1AJ**
Antimony	**0.22 B**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.0054	**08/15-08/18/11**	**MLGDR1AK**
Selenium	**4.0**	**0.30** Dilution Factor: 1	**ug**	**SW846 6020** MDL............: 0.26	**08/15-08/18/11**	**MLGDR1AL**

NOTE(S):

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

B Estimated result. Result is less than RL.

URS Corporation

Client Sample ID: BP-WV-D5-M29-Acetone Rinse of NPI

TOTAL Metals

Lot-Sample #...: G1H080437-009 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AA
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDT1AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGDT1AD
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.094 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**0.88**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**3.8**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**3.4 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGDT1AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**0.71 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGDT1AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AK
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGDT1AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

URS Corporation

Client Sample ID: BP-WV-FB-M29-PNR/Filt

TOTAL Metals

Lot-Sample #...: G1H080437-010 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AA
		Dilution Factor: 1		MDL...........: 0.075		
Beryllium	0.024 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AC
		Dilution Factor: 1		MDL...........: 0.012		
Cadmium	0.11 B	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AD
		Dilution Factor: 1		MDL...........: 0.011		
Cobalt	0.15 J	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AE
		Dilution Factor: 1		MDL...........: 0.0086		
Chromium	4.2	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AF
		Dilution Factor: 1		MDL...........: 0.14		
Manganese	5.4	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AG
		Dilution Factor: 1		MDL...........: 0.013		
Nickel	5.7	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AH
		Dilution Factor: 1		MDL...........: 0.015		
Lead	2.2	0.15	ug	SW846 6020	08/15-08/18/11	MLGD11AJ
		Dilution Factor: 1		MDL...........: 0.0099		
Antimony	0.26 B,J	0.30	ug	SW846 6020	08/15-08/18/11	MLGD11AK
		Dilution Factor: 1		MDL...........: 0.0054		
Selenium	ND G	1.5	ug	SW846 6020	08/15-08/18/11	MLGD11AL
		Dilution Factor: 1		MDL...........: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-FB-M29-NPI

TOTAL Metals

Lot-Sample #...: G1H080437-011 Matrix.......: AIR
Date Sampled...: 07/26/11 Date Received..: 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.23 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AA**
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND G	0.75	ug	SW846 6020	08/15-08/19/11	MLGD61AC
		Dilution Factor: 5		MDL............: 0.058		
Cadmium	**0.13 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AD**
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.042 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**0.99**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**3.7**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**0.82 J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD61AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**73.2 J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGD61AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD61AK
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD61AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result. Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-RB-TASRB-M29-Filt/Nitric Acid

TOTAL Metals

Lot-Sample #...: G1H080437-012 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228184						
Arsenic	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD71AA
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD71AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	**0.030 B**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AD**
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	**0.0094 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AE**
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**1.2**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**0.65**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**0.53**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**0.22**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	**0.030 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD71AK**
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND G	1.5	ug	SW846 6020	08/15-08/18/11	MLGD71AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result Result is less than RL

J Method blank contamination The associated method blank contains the target analyte at a reportable level.

G Elevated reporting limit. The reporting limit is elevated due to matrix interference.

URS Corporation

Client Sample ID: BP-WV-RB-TASRB-M29-NP

TOTAL Metals

Lot-Sample #...: G1H080437-013　　**Matrix.......:** AIR
Date Sampled...: 07/27/11　　**Date Received..:** 08/05/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1228186						
Arsenic	**0.24 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AA**
		Dilution Factor: 1		MDL............: 0.075		
Beryllium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AC
		Dilution Factor: 1		MDL............: 0.012		
Cadmium	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AD
		Dilution Factor: 1		MDL............: 0.011		
Cobalt	ND	0.15	ug	SW846 6020	08/15-08/18/11	MLGD91AE
		Dilution Factor: 1		MDL............: 0.0086		
Chromium	**0.24 B**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AF**
		Dilution Factor: 1		MDL............: 0.14		
Manganese	**0.21**	**0.15**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AG**
		Dilution Factor: 1		MDL............: 0.013		
Nickel	**0.14 B,J**	**0.30**	**ug**	**SW846 6020**	**08/15-08/18/11**	**MLGD91AH**
		Dilution Factor: 1		MDL............: 0.015		
Lead	**0.076 B,J**	**0.15**	**ug**	**SW846 6020**	**08/15-08/19/11**	**MLGD91AJ**
		Dilution Factor: 1		MDL............: 0.0099		
Antimony	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD91AK
		Dilution Factor: 1		MDL............: 0.0054		
Selenium	ND	0.30	ug	SW846 6020	08/15-08/18/11	MLGD91AL
		Dilution Factor: 1		MDL............: 0.26		

NOTE(S):

B Estimated result Result is less than RL.

J Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Shipping and Receiving Documents

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-M29-PNR-NA	PNR - Nitric Acid	7/15/11 2121	X						
BP-WV-D2-M29-Filt	Filter		X						
BP-WV-D2-M29-NPIA	Nitric/Peroxide Impingers - Bottle A		X						Combined for single analysis
BP-WV-D2-M29-NPIB	Nitric/Peroxide Impingers - Bottle B		X						
BP-WV-D2-M29-NPIC	Nitric/Peroxide Impingers - Bottle C		X						
BP-WV-D2-M29-NPID	Nitric/Peroxide Impingers - Bottle D		X						
BP-WV-D2-M29-NPIE	Nitric/Peroxide Impingers - Bottle E		X						
BP-WV-D2-M29-NPIF	Nitric/Peroxide Impingers - Bottle F		X						
BP-WV-D2-M29-NPIG	Nitric/Peroxide Impingers - Bottle G		X						
BP-WV-D2-M29-Org	Acetone Rinse of Nitric/Peroxide Impingers		X						

Remarks: Provide results in total mass per sample Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date 8/4/11	Time 1500	Received by.	Date 8-5-11	Time 1300	Relinquished by:	Date	Time
Received by	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D3-M29-PNR-NA	PNR - Nitric Acid	7/16/11 1517	X			X			HOLD ALL 'D3' SAMPLES - DO NOT ANALYZE
BP-WV-D3-M29-Filt	Filter		X			X			
BP-WV-D3-M29-NPIA	Nitric/Peroxide Impingers - Bottle A		X			X			Combined for single analysis
BP-WV-D3-M29-NPIB	Nitric/Peroxide Impingers - Bottle B		X			X			
BP-WV-D3-M29-NPIC	Nitric/Peroxide Impingers - Bottle C		X			X			
BP-WV-D3-M29-NPID	Nitric/Peroxide Impingers - Bottle D		X			X			
BP-WV-D3-M29-NPIE	Nitric/Peroxide Impingers - Bottle E		X			X			
BP-WV-D3-M29-NPIF	Nitric/Peroxide Impingers - Bottle F		X			X			
BP-WV-D3-M29-NPIG	Nitric/Peroxide Impingers - Bottle G		X			X			
BP-WV-D3-M29-NPIH	Nitric/Peroxide Impingers - Bottle H		X			X			
BP-WV-D3-M29-NPII	Nitric/Peroxide Impingers - Bottle I		X			X			
BP-WV-D3-M29-Org	Acetone Rinse of Nitric/Peroxide Impingers		X			X			

Remarks: Provide results in total mass per sample. Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date 8/4/11	Time 1900	Received by:	Date 8-5-11	Time 1300	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date:	Time:	Airbill No.:	Opened by:	Seal #:	Date:	Time:	Temp (C):
Seal #:	Condition:							

Remarks:

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D4-M29-PNR-NA	PNR - Nitric Acid	7/18/11 0440	X						
BP-WV-D4-M29-Filt	Filter		X						
BP-WV-D4-M29-NPIA	Nitric/Peroxide Impingers - Bottle A		X						Combined for single analysis
BP-WV-D4-M29-NPIB	Nitric/Peroxide Impingers - Bottle B		X						
BP-WV-D4-M29-NPIC	Nitric/Peroxide Impingers - Bottle C		X						
BP-WV-D4-M29-NPID	Nitric/Peroxide Impingers - Bottle D		X						
BP-WV-D4-M29-NPIE	Nitric/Peroxide Impingers - Bottle E		X						
BP-WV-D4-M29-NPIF	Nitric/Peroxide Impingers - Bottle F		X						
BP-WV-D4-M29-NPIG	Nitric/Peroxide Impingers - Bottle G		X						
BP-WV-D4-M29-NPIH	Nitric/Peroxide Impingers - Bottle H		X						
BP-WV-D4-M29-NPII	Nitric/Peroxide Impingers - Bottle I		X						
BP-WV-D4-M29-Org	Acetone Rinse of Nitric/Peroxide Impingers		X						

Remarks: Provide results in total mass per sample. Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date 8/4/11	Time 1500	Received by:	Date 8-5-11	Time 1300	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D5-M29-PNR-NA	PNR - Nitric Acid	7/27/11 0339	X						
BP-WV-D5-M29-Filt	Filter		X						
BP-WV-D5-M29-NPIA	Nitric/Peroxide Impingers - Bottle A		X						Combined for single analysis
BP-WV-D5-M29-NPIB	Nitric/Peroxide Impingers - Bottle B		X						
BP-WV-D5-M29-NPIC	Nitric/Peroxide Impingers - Bottle C		X						
BP-WV-D5-M29-NPID	Nitric/Peroxide Impingers - Bottle D		X						
BP-WV-D5-M29-NPIE	Nitric/Peroxide Impingers - Bottle E		X						
BP-WV-D5-M29-NPIF	Nitric/Peroxide Impingers - Bottle F		X						
BP-WV-D5-M29-NPIG	Nitric/Peroxide Impingers - Bottle G		X						
BP-WV-D5-M29-NPIH	Nitric/Peroxide Impingers - Bottle H		X						
BP-WV-D5-M29-NPII	Nitric/Peroxide Impingers - Bottle I		X						
BP-WV-D5-M29-Org	Acetone Rinse of Nitric/Peroxide Impingers		X						

Remarks: Provide results in total mass per sample. Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date 8/4/11	Time 1500	Received by:	Date 8-5-11	Time 1300	Relinquished by	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks:

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-DFB-M29-PNR-NA	PNR - Nitric Acid	7/26/11 1747	X						
BP-WV-DFB-M29-Filt	Filter		X						
BP-WV-DFB-M29-NPIA	Nitric/Peroxide Impingers - Bottle A		X						
BP-WV-TASRB-M29-Filt	Filter								
BP-WV-TASRB-M29-NA Rns Soln	Nitric Acid Rinse Solution	7/27/11 1330	X						
BP-WV-TASRB-M29-Water	Water		X						

Remarks: Provide results in total mass per sample. Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date 8/4/11	Time 1800	Received by:	Date 8-5-11	Time 1300	Relinquished by:	Date	Time
Received by	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

URS

Chain of Custody Record

Samples from Method 29 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time		Metals by ICAP/MS (per Refinery ICR) - SW-846 Method 6020A		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-TASRB-M29-NP	Nitric Acid/Hydrogen Peroxide Solution	7/27/11 1330		X					

Remarks: Provide results in total mass per sample. Raw data package required. Metals for analysis are Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se.

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	8/4/11	1500		8-5-11	1300			
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

LOT RECEIPT CHECKLIST
TestAmerica West Sacramento

CLIENT URS PM RV LOG # 72083

LOT# (QUANTIMS ID) G1H080437 QUOTE# 89157 LOCATION EPA 1

Checked (✓)

DATE RECEIVED 8-5-11 TIME RECEIVED 900 ☒

DELIVERED BY ☒ FEDEX ☐ ON TRAC ☐ OTHER
☐ GOLDENSTATE ☐ UPS ☐ EZ PARCEL
☐ TAL COURIER ☐ TAL SF ☐ CLIENT ☒

SHIPPPING CONTAINER(S) ☐ TAL ☒ CLIENT ☐ N/A ☒

CUSTODY SEAL STATUS ☐ INTACT ☐ BROKEN ☒ N/A ☒

CUSTODY SEAL #(S) ______

COC #(S) ______ ☒

TEMPERATURE BLANK Observed: NA Corrected: ______

SAMPLE TEMPERATURE - (TEMPERATURES ARE IN °C)

Observed: 22,23,24 Average 23 Corrected Average 23

LABORATORY THERMOMETER ID:

IR UNIT: #4 ☒ #5 ☐ ☐ OTHER ______ ☒

Initials: [illegible] Date: 8-5-11

---

pH MEASURED ☐ YES ☐ ANOMALY ☒ N/A ☒
LABELED BY.......... ☒
LABELS CHECKED BY.......... ☒
PEER REVIEW ______ ☒ NA

SHORT HOLD TEST NOTIFICATION
SAMPLE RECEIVING ☒
WETCHEM ☒ N/A ☒
VOA-ENCORES ☒ N/A ☒

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☒ N/A ☒

☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A ☒

☐ CLOUSEAU ☐ TEMPERATURE EXCEEDED (2 °C – 6 °C)*1 ☒ N/A
☐ WET ICE ☐ BLUE ICE ☐ GEL PACK ☒ NO COOLING AGENTS USED ☒ PM NOTIFIED

Initials ______ Date 080411

Notes ______

*1 Acceptable temperature range for State of Wisconsin samples is ≤4°C.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Bottle Lot Inventory

Lot ID: G1H080437

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VOA*	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
VOAh*	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
AGB																				
AGBs																				
250AGB																				
250AGBs																				
250AGBn																				
500AGB																				
____AGJ		7			9			9			1	1			9					
500AGJ			1			1											1			
250AGJ	1			1			1		1	1			1	1		1				
125AGJ																				
____CGJ																				
500CGJ																				
250CGJ																				
125CGJ																				
PJ																				
PJn																				
500PJ																				
500PJn																				
500PJna																				
500PJzn/na																				
250PJ																				
250PJn																				
250PJna																				
250PJzn/na																				
Acetate Tube																				
_____"CT																				
Encore																				
Folder/filter																				
PUF																				
Petri/Filter	1			1			1			1		1		1						
XAD Trap																				
Ziploc																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

h = hydrochloric acid **s** = sulfuric acid **na** = sodium hydroxide **n** = nitric acid **zn** = zinc acetate

Number of VOAs with air bubbles present / total number of VOA's

QA-185 5/05 EM

Page 3

Method 29 Lab Analysis Data

Client:	**Plant USA**
Unit Tested:	**Unit 1**
Sampling Location:	**Stack**

	Probe Wash (Front Half)							
	1		**2**		**3**		**Blank (Front Half)**	
Metal	ug	Less Blank	ug	Less Blank	ug	Less Blank	RDL	ug
Antimony	0.1854	0.1554	0.2154	0.1854	0.4754	0.4454	0.0108	0.0300
Arsenic	0.4850	0.4850	0.2450	0.2450	0.1500	0.1500	0.1500	0.0000
Beryllium	0.0760	0.0760	0.0240	0.0240	0.0240	0.0240	0.0240	0.0000
Cadmium	0.1510	0.1210	0.1210	0.0910	0.0600	0.0300	0.0220	0.0300
Chromium	2.8400	1.6400	4.7400	3.5400	6.4800	5.2800	0.2800	1.2000
Cobalt	0.3030	0.2936	0.7286	0.7192	1.0740	1.0646	0.0172	0.0094
Lead	0.0069	0.0198	1.5380	1.3180	1.7100	1.4900	0.0198	0.2200
Manganese	0.6800	0.0300	9.1000	8.4500	17.2000	16.5500	0.0260	0.6500
Nickel	5.7980	5.2680	105.0710	104.5410	10.3000	9.7700	0.0300	0.5300
Selenium	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.0000

	Impinger Wash (Back Half)							
	1		**2**		**3**		**Blank (Back Half)**	
Metal	ug	Less Blank	ug	Less Blank	ug	Less Blank	RDL	ug
Antimony	0.0640	0.0640	0.0860	0.0860	0.2200	0.2200	0.0054	0.0000
Arsenic	0.4100	0.1700	1.5000	1.2600	0.9400	0.7000	0.0750	0.2400
Beryllium	0.0580	0.0580	0.0120	0.0120	0.0120	0.0120	0.0120	0.0000
Cadmium	0.1100	0.1100	0.1900	0.1900	0.1000	0.1000	0.0110	0.0000
Chromium	3.8000	3.5600	1.9000	1.6600	1.6000	1.3600	0.1400	0.2400
Cobalt	0.2100	0.2100	0.2300	0.2300	0.1400	0.1400	0.0086	0.0000
Lead	1.3000	1.2240	1.1000	1.0240	61.7000	61.6240	0.0099	0.0760
Manganese	8.3000	8.0900	10.1000	9.8900	6.8000	6.5900	0.0130	0.2100
Nickel	4.8000	4.6600	3.8000	3.6600	5.4000	5.2600	0.0150	0.1400
Selenium	1.9000	1.9000	29.9000	29.9000	4.0000	4.0000	0.2600	0.0000

Denotes values were less than the Reported Detection Limit (RDL) ▨

Totals (Front & Back Halves) Less Blank			
	1	**2**	**3**
Metal	ug	ug	ug
Antimony	0.22	0.27	0.67
Arsenic	0.66	1.51	0.85
Beryllium	0.13	0.04	0.04
Cadmium	0.23	0.28	0.13
Chromium	5.20	5.20	6.64
Cobalt	0.50	0.95	1.20
Lead	1.24	2.34	63.11
Manganese	8.12	18.34	23.14
Nickel	9.93	108.20	15.03
Selenium	2.42	30.42	4.52
Mercury	0.00	0.00	0.00

For the purposes of reporting values below the RDL, half the RDL for each fraction below the RDL was used to calculate the total mass.

0.60	0.29	1.46
2.00	0.29	1.46
0.20	0.07	0.36
0.30	0.07	0.36
3.00	0.22	1.09
0.80	0.07	0.36
2.00	0.15	0.73
5.00	0.49	2.14
4.00	0.37	1.82
6.00	0.73	3.64
23.90	2.76	13.42

Field Data Sheets

Sample Type – **Multi Metals (Method 29)**	Date 7/15/11	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 1	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Console No. A161361	Operator RF	Initial not performed
Location (Source) – DCU3 West Vent	DGMCF 0.998	Nozzle Dia (in) ~~M29~~ 0.190	Final 0.275 @ 22in
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID M29-1	Pitot Tube ID n/a
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calibration		Bar. Press. (in. Hg) 29.50	Initial (+) n/a (-)
Nozzle ID 700904 Caliper	0.190 0.189 0.190	Stat. Press. (in. H_2O) n/a	Final (-) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)						Vacuum (in. Hg)	Condenser Temp
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
P3B	0220	698.77		1.0		222	295	84	101	101	5	58
	0225	699.119		0		RF 7/15 224 ~~224~~	307	84	101	100	20	63
	0230	699.154		0		237	325	85	100	100	20	61
	0235	699.233		0		249	354	85	100	100	20	58
	0240	699.282		0		258	334	86	101	100	20	59
	0245	699.361		0		262	331	87	101	100	20	57
	0250	699.414		0		266	333	87	101	100	20	60
	0255	699.495		0		268	333	87	102	100	20	58
	0300	699.561		0		270	333	87	102	100	20	57
	0305	~~699.841~~	RF 7/15 699.641	0		271	333	88	102	101	20	60
	0310	699.710		0		275	327	88	102	100	20	61
	0315	699.773		0		275	333	88	101	100	20	60
	0320	699.849		0		277	331	87	102	100	20	64
	0325	699.900		0		275	328	87	102	100	20	67
	0330	699.961		0		276	325	87	102	101	20	69
	0335	700.015		0		278	325	87	102	100	20	64
	0340	700.059		0		279	325	87	102	100	20	60
	0345	700.118		0		280	324	87	102	100	20	59
	0350	700.155		0		280	325	86	102	100	20	58
	0355	700.215		0		282	325	87	102	100	20	57
RF 7/15 0400	~~0340~~	700.267		0		281	324	87	101	100	20	59
↓	0405	700.305		0		280	326	86	101	100	20	58
STOP	0411	700.392										

Comments:

Sample Type – **Multi Metals (Method 29)**	Date 7/15/11	Condition D	Page 1 of 1	
Plant Name – BP-Husky Toledo	PTCF — n/a	Run ~~D~~ 2	Sampling Train Leak Rate (ft³ @ in. Hg)	
Project Number - 40942317	Console No. A16/361	Operator R/mh/RF	Initial	0.003 @ 20"
Location (Source) – DCU3 Port 2B East	DGMCF 0.998	Nozzle Dia (in) 0.220	Final	0.005 @ 22"
Duct Dimension(s) 8"	ΔH@ — 1.600	Nozzle ID m29-1	Pitot Tube ID n/a	
Elevation (relative to Barometer) (ft) 0'	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check	
Nozzle Calibration Nozzle ID NA	0.190 ~~0.220~~ 0.189 ~~0.220~~ 0.190 ~~0.220~~	Bar. Press. (in. Hg) 29.26	Initial (+) N/A	(+)
		Stat. Press. (in. H₂O) n/a	Final (-)	(-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	Cond
					Temperature (°F)							
2B	1939	~~701.744~~ 702.350		0.01		303	337	82	107	106	20	55
	1944	703.865		0.01		301	336	91	107	106	21	59
	1949	703.970		0.01		307	337	93	107	106	22	56
	1954	704.058		0.01		310	336	94	106	105	20.5	52
	1959	704.167		0.01		315	336	94	106	105	20	51
	2004	704.282		0.01		318	327	93	105	104	20	54
	2009	704.398		0.01		318	327	92	103	102	20	55
	2014	704.510		0.01		316	326	91	~~53~~ 102	~~102~~ 101	20	53
	2019	704.598		0.01		315	326	90	101	100	20	54
	2024	704.671		0.01		314	326	89	100	99	20	56
	2029	704.759		0.01		314	326	88	98	98	20	55
	2034	704.821		0.01		315	325	88	98	98	20	55
	2039	704.895		0.01		315	325	88	97	96	20	53
	2044	704.961		0.01		315	325	88	96	95	20	56
	2049	705.021		0.01		314	325	87	96	95	20	57
	2054	705.091		0.01		314	325	87	95	94	20	62
	2059	705.146		0.01		315	325	84	95	94	20	57
	2104	705.215		0.01		314	325	84	94	93	20	57
	2109	705.273		0.01		314	325	85	94	93	20	57
	2114	705.344		0.01		314	324	85	93	92	20	57
2119	~~2119~~	705.417		0.01		316	324	86	93	92	20	63
STOP	2121	705.454										

Comments:

SDS-07 Metals by EPA Method 29
Per EM SOP-017
Revision Date: May 2011

Sample Type – **Multi Metals (Method 29)**	Date 7/16/11		Condition D		Page 1 of 1	
Plant Name – BP-Husky Toledo	PTCF — n/a		Run 3		Sampling Train Leak Rate (ft³ @ in. Hg)	
Project Number - 40942317	Console No. A16/361		Operator NC		Initial	0.002 @ 20"
Location (Source) – DCU3 ~~P3B~~ West	DGMCF 0.998		Nozzle Dia (in) ~~0.220~~ 0.190		Final	0.001 @ 24"
Duct Dimension(s) 8"	ΔH@ 1.600		Nozzle ID — M29-1		~~Pitot Tube ID~~	
Elevation (relative to Barometer) (ft) — 0	Kf — n/a		Barometer ID BP-2		~~Pitot Tube Leak Check~~	
Nozzle Calibration Nozzle ID 700904	0.190 ~~0.220~~	0.190 ~~0.220~~ 0.189 ~~0.22~~ NC 7/16/11	Bar. Press. (in. Hg) 29.38		Initial (+)	(-)
			Stat. Press. (in. H₂O) n/a		Final (-)	(-)

Point	Clock Time	~~Dry Gas Vol. (ft³)~~	DGM ~~ΔP (in. H₂O)~~	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	Cond
P3B	1322		710.150	0.01		321	317	74	99	98	20	36
	1327		710.438	0.01		282	328	76	99	98	20	63
	1332		710.560	0.01		277	325	~~90~~ 77 NC 7/16/11	98	97	20	59
	1337		710.644	0.01		274	305	77	99	98	20	41
	1342		710.734	0.01		282	337	94	100	99	20	57
	1347		710.810	0.01		282	339	95	101	100	20	89
	1352		710.897	0.01		282	339	94	102	101	20	62
	1357		710.991	0.01		283	337	92	102	101	21	57
	1402		711.065	0.01		283	339	93	102	101	21	59
	1407		711.137	0.01		282	338	94	102	101	21	59
	1412		711.200	0.01		283	339	94	103	101	21	61
	1417		711.268	0.01		283	338	92	103	101	21	63
	1422		711.340	0.01		283	338	91	102	101	21	59
	1427		711.394	0.01		284	338	91	102	101	21	60
	1432		711.460	0.01		285	341	91	102	101	21	70
	1437		711.510	0.01		286	339	90	102	101	21	67
	1442		711.545	0.01		287	337	89	101	100	21	70
	1447		711.617	0.01		288	338	88	101	100	21	81
	1452		711.655	0.01		290	339	89	102	100	21	89
	1457		711.705	0.01		292	337	90	102	101	21	91
	1502		711.760	0.01		293	338	90	102	101	21	110
	1507		711.803	0.01		294	340	90	103	102	21	88
	1512		711.860	0.01		296	338	90	103	102	21	98
NC 7/16/11	1517		711.905	0.01		298	338	91	103	102	21	101
STOP	1518		711.924									

Comments:

SDS-07 Metals by EPA Method 29
Per EM SOP-017
Revision Date: May 2011

Sample Type – **Multi Metals (Method 29)**	Date ~~[illegible]~~ 7/18/11	Condition D		Page 1 of 1	
Plant Name – BP-Husky Toledo	PTCF n/a	Run 4		Sampling Train Leak Rate (ft³ @ in. Hg)	
Project Number - 40942317	Console No. 0.998	Operator RF		Initial	0.006 @ 22"
Location (Source) – DCU3 West Vent	DGMCF A161361	Nozzle Dia (in) ~~M29-2~~ 0.207		Final	0.003 @ 22"
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID M29-2		Pitot Tube ID n/a	
Elevation (relative to Barometer) (ft) 0	Kf N/A	Barometer ID BP-2		Pitot Tube Leak Check	
Nozzle Calibration		Bar. Press. (in. Hg) 29.38		Initial (+)	(-)
Caliper ~~Nozzle~~ ID 700904 ● 0.206 ● 0.206 ● 0.208		Stat. Press. (in. H₂O) n/a		Final (-)	(-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)						Vacuum (in. Hg)	Condenser Temp.
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
P 82B	0220	713.448	n/a	1.0	N A	335	359	77	73	72	~~1.0~~ 5.0 RF	38
	0225	713.888		0		317	350	85	93	93	20.0	48
	0230	714.076		0		316	344	83	93	92	20	50
	0235	714.264		0		317	342	82	93	92	20	52
	0240	714.432		0		315	340	83	92	92	20	56
	0245	714.636		0		318	342	82	92	92	20	46
	0250	714.831		0.01		318	342	83	93	92	20	49
	0255	715.027		0.01		318	354	83	93	92	20	54
	0300	715.240		0.01		318	345	84	93	92	20	60
	0305	715.419		0.01		317	341	84	93	93	20	53
	0310	715.609		0.01		317	342	84	93	92	20	51
	0315	715.776		0.01		317	341	84	93	93	20	52
	0320	715.954		0.01		315	337	81	90	90	20	47
	0325	716.135		0.01		317	341	84	93	92	20	52
	0330	716.299		0.01		316	341	84	93	92	20	56
	0335	716.486		0.01		319	343	86	95	94	20	66
	0340	716.651		0.01		319	341	85	RF ~~94~~ 95	94	20	54
	0345	716.840		0.01		319	341	85	95	94	20	54
	0350	717.015		0.01		317	339	82	92	91	20	56
	0355	717.181		0.01		318	340	83	93	92	20	62
	0400	717.366		0.01		318	343	84	95	94	20	57
	0405	717.523		0.01		318	343	83	91	89	20	54
	0410	717.676		0.01		RF ~~305~~ 318	343	83	RF ~~84~~ 95	RF ~~83~~ 95	20	~~45~~ RF 57
	0415	717.817		0.01		317	344	85	96	95	20	59
	0420	717.953		0.01		317	343	85	96	95	20	64
	0425	718.083		0.01		316	343	85	95	94	20	60
	0430	718.204		0.01		315	344	85	96	95	20	63
	0435	718.325		0.01		316	343	85	95	95	20	50
Stop	0440	718.446										

Comments:

SDS-07 Metals by EPA Method 29
Per EM SOP-017
Revision Date: May 2011

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Sample Type – **Multi Metals (Method 29)**	Date ~~July 26th 2011~~	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF ~~[illegible]~~ n/a	Run 5	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Console No. A161361	Operator DC	Initial 0.003 @ 20"
Location (Source) – DCU3 West (2B)	DGMCF 0.998	Nozzle Dia (in) 0.205	Final 0.002 @ 22"
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID M29-2	~~Pitot Tube ID~~
Elevation (relative to Barometer) (ft) — 0	Kf — n/a	Barometer ID [illegible] ~~29.10~~	~~Pitot Tube Leak Check~~
Nozzle Calibration		Bar. Press. (in. Hg) 29.10	Initial (+) n/a (-)
Nozzle ID 700904	0.205 0.206 0.205	Stat. Press. (in. H₂O) n/a	Final (-) (-)

Point	5-min Clock Time	Dry Gas Vol. (ft³)	cond conc ~~ΔP (in. H₂O)~~	ΔH (in. H₂O)	Temperature (°F)						Vacuum (in. Hg)
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	
P2B	0128	738.10	64	0.01	N A	345	333	76	94	94	20"
	0133	738.002	64	0.01		[illegible]	~~342~~	85	94	93	20"
	0138	738.51	52	0.01		350	343	88	94	93	20
	0143	738.612	50	0.01		352	342	88	94	93	20
	0148	738.684	51	0.01		353	340	86	92	91	20
	0153	738.785	47	0.01		352	342	88	93	92	20
	0158	738.880	53	0.01		353	343	88	93	92	20
	0203	738.942	56	0.01		354	340	88	93	92	20
	0208	739.022	51	0.01		354	341	88	93	92	20
	0213	739.100	51	0.01		352	337	88	92	92	20
	0218	739.153	53	0.01		349	338	87	93	92	20
	0223	739.228	54	0.01		350	338	86	93	92	20
	0228	739.278	52	0.01		349	338	86	93	92	20
	0233	739.344	53	0.01		349	336	87	93	92	20
	0238	739.393	55	0.01		347	334	87	93	92	20
	0243	739.446	53	0.01		344	333	87	93	92	20
	0248	739.513	55	0.01		343	332	87	93	91	20
	0253	739.555	52	0.01		343	332	86	93	92	20
	0258	739.613	52	0.01		343	333	86	93	91	20
	0303	739.662	53	0.01		344	333	86	92	91	20
	0308	739.712	53	0.01		344	332	86	92	91	20
	0313	739.767	51	0.01		344	331	86	92	91	20
	0318	739.813	50	0.01		343	331	86	91	90	20
	0323	739.878	49	0.01		343	331	86	91	90	20
	0328	739.922	49	0.01		344	333	86	90	90	20
	0333	739.986	53	0.01		344	331	86	91	91	20
	0338	740.020	53	0.01		344	332	86	91	91	20
Stop	0339	740.037									

Comments:

SDS-07 Metals by EPA Method 29
Per EM SOP-017
Revision Date: May 2011

Sample Type – **Multi Metals (Method 29)**	Date 7/26/14	Condition FB	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF NA	Run FB	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Console No. A167041	Operator NE	Initial see @
Location (Source) – DCU3	DGMCF 0.990	Nozzle Dia (in) NA	Final Below
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID NA	~~Pitot Tube ID~~
Elevation (relative to Barometer) (ft) 0	Kf NA	Barometer ID NA	~~Pitot Tube Leak Check~~ NA
Nozzle Calibration		Bar. Press. (in. Hg) NA	Initial (+) (-)
Nozzle ID NA ● NA ● NA ● NA		Stat. Press. (in. H₂O) NA	Final (-) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	
	1744		484.464	@ 15" = 0.005								
	1745		484.754									
	1746		484.754	@ 15" = 0.00								
	1747		485.014									

Comments:

SDS-07 Metals by EPA Method 29
Per EM SOP-017
Revision Date: May 2011

Sample Recovery Sheets

Project No. 40942317
Recovered by (Initials) DCW

Multi-Metals
No Determination of PM or Mercury
EPA Method 29

Condition No. D
Run No.: 1
Date: 7/15/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	Nitric/Peroxide	200	KO Fatty		-		=	
2	Nitric/Peroxide	200	Mod Fatty		-		=	
3	Nitric/Peroxide	100	G/S		-		=	
4	--		KO		-		=	
5	Zinc Acetate	200	G/S	n/a	-		=	
6	Zinc Acetate	200	G/S		-		=	
7	--		KO		-		=	
8	Silica Gel	~ 300g	Mod		-		=	
						Total Net Gain (g)	=	

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-____-M29-PNR-NA	n/a	Probe and Nozzle Rinse
BP-__-____-M29-Filt		Filter
BP-__-____-M29-NPI		Nitric Impinger

Sample Recovery Checklist

AT LOCATION

_____ Rinse and brush probe and nozzle with 0.1 M Nitric Acid into PNR bottle. Note – use Teflon brush.

_____ Rinse the Teflon transfer line with 0.1N nitric acid into NPI bottle.

IN LABORATORY

_____ Separate filter holder and place filter in clean Petri dish. Complete sample label.

_____ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR-NA sample label.

_____ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

_____ Pour contents of impingers 1 through 3 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

_____ Discard contents of 5th and 6th impingers (Zinc Acetate).

_____ Log samples into logbook and store appropriately.

Comments samples not recovered

Project No. 40942317

Recovered by (Initials) KMM

Multi-Metals

No Determination of PM or Mercury

EPA Method 29

Condition No. D

Run No.: 2

Date: 7/16/11

O Nitric/Peroxide 200 KO Fatty 2499.4 1196.4 = 3219.5

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)	
1	Nitric/Peroxide	200	KO Fatty	2387.2	-	1165.7	=	~~3219.5~~	1221.5
2	Nitric/Peroxide	200	Mod Fatty	1511.2	-	1193.3	=	~~1221.5~~	317.9
3	Nitric/Peroxide	100	G/S	765.6	-	765.2	=	~~317.9~~	0.4
4	--		KO	615.6	-	615.6	=	~~0.4~~	0
5	Zinc Acetate	200	G/S	719.6	-	787.6	=	~~0~~-68.	0
6	Zinc Acetate	200	G/S	834.5	-	827.1	=	7.4	
7	--		KO	681.1	-	618.9	=	62.2	
8	Silica Gel	~ 300g	Mod	971.3	-	967.9	=	3.4	
						Total Net Gain (g)	=	4764.3	

Sample Log

Sample ID Number	No. of Sample Containers	Description	
BP-WV-D2-M29-PNR-NA	KMM 7/16/11 ~~7~~ 1	Probe and Nozzle Rinse	
BP-WV-D2-M29-Filt	1	Filter	
BP-WV-D2-M29-NPI	7	Nitric Impinger	(A-F)
BP-WV-D2-M29-ORG	1	organic (acetone) rinse of Impingers	

	~~Initial~~ Final	~~Final~~ Initial
Bottle A	1379.4	414.4
Bottle B	1366.2	414.7

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 M Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse the Teflon transfer line with 0.1N nitric acid into NPI bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR-NA sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of impingers 1 through 3 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

✓ Discard contents of 5th and 6th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments - organic residue on condeser Imp1, Imp2 performed organic (acetone) rinse followed by repeat rinse w/ 0.1 N HNO3

0.1 N Front half rinse volume = 96.4 mL

0.1 N back-half rinse volume = 493.8 mL

RDS-25; Metals by EPA M29, no PM, no Mercury
Per EM SOP-017
Revision Date: March 2011

Project No. 40942317

Recovered by (Initials) AR

Multi-Metals

No Determination of PM or Mercury

EPA Method 29

Condition No. D

Run No.: 3

Date: 7/16/11

⊘ Nitric/Peroxide 200 KO Fatty 1158.7 = 2216.4

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	Nitric/Peroxide	200	KO Fatty	3375.1		1191.1	=	2296.9
2	Nitric/Peroxide	200	Mod Fatty	3488.0		1185.5	=	1887.7
3	Nitric/Peroxide	100	G/S	3073.2	-	764.6	=	148.8
4	--		KO	913.4	-	614.1	=	243.9
5	Zinc Acetate	200	G/S	858.0	-	893.1	=	-158.8
6	Zinc Acetate	200	G/S	734.3	-	864.6	=	33.6
7	--		KO	898.2	-	574.3	=	125.0
8	Silica Gel	~ 300g	Mod	699.3	-	971.3	=	5.0
				976.3	Total Net Gain (g)		=	6798.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-D3-M29-PNR-NA	1	Probe and Nozzle Rinse
BP-WV-D3-M29-Filt	1	Filter
BP-WV-D3-M29-NPIA	9	Nitric Impinger

NPIB
NPIC
NPID
NPIE
NPIF
NPIG
NPIH
NPII

BP-WV-D3-M29-ACE 1 Nitric Impingers

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 M Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse the Teflon transfer line with 0.1N nitric acid into NPI bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR-NA sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of impingers 1 through 3 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

✓ Discard contents of 5th and 6th impingers (Zinc Acetate).

____ Log samples into logbook and store appropriately.

Comments AR	Filter has piece of Fluff on it.
0.1 N HNO_3 front half rinse volume: 112.4 mL	
0.1 N HNO_3 back half rinse volume: 473.6 mL	

RDS-25: Metals by EPA M29, no PM, no Mercury
Per EM SOP-017
Revision Date: March 2011

Project No. 40942317
Recovered by (Initials) AC

Multi-Metals
No Determination of PM or Mercury
EPA Method 29

Condition No. D
Run No.: 4
Date: 7/18/11

0 Nitric/Peroxide 200 KoFatty 3479.9 - 1193.7 = ~~1946.7~~ 2286.2

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	Nitric/Peroxide	200	KO Fatty	3386.8	-	1140.4	=	2246.4 ~~2002.7~~
2	Nitric/Peroxide	200	KO ~~Mod~~ Fatty	3077.3	-	1161.1	=	1916.2
3	Nitric/Peroxide	100	G/S	941.0	-	~~1193~~ 761.8	=	179.2
4	--		KO	1075.4	-	612.8	=	462.6
5	Zinc Acetate	200	G/S	933.7	-	895.3	=	38.4
6	Zinc Acetate	200	G/S	898.0	-	891.1	=	6.9
7	--		KO	906.9	-	577.2	=	329.7
8	Silica Gel	~ 300g	Mod	991.0	-	976.3	=	14.7
						Total Net Gain (g)	=	7480.3

~~3 Nitric/Perox 200 Mod Fatty - 1193.7 =~~

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-~~WV~~-D4-M29-PNR-NA	1	Probe and Nozzle Rinse
BP-~~WV~~-D4-M29-Filt	1	Filter
BP-~~WV~~-D4-M29-NPI	9	Nitric Impinger

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 M Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse the Teflon transfer line with 0.1N nitric acid into NPI bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR-NA sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of impingers 1 through 3 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

✓ Discard contents of 5th and 6th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments
0.1N HNO_3 Front half 590.9 - 495.4 = 95.5
0.1N HNO_3 back half 495.4 - 163.8 = 331.6

RDS-25; Metals by EPA M29, no PM, no Mercury
Per EM SOP-017
Revision Date: March 2011

Project No. C0942317
Recovered by (Initials)

Multi-Metals
No Determination of PM or Mercury
EPA Method 29

Condition No. D
Run No.: 5
Date: 7/27/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	3523.5	-	937.9	=	2585.6
2	Nitric/Peroxide	200	Mod Fatty	3141.1	-	1217.9	=	1923.2
3	Nitric/Peroxide	200	Mod Fatty	3626.9	-	1335.5	=	2291.4
4	Nitric/Peroxide	100	G/S	962.8	-	776.5	=	186.3
5	-	-	KO	884.1	-	574.6	=	309.5
6	Zinc Acetate	200	G/S	753.4	-	886.1	=	-132.7
7	Zinc Acetate	200	G/S	897.8	-	879.1	=	18.7
8	--		KO	722.5	-	608.1	=	114.4
9	Silica Gel	~ 300g	Mod	984.8	-	978.8	=	6.0
						Total Net Gain (g)	=	7302.4

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-DS-M29-PNR-NA	1	Probe and Nozzle Rinse
BP-_-_-M29-Filt	1	Filter
BP-↓-↓-M29-NI	9 (A-I)	Nitric Impinger

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse the Teflon transfer line with 0.1M nitric acid into NI bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of impingers 1 through 4 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

✓ Discard contents of 6th and 7th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments
1st impinger separated into 2 layers - 1 cloudy white (top) 1 clear yellowish (bottom)
0.1 N HNO_3 front half volume = ~~36.9~~ 72.7 mL
0.1 N HNO_3 back half volume = 431.0 mL

Project No. 40942317
Recovered by (Initials) WDD

Multi-Metals
No Determination of PM or Mercury
EPA Method 29

Condition No. D
Run No.: FB
Date: 7/26/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	941.2	-	935.1	=	6.1
2	Nitric/Peroxide	200	Mod Fatty	1215.1	-	1215.4	=	-0.3
3	Nitric/Peroxide	200	Mod Fatty	1336.4	-	1336.7	=	-0.3
4	Nitric/Peroxide	100	G/S	774.1	-	774.3	=	-0.2
5	-	-	KO	574.6	-	574.8	=	-0.2
6	Zinc Acetate	200	G/S	886.1	-	886.3	=	-0.2
7	Zinc Acetate	200	G/S	879.1	-	879.3	=	-0.2
8	--		KO	608.1	-	608.1	=	0
9	Silica Gel	~ 300g	Mod	978.8	-	978.0	=	0.8
						Total Net Gain (g)	=	5.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-DFB-M29-PNR-NA	1	Probe and Nozzle Rinse
BP-↓-↓-M29-Filt	1	Filter
BP-↓-↓-M29-NI	1	Nitric Impinger

Mass ~~volume~~ HNO3 used
106.3 g
—
359.4 g

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse the Teflon transfer line with 0.1 ~~M~~ N nitric acid into NI bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of impingers 1 through 4 into the Nitric/peroxide impinger catch bottle(s). Rinse the impingers, filter support and back-half of the filter holder and connecting glassware with 0.1 N nitric acid same bottle(s). Complete sample label(s).

✓ Discard contents of 6th and 7th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments
0.1 N HNO3 front-half volume = 106.3 mL
0.1 N HNO3 back-half volume = 359.4 mL

Section O

Method 308 – Methanol

DILUTION RATIO SUMMARY

		A2	A3	A4	C1	C2	C3	D2	D4	D5
Selected DR		**21.29**	**21.32**	**16.83**	**18.68**	**17.27**	**18.32**	**106.37**	**105.82**	**107.86**
Average	Pre-test DR	20.13	21.32	13.35	18.14	17.27	17.90	106.37	105.82	107.86
	Post-test DR	21.29	13.94	16.83	18.68	15.79	18.32	105.34	95.38	
THC1	Pre-test DR	20.59	21.12	13.53						
	Post-test DR	21.84	13.68	16.98						
THC2	Pre-test DR	19.68	21.52	13.18						
	Post-test DR	20.74	14.21	16.69						
M18	Pre-test DR	15.58	14.22	16.32						
	Post-test DR	15.15	14.46	16.11						
O2	Pre-test DR	23.46	22.43	14.27	17.65	17.49	17.86			
	Post-test DR	24.27	15.43	18.57	18.55	16.08	18.53			
CO2	Pre-test DR	24.48	23.88	14.30	18.62	17.05	17.94	109.41	108.44	107.86
	Post-test DR	24.59	14.83	18.63	18.82	15.50	18.11	108.58	94.61	
NO_x	Pre-test DR							109.77	106.79	106.31
	Post-test DR							107.40	95.80	
SO2	Pre-test DR							99.93	102.23	109.40
	Post-test DR							100.03	95.72	

		A2	A3	A4
M308	THC1 Post Test	15.58	14.22	16.32
	THC2 Post Test	15.15	14.46	16.11
	Average Post Test	**15.37**	**14.34**	**16.22**

Notes: THC dilution ratio is better than any other. The diluted THC response is higher and more in the calibration range of the instrument

So: For Runs A2, A3, A4, THC only used for developing average Pre, and post-test DR

For runs C1, C2, C3, D2, d4, and D5, the other analytes are used to develop DR.

Once the average DR is developed, the larger of pre- or post-test DR is used for the run. This is conservative.

Since DR is not separable from analyzer drift, and this drift is addressed by use of the larger value, values are not corrected for drift, according to the methods.

Laboratory Report

URS Corporation

9400 Amberglen Blvd
Austin, TX 78729

BP Husky Refining, LLC – DCU3
Toledo, OH

Project # 40942317

Analytical Report
(0711-08R2)

EPA Method 18 (Bags)
EPA Method 18 (Bag Condensate)

1,3-Butadiene, Acetonitrile, Acrolein, Acetone, Acrylonitrile, Pentane, Methylene chloride, Hexane, Benzene, Trichloroethene, Toluene, 1,2-Dibromoethane, Tetrachloroethene, and Carbon disulfide

EPA Method 18 (Adsorbents)

Acetonitrile, Acrylonitrile, Methyl t-butyl ether, 2-Nitropropane, Isooctane, Methyl isobutyl ketone, Chlorobenzene, Ethylbenzene, m/p-Xylene, Styrene, o-Xylene, Cumene, and Nitrobenzene

EPA Method 308

Methanol

Enthalpy Analytical, Inc.
Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road, Durham, NC 27703 – 5518
800-1 Capitola Drive, Durham, NC 27713

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 971 pages.

Valgena Respass

QA Review Performed by – Valgena Respass

Report Issued: 09/23/2011

Summary of Results

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 308

Client #	40942317
Job #	0711-08
# Samples	3 runs

Compound	Sample ID / Catch Weight (ug)		
		BP-WV	
	A2 M308	***A3 M308***	***A4 M308***
Methanol	13.7 ND	13.7 ND	13.7 ND

Results

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 308

Client #	40942317
Job #	0711-08
# Samples	3 runs

MDL 0.325 (ug/mL)
LOQ 1.58 (ug/mL)
Compound Methanol

Lower Curve Limit 1.58 (ug/mL)
Upper Curve Limit 3,161 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
A2 M308 Cond	040F4401.D	040F4402.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	42.3	13.7	ND
A2 M308 SG-FH	073B2501.D	073B2502.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
A2 M308 SG-BH	074B2601.D	074B2602.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
													13.7	ND
A3 M308 Cond	041F4501.D	041F4502.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	42.3	13.7	ND
A3 M308 SG-FH	075B2701.D	075B2702.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
A3 M308 SG-BH	077B3101.D	077B3102.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
													13.7	ND
A3 M308 SG FH-LD	076B2801.D	076B2802.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
											% Difference		NA	
A4 M308 Cond	042F4601.D	042F4602.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	42.3	13.7	ND
A4 M308 SG-FH	078B3201.D	078B3202.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
A4 M308 SG-BH	079B3301.D	079B3302.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND
													13.7	ND
A4 M308 CondA-LD	043F4701.D	043F4702.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	42.3	13.7	ND
											% Difference		NA	
M308 H2O RB	044F4801.D	044F4802.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	1.00	0.325	ND
M308 SG MB	080B3401.D	080B3402.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	5.00	1.63	ND

Company	URS Corp - Austin
Analyst	KMT
Parameters	EPA Method 308

Client #	40942317
Job #	0711-08
# Samples	3 runs

MDL 0.325 (ug/mL)
LOQ 1.58 (ug/mL)
Compound Methanol

Lower Curve Limit 1.58 (ug/mL)
Upper Curve Limit 3,161 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
LB 3%p	057B0701.D	057B0702.D	GC120P152.M	NA	NA	NA	0.325	0.325	0.0	0.325	1	1.00	0.325	ND
M308 SG LCS-1	081B3501.D	081B3502.D	GC120P152.M	4.06	4.07	0.1	36.2	36.1	0.2	36.2	1	5.00	181	
												Spike Amount (ug)	198	
												Spike Recovery (%)	91.4%	
M308 SG LCS-2	082B3601.D	082B3602.D	GC120P152.M	4.07	4.06	0.1	34.9	34.6	0.5	34.8	1	5.00	174	
												Spike Amount (ug)	198	
												Spike Recovery (%)	87.8%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corp. - Austin
Analyst	KMT
Parameters	EPA Method 308

Client #	40942317
Job #	0711-08
# Samples	3 Runs

Custody

Steve Eckard of Enthalpy Analytical, Inc. received the samples on 7/30/11 at 3.9°C after being relinquished by URS Corporation of Austin, TX. The samples were received in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for methanol using the analytical procedures in EPA Method 308, Procedure for Determination of Methanol Emission from Stationary Sources (40 CFR Part 63, Appendix A).

The samples were analyzed following the procedures in Section 11.0 Analytical Procedures. All silica gel tubes were desorbed using 5.00 mL of a 3% n-propanol in deionized water solution.

The samples were received in VOA vials with zero headspace. The volume of the sample ***A2 M308 Cond*** was measured at 42.3 mL.

The Hewlett Packard Model 5890, Series II Gas Chromatograph ("Penn" S/N 2750A17269) was equipped with front and back Flame Ionization Detectors and Restek Stabilwax 30 m x 0.53 mm x 2.0 um (S/N 870087 and S/N 808560) capillary columns.

Calibration

The calibration curve is located in the Calibration Curve Chromatograms section of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Chromatographic Conditions

The acquisition method (GC120P150.M) is included in the Calibration Curve Chromatograms section of this report.

Enthalpy Analytical Narrative Summary
(continued)

QC Notes All sample preparation specified in the method were met.

A condensate Laboratory Control Samples was not prepared for analysis with the samples.

Two silica gel tube Laboratory Control Samples (LCSs) were prepared and analyzed in the same manner as the samples. The recoveries were 91.4% and 87.8%.

Laboratory duplicate samples were prepared using aliquots of the samples, ***A3 M308 SG FH*** and ***A4 M308 CondA***. Both the laboratory duplicates and the original samples were below the MDL value.

Reporting Notes These analyses met the requirements of the NELAC Standard. Any deviations from the requirements of the reference method or NELAC Standard have been previously noted in the report narrative.

The results presented in this report are representative of the samples as provided to the laboratory.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

Methanol from Method 308 Sampling Train

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	VOCs by GC/FID	Methanol by GC/FID		Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M308-CondA	Condensate - Bottle A	7/21/11 2207		X					
BP-WV-A2-M308-Silica	Silica			X					
BP-WV-A3-M308-CondA	Condensate - Bottle A	7/24/11 2103		X					
BP-WV-A3-M308-Silica	Silica			X					
BP-WV-A4-M308-CondA	Condensate - Bottle A	7/25/11 1540		X					
BP-WV-A4-M308-Silica	Silica			X					

RG #2 3.9 °C

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/30/11	1245		7/30/11	1245			
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
	8/1/11	3:50 pm						24° Raytek Gun #2

Seal #	Condition
	Good

Remarks

Spreadsheet Calculations

BP-Husky DCU3 Vent Test

Method 308

Data Entered By: ***dcw***
Data Checked By:

Run No.	A2	A3	A4
Date	7/21/2011	7/24/2011	7/25/2011
Time Start	20:57	19:55	14:40
Time Finish	22:07	21:03	15:40
Stack Diameter (ft)	0.6667	0.6667	0.6667
Dry Gas Meter Calibration (Yd)	1.005	1.005	1.005
Barometric Pressure ("Hg)	29.00	29.16	29.2
Height of Sampling Location (ft)	0	0	0
Static Pressure ("H2O)	3.21	3.41	18.96
Corrected Barometric Pressure ("Hg)	29.00	29.16	29.2
Initial Meter Reading (L)	1349.25	1410.32	1447.3
Final Meter Reading (L)	1400.26	1446.84	1478.08
Meter Volume (L)	51.010	36.520	30.780
Average delta H (" H2O)	1.14	0.50	0.50
Average DGM Temp (F)	114.5	99.1	107.8
Test Duration (minutes)	70	68	60
Meter Volume (dsL)	45.801	33.821	28.111
Average Sample Rate (L/min)	0.729	0.537	0.513

Delta H	**Delta H**	**Delta H**
1	0.5	0.5
1.2	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.1	0.5	0.5
1.2	0.5	0.5
1.2	0.5	0.5
1.2	0.5	0.5
1.2	0.5	
1.2	0.5	
1.1	**0.5**	**0.5**

Meter Temps		**Meter Temps**		**Meter Temps**	
In	**Out**	**In**	**Out**	**In**	**Out**
113	113	97	97	105	105
114	112	97	97	106	106
113	114	97	97	106	106
113	112	98	98	106	105
113	113	99	99	106	106
117	114	99	99	108	107
115	114	99	98	109	107
115	114	100	99	109	108
115	118	100	99	110	109
114	115	100	100	111	110
116	115	101	100	110	109
115	114	101	101	111	111
116	116	101	101		
116	116	101	101		
114.46		**99.14**		**107.75**	

Field Data Sheets

Sample Type – **Method 308**	Start Time 2057	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2207	Run 2	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 70	Operator RCW	Initial 0.00 @ 15"
Date 7/21/11	Critical Orifice No. 80-11701	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 East Vent	Bar. Press. (in. H_2O) 29.00	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	Clock Time ~~8~~ 2057	Volume (L)	ΔH (in. H_2O)	Temperature (°F)			In	Out	Vacuum (in. Hg)
				Stack	Critical Orifice	Heat trace			
P-33A	~~1349.25~~	1349.25	1.0		~~n/a 0.5~~	260	113	113	4.0
	2102	1352.00	1.2		~~n/a 0.5~~	260	114	112	4.5
	2107	1355.45	1.1		~~0.5~~	259	113	114	4.5
	2112	1359.20	1.1		—	259	113	112	5.0
	2117	1362.10	1.1		—	260	113	113	5.0
	2122	1364.90	1.1		—	261	117	114	5.0
	2127	1369.10	1.1		—	260	115	114	6.0
	2132	1372.50	1.1		—	247	115	114	6.0
	2137	1378.20	1.1		—	232	115	118	6.0
	2142	1382.10	1.2		—	223	114	115	6.0
	2147	1387.10	1.2		—	223	116	115	6.0
	2152	1390.10	1.2		—	224	115	114	5.0
	2157	1393.00	1.2		—	246	116	116	5.0
	2202	1396.35	1.2		—	262	116	116	5.0
STOP	2207	1400.326							

Comments: post test leak ✓ = 0.00 @ 10" tube ID = 3704500142

DGMCF = 1.005

Tubes by Method 308

Sample Type – **Method 308**	Start Time 1955	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2103	Run 3	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 68	Operator WDD	Initial 0.00@15"
Date 7-24-11	Critical Orifice No. 80-111701-	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3	Bar. Press. (in. H_2O) ~~29.30~~ 29.16	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

WDD 7/24/11

WDD 7/24/11

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				Stack	Heat Trace ~~Critical Orifice~~	DGM In ~~Heat trace~~	DGM Out	
P3A	1955	1410.32	0.5	—	259	97	97	3.5"
	2000	1414.81	0.5	—	259	97	97	3.5"
	2005	1416.30	0.5	—	259	97	97	3.5"
	2010	1418.91	0.5	—	260	98	98	3.5"
	2015	1421.52	0.5	—	261	99	99	3.5"
	2020	1424.11	0.5	—	260	99	99	3.5"
	2025	1426.72	0.5	—	259	99	98	3.5"
	2030	1429.53	0.5		260	100	99	4.0"
	2035	1432.10	0.5		260	100	99	3.5"
	2040	1434.55	0.5		261	100	100	3.5"
	2045	1437.17	0.5		259	101	100	3.5"
	2050	1439.78	0.5		259	101	101	3.5"
	2055	1442.42	0.5		260	101	101	3.5"
	2100	1445.01	0.5		260	101	101	3.5"
STOP	2103	1446.84						

Comments: 3704500107 = Tube ID
DGMCF = 1.005
post-test leak rate = 0.00 @ 6" Hg

Tubes by Method 308

MDD 7/25/11

Sample Type – **Method 308**	Date 7/25/11	Condition 2A	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 4	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-111701-9	Operator MDD	Initial 0.00 @ 15
Location (Source) – DCU3	Barometer ID BP-2	Pre-test Flow Ved	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.20	Post-test Flow n/a	Final leak rate = 0.00 @ 6"

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)				Vacuum (in. Hg)
				~~Stack~~ Heat Trace	Critical Orifice	DGM In	DGM Out	
P2A	1440	1447.30	0.5	260	--	105	105	4.0"
	1445	1450.70	0.5	260	--	106	106	4.0"
	1450	1453.35	0.5	260	--	106	106	4.0"
	1455	1456.00	0.5	260	--	106	105	4.0"
	1500	1458.63	0.5	260	--	106	106	4.0"
	1505	1461.1	0.5	260	--	108	107	4.0
	1510	1464.2	0.5	260	--	109	107	4.0
	1515	1466.35	0.5	261	--	109	108	4.0"
	1520	1468.68	0.5	260	--	110	109	4.0"
	1525	1471.03	0.5	260	--	111	110	4.0"
	1530	1473.37	0.5	260	--	110	109	4.0"
	1535	1475.81	0.5	261	--	111	111	4.0"
STOP	1540	1478.08		--	--			
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Comments: Sorbent Trap ID: Tube # 370450097

DGMCF = 1.005

Sample Type – **Method 308**	Start Time 2057	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2207	Run 2	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 70	Operator DCW	Initial 0.00 @ 15"
Date 7/21/11	Critical Orifice No. 80-11701	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3 East Vent	Bar. Press. (in. H_2O) 29.00	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F)					Vacuum (in. Hg)
				Stack	Critical Orifice	Heat trace	In	Out	
P ~~83A~~	~~1349.25~~ 2057	1349.25	1.0	—	~~n/a 0.5~~	260	113	113	4.0
	2102	1352.00	1.2		~~n/a 0.5~~	260	114	112	4.5
	2107	1355.45	1.1		~~0.5~~	259	113	114	4.5
	2112	1359.20	1.1		—	259	113	112	5.0
	2117	1362.10	1.1		—	260	113	113	5.0
	2122	1364.90	1.1		—	261	117	114	5.0
	2127	1369.10	1.1		—	260	115	114	6.0
	2132	1372.50	1.1		—	247	115	114	6.0
	2137	1378.20	1.1		—	232	115	118	6.0
	2142	1382.10	1.2		—	223	114	115	6.0
	2147	1387.10	1.2		—	223	116	115	6.0
	2152	1390.10	1.2		—	224	115	114	5.0
	2157	1393.00	1.2		—	246	116	116	5.0
	2202	1396.35	1.2		—	262	116	116	5.0
STOP	2207	1400.326							

Comments: post test leak ✓ = 0.00 @ 10'' tube ID = 3704500142
DGMCF = 1.005

Tubes by Method 308

Sample Type – **Method 308**	Start Time 1955	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 2103	Run 3	Sampling Train Leak Check
Project Number – 40942317	Duration (min) 68	Operator WDD	Initial 0.00@15"
Date 7-24-11	Critical Orifice No. 80-111701-	Pre-test Flow ✓ed	Duct Dimension(s) 8"
Location (Source) – DCU3	Bar. Press. (in. H_2O) 29.16 ~~29.30~~	Post-test Flow n/a	Elevation (relative to Barometer) (ft) 0

WDD 7/24/11

Point	Clock Time	Volume (L)	ΔH (in. H_2O)	Temperature (°F) Stack	Temperature (°F) ~~Heat Trace~~ ~~Critical Orifice~~	Temperature (°F) DGM In ~~Heat trace~~	Temperature (°F) DGM out	Vacuum (in. Hg)
P3A	1955	1410.32	0.5	—	259	97	97	3.5"
	2000	1414.81	0.5	—	259	97	97	3.5"
	2005	1416.30	0.5	—	259	97	97	3.5"
	2010	1418.91	0.5	—	260	98	98	3.5"
	2015	1421.52	0.5	—	261	99	99	3.5"
	2020	1424.11	0.5	—	260	99	99	3.5"
	2025	1426.72	0.5	—	259	99	98	3.5"
	2030	1429.53	0.5		260	100	99	4.0"
	2035	1432.10	0.5		260	100	99	3.5"
	2040	1434.55	0.5		261	100	100	3.5"
	2045	1437.17	0.5		259	101	100	3.5"
	2050	1439.78	0.5		259	101	101	3.5"
	2055	1442.42	0.5		260	101	101	3.5"
	2100	1445.01	0.5		260	101	101	3.5"
STOP	2103	1446.84						

WDD 7/24/11

Comments: 3704500107 = Tube ID

DGMCF = 1.005

post-test leak rate = 0.00 @ 6" Hg

Tubes by Method 308

MPD 7/25/11

Sample Type – **Method 308**	Date 7/25/11	Condition ØA	Page 1 of 1
Plant Name – BP-Husky Toledo		Run 4	Sampling Train Leak Check
Project Number – 40942317	Critical Orifice No. 80-111761	Operator MPD	Initial 0.00 @ 15
Location (Source) – DCU3	Barometer ID BP-2	Pre-test Flow Ved	Duct Dimension(s) 8"
Elevation (relative to Barometer) (ft) 0	Bar. Press. (in. Hg) 29.20	Post-test Flow n/a	Final leak rate = 0.00 @ 6"

Point	Clock Time	Volume (L)	ΔH (in. H₂O)	Temperature (°F)				Vacuum (in. Hg)
				Heat Trace ~~Stack~~	Critical Orifice	DGM In	DGM Out	
P2A	1440	1447.30	0.5	260	--	105	105	4.0"
	1445	1450.70	0.5	260	--	106	106	4.0"
	1450	1453.35	0.5	260	--	106	106	4.0"
	1455	1456.00	0.5	260	--	106	105	4.0"
	1500	1458.63	0.5	260	--	106	106	4.0"
	1505	1461.1	0.5	260	--	108	107	4.0
	1510	1464.2	0.5	260	--	109	107	4.0
	1515	1466.35	0.5	261	--	109	108	4.0"
	1520	1468.68	0.5	260	--	110	109	4.0"
	1525	1471.03	0.5	260	--	111	110	4.0"
	1530	1473.37	0.5	260	--	110	109	4.0"
✓	1535	1475.81	0.5	261	--	111	111	4.0"
STOP	1540	1478.08		--	--			
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Comments: Sorbent Trap ID: Tube # 3704500197

DGMCF= 1.005

Section P

Method 320 – Aldehydes

URS Data Printouts

No Dilution					
		Acetaldehyde	Propanal	Formaldehyde	CO
Run #		(ppmv)	(ppmv)	(ppmv)	(ppmv)
1 (A1)	Min	BDL	BDL	BDL	1.02
	Max	BDL	BDL	BDL	1.40
	Avg	0.37	0.41	0.09	1.21
	MDL	0.37	0.41	0.09	0.08
2 (A2)	Min	BDL	BDL	BDL	1.47
	Max	BDL	BDL	BDL	6.20
	Avg	0.37	0.57	0.09	2.03
	MDL	0.37	0.57	0.09	0.08
3 (A3)	Min	BDL	BDL	BDL	1.06
	Max	BDL	BDL	BDL	19.74
	Avg	0.37	0.41	0.09	2.95
	MDL	0.37	0.41	0.09	0.08
4 (A4)	Min	BDL	BDL	BDL	1.22
	Max	BDL	BDL	BDL	3.42
	Avg	0.37	0.49	0.09	1.79
	MDL	0.37	0.49	0.09	0.08

Adjusted for Dilution						
			Acetaldehyde	Propanal	Formaldehyde	CO
Run #	Dilution		(ppmv)	(ppmv)	(ppmv)	(ppmv)
1 (A1)	20.84	Min	BDL	BDL	BDL	21.21
		Max	BDL	BDL	BDL	29.11
		Avg	7.72	8.61	1.91	25.22
		MDL	7.72	8.61	1.91	1.60
2 (A2)	15.50	Min	BDL	BDL	BDL	22.77
		Max	BDL	BDL	BDL	96.08
		Avg	5.74	8.76	1.42	31.43
		MDL	5.74	8.76	1.42	1.19
3 (A3)	15.71	Min	BDL	BDL	BDL	16.67
		Max	BDL	BDL	BDL	310.27
		Avg	5.82	6.48	1.44	46.42
		MDL	5.82	6.48	1.44	1.21
4 (A4)	16.65	Min	BDL	BDL	BDL	20.38
		Max	BDL	BDL	BDL	56.98
		Avg	6.17	8.22	1.53	29.80
		MDL	6.17	8.22	1.53	1.28

Notes:

Detection limits during the first 5 minutes of runs A2 and A3 and the first 10 minutes of A4 were larger than reported in the table due to the presence of percent level hydrocarbon concentrations. Detection limits during these time periods were approximately 1 order of magnitude larger than those reported.

In addition, the presence of acetaldehyde was invalidated manually in two spectra after the first 10 minutes of run A4.

CF - Propanal = 1.11

Dilution = 20.84

Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/21/11	**2:19:49**	BDL	1.15	BDL	BDL		149.4	0.982
07/21/11	**2:20:19**	BDL	1.21	BDL	BDL		149.3	0.982
07/21/11	**2:20:49**	BDL	1.19	BDL	BDL		149.4	0.983
07/21/11	**2:21:19**	BDL	1.18	BDL	BDL		149.4	0.982
07/21/11	**2:21:49**	BDL	1.21	BDL	BDL		149.4	0.982
07/21/11	**2:22:19**	BDL	1.19	BDL	BDL		149.4	0.982
07/21/11	**2:22:49**	BDL	1.24	BDL	BDL		149.4	0.982
07/21/11	**2:23:19**	BDL	1.15	BDL	BDL		149.4	0.982
07/21/11	**2:23:48**	BDL	1.13	BDL	BDL		149.3	0.982
07/21/11	**2:24:18**	BDL	1.17	BDL	BDL		149.3	0.982
07/21/11	**2:24:48**	BDL	1.14	BDL	BDL		149.4	0.982
07/21/11	**2:25:18**	BDL	1.13	BDL	BDL		149.4	0.982
07/21/11	**2:25:48**	BDL	1.22	BDL	BDL		149.4	0.982
07/21/11	**2:26:18**	BDL	1.22	BDL	BDL		149.4	0.983
07/21/11	**2:26:48**	BDL	1.17	BDL	BDL		149.4	0.982
07/21/11	**2:27:18**	BDL	1.17	BDL	BDL		149.4	0.982
07/21/11	**2:27:48**	BDL	1.09	BDL	BDL		149.4	0.982
07/21/11	**2:28:18**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:28:49**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:29:18**	BDL	1.03	BDL	BDL		149.4	0.982
07/21/11	**2:29:48**	BDL	1.05	BDL	BDL		149.4	0.982
07/21/11	**2:30:18**	BDL	1.02	BDL	BDL		149.4	0.983
07/21/11	**2:30:48**	BDL	1.05	BDL	BDL		149.4	0.982
07/21/11	**2:31:18**	BDL	1.04	BDL	BDL		149.4	0.982
07/21/11	**2:31:48**	BDL	1.07	BDL	BDL		149.4	0.983
07/21/11	**2:32:18**	BDL	1.03	BDL	BDL		149.4	0.983
07/21/11	**2:32:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:33:17**	BDL	1.06	BDL	BDL		149.4	0.983
07/21/11	**2:33:47**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:34:17**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:34:47**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:35:17**	BDL	1.11	BDL	BDL		149.4	0.982
07/21/11	**2:35:47**	BDL	1.08	BDL	BDL		149.4	0.983
07/21/11	**2:36:17**	BDL	1.17	BDL	BDL		149.4	0.983
07/21/11	**2:36:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:37:17**	BDL	1.13	BDL	BDL		149.4	0.983
07/21/11	**2:37:47**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:38:17**	BDL	1.13	BDL	BDL		149.4	0.983
07/21/11	**2:38:47**	BDL	1.14	BDL	BDL		149.3	0.983
07/21/11	**2:39:17**	BDL	1.12	BDL	BDL		149.4	0.982
07/21/11	**2:39:47**	BDL	1.16	BDL	BDL		149.4	0.982
07/21/11	**2:40:17**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:40:47**	BDL	1.14	BDL	BDL		149.4	0.982
07/21/11	**2:41:17**	BDL	1.13	BDL	BDL		149.4	0.982
07/21/11	**2:41:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:42:16**	BDL	1.14	BDL	BDL		149.4	0.983
07/21/11	**2:42:46**	BDL	1.12	BDL	BDL		149.3	0.983
07/21/11	**2:43:16**	BDL	1.15	BDL	BDL		149.4	0.983
07/21/11	**2:43:46**	BDL	1.09	BDL	BDL		149.4	0.982
07/21/11	**2:44:16**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:44:46**	BDL	1.09	BDL	BDL		149.3	0.983
07/21/11	**2:45:16**	BDL	1.08	BDL	BDL		149.3	0.983
07/21/11	**2:45:46**	BDL	1.07	BDL	BDL		149.3	0.983
07/21/11	**2:46:16**	BDL	1.06	BDL	BDL		149.4	0.983
07/21/11	**2:46:46**	BDL	1.10	BDL	BDL		149.4	0.983
07/21/11	**2:47:16**	BDL	1.09	BDL	BDL		149.3	0.983
07/21/11	**2:47:46**	BDL	1.12	BDL	BDL		149.3	0.983
07/21/11	**2:48:16**	BDL	1.10	BDL	BDL		149.3	0.982
07/21/11	**2:48:46**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:49:16**	BDL	1.08	BDL	BDL		149.4	0.982
07/21/11	**2:49:46**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:50:16**	BDL	1.07	BDL	BDL		149.4	0.983

Run 1 (A1) Data	07/21/11	**2:50:46**	BDL	1.11	BDL	BDL	149.4	0.983
	07/21/11	**2:51:16**	BDL	1.10	BDL	BDL	149.4	0.983
	07/21/11	**2:51:45**	BDL	1.15	BDL	BDL	149.4	0.983
	07/21/11	**2:52:15**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**2:52:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:53:15**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**2:53:45**	BDL	1.17	BDL	BDL	149.3	0.982
	07/21/11	**2:54:15**	BDL	1.17	BDL	BDL	149.4	0.982
	07/21/11	**2:54:45**	BDL	1.17	BDL	BDL	149.3	0.982
	07/21/11	**2:55:15**	BDL	1.17	BDL	BDL	149.4	0.982
	07/21/11	**2:55:45**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**2:56:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:56:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:57:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:57:45**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**2:58:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:58:45**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**2:59:15**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**2:59:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:00:15**	BDL	1.18	BDL	BDL	149.5	0.982
	07/21/11	**3:00:44**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:01:14**	BDL	1.19	BDL	BDL	149.5	0.983
	07/21/11	**3:01:44**	BDL	1.19	BDL	BDL	149.5	0.983
	07/21/11	**3:02:14**	BDL	1.23	BDL	BDL	149.5	0.983
	07/21/11	**3:02:44**	BDL	1.20	BDL	BDL	149.4	0.983
	07/21/11	**3:03:14**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:03:44**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:04:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:04:44**	BDL	1.21	BDL	BDL	149.5	0.982
	07/21/11	**3:05:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:05:44**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:06:14**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**3:06:44**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**3:07:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:07:44**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:08:14**	BDL	1.26	BDL	BDL	149.4	0.982
	07/21/11	**3:08:44**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:09:14**	BDL	1.24	BDL	BDL	149.4	0.982
	07/21/11	**3:09:44**	BDL	1.24	BDL	BDL	149.4	0.982
	07/21/11	**3:10:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:10:43**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:11:13**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:11:43**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:12:13**	BDL	1.28	BDL	BDL	149.4	0.982
	07/21/11	**3:12:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:13:13**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:13:43**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:14:13**	BDL	1.25	BDL	BDL	149.5	0.982
	07/21/11	**3:14:43**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:15:13**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:15:43**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:16:13**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:16:43**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:17:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:17:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:18:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:18:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:19:12**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:19:42**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:20:12**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:20:42**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:21:12**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:21:42**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:22:12**	BDL	1.26	BDL	BDL	149.4	0.982
	07/21/11	**3:22:42**	BDL	1.31	BDL	BDL	149.4	0.982

07/21/11	**3:23:12**	BDL	1.27	BDL	BDL		149.5	0.982
07/21/11	**3:23:42**	BDL	1.26	BDL	BDL		149.4	0.982
07/21/11	**3:24:12**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:24:42**	BDL	1.26	BDL	BDL		149.5	0.983
07/21/11	**3:25:12**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:25:42**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:26:12**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:26:42**	BDL	1.26	BDL	BDL		149.4	0.983
07/21/11	**3:27:12**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:27:42**	BDL	1.33	BDL	BDL		149.5	0.983
07/21/11	**3:28:12**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:28:41**	BDL	1.35	BDL	BDL		149.4	0.983
07/21/11	**3:29:11**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:29:41**	BDL	1.25	BDL	BDL		149.5	0.983
07/21/11	**3:30:11**	BDL	1.26	BDL	BDL		149.4	0.983
07/21/11	**3:30:41**	BDL	1.27	BDL	BDL		149.5	0.983
07/21/11	**3:31:11**	BDL	1.29	BDL	BDL		149.5	0.983
07/21/11	**3:31:41**	BDL	1.28	BDL	BDL		149.5	0.983
07/21/11	**3:32:11**	BDL	1.30	BDL	BDL		149.5	0.983
07/21/11	**3:32:41**	BDL	1.31	BDL	BDL		149.5	0.983
07/21/11	**3:33:11**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:33:41**	BDL	1.32	BDL	BDL		149.5	0.983
07/21/11	**3:34:11**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:34:41**	BDL	1.28	BDL	BDL		149.5	0.983
07/21/11	**3:35:11**	BDL	1.31	BDL	BDL		149.4	0.982
07/21/11	**3:35:41**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:36:11**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:36:41**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:37:11**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:37:40**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:38:10**	BDL	1.32	BDL	BDL		149.5	0.983
07/21/11	**3:38:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:39:10**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:39:40**	BDL	1.32	BDL	BDL		149.4	0.982
07/21/11	**3:40:10**	BDL	1.33	BDL	BDL		149.4	0.982
07/21/11	**3:40:40**	BDL	1.33	BDL	BDL		149.4	0.983
07/21/11	**3:41:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:41:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:42:10**	BDL	1.34	BDL	BDL		149.4	0.983
07/21/11	**3:42:40**	BDL	1.35	BDL	BDL		149.4	0.982
07/21/11	**3:43:10**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:43:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:44:10**	BDL	1.33	BDL	BDL		149.4	0.983
07/21/11	**3:44:40**	BDL	1.39	BDL	BDL		149.4	0.983
07/21/11	**3:45:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:45:40**	BDL	1.30	BDL	BDL		149.3	0.982
07/21/11	**3:46:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:46:39**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:47:09**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:47:39**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:48:09**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:48:39**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:49:09**	BDL	1.40	BDL	BDL		149.4	0.983
07/21/11	**3:49:39**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:50:09**	BDL	1.37	BDL	BDL		149.4	0.983
07/21/11	**3:50:39**	BDL	1.30	BDL	BDL		149.4	0.983
	Minimum	BDL	1.02	BDL	BDL			
	Maximum	BDL	1.40	BDL	BDL			
	Average	0.37	1.21	0.09	0.41			
	MDL	0.37	0.08	0.09	0.41			

07/21/11	**3:51:09**					0.290	149.4	0.983
07/21/11	**3:51:39**					0.822	149.3	0.983

Dilution Check	07/21/11	**3:52:09**	0.827	149.3	0.983
	07/21/11	**3:52:39**	0.827	149.3	0.983
	07/21/11	**3:53:09**	0.830	149.3	0.983
	07/21/11	**3:53:39**	0.829	149.3	0.983
	07/21/11	**3:54:09**	0.829	149.3	0.982
	07/21/11	**3:54:39**	0.830	149.3	0.982
		Average	0.829		

CF - Propanal = 1.11

Dilution = 15.50

	Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
Dilution Check 1	07/21/11	**20:47:21**					-0.002	149.1	0.982
	07/21/11	**20:47:50**					0.112	149.2	0.982
	07/21/11	**20:48:20**					1.081	149.2	0.982
	07/21/11	**20:48:50**					1.099	149.2	0.982
	07/21/11	**20:49:20**					1.100	149.2	0.982
		Average					1.093		
Run 2 (A2) Data	07/21/11	**20:58:49**	BDL	6.20	BDL	BDL		149.3	0.981
	07/21/11	**20:59:19**	BDL	4.48	BDL	BDL		149.3	0.981
	07/21/11	**20:59:49**	BDL	2.83	BDL	BDL		149.3	0.981
	07/21/11	**21:00:19**	BDL	2.34	BDL	BDL		149.2	0.981
	07/21/11	**21:00:49**	BDL	2.65	BDL	BDL		149.2	0.981
	07/21/11	**21:01:19**	BDL	1.83	BDL	BDL		149.2	0.981
	07/21/11	**21:01:49**	BDL	1.68	BDL	BDL		149.3	0.981
	07/21/11	**21:02:19**	BDL	4.58	BDL	BDL		149.2	0.981
	07/21/11	**21:02:49**	BDL	2.49	BDL	BDL		149.2	0.981
	07/21/11	**21:03:19**	BDL	2.02	BDL	BDL		149.2	0.981
	07/21/11	**21:03:49**	BDL	2.02	BDL	BDL		149.3	0.981
	07/21/11	**21:04:19**	BDL	2.01	BDL	BDL		149.2	0.981
	07/21/11	**21:04:49**	BDL	2.11	BDL	BDL		149.2	0.981
	07/21/11	**21:05:19**	BDL	2.04	BDL	BDL		149.2	0.981
	07/21/11	**21:05:49**	BDL	2.11	BDL	BDL		149.2	0.982
	07/21/11	**21:06:18**	BDL	1.97	BDL	BDL		149.2	0.982
	07/21/11	**21:06:48**	BDL	1.98	BDL	BDL		149.1	0.982
	07/21/11	**21:07:18**	BDL	2.04	BDL	BDL		149.2	0.982
	07/21/11	**21:07:48**	BDL	1.87	BDL	BDL		149.2	0.982
	07/21/11	**21:08:18**	BDL	1.93	BDL	BDL		149.2	0.982
	07/21/11	**21:08:48**	BDL	1.94	BDL	BDL		149.3	0.982
	07/21/11	**21:09:18**	BDL	1.98	BDL	BDL		149.3	0.982
	07/21/11	**21:09:48**	BDL	1.92	BDL	BDL		149.3	0.982
	07/21/11	**21:10:18**	BDL	1.94	BDL	BDL		149.3	0.982
	07/21/11	**21:10:48**	BDL	2.31	BDL	BDL		149.3	0.981
	07/21/11	**21:11:18**	BDL	2.79	BDL	BDL		149.3	0.981
	07/21/11	**21:11:48**	BDL	1.98	BDL	BDL		149.3	0.982
	07/21/11	**21:12:18**	BDL	1.89	BDL	BDL		149.3	0.981
	07/21/11	**21:12:48**	BDL	2.00	BDL	BDL		149.3	0.982
	07/21/11	**21:13:18**	BDL	1.95	BDL	BDL		149.2	0.982
	07/21/11	**21:13:48**	BDL	1.88	BDL	BDL		149.3	0.982
	07/21/11	**21:14:18**	BDL	1.96	BDL	BDL		149.2	0.982
	07/21/11	**21:14:48**	BDL	1.99	BDL	BDL		149.3	0.982
	07/21/11	**21:15:18**	BDL	2.00	BDL	BDL		149.2	0.982
	07/21/11	**21:15:47**	BDL	2.06	BDL	BDL		149.2	0.982
	07/21/11	**21:43:14**	BDL	1.47	BDL	BDL		149.2	0.982
	07/21/11	**21:43:44**	BDL	1.50	BDL	BDL		149.2	0.982
	07/21/11	**21:44:14**	BDL	1.56	BDL	BDL		149.2	0.982
	07/21/11	**21:44:44**	BDL	1.65	BDL	BDL		149.3	0.982
	07/21/11	**21:45:14**	BDL	1.64	BDL	BDL		149.3	0.982
	07/21/11	**21:45:44**	BDL	1.65	BDL	BDL		149.3	0.982
	07/21/11	**21:46:14**	BDL	1.69	BDL	BDL		149.3	0.982
	07/21/11	**21:46:44**	BDL	1.69	BDL	BDL		149.3	0.982
	07/21/11	**21:47:14**	BDL	1.68	BDL	BDL		149.3	0.982
	07/21/11	**21:47:44**	BDL	1.72	BDL	BDL		149.3	0.982
	07/21/11	**21:48:14**	BDL	1.70	BDL	BDL		149.3	0.982
	07/21/11	**21:48:44**	BDL	1.79	BDL	BDL		149.3	0.982
	07/21/11	**21:49:14**	BDL	1.79	BDL	BDL		149.3	0.982
	07/21/11	**21:49:44**	BDL	1.80	BDL	BDL		149.3	0.982
	07/21/11	**21:50:14**	BDL	1.81	BDL	BDL		149.3	0.982

Run 2 (A2) Data	07/21/11	**21:50:44**	BDL	1.88	BDL	BDL	149.3	0.983
	07/21/11	**21:51:14**	BDL	1.88	BDL	BDL	149.3	0.982
	07/21/11	**21:51:44**	BDL	1.94	BDL	BDL	149.3	0.982
	07/21/11	**21:52:14**	BDL	1.94	BDL	BDL	149.3	0.982
	07/21/11	**21:52:43**	BDL	1.93	BDL	BDL	149.3	0.982
	07/21/11	**21:53:13**	BDL	1.98	BDL	BDL	149.3	0.982
	07/21/11	**21:53:43**	BDL	1.99	BDL	BDL	149.3	0.983
	07/21/11	**21:54:13**	BDL	2.00	BDL	BDL	149.3	0.982
	07/21/11	**21:54:43**	BDL	1.96	BDL	BDL	149.3	0.983
	07/21/11	**21:55:13**	BDL	2.04	BDL	BDL	149.3	0.982
	07/21/11	**21:55:43**	BDL	1.85	BDL	BDL	149.3	0.983
	07/21/11	**21:56:13**	BDL	1.47	BDL	BDL	149.3	0.983
	07/21/11	**21:56:43**	BDL	1.72	BDL	BDL	149.3	0.983
	07/21/11	**21:57:13**	BDL	1.80	BDL	BDL	149.3	0.983
	07/21/11	**21:57:43**	BDL	2.01	BDL	BDL	149.3	0.983
	07/21/11	**21:58:13**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**21:58:43**	BDL	2.05	BDL	BDL	149.3	0.983
	07/21/11	**21:59:13**	BDL	2.18	BDL	BDL	149.3	0.983
	07/21/11	**21:59:46**	BDL	2.14	BDL	BDL	149.3	0.983
	07/21/11	**22:00:16**	BDL	2.13	BDL	BDL	149.3	0.983
	07/21/11	**22:00:54**	BDL	2.18	BDL	BDL	149.3	0.983
	07/21/11	**22:01:24**	BDL	2.20	BDL	BDL	149.3	0.983
	07/21/11	**22:01:54**	BDL	2.20	BDL	BDL	149.4	0.983
	07/21/11	**22:02:24**	BDL	2.21	BDL	BDL	149.3	0.983
	07/21/11	**22:02:54**	BDL	2.26	BDL	BDL	149.3	0.983
	07/21/11	**22:03:24**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:03:54**	BDL	2.29	BDL	BDL	149.3	0.983
	07/21/11	**22:04:23**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:04:53**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:05:23**	BDL	2.29	BDL	BDL	149.4	0.983
	07/21/11	**22:05:53**	BDL	2.29	BDL	BDL	149.3	0.983
	07/21/11	**22:06:23**	BDL	2.25	BDL	BDL	149.4	0.983
	07/21/11	**22:06:53**	BDL	2.32	BDL	BDL	149.4	0.983
	07/21/11	**22:07:23**	BDL	2.33	BDL	BDL	149.3	0.983
	07/21/11	**22:07:53**	BDL	2.29	BDL	BDL	149.4	0.983
	07/21/11	**22:08:23**	BDL	1.98	BDL	BDL	149.4	0.983
	07/21/11	**22:08:53**	BDL	1.73	BDL	BDL	149.3	0.983
	07/21/11	**22:09:23**	BDL	1.94	BDL	BDL	149.3	0.983
	07/21/11	**22:09:53**	BDL	2.16	BDL	BDL	149.3	0.983
	07/21/11	**22:10:23**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**22:10:53**	BDL	1.88	BDL	BDL	149.3	0.983
	07/21/11	**22:11:23**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**22:11:53**	BDL	2.10	BDL	BDL	149.3	0.983
	07/21/11	**22:12:23**	BDL	2.07	BDL	BDL	149.3	0.983
	07/21/11	**22:12:53**	BDL	2.04	BDL	BDL	149.3	0.983
	07/21/11	**22:13:22**	BDL	2.06	BDL	BDL	149.3	0.984
	07/21/11	**22:13:52**	BDL	1.75	BDL	BDL	149.3	0.984
	07/21/11	**22:14:22**	BDL	1.73	BDL	BDL	149.3	0.983
	07/21/11	**22:14:52**	BDL	1.78	BDL	BDL	149.4	0.983
	07/21/11	**22:15:22**	BDL	1.87	BDL	BDL	149.3	0.983
	07/21/11	**22:15:52**	BDL	1.84	BDL	BDL	149.3	0.983
	07/21/11	**22:16:22**	BDL	1.82	BDL	BDL	149.4	0.983
	07/21/11	**22:16:52**	BDL	1.83	BDL	BDL	149.4	0.983
	07/21/11	**22:17:22**	BDL	1.93	BDL	BDL	149.3	0.983
	07/21/11	**22:17:52**	BDL	2.08	BDL	BDL	149.4	0.983
	07/21/11	**22:18:22**	BDL	2.05	BDL	BDL	149.3	0.983
	07/21/11	**22:18:52**	BDL	2.00	BDL	BDL	149.3	0.983
	07/21/11	**22:19:22**	BDL	2.00	BDL	BDL	149.4	0.983
	07/21/11	**22:19:52**	BDL	2.00	BDL	BDL	149.3	0.983
	07/21/11	**22:20:22**	BDL	1.81	BDL	BDL	149.3	0.983
	07/21/11	**22:20:52**	BDL	1.98	BDL	BDL	149.3	0.983
	07/21/11	**22:21:22**	BDL	1.98	BDL	BDL	149.3	0.983

	07/21/11	**22:21:52**	BDL	1.98	BDL	BDL		149.4	0.983
	07/21/11	**22:22:22**	BDL	1.97	BDL	BDL		149.3	0.983
	07/21/11	**22:22:51**	BDL	1.95	BDL	BDL		149.3	0.983
	07/21/11	**22:23:21**	BDL	1.95	BDL	BDL		149.3	0.983
	07/21/11	**22:23:51**	BDL	1.91	BDL	BDL		149.3	0.983
	07/21/11	**22:24:21**	BDL	1.90	BDL	BDL		149.3	0.983
	07/21/11	**22:24:51**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:25:21**	BDL	1.92	BDL	BDL		149.2	0.983
	07/21/11	**22:25:51**	BDL	1.67	BDL	BDL		149.3	0.983
	07/21/11	**22:26:21**	BDL	1.72	BDL	BDL		149.3	0.983
	07/21/11	**22:26:51**	BDL	1.76	BDL	BDL		149.3	0.983
	07/21/11	**22:27:21**	BDL	1.76	BDL	BDL		149.3	0.983
	07/21/11	**22:27:51**	BDL	1.78	BDL	BDL		149.3	0.983
	07/21/11	**22:28:21**	BDL	1.79	BDL	BDL		149.3	0.983
	07/21/11	**22:28:51**	BDL	1.79	BDL	BDL		149.3	0.983
	07/21/11	**22:29:21**	BDL	1.80	BDL	BDL		149.3	0.983
	07/21/11	**22:29:51**	BDL	1.82	BDL	BDL		149.3	0.983
	07/21/11	**22:30:21**	BDL	1.82	BDL	BDL		149.3	0.983
	07/21/11	**22:30:51**	BDL	1.94	BDL	BDL		149.3	0.983
	07/21/11	**22:31:21**	BDL	1.95	BDL	BDL		149.4	0.983
	07/21/11	**22:31:51**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:32:20**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:32:50**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:33:20**	BDL	1.89	BDL	BDL		149.4	0.983
	07/21/11	**22:33:50**	BDL	1.92	BDL	BDL		149.4	0.983
	07/21/11	**22:34:20**	BDL	1.72	BDL	BDL		149.3	0.983
	07/21/11	**22:34:50**	BDL	1.73	BDL	BDL		149.4	0.983
	07/21/11	**22:35:20**	BDL	1.75	BDL	BDL		149.4	0.983
	07/21/11	**22:35:50**	BDL	1.77	BDL	BDL		149.4	0.983
		Minimum	BDL	1.47	BDL	BDL			
		Maximum	BDL	6.20	BDL	BDL			
		Average	0.37	2.03	0.09	0.57			
		MDL	0.37	0.08	0.09	0.57			
Dilution Check 2	07/21/11	**22:42:19**					0.855	149.4	0.983
	07/21/11	**22:42:49**					0.872	149.4	0.983
	07/21/11	**22:43:19**					0.908	149.4	0.983
	07/21/11	**22:43:49**					0.981	149.4	0.982
	07/21/11	**22:44:19**					1.027	149.3	0.982
	07/21/11	**22:44:49**					1.059	149.3	0.982
	07/21/11	**22:45:19**					1.082	149.3	0.982
	07/21/11	**22:45:49**					1.094	149.3	0.982
	07/21/11	**22:46:19**					1.095	149.3	0.982
	07/21/11	**22:46:49**					1.089	149.3	0.982
		Average					1.093		

CF - Propanal = 1.11
Dilution = 15.71

	Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
Dilution Check 1	07/24/11	**19:42:26**					1.143	149.3	0.988
	07/24/11	**19:42:56**					1.144	149.3	0.988
	07/24/11	**19:43:26**					1.146	149.4	0.988
	07/24/11	**19:43:56**					1.148	149.3	0.988
	07/24/11	**19:44:26**					1.147	149.3	0.988
	07/24/11	**19:44:56**					1.147	149.3	0.988
	07/24/11	**19:45:26**					1.147	149.3	0.988
		Average					1.147		
	07/24/11	**19:55:55**	BDL	17.00	BDL	BDL		149.3	0.988
	07/24/11	**19:56:25**	BDL	19.74	BDL	BDL		149.3	0.988
	07/24/11	**19:56:55**	BDL	10.35	BDL	BDL		149.3	0.988
	07/24/11	**19:57:25**	BDL	6.46	BDL	BDL		149.3	0.988
	07/24/11	**19:57:54**	BDL	4.91	BDL	BDL		149.3	0.988
	07/24/11	**19:58:24**	BDL	4.18	BDL	BDL		149.3	0.988
	07/24/11	**19:58:54**	BDL	3.61	BDL	BDL		149.3	0.988
	07/24/11	**19:59:24**	BDL	3.22	BDL	BDL		149.3	0.988
	07/24/11	**19:59:54**	BDL	2.90	BDL	BDL		149.3	0.988
	07/24/11	**20:00:24**	BDL	2.69	BDL	BDL		149.3	0.988
	07/24/11	**20:00:54**	BDL	2.48	BDL	BDL		149.3	0.988
	07/24/11	**20:01:24**	BDL	2.31	BDL	BDL		149.3	0.988
	07/24/11	**20:01:54**	BDL	2.15	BDL	BDL		149.3	0.988
	07/24/11	**20:02:24**	BDL	2.17	BDL	BDL		149.4	0.988
	07/24/11	**20:02:54**	BDL	1.96	BDL	BDL		149.4	0.988
	07/24/11	**20:03:24**	BDL	1.70	BDL	BDL		149.3	0.988
	07/24/11	**20:03:54**	BDL	1.77	BDL	BDL		149.4	0.988
	07/24/11	**20:04:24**	BDL	2.30	BDL	BDL		149.4	0.988
	07/24/11	**20:04:54**	BDL	2.58	BDL	BDL		149.4	0.988
	07/24/11	**20:05:24**	BDL	1.87	BDL	BDL		149.4	0.988
	07/24/11	**20:05:54**	BDL	1.89	BDL	BDL		149.4	0.988
	07/24/11	**20:06:25**	BDL	1.92	BDL	BDL		149.4	0.988
	07/24/11	**20:06:54**	BDL	2.27	BDL	BDL		149.4	0.988
	07/24/11	**20:07:24**	BDL	2.68	BDL	BDL		149.4	0.988
	07/24/11	**20:07:53**	BDL	2.65	BDL	BDL		149.4	0.988
	07/24/11	**20:08:23**	BDL	2.47	BDL	BDL		149.4	0.988
	07/24/11	**20:08:53**	BDL	2.08	BDL	BDL		149.4	0.988
	07/24/11	**20:09:23**	BDL	1.67	BDL	BDL		149.4	0.988
	07/24/11	**20:09:53**	BDL	1.72	BDL	BDL		149.4	0.988
	07/24/11	**20:10:23**	BDL	2.50	BDL	BDL		149.4	0.988
	07/24/11	**20:10:53**	BDL	2.62	BDL	BDL		149.4	0.988
	07/24/11	**20:11:23**	BDL	2.64	BDL	BDL		149.4	0.988
	07/24/11	**20:11:53**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**20:12:23**	BDL	2.63	BDL	BDL		149.4	0.988
	07/24/11	**20:12:53**	BDL	2.70	BDL	BDL		149.4	0.988
	07/24/11	**20:13:23**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**20:13:53**	BDL	2.39	BDL	BDL		149.4	0.988
	07/24/11	**20:14:23**	BDL	1.06	BDL	BDL		149.3	0.988
	07/24/11	**20:14:53**	BDL	1.49	BDL	BDL		149.4	0.988
	07/24/11	**20:15:23**	BDL	1.38	BDL	BDL		149.4	0.988
	07/24/11	**20:15:53**	BDL	2.07	BDL	BDL		149.4	0.988
	07/24/11	**20:16:22**	BDL	2.10	BDL	BDL		149.4	0.988
	07/24/11	**20:16:52**	BDL	2.07	BDL	BDL		149.4	0.988
	07/24/11	**20:17:22**	BDL	1.92	BDL	BDL		149.4	0.988
	07/24/11	**20:17:52**	BDL	2.06	BDL	BDL		149.4	0.988
	07/24/11	**20:18:22**	BDL	2.13	BDL	BDL		149.4	0.988
	07/24/11	**20:18:52**	BDL	2.14	BDL	BDL		149.4	0.988
	07/24/11	**20:19:22**	BDL	2.16	BDL	BDL		149.4	0.988
	07/24/11	**20:19:52**	BDL	2.08	BDL	BDL		149.4	0.988
	07/24/11	**20:20:22**	BDL	1.96	BDL	BDL		149.4	0.988

Run 3 (A3) Data	07/24/11	**20:20:52**	BDL	1.66	BDL	BDL	149.4	0.988
	07/24/11	**20:21:22**	BDL	1.56	BDL	BDL	149.3	0.988
	07/24/11	**20:21:52**	BDL	1.58	BDL	BDL	149.4	0.988
	07/24/11	**20:22:22**	BDL	2.10	BDL	BDL	149.4	0.988
	07/24/11	**20:22:52**	BDL	2.03	BDL	BDL	149.3	0.988
	07/24/11	**20:23:22**	BDL	1.98	BDL	BDL	149.4	0.988
	07/24/11	**20:23:52**	BDL	2.33	BDL	BDL	149.3	0.988
	07/24/11	**20:24:22**	BDL	2.51	BDL	BDL	149.3	0.988
	07/24/11	**20:24:52**	BDL	2.17	BDL	BDL	149.3	0.988
	07/24/11	**20:25:21**	BDL	2.22	BDL	BDL	149.3	0.988
	07/24/11	**20:25:51**	BDL	2.08	BDL	BDL	149.3	0.988
	07/24/11	**20:26:21**	BDL	1.66	BDL	BDL	149.3	0.988
	07/24/11	**20:26:51**	BDL	1.61	BDL	BDL	149.3	0.988
	07/24/11	**20:27:21**	BDL	2.43	BDL	BDL	149.3	0.988
	07/24/11	**20:27:51**	BDL	2.49	BDL	BDL	149.3	0.988
	07/24/11	**20:28:21**	BDL	2.55	BDL	BDL	149.3	0.988
	07/24/11	**20:28:51**	BDL	1.85	BDL	BDL	149.3	0.988
	07/24/11	**20:29:21**	BDL	1.74	BDL	BDL	149.3	0.988
	07/24/11	**20:29:51**	BDL	2.74	BDL	BDL	149.3	0.988
	07/24/11	**20:30:21**	BDL	2.85	BDL	BDL	149.3	0.988
	07/24/11	**20:30:51**	BDL	2.89	BDL	BDL	149.3	0.988
	07/24/11	**20:31:21**	BDL	2.91	BDL	BDL	149.3	0.988
	07/24/11	**20:31:51**	BDL	3.00	BDL	BDL	149.3	0.988
	07/24/11	**20:32:21**	BDL	3.05	BDL	BDL	149.3	0.988
	07/24/11	**20:32:51**	BDL	3.20	BDL	BDL	149.3	0.988
	07/24/11	**20:33:21**	BDL	3.04	BDL	BDL	149.3	0.988
	07/24/11	**20:33:51**	BDL	2.48	BDL	BDL	149.3	0.988
	07/24/11	**20:34:21**	BDL	1.61	BDL	BDL	149.3	0.988
	07/24/11	**20:34:51**	BDL	1.36	BDL	BDL	149.3	0.988
	07/24/11	**20:35:21**	BDL	2.22	BDL	BDL	149.3	0.988
	07/24/11	**20:35:50**	BDL	3.14	BDL	BDL	149.4	0.988
	07/24/11	**20:36:20**	BDL	3.23	BDL	BDL	149.4	0.988
	07/24/11	**20:36:50**	BDL	3.29	BDL	BDL	149.4	0.988
	07/24/11	**20:37:20**	BDL	3.22	BDL	BDL	149.4	0.988
	07/24/11	**20:37:50**	BDL	3.37	BDL	BDL	149.3	0.988
	07/24/11	**20:38:20**	BDL	3.46	BDL	BDL	149.3	0.988
	07/24/11	**20:38:50**	BDL	3.56	BDL	BDL	149.4	0.988
	07/24/11	**20:39:20**	BDL	3.56	BDL	BDL	149.4	0.988
	07/24/11	**20:39:50**	BDL	3.66	BDL	BDL	149.4	0.988
	07/24/11	**20:40:20**	BDL	3.78	BDL	BDL	149.4	0.988
	07/24/11	**20:40:50**	BDL	3.59	BDL	BDL	149.4	0.988
	07/24/11	**20:41:20**	BDL	3.87	BDL	BDL	149.4	0.988
	07/24/11	**20:41:50**	BDL	4.03	BDL	BDL	149.4	0.988
	07/24/11	**20:42:20**	BDL	4.02	BDL	BDL	149.4	0.988
	07/24/11	**20:42:50**	BDL	2.66	BDL	BDL	149.4	0.988
	07/24/11	**20:43:20**	BDL	1.83	BDL	BDL	149.4	0.988
	07/24/11	**20:43:50**	BDL	2.50	BDL	BDL	149.5	0.988
	07/24/11	**20:44:20**	BDL	1.63	BDL	BDL	149.4	0.988
	07/24/11	**20:44:49**	BDL	2.06	BDL	BDL	149.4	0.988
	07/24/11	**20:45:19**	BDL	3.62	BDL	BDL	149.4	0.988
	07/24/11	**20:45:49**	BDL	3.53	BDL	BDL	149.4	0.989
	07/24/11	**20:46:19**	BDL	3.49	BDL	BDL	149.4	0.988
	07/24/11	**20:46:49**	BDL	2.67	BDL	BDL	149.4	0.988
	07/24/11	**20:47:19**	BDL	1.49	BDL	BDL	149.4	0.988
	07/24/11	**20:47:49**	BDL	2.69	BDL	BDL	149.4	0.988
	07/24/11	**20:48:19**	BDL	1.79	BDL	BDL	149.4	0.988
	07/24/11	**20:48:49**	BDL	2.11	BDL	BDL	149.4	0.988
	07/24/11	**20:49:19**	BDL	3.34	BDL	BDL	149.4	0.988
	07/24/11	**20:49:49**	BDL	3.37	BDL	BDL	149.4	0.988
	07/24/11	**20:50:19**	BDL	2.83	BDL	BDL	149.3	0.988
	07/24/11	**20:50:49**	BDL	1.18	BDL	BDL	149.3	0.988
	07/24/11	**20:51:19**	BDL	2.60	BDL	BDL	149.3	0.988
	07/24/11	**20:51:49**	BDL	3.31	BDL	BDL	149.3	0.988

	07/24/11	**20:52:19**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:52:49**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:53:18**	BDL	3.26	BDL	BDL		149.3	0.988
	07/24/11	**20:53:48**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:54:18**	BDL	2.91	BDL	BDL		149.3	0.988
	07/24/11	**20:54:48**	BDL	1.56	BDL	BDL		149.3	0.988
	07/24/11	**20:55:18**	BDL	1.54	BDL	BDL		149.3	0.988
	07/24/11	**20:55:48**	BDL	3.16	BDL	BDL		149.3	0.988
	07/24/11	**20:56:18**	BDL	3.29	BDL	BDL		149.3	0.988
	07/24/11	**20:56:48**	BDL	3.24	BDL	BDL		149.3	0.988
	07/24/11	**20:57:18**	BDL	3.28	BDL	BDL		149.3	0.988
	07/24/11	**20:57:48**	BDL	3.26	BDL	BDL		149.4	0.988
	07/24/11	**20:58:18**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:58:48**	BDL	3.30	BDL	BDL		149.3	0.988
	07/24/11	**20:59:18**	BDL	3.23	BDL	BDL		149.3	0.988
	07/24/11	**20:59:48**	BDL	3.27	BDL	BDL		149.3	0.988
	07/24/11	**21:00:18**	BDL	2.32	BDL	BDL		149.3	0.988
	07/24/11	**21:00:48**	BDL	2.14	BDL	BDL		149.3	0.988
	07/24/11	**21:01:18**	BDL	1.48	BDL	BDL		149.4	0.988
	07/24/11	**21:01:48**	BDL	3.36	BDL	BDL		149.4	0.988
	07/24/11	**21:02:17**	BDL	3.33	BDL	BDL		149.4	0.988
	07/24/11	**21:02:48**	BDL	3.27	BDL	BDL		149.3	0.988
	07/24/11	**21:03:17**	BDL	3.29	BDL	BDL		149.3	0.988
	07/24/11	**21:03:47**	BDL	3.39	BDL	BDL		149.3	0.988
	07/24/11	**21:04:17**	BDL	3.49	BDL	BDL		149.3	0.988
	07/24/11	**21:04:47**	BDL	3.01	BDL	BDL		149.3	0.983
	07/24/11	**21:05:17**	BDL	2.87	BDL	BDL		149.4	0.981
	07/24/11	**21:05:47**	BDL	4.23	BDL	BDL		149.4	0.990
	07/24/11	**21:06:17**	BDL	3.67	BDL	BDL		149.4	0.988
	07/24/11	**21:06:47**	BDL	3.60	BDL	BDL		149.4	0.988
	07/24/11	**21:07:17**	BDL	3.51	BDL	BDL		149.3	0.988
	07/24/11	**21:07:47**	BDL	3.57	BDL	BDL		149.3	0.988
	07/24/11	**21:08:17**	BDL	3.52	BDL	BDL		149.3	0.988
	07/24/11	**21:08:47**	BDL	3.57	BDL	BDL		149.3	0.988
	07/24/11	**21:09:17**	BDL	3.14	BDL	BDL		149.3	0.988
	07/24/11	**21:09:47**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**21:10:17**	BDL	2.59	BDL	BDL		149.3	0.988
	07/24/11	**21:10:47**	BDL	3.39	BDL	BDL		149.3	0.988
	07/24/11	**21:11:17**	BDL	3.73	BDL	BDL		149.3	0.988
		Minimum	BDL	1.06	BDL	BDL			
		Maximum	BDL	19.74	BDL	BDL			
		Average	0.37	2.95	0.09	0.41			
		MDL	0.37	0.08	0.09	0.41			
Dilution Check 2	07/24/11	**21:11:47**					0.008	149.3	0.988
	07/24/11	**21:12:16**					1.003	149.4	0.988
	07/24/11	**21:12:46**					1.057	149.4	0.988
	07/24/11	**21:13:16**					1.053	149.3	0.988
	07/24/11	**21:13:46**					1.053	149.3	0.988
	07/24/11	**21:14:16**					1.053	149.3	0.988
	07/24/11	**21:14:46**					1.051	149.4	0.988
	07/24/11	**21:15:16**					1.051	149.3	0.988
	07/24/11	**21:15:46**					1.051	149.4	0.988
		Average					1.053		

CF - Propanal = 1.11
Dilution = 16.65

Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/25/11	**14:40:51**	BDL	1.88	BDL	BDL		149.4	0.985
07/25/11	**14:41:21**	BDL	2.72	BDL	BDL		149.4	0.985
07/25/11	**14:41:51**	BDL	2.83	BDL	BDL		149.4	0.985
07/25/11	**14:42:21**	BDL	3.40	BDL	BDL		149.5	0.985
07/25/11	**14:42:51**	BDL	1.32	BDL	BDL		149.4	0.985
07/25/11	**14:43:21**	BDL	2.89	BDL	BDL		149.4	0.986
07/25/11	**14:43:51**	BDL	1.36	BDL	BDL		149.5	0.986
07/25/11	**14:44:21**	BDL	2.05	BDL	BDL		149.4	0.986
07/25/11	**14:44:51**	BDL	2.40	BDL	BDL		149.5	0.986
07/25/11	**14:45:21**	BDL	1.90	BDL	BDL		149.4	0.986
07/25/11	**14:45:51**	BDL	1.75	BDL	BDL		149.5	0.986
07/25/11	**14:46:21**	BDL	1.69	BDL	BDL		149.4	0.986
07/25/11	**14:46:51**	BDL	1.51	BDL	BDL		149.5	0.986
07/25/11	**14:47:21**	BDL	1.67	BDL	BDL		149.5	0.986
07/25/11	**14:47:51**	BDL	1.76	BDL	BDL		149.5	0.986
07/25/11	**14:48:21**	BDL	1.63	BDL	BDL		149.5	0.986
07/25/11	**14:48:51**	BDL	1.59	BDL	BDL		149.5	0.986
07/25/11	**14:49:20**	BDL	1.79	BDL	BDL		149.5	0.986
07/25/11	**14:49:50**	BDL	1.67	BDL	BDL		149.5	0.986
07/25/11	**14:50:20**	BDL	1.59	BDL	BDL		149.5	0.986
07/25/11	**14:50:50**	BDL	1.52	BDL	BDL		149.5	0.986
07/25/11	**14:51:20**	BDL	1.71	BDL	BDL		149.5	0.986
07/25/11	**14:51:50**	BDL	1.78	BDL	BDL		149.5	0.986
07/25/11	**14:52:20**	BDL	1.60	BDL	BDL		149.5	0.986
07/25/11	**14:52:50**	BDL	1.61	BDL	BDL		149.5	0.986
07/25/11	**14:53:20**	BDL	1.68	BDL	BDL		149.5	0.986
07/25/11	**14:53:50**	BDL	1.79	BDL	BDL		149.4	0.986
07/25/11	**14:54:20**	BDL	1.77	BDL	BDL		149.5	0.986
07/25/11	**14:54:50**	BDL	1.72	BDL	BDL		149.5	0.986
07/25/11	**14:55:20**	BDL	1.82	BDL	BDL		149.5	0.986
07/25/11	**14:55:50**	BDL	1.88	BDL	BDL		149.5	0.986
07/25/11	**14:56:20**	BDL	1.88	BDL	BDL		149.5	0.986
07/25/11	**14:56:50**	BDL	1.70	BDL	BDL		149.5	0.986
07/25/11	**14:57:20**	BDL	1.54	BDL	BDL		149.5	0.986
07/25/11	**14:57:50**	BDL	1.63	BDL	BDL		149.5	0.986
07/25/11	**14:58:19**	BDL	1.35	BDL	BDL		149.5	0.986
07/25/11	**14:58:49**	BDL	1.22	BDL	BDL		149.5	0.986
07/25/11	**14:59:19**	BDL	1.29	BDL	BDL		149.4	0.986
07/25/11	**14:59:49**	BDL	1.29	BDL	BDL		149.3	0.986
07/25/11	**15:00:19**	BDL	1.33	BDL	BDL		149.4	0.987
07/25/11	**15:00:49**	BDL	3.40	BDL	BDL		149.4	0.986
07/25/11	**15:01:19**	BDL	2.15	BDL	BDL		149.4	0.986
07/25/11	**15:01:49**	BDL	2.19	BDL	BDL		149.4	0.986
07/25/11	**15:02:19**	BDL	1.91	BDL	BDL		149.4	0.986
07/25/11	**15:02:49**	BDL	1.64	BDL	BDL		149.4	0.987
07/25/11	**15:03:19**	BDL	1.81	BDL	BDL		149.5	0.986
07/25/11	**15:03:49**	BDL	1.69	BDL	BDL		149.4	0.986
07/25/11	**15:04:19**	BDL	1.60	BDL	BDL		149.4	0.987
07/25/11	**15:04:49**	BDL	1.54	BDL	BDL		149.5	0.987
07/25/11	**15:05:19**	BDL	1.62	BDL	BDL		149.5	0.986
07/25/11	**15:05:49**	BDL	1.64	BDL	BDL		149.5	0.987
07/25/11	**15:06:19**	BDL	1.68	BDL	BDL		149.5	0.987
07/25/11	**15:06:49**	BDL	1.64	BDL	BDL		149.5	0.987
07/25/11	**15:07:18**	BDL	1.60	BDL	BDL		149.5	0.987
07/25/11	**15:07:48**	BDL	1.54	BDL	BDL		149.4	0.987
07/25/11	**15:08:18**	BDL	1.43	BDL	BDL		149.5	0.988
07/25/11	**15:08:48**	BDL	1.57	BDL	BDL		149.4	0.987
07/25/11	**15:09:18**	BDL	1.53	BDL	BDL		149.4	0.987
07/25/11	**15:09:48**	BDL	1.55	BDL	BDL		149.5	0.987
07/25/11	**15:10:18**	BDL	1.60	BDL	BDL		149.4	0.987

Run 4 (A4) Data	07/25/11	**15:10:48**	BDL	1.59	BDL	BDL	149.4	0.986
	07/25/11	**15:11:18**	BDL	1.63	BDL	BDL	149.4	0.986
	07/25/11	**15:11:48**	BDL	1.62	BDL	BDL	149.5	0.986
	07/25/11	**15:12:18**	BDL	1.64	BDL	BDL	149.4	0.986
	07/25/11	**15:12:48**	BDL	1.65	BDL	BDL	149.5	0.986
	07/25/11	**15:13:18**	BDL	1.60	BDL	BDL	149.4	0.986
	07/25/11	**15:13:48**	BDL	1.58	BDL	BDL	149.5	0.986
	07/25/11	**15:14:18**	BDL	1.57	BDL	BDL	149.5	0.986
	07/25/11	**15:14:48**	BDL	1.57	BDL	BDL	149.4	0.986
	07/25/11	**15:15:18**	BDL	1.63	BDL	BDL	149.5	0.988
	07/25/11	**15:15:48**	BDL	1.63	BDL	BDL	149.4	0.987
	07/25/11	**15:16:17**	BDL	1.64	BDL	BDL	149.5	0.986
	07/25/11	**15:16:47**	BDL	1.67	BDL	BDL	149.5	0.986
	07/25/11	**15:17:17**	BDL	1.62	BDL	BDL	149.5	0.986
	07/25/11	**15:17:48**	BDL	1.67	BDL	BDL	149.4	0.986
	07/25/11	**15:18:17**	BDL	1.57	BDL	BDL	149.4	0.986
	07/25/11	**15:18:47**	BDL	1.59	BDL	BDL	149.4	0.986
	07/25/11	**15:19:17**	BDL	1.63	BDL	BDL	149.4	0.986
	07/25/11	**15:19:47**	BDL	1.70	BDL	BDL	149.4	0.986
	07/25/11	**15:20:17**	BDL	3.42	BDL	BDL	149.4	0.986
	07/25/11	**15:20:47**	BDL	2.63	BDL	BDL	149.4	0.987
	07/25/11	**15:21:17**	BDL	1.77	BDL	BDL	149.4	0.987
	07/25/11	**15:21:47**	BDL	1.75	BDL	BDL	149.4	0.986
	07/25/11	**15:22:17**	BDL	1.74	BDL	BDL	149.4	0.986
	07/25/11	**15:22:47**	BDL	1.76	BDL	BDL	149.4	0.986
	07/25/11	**15:23:17**	BDL	1.77	BDL	BDL	149.4	0.986
	07/25/11	**15:23:47**	BDL	1.74	BDL	BDL	149.5	0.986
	07/25/11	**15:24:17**	BDL	1.75	BDL	BDL	149.5	0.986
	07/25/11	**15:24:47**	BDL	1.78	BDL	BDL	149.5	0.986
	07/25/11	**15:25:17**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:25:46**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:26:16**	BDL	1.72	BDL	BDL	149.5	0.986
	07/25/11	**15:26:46**	BDL	1.68	BDL	BDL	149.5	0.986
	07/25/11	**15:27:16**	BDL	1.74	BDL	BDL	149.5	0.986
	07/25/11	**15:27:46**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:28:16**	BDL	1.77	BDL	BDL	149.5	0.986
	07/25/11	**15:28:46**	BDL	1.77	BDL	BDL	149.4	0.986
	07/25/11	**15:29:16**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:29:46**	BDL	1.81	BDL	BDL	149.4	0.986
	07/25/11	**15:30:16**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:30:46**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:31:16**	BDL	1.83	BDL	BDL	149.4	0.986
	07/25/11	**15:31:46**	BDL	1.80	BDL	BDL	149.4	0.986
	07/25/11	**15:32:16**	BDL	1.80	BDL	BDL	149.5	0.986
	07/25/11	**15:32:46**	BDL	1.83	BDL	BDL	149.4	0.986
	07/25/11	**15:33:16**	BDL	1.86	BDL	BDL	149.5	0.986
	07/25/11	**15:33:46**	BDL	1.82	BDL	BDL	149.4	0.986
	07/25/11	**15:34:16**	BDL	1.82	BDL	BDL	149.4	0.986
	07/25/11	**15:34:45**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:35:15**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:35:45**	BDL	1.81	BDL	BDL	149.4	0.986
	07/25/11	**15:36:15**	BDL	1.85	BDL	BDL	149.4	0.986
	07/25/11	**15:36:45**	BDL	1.84	BDL	BDL	149.4	0.986
	07/25/11	**15:37:15**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:37:45**	BDL	1.88	BDL	BDL	149.4	0.986
	07/25/11	**15:38:15**	BDL	1.88	BDL	BDL	149.4	0.986
	07/25/11	**15:38:45**	BDL	1.89	BDL	BDL	149.5	0.986
	07/25/11	**15:39:15**	BDL	1.86	BDL	BDL	149.5	0.986
	07/25/11	**15:39:45**	BDL	1.90	BDL	BDL	149.5	0.986
	07/25/11	**15:40:15**	BDL	1.91	BDL	BDL	149.5	0.986
	07/25/11	**15:40:45**	BDL	1.92	BDL	BDL	149.5	0.986
	07/25/11	**15:41:15**	BDL	1.90	BDL	BDL	149.5	0.986
	07/25/11	**15:41:45**	BDL	1.93	BDL	BDL	149.4	0.986

	07/25/11	**15:42:15**	BDL	1.93	BDL	BDL		149.5	0.986
		Minimum	BDL	1.22	BDL	BDL			
		Maximum	BDL	3.42	BDL	BDL			
		Average	0.37	1.79	0.09	0.49			
		MDL	0.37	0.08	0.09	0.49			
Dilution Check	07/25/11	**15:45:14**					0.500	149.5	0.986
	07/25/11	**15:45:44**					0.497	149.5	0.986
	07/25/11	**15:46:14**					0.457	149.5	0.986
	07/25/11	**15:46:44**					0.442	149.5	0.986
	07/25/11	**15:47:14**					0.501	149.5	0.986
	07/25/11	**15:47:44**					0.508	149.5	0.986
	07/25/11	**15:48:14**					0.512	149.5	0.986
		Average					0.507		

QA Spike Recovery and Validation Data

Formaldehyde Method 320 QA Spike Recoveries (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	8.44	0.130	0.154	0.168	109.2	Pass

Propanal Method 320 QA Spike Results (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	16.94	0.066	0.429	0.497	115.9	Pass
Spike 2	16.94	0.107	0.672	0.783	116.5	Pass

Acetaldehyde Method 320 QA Spike Results (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	17.282	0.115	0.654	0.678	103.6	Pass

Carbon Monoxide Method 320 QA Spike Results (No Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
NA	NA	NA	NA	NA	NA	NA

Formaldehyde (H2CO): Validation by Dynamic Analyte Spiking (biases taken into account)

Spiking Data

Total tracer conc. (ppm):	8.443	
tracer conc. while line spiking (ppm):	0.080	
Percentage of native exhaust in total spiked sample:	0.990	
Certified cylinder conc. of analyte (ppm):	19.608	Dir Inject
Conc. of analyte spiked into extracted exhaust (ppm):	0.187	

Validation Data (conc. in ppm)

		Analyte Concentrations					Tracer Concentrations	
	Pair #	Unspiked Native Conc.	Corr. Native Conc.	Native + Spiked Conc.	Native + Spiked (meas.)	% Recovery	SF6 Unspiked	SF6 Spiked
	1	-0.013	-0.013	0.174	0.159	91.232	-0.038	0.042
	2	-0.012	-0.012	0.175	0.161	92.160	-0.036	0.044
	3	-0.001	-0.001	0.185	0.164	88.581	-0.037	0.031
	4	-0.012	-0.012	0.175	0.162	92.913	-0.033	0.048
	5	-0.010	-0.010	0.177	0.173	97.755	-0.034	0.046
	6	0.004	0.004	0.190	0.230	121.056	-0.034	0.050
	7	0.004	0.004	0.191	0.203	106.339	-0.032	0.054
	8	0.006	0.006	0.193	0.167	86.639	-0.032	0.049
	9	0.003	0.003	0.190	0.144	75.883	-0.032	0.052
	10	-0.007	-0.007	0.179	0.227	126.245	-0.031	0.050
	11	-0.003	-0.003	0.184	0.194	105.753	-0.030	0.052
	12	0.015	0.015	0.202	0.207	102.464	-0.032	0.049
Mean Conc.:		-0.002	-0.002	0.185	0.183	**98.918**	-0.033	0.047

Method 320/301 Analyte Spiking Statistical Results

Mean of FTIR meas. spiked samples:	0.1826	
Mean of FTIR meas. unspiked samp:	-0.0021	
CS Calculated value of Spiked Samples:	0.1846	
SD St.Dev of spiked samples Eq 301-2:	0.0285	also Eq 301-5 in 2011 version of m301
SDM = SD/sqrt(12)	0.0082	
F-test:	0.0833	For n=6, if 0.139<F<7.146, calculate pooled SD
SDpooled-pooled std. dev.:	NA	
RSD:	**0.1560**	RSD must be <= 0.20 for successful validation
RSD, if using pooled SD:	NA	RSD must be <= 0.50 for successful validation
B-bias at spike level m320 Eq. 7:	-0.0019	
t-statistic, Eq. 301-4:	**0.2354**	if t-stat.>=2.201 (11 degrees of freedom), then B is statistically significant must calc. and use CF (also Eq 301-6 in 2011 version of m301)
Br, Relative Bias Eq. 301-7 (2011 ver):	0.0105	If < 0.1 the CF not required (CF=1) if Br>0.3 then validation is unsucessful
CF-correction factor Eq. 301-5 (pre-2011):	1.0106	if 0.7<=CF<=1.3 or if B not statistically signif., then validation successful

Method 320 Spikes for Formaldehyde (H2CO) using a Sulfur hexafluoride (SF6) Tracer

Spike #1

Compound #	Name	Cyl. Conc. (ppmv)	Native Conc. (ppmv)	Method Bias (ppmv)	Meas. Conc. (ppmv)	Spike Obs. (ppmv)	Spike Exp. (ppmv)	Recovery (%)
tracer	SF6	8.44	0.000	-0.030	0.036	0.066	0.066	100.0
1	H2CO	19.61	0.000	0.102	0.268	0.168	0.154	109.2
2								
3								

"Dil Factor"	0.008
Dil Factor	0.130
Probe Dilution	16.65

Entered Values

	Date	Time	H2CO (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
	07/25/11	**15:35:45**	0.084	-0.033	149.44	0.99
	07/25/11	**15:36:15**	0.094	-0.034	149.41	0.99
	07/25/11	**15:36:45**	0.124	-0.032	149.44	0.99
	07/25/11	**15:37:15**	0.140	-0.032	149.45	0.99
	07/25/11	**15:37:45**	0.130	-0.033	149.44	0.99
	07/25/11	**15:38:15**	0.124	-0.031	149.44	0.99
	07/25/11	**15:38:45**	0.099	-0.032	149.47	0.99
	07/25/11	**15:39:15**	0.108	-0.034	149.48	0.99
	07/25/11	**15:39:45**	0.113	-0.031	149.50	0.99
	07/25/11	**15:40:15**	0.133	-0.031	149.48	0.99
Bkg	07/25/11	**15:40:45**	0.103	-0.031	149.50	0.99
	07/25/11	**15:41:15**	0.102	-0.029	149.49	0.99
	07/25/11	**15:41:45**	0.090	-0.030	149.44	0.99
	07/25/11	**15:42:15**	0.110	-0.030	149.46	0.99
	07/25/11	**15:42:45**	0.209	0.046	149.45	0.99
	07/25/11	**15:43:15**	0.286	0.241	149.42	0.99
	07/25/11	**15:43:44**	0.219	0.306	149.40	0.99
	07/25/11	**15:44:14**	0.335	0.469	149.43	0.99
	07/25/11	**15:44:44**	0.654	0.499	149.45	0.99
	07/25/11	**15:45:14**	0.834	0.500	149.48	0.99
	07/25/11	**15:45:44**	1.017	0.497	149.51	0.99
	07/25/11	**15:46:14**	1.047	0.457	149.52	0.99
	07/25/11	**15:46:44**	1.003	0.442	149.51	0.99
Probe Dilution	07/25/11	**15:47:14**	1.035	**0.501**	149.53	0.99
	07/25/11	**15:47:44**	0.939	**0.508**	149.49	0.99
	07/25/11	**15:48:14**	1.022	**0.512**	149.52	0.99
	07/25/11	**15:48:44**	1.185	0.172	149.50	0.99
	07/25/11	**15:49:14**	0.378	0.026	149.51	0.99
	07/25/11	**15:49:44**	0.392	0.039	149.49	0.99
	07/25/11	**15:50:14**	0.267	0.032	149.53	0.99
Spike 1	07/25/11	**15:50:44**	0.254	0.035	149.56	0.99
	07/25/11	**15:51:14**	0.291	0.035	149.53	0.99
	07/25/11	**15:51:44**	0.260	0.039	149.51	0.99
	07/25/11	**15:52:14**	0.373	0.038	149.50	0.99

Date	Time	H2CO (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/16/11	**8:57:39**	0.02	0.01	149.46	0.98
07/16/11	**8:58:09**	14.13	7.49	149.48	0.99
07/16/11	**8:58:39**	18.41	8.45	149.46	0.99
07/16/11	**8:59:09**	18.80	8.44	149.44	0.99
07/16/11	**8:59:39**	19.02	8.44	149.40	0.99
07/16/11	**9:00:09**	19.12	8.44	149.35	0.99
07/16/11	**9:00:39**	19.21	8.44	149.34	0.99
07/16/11	**9:01:09**	19.28	8.44	149.38	0.99
07/16/11	**9:01:39**	19.35	8.44	149.36	0.99
07/16/11	**9:02:09**	19.36	8.44	149.35	0.99
07/16/11	**9:02:39**	19.40	8.44	149.39	0.99
07/16/11	**9:03:09**	19.43	8.44	149.42	0.99
07/16/11	**9:03:39**	19.53	8.44	149.42	0.99
07/16/11	**9:04:09**	19.52	8.44	149.43	0.99
07/16/11	**9:04:39**	19.54	8.44	149.40	0.99
07/16/11	**9:05:09**	19.52	8.44	149.39	0.99
07/16/11	**9:05:39**	19.54	8.44	149.34	0.99
07/16/11	**9:06:08**	19.57	8.45	149.38	0.99
07/16/11	**9:06:38**	19.62	8.44	149.35	0.99
07/16/11	**9:07:08**	19.61	8.44	149.36	0.99
07/16/11	**9:07:38**	19.65	8.44	149.39	0.99
07/16/11	**9:08:08**	19.58	8.44	149.37	0.99
	Average	19.61	8.44		

Date	Time	SF6 (ppmv	H2CO (ppmv)	Temp C	Pressure (Atm)
07/18/11	**2:22:35**	-0.01	0.05	149.38	0.99
07/18/11	**2:23:05**	-0.01	0.13	149.36	0.99
07/18/11	**2:23:35**	-0.01	0.03	149.38	0.99
07/18/11	**2:24:05**	-0.01	-0.11	149.37	0.99
07/18/11	**2:24:35**	-0.01	-0.12	149.42	0.99
07/18/11	**2:25:05**	-0.01	-0.08	149.38	0.99
07/18/11	**2:25:35**	-0.01	0.00	149.35	0.99
07/18/11	**2:26:05**	-0.01	0.09	149.40	0.99
07/18/11	**2:26:35**	-0.01	0.06	149.42	0.99
07/18/11	**2:27:05**	-0.01	0.05	149.42	0.99
07/18/11	**2:27:35**	-0.01	0.06	149.46	0.99
07/18/11	**2:28:05**	-0.01	0.05	149.46	0.99
07/18/11	**2:28:35**	-0.01	0.06	149.45	0.99
07/18/11	**2:29:05**	-0.01	0.09	149.43	0.99
07/18/11	**2:29:35**	-0.01	0.03	149.47	0.99
07/18/11	**2:30:05**	-0.01	0.03	149.47	0.99
07/18/11	**2:30:34**	-0.01	0.06	149.48	0.99
07/18/11	**2:31:04**	-0.01	0.03	149.52	0.99
07/18/11	**2:31:34**	-0.01	0.03	149.55	0.99
07/18/11	**2:32:04**	-0.01	0.07	149.57	0.99
07/18/11	**2:32:34**	-0.01	0.02	149.52	0.99
07/18/11	**2:33:04**	-0.01	0.07	149.50	0.99
07/18/11	**2:33:34**	-0.01	0.06	149.47	0.99
07/18/11	**2:34:04**	-0.01	0.03	149.43	0.99
07/18/11	**2:34:34**	-0.01	0.08	149.41	0.99
07/18/11	**2:35:04**	-0.01	0.07	149.40	0.99
07/18/11	**2:35:34**	-0.01	0.05	149.44	0.99
07/18/11	**2:36:04**	-0.01	0.06	149.43	0.99
07/18/11	**2:36:34**	-0.01	0.06	149.45	0.99
07/18/11	**2:37:04**	-0.01	0.05	149.45	0.99
07/18/11	**2:37:34**	-0.01	0.09	149.45	0.99
07/18/11	**2:38:04**	0.11	0.10	149.48	0.99
07/18/11	**2:38:34**	0.36	0.37	149.45	0.99
07/18/11	**2:39:04**	0.41	0.50	149.42	0.99
07/18/11	**2:39:34**	0.41	0.59	149.43	0.99
07/18/11	**2:40:04**	0.40	0.65	149.44	0.99
07/18/11	**2:40:33**	0.40	0.71	149.45	0.99
07/18/11	**2:41:03**	0.42	0.76	149.49	0.99
07/18/11	**2:41:33**	0.42	0.81	149.49	0.99
07/18/11	**2:42:03**	0.42	0.80	149.48	0.99
07/18/11	**2:42:33**	0.41	0.84	149.50	0.99
07/18/11	**2:43:03**	0.43	0.86	149.49	0.99
07/18/11	**2:43:33**	0.43	0.92	149.49	0.99
07/18/11	**2:44:03**	0.44	0.96	149.48	0.99
07/18/11	**2:44:33**	0.44	1.07	149.45	0.99
07/18/11	**2:45:03**	0.44	1.13	149.44	0.99
07/18/11	**2:45:33**	0.45	1.17	149.44	0.99
07/18/11	**2:46:03**	0.45	1.25	149.48	0.99
07/18/11	**2:46:33**	0.38	1.52	149.40	0.99
07/18/11	**2:47:03**	-0.01	1.76	149.37	0.99
07/18/11	**2:47:33**	-0.01	0.57	149.38	0.99
07/18/11	**2:48:03**	-0.01	0.28	149.40	0.99
07/18/11	**2:48:33**	0.01	0.21	149.42	0.99
07/18/11	**2:49:03**	0.02	0.17	149.45	0.99
07/18/11	**2:49:33**	0.02	0.06	149.44	0.99
07/18/11	**2:50:03**	0.02	0.05	149.46	0.99
07/18/11	**2:50:33**	0.02	0.05	149.46	0.99
07/18/11	**2:51:02**	0.02	0.05	149.43	0.99
07/18/11	**2:51:32**	0.04	0.10	149.44	0.99
07/18/11	**2:52:02**	0.06	0.19	149.42	0.99
07/18/11	**2:52:32**	0.06	0.21	149.43	0.99
07/18/11	**2:53:02**	0.05	0.16	149.45	0.99
07/18/11	**2:53:32**	0.06	0.18	149.42	0.99

07/18/11	**2:54:02**	0.07	0.17	149.44	0.99	
07/18/11	**2:54:32**	0.06	0.14	149.42	0.99	
07/18/11	**2:55:02**	0.04	0.13	149.44	0.99	
07/18/11	**2:55:32**	0.05	0.11	149.45	0.99	
07/18/11	**2:56:02**	0.06	0.20	149.42	0.99	
07/18/11	**2:56:32**	0.03	0.15	149.44	0.99	
07/18/11	**2:57:02**	-0.03	0.02	149.43	0.99	
07/18/11	**2:57:32**	-0.03	-0.02	149.47	0.99	
07/18/11	**2:58:02**	0.00	0.08	149.45	0.99	
07/18/11	**2:58:32**	0.06	0.20	149.46	0.99	
07/18/11	**2:59:02**	0.06	0.22	149.45	0.99	
07/18/11	**2:59:32**	0.02	0.14	149.46	0.99	
07/18/11	**3:00:02**	-0.03	-0.02	149.46	0.99	
07/18/11	**3:00:32**	-0.03	0.00	149.44	0.99	
07/18/11	**3:01:01**	0.00	0.13	149.38	0.99	
07/18/11	**3:01:31**	0.06	0.25	149.41	0.99	
07/18/11	**3:02:01**	0.07	0.30	149.45	0.99	
07/18/11	**3:02:31**	0.07	0.22	149.45	0.99	
07/18/11	**3:03:01**	0.06	0.23	149.44	0.99	
07/18/11	**3:03:31**	-0.01	0.00	149.47	0.99	
07/18/11	**3:04:01**	-0.01	0.02	149.47	0.99	
07/18/11	**3:04:31**	-0.01	-0.01	149.47	0.99	
07/18/11	**3:05:01**	0.02	0.06	149.48	0.99	
07/18/11	**3:05:31**	0.08	0.23	149.47	0.99	
07/18/11	**3:06:01**	0.08	0.19	149.41	0.99	
07/18/11	**3:06:31**	0.08	0.20	149.36	0.99	
07/18/11	**3:07:01**	0.08	0.19	149.33	0.99	
07/18/11	**3:07:31**	0.08	0.26	149.33	0.99	
07/18/11	**3:08:01**	0.08	0.30	149.34	0.99	
07/18/11	**3:08:31**	0.08	0.21	149.35	0.99	
07/18/11	**3:09:01**	0.06	0.24	149.34	0.99	
07/18/11	**3:09:31**	0.06	0.25	149.43	0.99	
07/18/11	**3:10:01**	0.05	0.12	149.37	0.99	
07/18/11	**3:10:31**	0.02	0.07	149.40	0.99	
07/18/11	**3:11:00**	-0.02	-0.01	149.38	0.99	
07/18/11	**3:11:30**	-0.03	-0.03	149.38	0.99	
07/18/11	**3:12:00**	-0.03	0.02	149.36	0.99	
07/18/11	**3:12:30**	-0.01	0.11	149.38	0.99	
07/18/11	**3:13:00**	0.03	0.13	149.37	0.99	
07/18/11	**3:13:30**	0.03	0.13	149.35	0.99	
07/18/11	**3:14:00**	0.03	0.18	149.36	0.99	
07/18/11	**3:14:30**	0.04	0.14	149.37	0.99	
07/18/11	**3:15:00**	0.06	0.18	149.37	0.99	
07/18/11	**3:15:30**	0.08	0.27	149.38	0.99	
07/18/11	**3:16:00**	0.05	0.21	149.38	0.99	
07/18/11	**3:16:30**	0.02	0.10	149.36	0.99	
07/18/11	**3:17:00**	0.03	0.12	149.35	0.99	
07/18/11	**3:17:30**	0.04	0.18	149.34	0.99	
07/18/11	**3:18:00**	0.04	0.23	149.34	0.99	
07/18/11	**3:18:30**	0.01	0.11	149.36	0.99	
07/18/11	**3:19:00**	-0.04	-0.01	149.38	0.99	1
07/18/11	**3:19:30**	-0.04	-0.02	149.35	0.99	
07/18/11	**3:20:00**	-0.01	0.06	149.37	0.99	
07/18/11	**3:20:30**	0.04	0.15	149.38	0.99	1
07/18/11	**3:20:59**	0.04	0.17	149.35	0.99	
07/18/11	**3:21:29**	0.03	0.15	149.37	0.99	
07/18/11	**3:21:59**	-0.04	-0.02	149.39	0.99	
07/18/11	**3:22:29**	-0.03	0.08	149.37	0.99	
07/18/11	**3:22:59**	-0.04	-0.01	149.36	0.99	
07/18/11	**3:23:29**	-0.04	-0.03	149.41	0.99	2
07/18/11	**3:23:59**	-0.04	0.00	149.39	0.99	
07/18/11	**3:24:29**	0.01	0.08	149.36	0.99	
07/18/11	**3:24:59**	0.04	0.11	149.40	0.99	
07/18/11	**3:25:29**	0.04	0.17	149.38	0.99	2
07/18/11	**3:25:59**	0.04	0.15	149.39	0.99	

07/18/11	**3:26:29**	0.01	0.07	149.43	0.99	
07/18/11	**3:26:59**	-0.04	-0.01	149.41	0.99	3
07/18/11	**3:27:29**	-0.04	0.01	149.41	0.99	
07/18/11	**3:27:59**	-0.01	0.04	149.42	0.99	
07/18/11	**3:28:29**	0.04	0.21	149.42	0.99	
07/18/11	**3:28:59**	0.05	0.13	149.39	0.99	
07/18/11	**3:29:29**	0.04	0.17	149.39	0.99	
07/18/11	**3:29:59**	0.05	0.20	149.38	0.99	3
07/18/11	**3:30:29**	0.02	0.13	149.42	0.99	
07/18/11	**3:30:58**	-0.03	0.09	149.38	0.99	
07/18/11	**3:31:28**	-0.03	-0.02	149.38	0.99	4
07/18/11	**3:31:58**	-0.03	0.00	149.38	0.99	
07/18/11	**3:32:28**	0.00	0.06	149.39	0.99	
07/18/11	**3:32:58**	0.05	0.25	149.40	0.99	
07/18/11	**3:33:28**	0.05	0.16	149.42	0.99	
07/18/11	**3:33:58**	0.05	0.15	149.40	0.99	4
07/18/11	**3:34:28**	0.05	0.18	149.43	0.99	
07/18/11	**3:34:58**	0.02	0.08	149.40	0.99	
07/18/11	**3:35:28**	-0.03	0.03	149.45	0.99	
07/18/11	**3:35:58**	-0.03	0.00	149.42	0.99	
07/18/11	**3:36:28**	-0.03	-0.04	149.40	0.99	
07/18/11	**3:36:58**	-0.03	-0.01	149.38	0.99	5
07/18/11	**3:37:28**	-0.03	-0.01	149.36	0.99	
07/18/11	**3:37:58**	-0.01	0.09	149.41	0.99	
07/18/11	**3:38:28**	0.05	0.14	149.40	0.99	
07/18/11	**3:38:58**	0.04	0.17	149.35	0.99	5
07/18/11	**3:39:28**	0.05	0.17	149.35	0.99	
07/18/11	**3:39:58**	0.02	0.09	149.36	0.99	
07/18/11	**3:40:27**	-0.03	0.00	149.37	0.99	6
07/18/11	**3:40:57**	-0.03	0.01	149.39	0.99	
07/18/11	**3:41:27**	0.00	0.07	149.34	0.99	
07/18/11	**3:41:57**	0.05	0.22	149.38	0.99	6
07/18/11	**3:42:27**	0.05	0.25	149.40	0.99	
07/18/11	**3:42:57**	0.03	0.15	149.37	0.99	
07/18/11	**3:43:27**	-0.03	-0.02	149.38	0.99	
07/18/11	**3:43:57**	-0.03	0.09	149.39	0.99	
07/18/11	**3:44:27**	-0.03	0.00	149.40	0.99	7
07/18/11	**3:44:57**	-0.03	0.01	149.43	0.99	
07/18/11	**3:45:27**	0.00	0.01	149.41	0.99	
07/18/11	**3:45:57**	0.05	0.13	149.38	0.99	
07/18/11	**3:46:27**	0.05	0.21	149.41	0.99	
07/18/11	**3:46:57**	0.05	0.12	149.38	0.99	
07/18/11	**3:47:27**	0.06	0.16	149.37	0.99	7
07/18/11	**3:47:57**	0.05	0.24	149.36	0.99	
07/18/11	**3:48:27**	0.02	0.11	149.32	0.99	
07/18/11	**3:48:57**	-0.03	0.10	149.31	0.99	
07/18/11	**3:49:27**	-0.03	0.01	149.30	0.99	8
07/18/11	**3:49:57**	-0.03	0.01	149.33	0.99	
07/18/11	**3:50:26**	-0.03	0.00	149.37	0.99	
07/18/11	**3:50:56**	0.04	0.16	149.43	0.99	
07/18/11	**3:51:26**	0.05	0.15	149.45	0.99	8
07/18/11	**3:51:56**	0.05	0.18	149.48	0.99	
07/18/11	**3:52:26**	0.02	0.12	149.45	0.99	
07/18/11	**3:52:56**	-0.03	0.05	149.50	0.99	
07/18/11	**3:53:26**	-0.03	0.06	149.49	0.99	
07/18/11	**3:53:56**	-0.03	0.04	149.45	0.99	
07/18/11	**3:54:26**	-0.03	0.02	149.36	0.99	9
07/18/11	**3:54:56**	-0.03	-0.01	149.36	0.99	
07/18/11	**3:55:26**	0.00	0.05	149.36	0.99	
07/18/11	**3:55:56**	0.05	0.15	149.35	0.99	9
07/18/11	**3:56:26**	0.05	0.14	149.40	0.99	
07/18/11	**3:56:56**	0.05	0.14	149.43	0.99	
07/18/11	**3:57:26**	0.02	0.21	149.44	0.99	
07/18/11	**3:57:56**	-0.03	0.00	149.44	0.99	10
07/18/11	**3:58:26**	-0.03	-0.02	149.46	0.99	

07/18/11	**3:58:56**	-0.03	0.03	149.45	0.99	
07/18/11	**3:59:26**	0.05	0.14	149.46	0.99	
07/18/11	**3:59:55**	0.05	0.14	149.47	0.99	
07/18/11	**4:00:25**	0.05	0.25	149.47	0.99	
07/18/11	**4:00:55**	0.05	0.21	149.48	0.99	10
07/18/11	**4:01:25**	0.05	0.25	149.41	0.99	
07/18/11	**4:01:55**	0.03	0.13	149.40	0.99	
07/18/11	**4:02:25**	-0.03	0.01	149.36	0.99	11
07/18/11	**4:02:55**	-0.03	-0.01	149.36	0.99	
07/18/11	**4:03:25**	-0.01	0.07	149.33	0.99	
07/18/11	**4:03:55**	0.05	0.23	149.38	0.99	
07/18/11	**4:04:25**	0.05	0.21	149.42	0.99	
07/18/11	**4:04:55**	0.05	0.16	149.40	0.99	11
07/18/11	**4:05:25**	0.05	0.23	149.42	0.99	
07/18/11	**4:05:55**	0.04	0.27	149.39	0.99	
07/18/11	**4:06:25**	-0.03	0.02	149.40	0.99	
07/18/11	**4:06:55**	-0.03	0.04	149.38	0.99	
07/18/11	**4:07:25**	-0.03	0.04	149.39	0.99	12
07/18/11	**4:07:55**	-0.03	-0.01	149.45	0.99	
07/18/11	**4:08:25**	-0.03	0.04	149.45	0.99	
07/18/11	**4:08:55**	-0.01	0.08	149.47	0.99	
07/18/11	**4:09:25**	0.05	0.22	149.45	0.99	12
07/18/11	**4:09:54**	0.05	0.19	149.46	0.99	
07/18/11	**4:10:24**	0.03	0.19	149.44	0.99	
07/18/11	**4:10:54**	-0.03	0.09	149.39	0.99	
07/18/11	**4:11:24**	-0.03	0.05	149.38	0.99	
07/18/11	**4:11:54**	-0.03	0.09	149.42	0.99	
07/18/11	**4:12:24**	-0.03	0.09	149.41	0.99	
07/18/11	**4:12:54**	-0.03	-0.01	149.43	0.99	
07/18/11	**4:13:24**	-0.03	0.07	149.44	0.99	
07/18/11	**4:13:54**	-0.03	0.10	149.45	0.99	
07/18/11	**4:14:24**	-0.03	0.07	149.43	0.99	
07/18/11	**4:14:54**	-0.02	0.07	149.41	0.99	
07/18/11	**4:15:24**	-0.01	0.08	149.38	0.99	
07/18/11	**4:15:54**	-0.01	0.01	149.37	0.99	
07/18/11	**4:16:24**	-0.01	0.00	149.38	0.99	
07/18/11	**4:16:54**	-0.01	0.03	149.39	0.99	
07/18/11	**4:17:24**	-0.01	0.02	149.43	0.99	
07/18/11	**4:17:54**	-0.01	0.07	149.42	0.99	
07/18/11	**4:18:24**	-0.05	0.09	149.41	0.99	
07/18/11	**4:18:54**	-0.04	0.04	149.39	0.99	

07/18/11	**4:19:24**	0.02	0.14	149.44	0.99
07/18/11	**4:19:53**	**0.51**	0.76	149.45	0.99
07/18/11	**4:20:23**	**0.51**	0.89	149.42	0.99
07/18/11	**4:20:53**	**0.51**	0.99	149.40	0.99
07/18/11	**4:21:23**	**0.51**	1.05	149.37	0.99
07/18/11	**4:21:53**	**0.51**	1.11	149.40	0.99
07/18/11	**4:22:23**	**0.50**	1.09	149.41	0.99
07/18/11	**4:22:53**	0.28	0.74	149.47	0.99
07/18/11	**4:23:23**	0.50	1.07	149.45	0.99

Dil Factor 0.51

07/18/11	**4:23:53**	0.11	0.87	149.43	0.99
07/18/11	**4:24:23**	-0.04	0.15	149.46	0.99
07/18/11	**4:24:53**	-0.03	0.09	149.51	0.99
07/18/11	**4:25:23**	-0.03	0.07	149.51	0.99
07/18/11	**4:25:53**	-0.03	0.07	149.45	0.99
07/18/11	**4:26:23**	0.02	-0.03	149.43	0.99
07/18/11	**4:26:53**	0.20	0.30	149.40	0.99
07/18/11	**4:27:23**	0.04	0.18	149.39	0.99
07/18/11	**4:27:53**	-0.03	0.05	149.37	0.99
07/18/11	**4:28:23**	-0.03	0.09	149.46	0.99

Propanal: Validation by Dynamic Analyte Spiking (biases taken into account)

Spiking Data

Total tracer conc. (ppm): 16.938 Dir. Inject
tracer conc. while line spiking (ppm): 0.094

Percentage of native exhaust in total spiked sample: 0.994

Certified cylinder conc. of analyte (ppm): 100.000

Conc. of analyte spiked into extracted exhaust (ppm): 0.553

Validation Data (conc. in ppm)		Analyte Concentrations					Tracer Concentrations	
	Pair #	Unspiked Native Conc.	Corr. Native Conc.	Native + Spiked Conc.	Native + Spiked (meas.)	% Recovery	**SF6 Unspiked**	**SF6 Spiked**
	1	0.240	0.239	0.792	0.695	87.737	0.000	0.092
	2	0.185	0.184	0.737	0.696	94.419	0.001	0.092
	3	0.169	0.168	0.721	0.688	95.464	0.004	0.092
	4	0.223	0.222	0.775	0.704	90.859	0.002	0.092
	5	0.299	0.297	0.850	0.644	75.749	0.004	0.089
	6	0.187	0.186	0.739	0.700	94.753	-0.003	0.090
	7	0.244	0.243	0.796	0.685	86.081	-0.005	0.092
	8	0.254	0.253	0.805	0.726	90.121	-0.006	0.094
	9	0.230	0.229	0.782	0.680	86.986	-0.006	0.092
	10	0.196	0.195	0.748	0.711	95.123	-0.007	0.091
	11	0.192	0.191	0.744	0.720	96.719	-0.008	0.088
	12	0.200	0.199	0.751	0.646	86.025	-0.003	0.087
Mean Conc.:		0.218	0.217	0.770	0.691	**90.003**	-0.002	0.091

Method 320/301 Analyte Spiking Statistical Results

Mean of FTIR meas. spiked samples: 0.6912
Mean of FTIR meas. unspiked samp: 0.2182
CS Calculated value of Spiked Samples: 0.7699
SD St.Dev of spiked samples Eq 301-2: 0.0254 also Eq 301-5 in 2011 version of m301
SDM = SD/sqrt(12) 0.0073
F-test: 0.0833 For n=6, if 0.139<F<7.146, calculate pooled SD
SD_{pooled}-pooled std. dev.: NA
RSD: **0.0368** RSD must be <= 0.20 for successful validation
RSD, if using pooled SD: NA RSD must be <= 0.50 for successful validation
B-bias at spike level m320 Eq. 7: -0.0787
t-statistic, Eq. 301-4: **10.7232** if t-stat.>=2.201 (11 degrees of freedom), then B is statistically significant must calc. and use CF (also Eq 301-6 in 2011 version of m301)
Br, Relative Bias Eq. 301-7 (2011 ver): **0.1022** If < 0.1 the CF not required (CF=1) if Br>0.3 then validation is unsucessful
CF-correction factor Eq. 301-5 (pre-2011): **1.1139** if 0.7<=CF<=1.3 or if B not statistically signif., then validation successful

Method 320 Spikes for Propanal using a Sulfur hexafluoride (SF6) Tracer

Spike #1

Compound #	Name	Cyl. Conc. (ppmv)	Native Conc. (ppmv)	Method Bias (ppmv)	Meas. Conc. (ppmv)	Spike Obs. (ppmv)	Spike Exp. (ppmv)	Recovery (%)
tracer	SF6	16.94	0.000	-0.053	0.020	0.073	0.073	100.0
1	Propanal	100.00	0.000	-0.066	0.431	0.497	0.429	115.9
2								
3								

"Dil Factor"	0.004
Dil Factor	0.066
Probe Dilution	15.50

Entered Values

Spike #2

Compound #	Name	Cyl. Conc. (ppmv)	Native Conc. (ppmv)	Method Bias (ppmv)	Meas. Conc. (ppmv)	Spike Obs. (ppmv)	Spike Exp. (ppmv)	Recovery (%)
tracer	SF6	24.38	0.000	-0.053	0.115	0.168	0.168	100.0
1	Propanal	97.73	0.000	-0.066	0.717	0.783	0.672	116.5
2								
3								

"Dil Factor"	0.007
Dil Factor	0.107

Entered Values

	Date	Time	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
	07/21/11	22:32:20	0.140	-0.070	149.35	0.98
	07/21/11	22:32:50	0.195	-0.071	149.33	0.98
	07/21/11	22:33:20	0.139	-0.072	149.41	0.98
	07/21/11	22:33:50	0.236	-0.073	149.37	0.98
	07/21/11	22:34:20	0.270	-0.073	149.35	0.98
	07/21/11	22:34:50	0.322	-0.071	149.35	0.98
	07/21/11	22:35:20	0.307	-0.070	149.36	0.98
	07/21/11	22:35:50	0.295	-0.071	149.38	0.98
	07/21/11	22:36:20	0.311	-0.071	149.36	0.98
	07/21/11	22:36:50	0.258	-0.069	149.35	0.98
	07/21/11	22:37:20	0.103	-0.045	149.35	0.98
	07/21/11	22:37:50	1.561	0.457	149.33	0.98
	07/21/11	22:38:20	3.560	0.678	149.36	0.98
	07/21/11	22:38:50	4.099	0.739	149.31	0.98
	07/21/11	22:39:20	4.141	0.763	149.33	0.98
	07/21/11	22:39:50	4.103	0.785	149.32	0.98
	07/21/11	22:40:20	4.233	0.802	149.30	0.98
	07/21/11	22:40:50	3.100	0.602	149.30	0.98
	07/21/11	22:41:20	4.092	0.818	149.33	0.98
	07/21/11	22:41:49	4.246	0.827	149.38	0.98
	07/21/11	22:42:19	4.331	0.855	149.36	0.98
	07/21/11	22:42:49	4.452	0.872	149.36	0.98
	07/21/11	22:43:19	4.437	0.908	149.36	0.98
	07/21/11	22:43:49	4.622	0.981	149.40	0.98
	07/21/11	22:44:19	4.959	1.027	149.35	0.98
	07/21/11	22:44:49	5.023	1.059	149.35	0.98
	07/21/11	22:45:19	5.091	1.082	149.34	0.98
Probe Dilution	07/21/11	22:45:49	5.246	1.094	149.33	0.98
	07/21/11	22:46:19	5.353	1.098	149.34	0.98
	07/21/11	22:46:49	5.373	1.089	149.34	0.98
	07/21/11	22:47:19	5.498	1.062	149.32	0.98
	07/21/11	22:47:49	3.400	-0.004	149.32	0.98
	07/21/11	22:48:19	0.076	-0.062	149.35	0.98
	07/21/11	22:48:49	-0.052	-0.046	149.36	0.98
	07/21/11	22:49:19	0.324	0.010	149.29	0.98
	07/21/11	22:49:49	0.511	0.058	149.29	0.98
	07/21/11	22:50:18	0.432	0.040	149.33	0.98
	07/21/11	22:50:48	0.434	0.030	149.32	0.98
Spike 1	07/21/11	22:51:18	0.411	0.021	149.33	0.98
	07/21/11	22:51:48	0.415	0.020	149.32	0.98
	07/21/11	22:52:18	0.467	0.018	149.30	0.98
	07/21/11	22:52:48	0.403	0.017	149.28	0.98
	07/21/11	22:53:18	0.487	0.048	149.27	0.98
Spike 2	07/21/11	22:53:48	0.926	0.112	149.23	0.98
	07/21/11	22:54:18	0.679	0.114	149.27	0.98
	07/21/11	22:54:48	0.547	0.118	149.29	0.98
	07/21/11	22:55:18	0.365	0.120	149.32	0.98
	07/21/11	22:55:48	0.477	0.271	149.35	0.98
	07/21/11	22:56:18	-0.066	0.095	149.41	0.98
	07/21/11	22:56:48	0.043	-0.067	149.36	0.98
	07/21/11	22:57:18	-0.056	-0.070	149.38	0.98
	07/21/11	22:57:48	0.061	-0.033	149.34	0.98
	07/21/11	22:58:18	0.131	0.095	149.34	0.98
	07/21/11	22:58:48	0.490	0.624	149.34	0.98
	07/21/11	22:59:18	0.041	-0.004	149.31	0.98
	07/21/11	22:59:47	0.068	-0.064	149.33	0.98
Bkg	07/21/11	23:00:17	0.012	-0.058	149.35	0.98
	07/21/11	23:00:47	-0.159	-0.052	149.35	0.98
	07/21/11	23:01:17	-0.052	-0.050	149.39	0.98

Date	Time	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/14/11	**4:02:55**	-0.09	0.00	149.67	0.99
07/14/11	**4:03:25**	-0.02	0.00	149.67	0.99
07/14/11	**4:03:55**	-0.07	0.00	149.66	0.99
07/14/11	**4:09:22**	0.00	0.00	149.64	0.99
07/14/11	**4:09:54**	-0.09	0.00	149.64	0.99
07/14/11	**4:10:24**	0.00	0.00	149.66	0.99
07/14/11	**4:10:54**	-0.04	0.00	149.64	0.99
07/14/11	**4:11:24**	0.02	0.00	149.67	0.99
07/14/11	**4:11:54**	0.00	0.00	149.68	0.99
07/14/11	**4:12:24**	0.01	0.00	149.65	0.99
07/14/11	**4:12:54**	-0.04	0.00	149.65	0.99
07/14/11	**4:13:24**	0.02	0.00	149.67	0.99
07/14/11	**4:13:53**	0.00	0.00	149.68	0.99
07/14/11	**4:14:23**	0.02	0.00	149.68	0.99
07/14/11	**4:14:53**	-0.02	0.00	149.64	0.99
07/14/11	**4:15:23**	0.01	0.00	149.65	0.99
07/14/11	**4:15:53**	0.02	0.00	149.63	0.99
07/14/11	**4:16:23**	-0.09	0.00	149.64	0.99
07/14/11	**4:16:53**	-0.02	0.00	149.67	0.99
07/14/11	**4:17:23**	-0.08	0.00	149.67	0.99
07/14/11	**4:17:53**	0.11	0.00	149.68	0.99
07/14/11	**4:18:23**	-0.01	0.00	149.75	0.99
07/14/11	**4:18:53**	0.04	0.00	149.72	0.99
07/14/11	**4:19:23**	3.41	0.34	149.76	0.99
07/14/11	**4:19:53**	101.74	16.90	149.69	0.99
07/14/11	**4:20:23**	102.90	16.93	149.60	0.99
07/14/11	**4:20:53**	103.08	16.96	149.54	0.99
07/14/11	**4:21:23**	103.26	16.96	149.46	0.99
07/14/11	**4:21:53**	103.36	16.96	149.48	0.99
07/14/11	**4:22:23**	103.37	16.96	149.50	0.99
07/14/11	**4:22:53**	103.43	16.94	149.51	0.99
07/14/11	**4:23:23**	103.45	16.95	149.55	0.99
07/14/11	**4:23:53**	102.57	16.84	149.54	0.99
	Average	103.18	16.94		

Dilution Check #1

Date	14.23 Time	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/15/11	**17:34:27**	-0.34	0.00	148.86	0.99
07/15/11	**17:34:57**	-0.39	0.00	148.82	0.99
07/15/11	**17:35:27**	0.63	0.28	148.90	0.99
07/15/11	**17:35:57**	5.14	1.21	149.01	0.99
07/15/11	**17:36:27**	5.48	1.21	149.15	0.99
07/15/11	**17:36:57**	5.73	1.21	149.26	0.99
07/15/11	**17:37:27**	5.90	1.21	149.29	0.99
07/15/11	**17:37:57**	5.97	1.21	149.32	0.99
07/15/11	**17:38:27**	6.08	1.21	149.34	0.99
07/15/11	**17:38:56**	6.19	1.21	149.35	0.99
07/15/11	**17:39:26**	6.24	1.21	149.37	0.99
07/15/11	**17:39:56**	6.32	1.21	149.34	0.99
07/15/11	**17:40:26**	6.29	1.21	149.30	0.99
07/15/11	**17:40:56**	6.31	1.21	149.35	0.99
07/15/11	**17:41:26**	**6.52**	**1.21**	149.36	0.99
07/15/11	**17:41:56**	**6.45**	**1.21**	149.33	0.99
07/15/11	**17:42:26**	**6.35**	**1.21**	149.32	0.99
	Average	6.44	1.21		
	Dilution	15.53	**14.06**		
07/15/11	**19:39:18**	-11.67	0.02	148.86	0.99
07/15/11	**19:39:47**	6.63	-0.02	148.82	0.99
07/15/11	**19:40:17**	12.58	-0.02	148.90	0.99
07/15/11	**19:40:47**	5.94	0.00	149.01	0.99
07/15/11	**19:41:17**	1.68	0.00	149.15	0.99
07/15/11	**19:41:47**	1.09	0.00	149.26	0.99
07/15/11	**19:42:17**	0.94	0.00	149.29	0.99
07/15/11	**19:42:47**	0.79	0.00	149.32	0.99
07/15/11	**19:43:17**	0.85	0.00	149.34	0.99
07/15/11	**19:43:47**	0.76	0.00	149.35	0.99
07/15/11	**19:44:17**	0.75	0.00	149.37	0.99
07/15/11	**19:44:47**	0.72	0.00	149.34	0.99
07/15/11	**19:45:17**	0.79	0.00	149.30	0.99
07/15/11	**19:45:47**	1.38	0.00	149.35	0.99
07/15/11	**19:46:17**	1.17	0.00	149.36	0.99
07/15/11	**19:46:47**	1.26	0.00	149.33	0.99
07/15/11	**19:47:17**	1.30	0.00	149.32	0.99
07/15/11	**19:47:47**	1.13	0.00	149.34	0.99
07/15/11	**19:48:17**	1.10	0.00	149.35	0.99
07/15/11	**19:48:47**	0.96	0.00	149.35	0.99
07/15/11	**19:49:17**	0.79	0.00	149.34	0.99
07/15/11	**19:49:47**	0.82	0.00	149.32	0.99
07/15/11	**19:50:16**	0.78	0.00	149.32	0.99
07/15/11	**19:50:46**	0.67	0.00	149.36	0.99
07/15/11	**19:51:16**	0.60	0.00	149.31	0.99
07/15/11	**19:51:46**	0.56	0.00	149.30	0.99
07/15/11	**19:52:16**	0.49	0.00	149.29	0.99
07/15/11	**19:52:46**	0.47	0.00	149.29	0.99
07/15/11	**19:53:16**	0.41	0.00	149.32	0.99
07/15/11	**19:53:46**	0.47	0.00	149.29	0.99
07/15/11	**19:54:16**	0.42	-0.01	149.31	0.99
07/15/11	**19:54:46**	0.47	0.00	149.33	0.99
07/15/11	**19:55:16**	0.48	0.00	149.38	0.99
07/15/11	**19:55:46**	0.38	0.00	149.34	0.99
07/15/11	**19:56:16**	0.32	0.00	149.36	0.99
07/15/11	**19:56:46**	0.33	0.00	149.33	0.99
07/15/11	**19:57:16**	0.36	-0.01	149.32	0.99
07/15/11	**19:57:46**	0.32	0.00	149.32	0.99
07/15/11	**19:58:16**	0.22	0.00	149.38	0.99
07/15/11	**19:58:46**	0.30	-0.01	149.34	0.99

07/15/11	**19:59:16**	0.25	-0.01	149.41	0.99	
07/15/11	**19:59:46**	0.27	0.00	149.43	0.99	
07/15/11	**20:00:16**	0.19	0.00	149.38	0.99	
07/15/11	**20:00:45**	0.22	-0.01	149.36	0.99	
07/15/11	**20:01:15**	0.36	0.00	149.36	0.99	
07/15/11	**20:01:45**	0.23	-0.01	149.33	0.99	
07/15/11	**20:02:15**	0.34	-0.01	149.34	0.99	
07/15/11	**20:02:45**	0.58	0.03	149.32	0.99	
07/15/11	**20:03:15**	0.76	0.09	149.36	0.99	
07/15/11	**20:03:45**	0.67	0.09	149.39	0.99	
07/15/11	**20:04:15**	0.68	0.09	149.34	0.99	
07/15/11	**20:04:45**	0.68	0.09	149.35	0.99	
07/15/11	**20:05:15**	0.47	0.04	149.31	0.99	
07/15/11	**20:05:45**	0.25	0.00	149.35	0.99	
07/15/11	**20:06:15**	0.22	0.00	149.32	0.99	1
07/15/11	**20:06:45**	0.26	0.00	149.31	0.99	
07/15/11	**20:07:15**	0.17	0.00	149.34	0.99	
07/15/11	**20:07:45**	0.50	0.08	149.34	0.99	
07/15/11	**20:08:15**	0.54	0.09	149.37	0.99	
07/15/11	**20:08:45**	0.56	0.09	149.37	0.99	
07/15/11	**20:09:15**	0.73	0.09	149.33	0.99	1
07/15/11	**20:09:45**	0.66	0.09	149.40	0.99	
07/15/11	**20:10:15**	0.51	0.07	149.38	0.99	
07/15/11	**20:10:48**	0.18	0.01	149.38	0.99	
07/15/11	**20:11:18**	0.16	0.00	149.39	0.99	2
07/15/11	**20:11:48**	0.21	0.00	149.37	0.99	
07/15/11	**20:12:18**	0.06	0.00	149.35	0.99	
07/15/11	**20:12:48**	0.41	0.05	149.36	0.99	
07/15/11	**20:13:18**	0.42	0.03	149.38	0.99	
07/15/11	**20:13:48**	0.37	0.05	149.37	0.99	
07/15/11	**20:14:18**	0.61	0.08	149.34	0.99	
07/15/11	**20:14:48**	0.49	0.09	149.37	0.99	
07/15/11	**20:15:18**	0.78	0.09	149.40	0.99	2
07/15/11	**20:15:48**	0.61	0.09	149.40	0.99	
07/15/11	**20:16:18**	0.52	0.09	149.45	0.99	
07/15/11	**20:16:48**	0.74	0.09	149.40	0.99	
07/15/11	**20:17:18**	0.24	0.03	149.44	0.99	
07/15/11	**20:17:48**	0.00	0.00	149.44	0.99	
07/15/11	**20:18:18**	0.14	0.00	149.39	0.99	3
07/15/11	**20:18:48**	0.20	0.00	149.42	0.99	
07/15/11	**20:19:17**	0.09	0.00	149.37	0.99	
07/15/11	**20:19:47**	0.47	0.06	149.39	0.99	
07/15/11	**20:20:17**	0.44	0.10	149.36	0.99	
07/15/11	**20:20:47**	0.57	0.09	149.32	0.99	
07/15/11	**20:21:17**	0.73	0.09	149.37	0.99	3
07/15/11	**20:21:47**	0.65	0.09	149.33	0.99	
07/15/11	**20:22:17**	0.47	0.07	149.38	0.99	
07/15/11	**20:22:47**	0.16	0.01	149.33	0.99	
07/15/11	**20:23:17**	0.32	0.00	149.32	0.99	
07/15/11	**20:23:47**	0.14	0.00	149.35	0.99	4
07/15/11	**20:24:17**	0.31	0.00	149.35	0.99	
07/15/11	**20:24:47**	0.13	0.00	149.34	0.99	
07/15/11	**20:25:17**	0.57	0.07	149.34	0.99	
07/15/11	**20:25:47**	0.74	0.09	149.37	0.99	
07/15/11	**20:26:17**	0.70	0.09	149.38	0.99	4
07/15/11	**20:26:47**	0.70	0.09	149.39	0.99	
07/15/11	**20:27:17**	0.60	0.07	149.44	0.99	
07/15/11	**20:27:47**	0.29	0.01	149.47	0.99	5
07/15/11	**20:28:17**	0.31	0.00	149.42	0.99	
07/15/11	**20:28:47**	0.30	0.00	149.38	0.99	
07/15/11	**20:29:17**	0.29	0.00	149.36	0.99	
07/15/11	**20:29:46**	0.66	0.08	149.37	0.99	
07/15/11	**20:30:16**	0.64	0.09	149.36	0.99	

07/15/11	**20:30:46**	0.64	0.09	149.36	0.99	
07/15/11	**20:31:16**	0.60	0.09	149.36	0.99	
07/15/11	**20:31:46**	0.65	0.09	149.40	0.99	5
07/15/11	**20:32:16**	0.63	0.09	149.38	0.99	
07/15/11	**20:32:46**	0.48	0.07	149.37	0.99	
07/15/11	**20:33:16**	0.25	0.01	149.40	0.99	
07/15/11	**20:33:46**	0.31	0.00	149.36	0.99	
07/15/11	**20:34:16**	0.20	0.00	149.32	0.99	
07/15/11	**20:34:46**	0.30	0.00	149.32	0.99	
07/15/11	**20:35:16**	0.18	0.00	149.32	0.99	6
07/15/11	**20:35:46**	0.19	0.00	149.34	0.99	
07/15/11	**20:36:16**	0.18	0.00	149.34	0.99	
07/15/11	**20:36:46**	0.69	0.07	149.38	0.99	
07/15/11	**20:37:16**	0.65	0.09	149.40	0.99	
07/15/11	**20:37:46**	0.64	0.09	149.46	0.99	
07/15/11	**20:38:16**	0.81	0.09	149.45	0.99	
07/15/11	**20:38:46**	0.69	0.09	149.41	0.99	6
07/15/11	**20:39:16**	0.71	0.09	149.42	0.99	
07/15/11	**20:39:46**	0.52	0.07	149.42	0.99	
07/15/11	**20:40:15**	0.33	0.00	149.35	0.99	
07/15/11	**20:40:45**	0.24	0.00	149.41	0.99	
07/15/11	**20:41:15**	0.31	0.00	149.39	0.99	
07/15/11	**20:41:45**	0.31	0.00	149.37	0.99	7
07/15/11	**20:42:15**	0.18	-0.01	149.35	0.99	
07/15/11	**20:42:45**	0.26	0.01	149.39	0.99	
07/15/11	**20:43:15**	0.74	0.09	149.44	0.99	
07/15/11	**20:43:45**	0.64	0.10	149.46	0.99	
07/15/11	**20:44:15**	0.80	0.09	149.49	0.99	
07/15/11	**20:44:45**	0.63	0.09	149.50	0.99	
07/15/11	**20:45:15**	0.71	0.09	149.48	0.99	7
07/15/11	**20:45:45**	0.66	0.09	149.48	0.99	
07/15/11	**20:46:15**	0.59	0.05	149.48	0.99	
07/15/11	**20:46:45**	0.19	0.00	149.44	0.99	
07/15/11	**20:47:15**	0.28	0.00	149.42	0.99	
07/15/11	**20:47:45**	0.26	-0.01	149.38	0.99	8
07/15/11	**20:48:15**	0.24	-0.01	149.37	0.99	
07/15/11	**20:48:45**	0.30	-0.01	149.38	0.99	
07/15/11	**20:49:15**	0.32	0.01	149.46	0.99	
07/15/11	**20:49:45**	0.75	0.09	149.41	0.99	
07/15/11	**20:50:15**	0.74	0.09	149.44	0.99	8
07/15/11	**20:50:44**	0.71	0.09	149.44	0.99	
07/15/11	**20:51:14**	0.52	0.06	149.41	0.99	
07/15/11	**20:51:44**	0.28	0.00	149.44	0.99	
07/15/11	**20:52:14**	0.30	0.00	149.34	0.99	
07/15/11	**20:52:44**	0.24	-0.01	149.37	0.99	9
07/15/11	**20:53:14**	0.22	-0.01	149.31	0.99	
07/15/11	**20:53:44**	0.25	0.02	149.37	0.99	
07/15/11	**20:54:14**	0.71	0.09	149.37	0.99	
07/15/11	**20:54:44**	0.70	0.09	149.37	0.99	
07/15/11	**20:55:14**	0.57	0.09	149.37	0.99	
07/15/11	**20:55:44**	0.63	0.09	149.38	0.99	
07/15/11	**20:56:14**	0.67	0.09	149.44	0.99	
07/15/11	**20:56:44**	0.62	0.09	149.44	0.99	9
07/15/11	**20:57:14**	0.73	0.09	149.48	0.99	
07/15/11	**20:57:44**	0.61	0.09	149.44	0.99	
07/15/11	**20:58:14**	0.48	0.06	149.48	0.99	
07/15/11	**20:58:44**	0.13	0.00	149.46	0.99	
07/15/11	**20:59:14**	0.28	-0.01	149.44	0.99	
07/15/11	**20:59:44**	0.16	-0.01	149.46	0.99	10
07/15/11	**21:00:14**	0.23	-0.01	149.42	0.99	
07/15/11	**21:00:44**	0.16	0.00	149.45	0.99	
07/15/11	**21:01:13**	0.55	0.08	149.42	0.99	
07/15/11	**21:01:43**	0.67	0.10	149.43	0.99	

07/15/11	**21:02:13**	0.68	0.09	149.41	0.99	10
07/15/11	**21:02:43**	0.74	0.09	149.34	0.99	
07/15/11	**21:03:13**	0.63	0.09	149.41	0.99	
07/15/11	**21:03:43**	0.66	0.09	149.46	0.99	
07/15/11	**21:04:13**	0.32	0.00	149.47	0.99	
07/15/11	**21:04:43**	0.35	0.00	149.37	0.99	
07/15/11	**21:05:13**	0.18	-0.01	149.43	0.99	
07/15/11	**21:05:43**	0.19	-0.01	149.35	0.99	11
07/15/11	**21:06:13**	0.20	-0.01	149.38	0.99	
07/15/11	**21:06:43**	0.16	-0.01	149.45	0.99	
07/15/11	**21:07:13**	0.27	-0.01	149.43	0.99	
07/15/11	**21:07:43**	0.57	0.05	149.40	0.99	
07/15/11	**21:08:13**	0.70	0.10	149.40	0.99	
07/15/11	**21:08:43**	0.62	0.09	149.45	0.99	
07/15/11	**21:09:13**	0.65	0.09	149.45	0.99	
07/15/11	**21:09:43**	0.79	0.09	149.40	0.99	
07/15/11	**21:10:13**	0.75	0.09	149.38	0.99	11
07/15/11	**21:10:43**	0.69	0.09	149.39	0.99	
07/15/11	**21:11:13**	0.43	0.09	149.39	0.99	
07/15/11	**21:11:42**	0.52	0.08	149.36	0.99	
07/15/11	**21:12:12**	0.21	0.00	149.33	0.99	12
07/15/11	**21:12:42**	0.19	-0.01	149.37	0.99	
07/15/11	**21:13:12**	0.02	-0.01	149.38	0.99	
07/15/11	**21:13:42**	0.03	-0.01	149.36	0.99	
07/15/11	**21:14:12**	0.21	0.03	149.33	0.99	
07/15/11	**21:14:42**	0.51	0.09	149.37	0.99	
07/15/11	**21:15:12**	0.53	0.09	149.39	0.99	
07/15/11	**21:15:42**	0.58	0.09	149.33	0.99	12
07/15/11	**21:16:12**	0.71	0.08	149.35	0.99	
07/15/11	**21:16:42**	0.56	0.09	149.34	0.99	
07/15/11	**21:17:12**	0.49	0.09	149.32	0.99	
07/15/11	**21:17:42**	0.62	0.09	149.36	0.99	
07/15/11	**21:18:12**	0.55	0.08	149.35	0.99	
07/15/11	**21:18:42**	0.16	0.00	149.37	0.99	
07/15/11	**21:19:12**	0.14	-0.01	149.40	0.99	
07/15/11	**21:19:42**	0.04	-0.01	149.36	0.99	
07/15/11	**21:20:12**	-0.06	-0.01	149.39	0.99	
07/15/11	**21:20:42**	0.03	-0.01	149.40	0.99	
07/15/11	**21:21:12**	0.04	-0.01	149.35	0.99	
07/15/11	**21:21:42**	-0.02	-0.01	149.34	0.99	
07/15/11	**21:22:11**	0.00	-0.01	149.33	0.99	
07/15/11	**21:22:41**	-0.04	-0.02	149.33	0.99	
07/15/11	**21:23:11**	0.07	0.02	149.40	0.99	
07/15/11	**21:23:41**	-0.22	0.00	149.46	0.99	
07/15/11	**21:24:11**	-0.21	0.00	149.48	0.99	
07/15/11	**21:24:41**	-0.19	0.00	149.49	0.99	
07/15/11	**21:25:11**	-0.16	0.00	149.36	0.99	
07/15/11	**21:25:41**	-0.08	0.00	149.32	0.99	

	07/15/11	**21:26:11**	-0.13	0.00	149.32	0.99
	07/15/11	**21:26:41**	-0.18	0.00	149.31	0.99
	07/15/11	**21:27:11**	-0.39	0.00	149.30	0.99
	07/15/11	**21:27:41**	-0.18	-0.02	149.33	0.99
Dilution Check #2	07/15/11	**21:28:11**	0.02	-0.02	149.40	0.99
	07/15/11	**21:28:41**	0.08	-0.02	149.39	0.99
	07/15/11	**21:29:11**	2.65	0.57	149.43	0.99
	07/15/11	**21:29:41**	**6.42**	**1.23**	149.37	0.99
	07/15/11	**21:30:11**	**6.60**	**1.22**	149.43	0.99
	07/15/11	**21:30:41**	**6.69**	**1.22**	149.45	0.99
			6.57	1.23		
			15.22	**13.88**		

Acetaldehyde: Validation by Dynamic Analyte Spiking (biases taken into account)

Spiking Data

Total tracer conc. (ppm):	17.282	
tracer conc. while line spiking (ppm):	0.122	
Percentage of native exhaust in total spiked sample:	0.993	
Certified cylinder conc. of analyte (ppm):	93.30	Dir Injection
Conc. of analyte spiked into extracted exhaust (ppm):	0.657	

Validation Data (conc. in ppm)

		Analyte Concentrations					Tracer Concentrations	
	Pair #	Unspiked Native Conc.	Corr. Native Conc.	Native + Spiked Conc.	Native + Spiked (meas.)	% Recovery	SF6 unspiked	SF6 spiked
	1	0.018	0.018	0.674	0.800	118.717	0.000	0.138
	2	0.116	0.115	0.772	0.726	94.095	0.000	0.116
	3	0.122	0.121	0.778	0.777	99.831	0.001	0.125
	4	0.404	0.401	1.058	1.101	104.107	0.000	0.111
	5	0.151	0.150	0.807	1.216	150.747	0.001	0.134
	6	0.428	0.425	1.081	1.205	111.406	0.001	0.133
	7	0.397	0.394	1.050	1.083	103.152	0.000	0.106
	8	0.321	0.319	0.975	1.195	122.508	0.001	0.121
	9	0.350	0.348	1.004	1.056	105.085	0.001	0.111
	10	0.350	0.347	1.004	0.919	91.543	0.001	0.093
	11	0.342	0.339	0.996	1.210	121.504	0.001	0.141
	12	0.330	0.327	0.984	1.298	131.903	0.001	0.140
Mean Conc.:		0.277	0.275	0.932	1.026	112.883	0.001	0.122

Method 320/301 Analyte Spiking Statistical Results

Mean of FTIR meas. spiked samples:	1.0488	
Mean of FTIR meas. unspiked samp:	0.2773	
CS Calculated value of Spiked Samples:	0.9320	
SD St.Dev of spiked samples Eq 301-2:	0.1960	also Eq 301-5 in 2011 version of m301
SDM = SD/sqrt(12)	0.0566	
F-test:	0.0833	For n=6, if 0.139<F<7.146, calculate pooled SD
SDpooled-pooled std. dev.:	NA	
RSD:	**0.1868**	RSD must be <= 0.20 for successful validation
RSD, if using pooled SD:	NA	RSD must be <= 0.50 for successful validation
B-bias at spike level m320 Eq. 7:	0.1169	
t-statistic, Eq. 301-4:	**2.0657**	if t-stat.>=2.201 (11 degrees of freedom), then B is statistically significant must calc. and use CF (also Eq 301-6 in 2011 version of m301)
Br, Relative Bias Eq. 301-7 (2011 ver):	0.1254	If < 0.1 the CF not required (CF=1) if Br>0.3 then validation is unsucessful
CF-correction factor Eq. 301-5 (pre-2011):	0.8886	if 0.7<=CF<=1.3 or if B not statistically signif., then validation successful

Method 320 Spikes for Acetaldehyde using a Sulfur hexafluoride (SF6) Tracer

Spike #1

Compound #	Name	Cyl. Conc. (ppmv)	Native Conc. (ppmv)	Method Bias (ppmv)	Meas. Conc. (ppmv)	Spike Obs. (ppmv)	Spike Exp. (ppmv)	Recovery (%)
tracer	SF6	17.28	0.000	-0.036	0.085	0.121	0.121	100.0
1	Acetaldehyde	93.30	0.000	0.200	0.876	0.678	0.654	103.6
2								
3								

"Dil Factor"	0.007
Dil Factor	0.115
Probe Dilution	16.44

Entered Values

	Date	Time	Acetaldehyde (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
	07/24/11	**21:04:17**	0.205	-0.034	149.31	0.99
	07/24/11	**21:04:47**	0.225	-0.035	149.32	0.98
	07/24/11	**21:05:17**	0.055	-0.032	149.40	0.98
	07/24/11	**21:05:47**	0.801	-0.034	149.40	0.99
	07/24/11	**21:06:17**	0.125	-0.032	149.35	0.99
Bkg	07/24/11	**21:06:47**	0.165	-0.033	149.36	0.99
	07/24/11	**21:07:17**	0.250	-0.036	149.32	0.99
	07/24/11	**21:07:47**	0.229	-0.037	149.32	0.99
	07/24/11	**21:08:17**	0.155	-0.039	149.32	0.99
	07/24/11	**21:08:47**	0.040	-0.039	149.34	0.99
	07/24/11	**21:09:17**	0.317	-0.038	149.32	0.99
	07/24/11	**21:09:47**	0.017	-0.039	149.36	0.99
	07/24/11	**21:10:17**	0.006	-0.040	149.33	0.99
	07/24/11	**21:10:47**	0.132	-0.041	149.33	0.99
	07/24/11	**21:11:17**	0.107	-0.043	149.34	0.99
	07/24/11	**21:11:47**	0.811	0.008	149.33	0.99
	07/24/11	**21:12:16**	2.799	1.003	149.36	0.99
	07/24/11	**21:12:46**	1.627	1.057	149.36	0.99
	07/24/11	**21:13:16**	3.307	1.053	149.32	0.99
	07/24/11	**21:13:46**	5.383	1.053	149.32	0.99
	07/24/11	**21:14:16**	5.470	1.053	149.34	0.99
	07/24/11	**21:14:46**	5.536	1.051	149.37	0.99
Probe Dilution	07/24/11	**21:15:16**	**5.535**	**1.051**	149.35	0.99
	07/24/11	**21:15:46**	**5.597**	**1.051**	149.43	0.99
	07/24/11	**21:16:16**	**5.558**	**1.050**	149.35	0.99
	07/24/11	**21:16:46**	6.731	1.033	149.32	0.99
	07/24/11	**21:17:16**	7.291	0.366	149.31	0.99
	07/24/11	**21:17:46**	3.109	0.428	149.35	0.99
	07/24/11	**21:18:16**	2.796	0.428	149.40	0.99
	07/24/11	**21:18:46**	2.843	0.431	149.46	0.99
	07/24/11	**21:19:16**	2.237	0.325	149.45	0.99
	07/24/11	**21:19:46**	2.197	0.333	149.39	0.99
	07/24/11	**21:20:16**	2.171	0.330	149.40	0.99
	07/24/11	**21:20:46**	2.069	0.303	149.41	0.99
	07/24/11	**21:21:15**	1.713	0.237	149.42	0.99
Spike 1	07/24/11	**21:21:45**	0.887	0.065	149.43	0.99
	07/24/11	**21:22:15**	0.884	0.067	149.41	0.99
	07/24/11	**21:22:45**	0.857	0.064	149.36	0.99
	07/24/11	**21:23:15**	0.901	0.077	149.34	0.99
	07/24/11	**21:23:45**	0.816	0.072	149.34	0.99
	07/24/11	**21:24:15**	0.890	0.065	149.34	0.99
	07/24/11	**21:24:45**	0.888	0.062	149.33	0.99
	07/24/11	**21:25:15**	0.676	0.017	149.38	0.99
	07/24/11	**21:25:45**	0.776	0.018	149.41	0.99
	07/24/11	**21:26:15**	0.612	0.017	149.39	0.99
	07/24/11	**21:26:45**	0.684	0.016	149.38	0.99

Date	Time	Acetaldehyde (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/18/11	**17:19:34**	0.00	0.00	149.58	0.98
07/18/11	**17:20:06**	0.05	0.00	149.57	0.98
07/18/11	**17:20:36**	0.09	0.00	149.55	0.98
07/18/11	**17:21:06**	-0.01	0.00	149.54	0.98
07/18/11	**17:21:36**	0.12	0.00	149.56	0.98
07/18/11	**17:22:06**	0.12	0.00	149.59	0.98
07/18/11	**17:22:36**	0.12	0.00	149.59	0.98
07/18/11	**17:23:06**	-0.16	0.00	149.57	0.98
07/18/11	**17:50:45**	0.96	0.00	149.63	0.98
07/18/11	**17:51:15**	1.03	0.00	149.67	0.98
07/18/11	**17:51:45**	1.09	0.00	149.64	0.98
07/18/11	**17:52:15**	1.10	0.00	149.62	0.98
07/18/11	**17:52:45**	19.49	1.68	149.63	0.98
07/18/11	**17:53:14**	92.92	17.26	149.52	0.99
07/18/11	**17:53:44**	93.22	17.29	149.30	0.99
07/18/11	**17:54:14**	93.21	17.30	149.21	0.99
07/18/11	**17:54:45**	93.20	17.29	149.18	0.99
07/18/11	**17:55:14**	93.38	17.27	149.14	0.99
07/18/11	**17:55:44**	93.32	17.29	149.12	0.99
07/18/11	**17:56:14**	93.21	17.30	149.15	0.99
07/18/11	**17:56:44**	93.36	17.28	149.16	0.99
07/18/11	**17:57:14**	93.22	17.28	149.15	0.99
07/18/11	**17:57:44**	93.14	17.28	149.14	0.99
07/18/11	**17:58:14**	93.40	17.30	149.16	0.99
07/18/11	**17:58:44**	93.36	17.27	149.16	0.99
	Average	93.30	17.28		

Date	Time	Acetaldehyde (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
07/18/11	19:59:53	0.04	0.00	149.59	0.98
07/18/11	20:00:23	0.05	0.00	149.57	0.98
07/18/11	20:00:53	0.15	0.00	149.55	0.98
07/18/11	20:01:23	0.06	0.00	149.58	0.98
07/18/11	20:01:53	-0.10	0.00	149.59	0.98
07/18/11	20:02:23	-0.16	0.00	149.60	0.98
07/18/11	20:02:53	-0.03	0.00	149.60	0.98
07/18/11	20:03:23	-0.05	0.00	149.58	0.98
07/18/11	20:03:53	0.23	0.00	149.60	0.98
07/18/11	20:04:23	0.16	0.01	149.58	0.98
07/18/11	20:04:53	0.34	0.00	149.57	0.98
07/18/11	20:05:23	0.22	0.01	149.55	0.98
07/18/11	20:05:53	0.14	0.00	149.58	0.98
07/18/11	20:06:23	0.43	0.01	149.58	0.98
07/18/11	20:06:53	0.39	0.01	149.59	0.98
07/18/11	20:07:23	0.39	0.00	149.54	0.98
07/18/11	20:07:53	0.34	0.00	149.56	0.98
07/18/11	20:08:23	0.34	0.01	149.58	0.98
07/18/11	20:09:16	0.33	0.01	149.57	0.98
07/18/11	20:09:46	0.32	0.01	149.58	0.98
07/18/11	20:10:16	0.27	0.00	149.58	0.98
07/18/11	20:10:46	0.28	0.00	149.56	0.98
07/18/11	20:11:16	0.44	0.00	149.51	0.98
07/18/11	20:12:30	0.10	0.02	149.48	0.99
07/18/11	20:13:00	0.31	0.02	149.47	0.99
07/18/11	20:13:30	0.32	0.02	149.48	0.99
07/18/11	20:14:00	0.31	0.02	149.49	0.99
07/18/11	20:14:30	0.30	0.01	149.44	0.99
07/18/11	20:15:00	0.16	0.01	149.45	0.99
07/18/11	20:15:30	0.13	0.01	149.44	0.99
07/18/11	20:16:00	0.50	0.01	149.47	0.99
07/18/11	20:16:30	0.17	0.01	149.47	0.99
07/18/11	20:17:00	0.39	0.01	149.49	0.99
07/18/11	20:17:30	0.32	0.01	149.51	0.99
07/18/11	20:18:00	0.25	0.01	149.47	0.99
07/18/11	20:18:30	0.34	0.01	149.48	0.99
07/18/11	20:19:00	0.17	0.01	149.49	0.99
07/18/11	20:19:30	0.27	0.01	149.47	0.99
07/18/11	20:20:00	0.13	0.01	149.49	0.99
07/18/11	20:20:30	0.27	0.01	149.49	0.99
07/18/11	20:21:00	0.31	0.00	149.52	0.99
07/18/11	20:21:30	0.31	0.01	149.52	0.99
07/18/11	20:21:59	0.37	0.01	149.50	0.99
07/18/11	20:22:29	0.22	0.01	149.48	0.99
07/18/11	20:22:59	1.27	0.00	149.49	0.99
07/18/11	20:23:29	1.93	0.00	149.48	0.99
07/18/11	20:23:59	1.52	0.00	149.49	0.99
07/18/11	20:24:29	1.82	0.00	149.48	0.99
07/18/11	20:24:59	1.64	0.00	149.49	0.99
07/18/11	20:25:29	1.53	0.00	149.46	0.99
07/18/11	20:25:59	1.75	0.00	149.47	0.99
07/18/11	20:26:29	1.53	0.00	149.48	0.99
07/18/11	20:26:59	1.55	0.00	149.48	0.99
07/18/11	20:27:29	1.59	0.00	149.51	0.99
07/18/11	20:27:59	1.63	0.00	149.51	0.99
07/18/11	20:28:29	1.73	0.00	149.48	0.99
07/18/11	20:28:59	9.32	0.01	149.47	0.99
07/18/11	20:29:29	30.30	0.00	149.51	0.99
07/18/11	20:29:59	3.73	0.00	149.46	0.99
07/18/11	20:30:29	1.08	0.00	149.45	0.99
07/18/11	20:30:59	0.85	0.00	149.43	0.99
07/18/11	20:31:28	0.56	0.00	149.43	0.99
07/18/11	20:31:58	0.69	0.00	149.47	0.99
07/18/11	20:32:28	0.64	0.00	149.49	0.99
07/18/11	20:32:58	0.11	0.00	149.50	0.99
07/18/11	20:33:28	0.01	0.00	149.54	0.99
07/18/11	20:33:58	-0.06	0.00	149.53	0.99
07/18/11	20:34:28	0.47	0.00	149.58	0.99
07/18/11	20:34:58	0.06	0.00	149.54	0.99
07/18/11	20:35:28	-0.10	0.00	149.57	0.99
07/18/11	20:35:58	0.02	0.00	149.58	0.99
07/18/11	20:36:28	0.06	0.00	149.59	0.99
07/18/11	20:36:58	-0.06	0.00	149.58	0.99
07/18/11	20:37:28	0.05	0.00	149.51	0.99
07/18/11	20:37:58	-0.04	0.00	149.49	0.99
07/18/11	20:38:28	-0.02	0.00	149.45	0.99
07/18/11	20:38:58	0.03	0.00	149.51	0.99
07/18/11	20:39:28	-0.02	0.00	149.51	0.99
07/18/11	20:39:58	-0.18	0.00	149.52	0.99
07/18/11	20:40:28	0.02	0.00	149.54	0.99
07/18/11	20:40:57	-0.15	0.00	149.53	0.99
07/18/11	20:41:27	-0.12	0.00	149.54	0.99
07/18/11	20:41:57	-0.06	0.00	149.56	0.99
07/18/11	20:42:27	0.08	0.00	149.51	0.99
07/18/11	20:42:57	0.01	0.00	149.52	0.99

07/18/11	**20:43:27**	0.21	0.00	149.49	0.99
07/18/11	**20:43:57**	-0.10	0.00	149.50	0.99
07/18/11	**20:44:27**	0.02	0.00	149.51	0.99
07/18/11	**20:44:57**	-0.14	0.00	149.48	0.99
07/18/11	**20:45:27**	-0.09	0.00	149.51	0.99
07/18/11	**20:45:57**	-0.11	0.00	149.52	0.99
07/18/11	**20:46:27**	0.07	0.00	149.49	0.99
07/18/11	**20:46:57**	0.06	0.00	149.47	0.99
07/18/11	**20:47:27**	-0.12	0.00	149.51	0.99
07/18/11	**20:47:57**	-0.07	0.00	149.45	0.99
07/18/11	**20:48:27**	1.97	0.34	149.50	0.99
07/18/11	**20:48:57**	5.25	1.08	149.50	0.99
07/18/11	**20:49:27**	4.95	1.11	149.50	0.99
07/18/11	**20:49:57**	5.37	1.11	149.49	0.99
07/18/11	**20:50:27**	6.01	1.15	149.51	0.99
07/18/11	**20:50:56**	6.50	1.23	149.51	0.99
07/18/11	**20:51:26**	6.26	1.23	149.51	0.99
07/18/11	**20:51:56**	**5.81**	**1.11**	**149.51**	**0.99**
07/18/11	**20:52:26**	**5.81**	**1.12**	**149.50**	**0.99**

Dil Factor

07/18/11	**20:52:56**	5.69	1.12	149.54	0.99	
07/18/11	**20:53:26**	3.08	0.50	149.53	0.99	
07/18/11	**20:53:56**	0.07	0.00	149.43	0.99	
07/18/11	**20:54:26**	0.27	0.00	149.40	0.99	
07/18/11	**20:54:56**	0.13	0.00	149.39	0.99	
07/18/11	**20:55:26**	-0.08	0.00	149.42	0.99	
07/18/11	**20:55:56**	0.09	0.00	149.45	0.99	
07/18/11	**20:56:26**	0.25	0.03	149.45	0.99	
07/18/11	**20:56:56**	1.26	0.16	149.47	0.99	
07/18/11	**20:57:26**	1.33	0.15	149.51	0.99	
07/18/11	**20:57:56**	0.81	0.15	149.51	0.99	
07/18/11	**20:58:26**	0.59	0.10	149.47	0.99	
07/18/11	**20:58:56**	0.60	0.05	149.45	0.99	
07/18/11	**20:59:26**	0.94	0.12	149.51	0.99	
07/18/11	**20:59:56**	1.32	0.16	149.49	0.99	
07/18/11	**21:00:25**	0.99	0.17	149.52	0.99	
07/18/11	**21:00:55**	1.02	0.17	149.50	0.99	1
07/18/11	**21:01:25**	0.58	0.11	149.49	0.99	
07/18/11	**21:01:55**	0.64	0.11	149.48	0.99	
07/18/11	**21:02:25**	0.53	0.11	149.46	0.99	
07/18/11	**21:02:55**	0.48	0.10	149.43	0.99	
07/18/11	**21:03:25**	0.61	0.11	149.45	0.99	
07/18/11	**21:03:55**	0.44	0.07	149.46	0.99	
07/18/11	**21:04:25**	**-0.03**	**0.00**	**149.42**	**0.99**	1
07/18/11	**21:04:55**	**0.06**	**0.00**	**149.45**	**0.99**	
07/18/11	**21:05:25**	-0.14	0.00	149.43	0.99	
07/18/11	**21:05:55**	0.00	0.02	149.47	0.99	
07/18/11	**21:06:25**	0.17	0.04	149.49	0.99	
07/18/11	**21:06:55**	-0.02	0.02	149.46	0.99	
07/18/11	**21:07:25**	0.01	0.02	149.48	0.99	
07/18/11	**21:07:55**	0.08	0.03	149.46	0.99	
07/18/11	**21:08:25**	0.48	0.09	149.49	0.99	2
07/18/11	**21:08:55**	0.97	0.15	149.49	0.99	
07/18/11	**21:09:25**	0.68	0.13	149.49	0.99	
07/18/11	**21:09:55**	0.83	0.13	149.46	0.99	
07/18/11	**21:10:24**	0.56	0.08	149.47	0.99	
07/18/11	**21:10:54**	0.14	0.00	149.48	0.99	
07/18/11	**21:11:24**	**0.12**	**0.00**	**149.46**	**0.99**	2
07/18/11	**21:11:54**	**0.11**	**0.00**	**149.40**	**0.99**	
07/18/11	**21:12:24**	0.16	0.03	149.44	0.99	
07/18/11	**21:12:54**	0.34	0.07	149.45	0.99	
07/18/11	**21:13:24**	1.19	0.12	149.51	0.99	
07/18/11	**21:13:54**	0.78	0.13	149.50	0.99	
07/18/11	**21:14:24**	1.11	0.16	149.53	0.99	
07/18/11	**21:14:54**	1.06	0.15	149.52	0.99	3
07/18/11	**21:15:24**	0.49	0.10	149.55	0.99	
07/18/11	**21:15:54**	0.33	0.00	149.53	0.99	
07/18/11	**21:16:24**	0.36	0.00	149.54	0.99	
07/18/11	**21:16:54**	**-0.10**	**0.00**	**149.52**	**0.99**	3
07/18/11	**21:17:24**	**0.34**	**0.00**	**149.57**	**0.99**	
07/18/11	**21:17:54**	0.64	0.05	149.58	0.99	
07/18/11	**21:18:24**	1.21	0.12	149.57	0.99	
07/18/11	**21:18:54**	1.41	0.16	149.55	0.99	
07/18/11	**21:19:24**	1.38	0.18	149.51	0.99	
07/18/11	**21:19:53**	1.39	0.18	149.56	0.99	
07/18/11	**21:20:23**	1.47	0.17	149.53	0.99	
07/18/11	**21:20:53**	1.12	0.13	149.52	0.99	
07/18/11	**21:21:23**	1.22	0.14	149.49	0.99	4
07/18/11	**21:21:53**	0.98	0.08	149.52	0.99	
07/18/11	**21:22:23**	0.35	0.00	149.54	0.99	
07/18/11	**21:22:53**	0.44	0.00	149.51	0.99	
07/18/11	**21:23:23**	**0.38**	**0.00**	**149.48**	**0.99**	4
07/18/11	**21:23:53**	**0.43**	**0.00**	**149.52**	**0.99**	
07/18/11	**21:24:23**	0.71	0.08	149.52	0.99	

07/18/11	21:24:53	1.63	0.21	149.54	0.99	
07/18/11	21:25:23	2.04	0.25	149.52	0.99	
07/18/11	21:25:53	2.07	0.26	149.56	0.99	
07/18/11	21:26:23	1.77	0.26	149.54	0.99	
07/18/11	21:26:53	2.01	0.26	149.52	0.99	
07/18/11	21:27:23	1.90	0.26	149.51	0.99	
07/18/11	21:27:53	1.72	0.23	149.51	0.99	
07/18/11	21:28:23	1.44	0.19	149.51	0.99	
07/18/11	21:28:53	1.54	0.18	149.52	0.99	
07/18/11	21:29:23	1.49	0.18	149.48	0.99	
07/18/11	21:29:52	1.38	0.16	149.44	0.99	
07/18/11	21:30:22	1.27	0.16	149.45	0.99	
07/18/11	21:30:52	1.23	0.14	149.43	0.99	5
07/18/11	21:31:22	1.21	0.12	149.49	0.99	
07/18/11	21:31:52	0.57	0.08	149.47	0.99	
07/18/11	21:32:22	0.29	0.00	149.48	0.99	5
07/18/11	21:32:52	0.01	0.00	149.51	0.99	
07/18/11	21:33:22	0.51	0.00	149.51	0.99	
07/18/11	21:33:52	0.54	0.02	149.52	0.99	
07/18/11	21:34:22	1.02	0.10	149.56	0.99	
07/18/11	21:34:52	0.83	0.09	149.52	0.99	
07/18/11	21:35:22	1.12	0.10	149.49	0.99	
07/18/11	21:35:52	1.07	0.12	149.53	0.99	
07/18/11	21:36:22	1.46	0.18	149.51	0.99	
07/18/11	21:36:52	1.41	0.18	149.51	0.99	
07/18/11	21:37:22	1.28	0.17	149.54	0.99	
07/18/11	21:37:52	1.25	0.15	149.55	0.99	
07/18/11	21:38:22	1.38	0.15	149.56	0.99	
07/18/11	21:38:51	1.18	0.11	149.56	0.99	
07/18/11	21:39:21	0.33	0.00	149.59	0.99	6
07/18/11	21:39:51	0.53	0.00	149.64	0.99	
07/18/11	21:40:21	0.36	0.00	149.62	0.99	
07/18/11	21:40:51	0.73	0.04	149.63	0.99	
07/18/11	21:41:21	1.14	0.12	149.62	0.99	6
07/18/11	21:41:51	1.27	0.15	149.61	0.99	
07/18/11	21:42:21	1.28	0.16	149.62	0.99	
07/18/11	21:42:51	1.11	0.12	149.63	0.99	
07/18/11	21:43:21	0.48	0.00	149.64	0.99	
07/18/11	21:43:51	0.49	0.00	149.62	0.99	7
07/18/11	21:44:21	0.30	0.00	149.59	0.99	
07/18/11	21:44:51	0.79	0.06	149.56	0.99	7
07/18/11	21:45:21	1.37	0.15	149.54	0.99	
07/18/11	21:45:51	2.03	0.27	149.52	0.99	
07/18/11	21:46:21	3.43	0.52	149.52	0.99	
07/18/11	21:46:51	3.07	0.43	149.56	0.99	
07/18/11	21:47:21	1.47	0.21	149.55	0.99	
07/18/11	21:47:51	0.71	0.03	149.56	0.99	
07/18/11	21:48:20	0.62	0.01	149.58	0.98	
07/18/11	21:48:50	0.06	0.00	149.62	0.99	
07/18/11	21:49:20	-0.01	0.00	149.65	0.99	
07/18/11	21:49:50	0.20	0.00	149.68	0.99	
07/18/11	21:50:20	0.37	0.00	149.64	0.99	
07/18/11	21:50:50	1.59	0.20	149.61	0.99	
07/18/11	21:51:20	5.67	1.06	149.60	0.99	
07/18/11	21:51:50	5.43	1.08	149.58	0.99	
07/18/11	21:52:20	5.06	0.88	149.58	0.99	
07/18/11	21:52:50	0.49	0.00	149.56	0.99	
07/18/11	21:53:20	0.36	0.00	149.56	0.99	
07/18/11	21:53:50	0.25	0.00	149.56	0.99	
07/18/11	21:54:20	0.52	0.00	149.53	0.99	
07/18/11	21:54:50	0.49	0.00	149.50	0.99	
07/18/11	21:55:20	1.14	0.13	149.48	0.99	
07/18/11	21:55:50	1.98	0.27	149.51	0.99	
07/18/11	21:56:20	1.90	0.25	149.49	0.99	
07/18/11	21:56:50	1.44	0.18	149.43	0.99	
07/18/11	21:57:20	0.62	0.04	149.46	0.99	
07/18/11	21:57:50	0.88	0.07	149.46	0.99	
07/18/11	21:58:19	1.16	0.15	149.43	0.99	
07/18/11	21:58:49	1.29	0.17	149.48	0.99	
07/18/11	21:59:19	1.40	0.16	149.47	0.99	8
07/18/11	21:59:49	0.99	0.08	149.51	0.99	
07/18/11	22:00:19	0.31	0.00	149.48	0.99	8
07/18/11	22:00:49	0.33	0.00	149.48	0.99	
07/18/11	22:01:19	0.49	0.02	149.45	0.99	
07/18/11	22:01:49	1.13	0.13	149.42	0.99	
07/18/11	22:02:19	1.44	0.16	149.46	0.99	9
07/18/11	22:02:49	0.67	0.06	149.47	0.99	
07/18/11	22:03:19	0.34	0.00	149.44	0.99	9
07/18/11	22:03:49	0.36	0.00	149.47	0.99	
07/18/11	22:04:19	0.51	0.01	149.46	0.99	
07/18/11	22:04:49	0.88	0.09	149.49	0.99	
07/18/11	22:05:19	0.88	0.09	149.50	0.99	
07/18/11	22:05:49	0.78	0.08	149.51	0.99	
07/18/11	22:06:19	0.88	0.08	149.50	0.99	
07/18/11	22:06:49	0.50	0.01	149.49	0.99	
07/18/11	22:07:19	0.88	0.07	149.51	0.99	
07/18/11	22:07:48	1.85	0.25	149.50	0.99	

07/18/11	**22:08:18**	2.10	0.29	149.50	0.99	
07/18/11	**22:08:48**	0.93	0.09	149.45	0.99	
07/18/11	**22:09:18**	0.81	0.09	149.47	0.99	10
07/18/11	**22:09:48**	1.03	0.10	149.47	0.99	
07/18/11	**22:10:18**	1.83	0.25	149.44	0.99	
07/18/11	**22:10:48**	2.50	0.32	149.45	0.99	
07/18/11	**22:11:18**	0.41	0.01	149.48	0.99	
07/18/11	**22:11:48**	**0.39**	**0.00**	**149.49**	**0.99**	**10**
07/18/11	**22:12:18**	**0.31**	**0.00**	**149.45**	**0.99**	
07/18/11	**22:12:48**	1.23	0.19	149.46	0.99	
07/18/11	**22:13:18**	2.35	0.35	149.46	0.99	
07/18/11	**22:13:48**	0.28	0.00	149.48	0.99	
07/18/11	**22:14:18**	0.30	0.00	149.47	0.99	
07/18/11	**22:14:48**	0.31	0.00	149.45	0.99	
07/18/11	**22:15:18**	0.53	0.01	149.49	0.99	
07/18/11	**22:15:48**	0.53	0.02	149.47	0.99	
07/18/11	**22:16:18**	0.30	0.01	149.46	0.99	
07/18/11	**22:16:48**	0.26	0.01	149.45	0.99	
07/18/11	**22:17:17**	0.43	0.01	149.47	0.99	
07/18/11	**22:17:47**	0.25	0.00	149.50	0.99	
07/18/11	**22:18:17**	0.40	0.00	149.50	0.99	
07/18/11	**22:18:47**	0.62	0.03	149.53	0.99	
07/18/11	**22:19:17**	4.90	0.85	149.51	0.99	
07/18/11	**22:19:47**	2.06	0.29	149.56	0.99	
07/18/11	**22:20:17**	0.53	0.01	149.50	0.99	
07/18/11	**22:20:47**	0.61	0.06	149.52	0.99	
07/18/11	**22:21:17**	1.61	0.20	149.51	0.99	
07/18/11	**22:21:47**	1.75	0.22	149.48	0.99	
07/18/11	**22:22:17**	1.44	0.19	149.48	0.99	
07/18/11	**22:22:47**	0.36	0.01	149.46	0.99	
07/18/11	**22:23:17**	1.47	0.18	149.48	0.99	
07/18/11	**22:23:47**	1.34	0.17	149.51	0.99	11
07/18/11	**22:24:17**	1.08	0.11	149.51	0.99	
07/18/11	**22:24:47**	**0.33**	**0.00**	**149.51**	**0.99**	**11**
07/18/11	**22:25:17**	**0.36**	**0.00**	**149.53**	**0.99**	
07/18/11	**22:25:47**	0.61	0.04	149.58	0.99	
07/18/11	**22:26:17**	1.35	0.18	149.57	0.99	
07/18/11	**22:26:46**	1.49	0.17	149.53	0.99	12
07/18/11	**22:27:16**	1.11	0.11	149.53	0.99	
07/18/11	**22:27:46**	0.31	0.00	149.51	0.99	
07/18/11	**22:28:16**	0.39	0.00	149.54	0.99	
07/18/11	**22:28:46**	0.44	0.02	149.51	0.99	
07/18/11	**22:29:16**	1.40	0.19	149.52	0.99	
07/18/11	**22:29:46**	1.39	0.19	149.48	0.99	
07/18/11	**22:30:16**	1.09	0.12	149.50	0.99	
07/18/11	**22:30:46**	0.47	0.00	149.50	0.99	
07/18/11	**22:31:16**	**0.33**	**0.00**	**149.50**	**0.99**	**12**
07/18/11	**22:31:46**	**0.32**	**0.00**	**149.47**	**0.99**	
07/18/11	**22:32:16**	0.47	0.00	149.41	0.99	
07/18/11	**22:32:46**	0.84	0.10	149.37	0.99	
07/18/11	**22:33:16**	1.44	0.19	149.47	0.99	
07/18/11	**22:33:46**	1.63	0.21	149.46	0.99	
07/18/11	**22:34:16**	1.25	0.15	149.49	0.99	
07/18/11	**22:34:46**	0.62	0.00	149.49	0.99	
07/18/11	**22:35:16**	0.26	0.00	149.52	0.99	
07/18/11	**22:35:46**	0.32	0.00	149.54	0.99	
07/18/11	**22:36:16**	0.54	0.04	149.52	0.99	
07/18/11	**22:36:45**	1.42	0.19	149.51	0.99	
07/18/11	**22:37:15**	1.55	0.17	149.49	0.99	
07/18/11	**22:37:45**	1.63	0.18	149.52	0.99	
07/18/11	**22:38:15**	1.22	0.10	149.50	0.99	
07/18/11	**22:38:45**	0.31	0.00	149.50	0.99	
07/18/11	**22:39:15**	0.25	0.00	149.52	0.99	
07/18/11	**22:39:45**	0.48	0.00	149.47	0.99	
07/18/11	**22:40:15**	1.23	0.11	149.41	0.99	
07/18/11	**22:40:45**	1.17	0.12	149.39	0.99	
07/18/11	**22:41:15**	1.30	0.13	149.34	0.99	
07/18/11	**22:41:45**	0.75	0.09	149.35	0.99	
07/18/11	**22:42:15**	0.25	0.00	149.37	0.99	
07/18/11	**22:42:45**	0.41	0.00	149.39	0.99	
07/18/11	**22:43:15**	0.28	0.00	149.49	0.99	
07/18/11	**22:43:45**	3.60	0.69	149.50	0.99	
07/18/11	**22:44:15**	**5.16**	**1.04**	**149.56**	**0.99**	
07/18/11	**22:44:45**	**5.13**	**1.04**	**149.56**	**0.99**	
07/18/11	**22:45:15**	**5.26**	**1.04**	**149.58**	**0.99**	

	Average		1.04		
Dil Factor			16.67		

07/18/11	**22:45:45**	4.98	0.77	149.55	0.99
07/18/11	**22:46:14**	0.71	0.01	149.51	0.99
07/18/11	**22:46:44**	5.16	1.00	149.49	0.99
07/18/11	**22:47:14**	2.37	0.41	149.51	0.99
07/18/11	**22:47:44**	0.79	0.00	149.50	0.99
07/18/11	**22:48:14**	0.65	0.00	149.51	0.99
07/18/11	**22:48:44**	0.11	0.00	149.51	0.99

Section Q
Method 320 – CO

URS Data Printouts

No Dilution					
		Acetaldehyde	Propanal	Formaldehyde	CO
Run #		(ppmv)	(ppmv)	(ppmv)	(ppmv)
1 (A1)	Min	BDL	BDL	BDL	1.02
	Max	BDL	BDL	BDL	1.40
	Avg	0.37	0.41	0.09	1.21
	MDL	0.37	0.41	0.09	0.08
2 (A2)	Min	BDL	BDL	BDL	1.47
	Max	BDL	BDL	BDL	6.20
	Avg	0.37	0.57	0.09	2.03
	MDL	0.37	0.57	0.09	0.08
3 (A3)	Min	BDL	BDL	BDL	1.06
	Max	BDL	BDL	BDL	19.74
	Avg	0.37	0.41	0.09	2.95
	MDL	0.37	0.41	0.09	0.08
4 (A4)	Min	BDL	BDL	BDL	1.22
	Max	BDL	BDL	BDL	3.42
	Avg	0.37	0.49	0.09	1.79
	MDL	0.37	0.49	0.09	0.08

Adjusted for Dilution						
			Acetaldehyde	Propanal	Formaldehyde	CO
Run #	Dilution		(ppmv)	(ppmv)	(ppmv)	(ppmv)
1 (A1)	20.84	Min	BDL	BDL	BDL	21.21
		Max	BDL	BDL	BDL	29.11
		Avg	7.72	8.61	1.91	25.22
		MDL	7.72	8.61	1.91	1.60
2 (A2)	15.50	Min	BDL	BDL	BDL	22.77
		Max	BDL	BDL	BDL	96.08
		Avg	5.74	8.76	1.42	31.43
		MDL	5.74	8.76	1.42	1.19
3 (A3)	15.71	Min	BDL	BDL	BDL	16.67
		Max	BDL	BDL	BDL	310.27
		Avg	5.82	6.48	1.44	46.42
		MDL	5.82	6.48	1.44	1.21
4 (A4)	16.65	Min	BDL	BDL	BDL	20.38
		Max	BDL	BDL	BDL	56.98
		Avg	6.17	8.22	1.53	29.80
		MDL	6.17	8.22	1.53	1.28

Notes:

Detection limits during the first 5 minutes of runs A2 and A3 and the first 10 minutes of A4 were larger than reported in the table due to the presence of percent level hydrocarbon concentrations. Detection limits during these time periods were approximately 1 order of magnitude larger than those reported.

In addition, the presence of acetaldehyde was invalidated manually in two spectra after the first 10 minutes of run A4.

CF - Propanal = 1.11

Dilution = 20.84

Date	**Time**	**Acetaldehyde (ppmv)**	**CO (ppmv)**	**H2CO (ppmv)**	**Propanal (ppmv)**	**SF6 (ppmv)**	**Temp C**	**Pressure (Atm)**
07/21/11	**2:19:49**	BDL	1.15	BDL	BDL		149.4	0.982
07/21/11	**2:20:19**	BDL	1.21	BDL	BDL		149.3	0.982
07/21/11	**2:20:49**	BDL	1.19	BDL	BDL		149.4	0.983
07/21/11	**2:21:19**	BDL	1.18	BDL	BDL		149.4	0.982
07/21/11	**2:21:49**	BDL	1.21	BDL	BDL		149.4	0.982
07/21/11	**2:22:19**	BDL	1.19	BDL	BDL		149.4	0.982
07/21/11	**2:22:49**	BDL	1.24	BDL	BDL		149.4	0.982
07/21/11	**2:23:19**	BDL	1.15	BDL	BDL		149.4	0.982
07/21/11	**2:23:48**	BDL	1.13	BDL	BDL		149.3	0.982
07/21/11	**2:24:18**	BDL	1.17	BDL	BDL		149.3	0.982
07/21/11	**2:24:48**	BDL	1.14	BDL	BDL		149.4	0.982
07/21/11	**2:25:18**	BDL	1.13	BDL	BDL		149.4	0.982
07/21/11	**2:25:48**	BDL	1.22	BDL	BDL		149.4	0.982
07/21/11	**2:26:18**	BDL	1.22	BDL	BDL		149.4	0.983
07/21/11	**2:26:48**	BDL	1.17	BDL	BDL		149.4	0.982
07/21/11	**2:27:18**	BDL	1.17	BDL	BDL		149.4	0.982
07/21/11	**2:27:48**	BDL	1.09	BDL	BDL		149.4	0.982
07/21/11	**2:28:18**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:28:49**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:29:18**	BDL	1.03	BDL	BDL		149.4	0.982
07/21/11	**2:29:48**	BDL	1.05	BDL	BDL		149.4	0.982
07/21/11	**2:30:18**	BDL	1.02	BDL	BDL		149.4	0.983
07/21/11	**2:30:48**	BDL	1.05	BDL	BDL		149.4	0.982
07/21/11	**2:31:18**	BDL	1.04	BDL	BDL		149.4	0.982
07/21/11	**2:31:48**	BDL	1.07	BDL	BDL		149.4	0.983
07/21/11	**2:32:18**	BDL	1.03	BDL	BDL		149.4	0.983
07/21/11	**2:32:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:33:17**	BDL	1.06	BDL	BDL		149.4	0.983
07/21/11	**2:33:47**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:34:17**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:34:47**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:35:17**	BDL	1.11	BDL	BDL		149.4	0.982
07/21/11	**2:35:47**	BDL	1.08	BDL	BDL		149.4	0.983
07/21/11	**2:36:17**	BDL	1.17	BDL	BDL		149.4	0.983
07/21/11	**2:36:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:37:17**	BDL	1.13	BDL	BDL		149.4	0.983
07/21/11	**2:37:47**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:38:17**	BDL	1.13	BDL	BDL		149.4	0.983
07/21/11	**2:38:47**	BDL	1.14	BDL	BDL		149.3	0.983
07/21/11	**2:39:17**	BDL	1.12	BDL	BDL		149.4	0.982
07/21/11	**2:39:47**	BDL	1.16	BDL	BDL		149.4	0.982
07/21/11	**2:40:17**	BDL	1.10	BDL	BDL		149.4	0.982
07/21/11	**2:40:47**	BDL	1.14	BDL	BDL		149.4	0.982
07/21/11	**2:41:17**	BDL	1.13	BDL	BDL		149.4	0.982
07/21/11	**2:41:47**	BDL	1.12	BDL	BDL		149.4	0.983
07/21/11	**2:42:16**	BDL	1.14	BDL	BDL		149.4	0.983
07/21/11	**2:42:46**	BDL	1.12	BDL	BDL		149.3	0.983
07/21/11	**2:43:16**	BDL	1.15	BDL	BDL		149.4	0.983
07/21/11	**2:43:46**	BDL	1.09	BDL	BDL		149.4	0.982
07/21/11	**2:44:16**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:44:46**	BDL	1.09	BDL	BDL		149.3	0.983
07/21/11	**2:45:16**	BDL	1.08	BDL	BDL		149.3	0.983
07/21/11	**2:45:46**	BDL	1.07	BDL	BDL		149.3	0.983
07/21/11	**2:46:16**	BDL	1.06	BDL	BDL		149.4	0.983
07/21/11	**2:46:46**	BDL	1.10	BDL	BDL		149.4	0.983
07/21/11	**2:47:16**	BDL	1.09	BDL	BDL		149.3	0.983
07/21/11	**2:47:46**	BDL	1.12	BDL	BDL		149.3	0.983
07/21/11	**2:48:16**	BDL	1.10	BDL	BDL		149.3	0.982
07/21/11	**2:48:46**	BDL	1.07	BDL	BDL		149.4	0.982
07/21/11	**2:49:16**	BDL	1.08	BDL	BDL		149.4	0.982
07/21/11	**2:49:46**	BDL	1.09	BDL	BDL		149.4	0.983
07/21/11	**2:50:16**	BDL	1.07	BDL	BDL		149.4	0.983

Run 1 (A1) Data	07/21/11	**2:50:46**	BDL	1.11	BDL	BDL	149.4	0.983
	07/21/11	**2:51:16**	BDL	1.10	BDL	BDL	149.4	0.983
	07/21/11	**2:51:45**	BDL	1.15	BDL	BDL	149.4	0.983
	07/21/11	**2:52:15**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**2:52:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:53:15**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**2:53:45**	BDL	1.17	BDL	BDL	149.3	0.982
	07/21/11	**2:54:15**	BDL	1.17	BDL	BDL	149.4	0.982
	07/21/11	**2:54:45**	BDL	1.17	BDL	BDL	149.3	0.982
	07/21/11	**2:55:15**	BDL	1.17	BDL	BDL	149.4	0.982
	07/21/11	**2:55:45**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**2:56:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:56:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:57:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:57:45**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**2:58:15**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**2:58:45**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**2:59:15**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**2:59:45**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:00:15**	BDL	1.18	BDL	BDL	149.5	0.982
	07/21/11	**3:00:44**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:01:14**	BDL	1.19	BDL	BDL	149.5	0.983
	07/21/11	**3:01:44**	BDL	1.19	BDL	BDL	149.5	0.983
	07/21/11	**3:02:14**	BDL	1.23	BDL	BDL	149.5	0.983
	07/21/11	**3:02:44**	BDL	1.20	BDL	BDL	149.4	0.983
	07/21/11	**3:03:14**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:03:44**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:04:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:04:44**	BDL	1.21	BDL	BDL	149.5	0.982
	07/21/11	**3:05:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:05:44**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:06:14**	BDL	1.19	BDL	BDL	149.4	0.982
	07/21/11	**3:06:44**	BDL	1.18	BDL	BDL	149.4	0.982
	07/21/11	**3:07:14**	BDL	1.21	BDL	BDL	149.4	0.982
	07/21/11	**3:07:44**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:08:14**	BDL	1.26	BDL	BDL	149.4	0.982
	07/21/11	**3:08:44**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:09:14**	BDL	1.24	BDL	BDL	149.4	0.982
	07/21/11	**3:09:44**	BDL	1.24	BDL	BDL	149.4	0.982
	07/21/11	**3:10:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:10:43**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:11:13**	BDL	1.20	BDL	BDL	149.4	0.982
	07/21/11	**3:11:43**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:12:13**	BDL	1.28	BDL	BDL	149.4	0.982
	07/21/11	**3:12:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:13:13**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:13:43**	BDL	1.22	BDL	BDL	149.4	0.982
	07/21/11	**3:14:13**	BDL	1.25	BDL	BDL	149.5	0.982
	07/21/11	**3:14:43**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:15:13**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:15:43**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:16:13**	BDL	1.26	BDL	BDL	149.5	0.982
	07/21/11	**3:16:43**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:17:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:17:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:18:13**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:18:43**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:19:12**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:19:42**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:20:12**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:20:42**	BDL	1.27	BDL	BDL	149.4	0.982
	07/21/11	**3:21:12**	BDL	1.23	BDL	BDL	149.4	0.982
	07/21/11	**3:21:42**	BDL	1.25	BDL	BDL	149.4	0.982
	07/21/11	**3:22:12**	BDL	1.26	BDL	BDL	149.4	0.982
	07/21/11	**3:22:42**	BDL	1.31	BDL	BDL	149.4	0.982

07/21/11	**3:23:12**	BDL	1.27	BDL	BDL		149.5	0.982
07/21/11	**3:23:42**	BDL	1.26	BDL	BDL		149.4	0.982
07/21/11	**3:24:12**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:24:42**	BDL	1.26	BDL	BDL		149.5	0.983
07/21/11	**3:25:12**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:25:42**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:26:12**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:26:42**	BDL	1.26	BDL	BDL		149.4	0.983
07/21/11	**3:27:12**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:27:42**	BDL	1.33	BDL	BDL		149.5	0.983
07/21/11	**3:28:12**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:28:41**	BDL	1.35	BDL	BDL		149.4	0.983
07/21/11	**3:29:11**	BDL	1.27	BDL	BDL		149.4	0.983
07/21/11	**3:29:41**	BDL	1.25	BDL	BDL		149.5	0.983
07/21/11	**3:30:11**	BDL	1.26	BDL	BDL		149.4	0.983
07/21/11	**3:30:41**	BDL	1.27	BDL	BDL		149.5	0.983
07/21/11	**3:31:11**	BDL	1.29	BDL	BDL		149.5	0.983
07/21/11	**3:31:41**	BDL	1.28	BDL	BDL		149.5	0.983
07/21/11	**3:32:11**	BDL	1.30	BDL	BDL		149.5	0.983
07/21/11	**3:32:41**	BDL	1.31	BDL	BDL		149.5	0.983
07/21/11	**3:33:11**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:33:41**	BDL	1.32	BDL	BDL		149.5	0.983
07/21/11	**3:34:11**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:34:41**	BDL	1.28	BDL	BDL		149.5	0.983
07/21/11	**3:35:11**	BDL	1.31	BDL	BDL		149.4	0.982
07/21/11	**3:35:41**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:36:11**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:36:41**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:37:11**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:37:40**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:38:10**	BDL	1.32	BDL	BDL		149.5	0.983
07/21/11	**3:38:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:39:10**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:39:40**	BDL	1.32	BDL	BDL		149.4	0.982
07/21/11	**3:40:10**	BDL	1.33	BDL	BDL		149.4	0.982
07/21/11	**3:40:40**	BDL	1.33	BDL	BDL		149.4	0.983
07/21/11	**3:41:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:41:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:42:10**	BDL	1.34	BDL	BDL		149.4	0.983
07/21/11	**3:42:40**	BDL	1.35	BDL	BDL		149.4	0.982
07/21/11	**3:43:10**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:43:40**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:44:10**	BDL	1.33	BDL	BDL		149.4	0.983
07/21/11	**3:44:40**	BDL	1.39	BDL	BDL		149.4	0.983
07/21/11	**3:45:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:45:40**	BDL	1.30	BDL	BDL		149.3	0.982
07/21/11	**3:46:10**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:46:39**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:47:09**	BDL	1.31	BDL	BDL		149.4	0.983
07/21/11	**3:47:39**	BDL	1.29	BDL	BDL		149.4	0.983
07/21/11	**3:48:09**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:48:39**	BDL	1.32	BDL	BDL		149.4	0.983
07/21/11	**3:49:09**	BDL	1.40	BDL	BDL		149.4	0.983
07/21/11	**3:49:39**	BDL	1.30	BDL	BDL		149.4	0.983
07/21/11	**3:50:09**	BDL	1.37	BDL	BDL		149.4	0.983
07/21/11	**3:50:39**	BDL	1.30	BDL	BDL		149.4	0.983
	Minimum	BDL	1.02	BDL	BDL			
	Maximum	BDL	1.40	BDL	BDL			
	Average	0.37	1.21	0.09	0.41			
	MDL	0.37	0.08	0.09	0.41			
07/21/11	**3:51:09**					0.290	149.4	0.983
07/21/11	**3:51:39**					0.822	149.3	0.983

Dilution Check	07/21/11	**3:52:09**	0.827	149.3	0.983
	07/21/11	**3:52:39**	0.827	149.3	0.983
	07/21/11	**3:53:09**	0.830	149.3	0.983
	07/21/11	**3:53:39**	0.829	149.3	0.983
	07/21/11	**3:54:09**	0.829	149.3	0.982
	07/21/11	**3:54:39**	0.830	149.3	0.982
		Average	0.829		

CF - Propanal = 1.11
Dilution = 15.50

	Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
Dilution Check 1	07/21/11	**20:47:21**					-0.002	149.1	0.982
	07/21/11	**20:47:50**					0.112	149.2	0.982
	07/21/11	**20:48:20**					1.081	149.2	0.982
	07/21/11	**20:48:50**					1.099	149.2	0.982
	07/21/11	**20:49:20**					1.100	149.2	0.982
		Average					1.093		
Run 2 (A2) Data	07/21/11	**20:58:49**	BDL	6.20	BDL	BDL		149.3	0.981
	07/21/11	**20:59:19**	BDL	4.48	BDL	BDL		149.3	0.981
	07/21/11	**20:59:49**	BDL	2.83	BDL	BDL		149.3	0.981
	07/21/11	**21:00:19**	BDL	2.34	BDL	BDL		149.2	0.981
	07/21/11	**21:00:49**	BDL	2.65	BDL	BDL		149.2	0.981
	07/21/11	**21:01:19**	BDL	1.83	BDL	BDL		149.2	0.981
	07/21/11	**21:01:49**	BDL	1.68	BDL	BDL		149.3	0.981
	07/21/11	**21:02:19**	BDL	4.58	BDL	BDL		149.2	0.981
	07/21/11	**21:02:49**	BDL	2.49	BDL	BDL		149.2	0.981
	07/21/11	**21:03:19**	BDL	2.02	BDL	BDL		149.2	0.981
	07/21/11	**21:03:49**	BDL	2.02	BDL	BDL		149.3	0.981
	07/21/11	**21:04:19**	BDL	2.01	BDL	BDL		149.2	0.981
	07/21/11	**21:04:49**	BDL	2.11	BDL	BDL		149.2	0.981
	07/21/11	**21:05:19**	BDL	2.04	BDL	BDL		149.2	0.981
	07/21/11	**21:05:49**	BDL	2.11	BDL	BDL		149.2	0.982
	07/21/11	**21:06:18**	BDL	1.97	BDL	BDL		149.2	0.982
	07/21/11	**21:06:48**	BDL	1.98	BDL	BDL		149.1	0.982
	07/21/11	**21:07:18**	BDL	2.04	BDL	BDL		149.2	0.982
	07/21/11	**21:07:48**	BDL	1.87	BDL	BDL		149.2	0.982
	07/21/11	**21:08:18**	BDL	1.93	BDL	BDL		149.2	0.982
	07/21/11	**21:08:48**	BDL	1.94	BDL	BDL		149.3	0.982
	07/21/11	**21:09:18**	BDL	1.98	BDL	BDL		149.3	0.982
	07/21/11	**21:09:48**	BDL	1.92	BDL	BDL		149.3	0.982
	07/21/11	**21:10:18**	BDL	1.94	BDL	BDL		149.3	0.982
	07/21/11	**21:10:48**	BDL	2.31	BDL	BDL		149.3	0.981
	07/21/11	**21:11:18**	BDL	2.79	BDL	BDL		149.3	0.981
	07/21/11	**21:11:48**	BDL	1.98	BDL	BDL		149.3	0.982
	07/21/11	**21:12:18**	BDL	1.89	BDL	BDL		149.3	0.981
	07/21/11	**21:12:48**	BDL	2.00	BDL	BDL		149.3	0.982
	07/21/11	**21:13:18**	BDL	1.95	BDL	BDL		149.2	0.982
	07/21/11	**21:13:48**	BDL	1.88	BDL	BDL		149.3	0.982
	07/21/11	**21:14:18**	BDL	1.96	BDL	BDL		149.2	0.982
	07/21/11	**21:14:48**	BDL	1.99	BDL	BDL		149.3	0.982
	07/21/11	**21:15:18**	BDL	2.00	BDL	BDL		149.2	0.982
	07/21/11	**21:15:47**	BDL	2.06	BDL	BDL		149.2	0.982
	07/21/11	**21:43:14**	BDL	1.47	BDL	BDL		149.2	0.982
	07/21/11	**21:43:44**	BDL	1.50	BDL	BDL		149.2	0.982
	07/21/11	**21:44:14**	BDL	1.56	BDL	BDL		149.2	0.982
	07/21/11	**21:44:44**	BDL	1.65	BDL	BDL		149.3	0.982
	07/21/11	**21:45:14**	BDL	1.64	BDL	BDL		149.3	0.982
	07/21/11	**21:45:44**	BDL	1.65	BDL	BDL		149.3	0.982
	07/21/11	**21:46:14**	BDL	1.69	BDL	BDL		149.3	0.982
	07/21/11	**21:46:44**	BDL	1.69	BDL	BDL		149.3	0.982
	07/21/11	**21:47:14**	BDL	1.68	BDL	BDL		149.3	0.982
	07/21/11	**21:47:44**	BDL	1.72	BDL	BDL		149.3	0.982
	07/21/11	**21:48:14**	BDL	1.70	BDL	BDL		149.3	0.982
	07/21/11	**21:48:44**	BDL	1.79	BDL	BDL		149.3	0.982
	07/21/11	**21:49:14**	BDL	1.79	BDL	BDL		149.3	0.982
	07/21/11	**21:49:44**	BDL	1.80	BDL	BDL		149.3	0.982
	07/21/11	**21:50:14**	BDL	1.81	BDL	BDL		149.3	0.982

Run 2 (A2) Data	07/21/11	**21:50:44**	BDL	1.88	BDL	BDL	149.3	0.983
	07/21/11	**21:51:14**	BDL	1.88	BDL	BDL	149.3	0.982
	07/21/11	**21:51:44**	BDL	1.94	BDL	BDL	149.3	0.982
	07/21/11	**21:52:14**	BDL	1.94	BDL	BDL	149.3	0.982
	07/21/11	**21:52:43**	BDL	1.93	BDL	BDL	149.3	0.982
	07/21/11	**21:53:13**	BDL	1.98	BDL	BDL	149.3	0.982
	07/21/11	**21:53:43**	BDL	1.99	BDL	BDL	149.3	0.983
	07/21/11	**21:54:13**	BDL	2.00	BDL	BDL	149.3	0.982
	07/21/11	**21:54:43**	BDL	1.96	BDL	BDL	149.3	0.983
	07/21/11	**21:55:13**	BDL	2.04	BDL	BDL	149.3	0.982
	07/21/11	**21:55:43**	BDL	1.85	BDL	BDL	149.3	0.983
	07/21/11	**21:56:13**	BDL	1.47	BDL	BDL	149.3	0.983
	07/21/11	**21:56:43**	BDL	1.72	BDL	BDL	149.3	0.983
	07/21/11	**21:57:13**	BDL	1.80	BDL	BDL	149.3	0.983
	07/21/11	**21:57:43**	BDL	2.01	BDL	BDL	149.3	0.983
	07/21/11	**21:58:13**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**21:58:43**	BDL	2.05	BDL	BDL	149.3	0.983
	07/21/11	**21:59:13**	BDL	2.18	BDL	BDL	149.3	0.983
	07/21/11	**21:59:46**	BDL	2.14	BDL	BDL	149.3	0.983
	07/21/11	**22:00:16**	BDL	2.13	BDL	BDL	149.3	0.983
	07/21/11	**22:00:54**	BDL	2.18	BDL	BDL	149.3	0.983
	07/21/11	**22:01:24**	BDL	2.20	BDL	BDL	149.3	0.983
	07/21/11	**22:01:54**	BDL	2.20	BDL	BDL	149.4	0.983
	07/21/11	**22:02:24**	BDL	2.21	BDL	BDL	149.3	0.983
	07/21/11	**22:02:54**	BDL	2.26	BDL	BDL	149.3	0.983
	07/21/11	**22:03:24**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:03:54**	BDL	2.29	BDL	BDL	149.3	0.983
	07/21/11	**22:04:23**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:04:53**	BDL	2.27	BDL	BDL	149.3	0.983
	07/21/11	**22:05:23**	BDL	2.29	BDL	BDL	149.4	0.983
	07/21/11	**22:05:53**	BDL	2.29	BDL	BDL	149.3	0.983
	07/21/11	**22:06:23**	BDL	2.25	BDL	BDL	149.4	0.983
	07/21/11	**22:06:53**	BDL	2.32	BDL	BDL	149.4	0.983
	07/21/11	**22:07:23**	BDL	2.33	BDL	BDL	149.3	0.983
	07/21/11	**22:07:53**	BDL	2.29	BDL	BDL	149.4	0.983
	07/21/11	**22:08:23**	BDL	1.98	BDL	BDL	149.4	0.983
	07/21/11	**22:08:53**	BDL	1.73	BDL	BDL	149.3	0.983
	07/21/11	**22:09:23**	BDL	1.94	BDL	BDL	149.3	0.983
	07/21/11	**22:09:53**	BDL	2.16	BDL	BDL	149.3	0.983
	07/21/11	**22:10:23**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**22:10:53**	BDL	1.88	BDL	BDL	149.3	0.983
	07/21/11	**22:11:23**	BDL	2.08	BDL	BDL	149.3	0.983
	07/21/11	**22:11:53**	BDL	2.10	BDL	BDL	149.3	0.983
	07/21/11	**22:12:23**	BDL	2.07	BDL	BDL	149.3	0.983
	07/21/11	**22:12:53**	BDL	2.04	BDL	BDL	149.3	0.983
	07/21/11	**22:13:22**	BDL	2.06	BDL	BDL	149.3	0.984
	07/21/11	**22:13:52**	BDL	1.75	BDL	BDL	149.3	0.984
	07/21/11	**22:14:22**	BDL	1.73	BDL	BDL	149.3	0.983
	07/21/11	**22:14:52**	BDL	1.78	BDL	BDL	149.4	0.983
	07/21/11	**22:15:22**	BDL	1.87	BDL	BDL	149.3	0.983
	07/21/11	**22:15:52**	BDL	1.84	BDL	BDL	149.3	0.983
	07/21/11	**22:16:22**	BDL	1.82	BDL	BDL	149.4	0.983
	07/21/11	**22:16:52**	BDL	1.83	BDL	BDL	149.4	0.983
	07/21/11	**22:17:22**	BDL	1.93	BDL	BDL	149.3	0.983
	07/21/11	**22:17:52**	BDL	2.08	BDL	BDL	149.4	0.983
	07/21/11	**22:18:22**	BDL	2.05	BDL	BDL	149.3	0.983
	07/21/11	**22:18:52**	BDL	2.00	BDL	BDL	149.3	0.983
	07/21/11	**22:19:22**	BDL	2.00	BDL	BDL	149.4	0.983
	07/21/11	**22:19:52**	BDL	2.00	BDL	BDL	149.3	0.983
	07/21/11	**22:20:22**	BDL	1.81	BDL	BDL	149.3	0.983
	07/21/11	**22:20:52**	BDL	1.98	BDL	BDL	149.3	0.983
	07/21/11	**22:21:22**	BDL	1.98	BDL	BDL	149.3	0.983

	07/21/11	**22:21:52**	BDL	1.98	BDL	BDL		149.4	0.983
	07/21/11	**22:22:22**	BDL	1.97	BDL	BDL		149.3	0.983
	07/21/11	**22:22:51**	BDL	1.95	BDL	BDL		149.3	0.983
	07/21/11	**22:23:21**	BDL	1.95	BDL	BDL		149.3	0.983
	07/21/11	**22:23:51**	BDL	1.91	BDL	BDL		149.3	0.983
	07/21/11	**22:24:21**	BDL	1.90	BDL	BDL		149.3	0.983
	07/21/11	**22:24:51**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:25:21**	BDL	1.92	BDL	BDL		149.2	0.983
	07/21/11	**22:25:51**	BDL	1.67	BDL	BDL		149.3	0.983
	07/21/11	**22:26:21**	BDL	1.72	BDL	BDL		149.3	0.983
	07/21/11	**22:26:51**	BDL	1.76	BDL	BDL		149.3	0.983
	07/21/11	**22:27:21**	BDL	1.76	BDL	BDL		149.3	0.983
	07/21/11	**22:27:51**	BDL	1.78	BDL	BDL		149.3	0.983
	07/21/11	**22:28:21**	BDL	1.79	BDL	BDL		149.3	0.983
	07/21/11	**22:28:51**	BDL	1.79	BDL	BDL		149.3	0.983
	07/21/11	**22:29:21**	BDL	1.80	BDL	BDL		149.3	0.983
	07/21/11	**22:29:51**	BDL	1.82	BDL	BDL		149.3	0.983
	07/21/11	**22:30:21**	BDL	1.82	BDL	BDL		149.3	0.983
	07/21/11	**22:30:51**	BDL	1.94	BDL	BDL		149.3	0.983
	07/21/11	**22:31:21**	BDL	1.95	BDL	BDL		149.4	0.983
	07/21/11	**22:31:51**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:32:20**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:32:50**	BDL	1.89	BDL	BDL		149.3	0.983
	07/21/11	**22:33:20**	BDL	1.89	BDL	BDL		149.4	0.983
	07/21/11	**22:33:50**	BDL	1.92	BDL	BDL		149.4	0.983
	07/21/11	**22:34:20**	BDL	1.72	BDL	BDL		149.3	0.983
	07/21/11	**22:34:50**	BDL	1.73	BDL	BDL		149.4	0.983
	07/21/11	**22:35:20**	BDL	1.75	BDL	BDL		149.4	0.983
	07/21/11	**22:35:50**	BDL	1.77	BDL	BDL		149.4	0.983
		Minimum	BDL	1.47	BDL	BDL			
		Maximum	BDL	6.20	BDL	BDL			
		Average	0.37	2.03	0.09	0.57			
		MDL	0.37	0.08	0.09	0.57			
Dilution Check 2	07/21/11	**22:42:19**					0.855	149.4	0.983
	07/21/11	**22:42:49**					0.872	149.4	0.983
	07/21/11	**22:43:19**					0.908	149.4	0.983
	07/21/11	**22:43:49**					0.981	149.4	0.982
	07/21/11	**22:44:19**					1.027	149.3	0.982
	07/21/11	**22:44:49**					1.059	149.3	0.982
	07/21/11	**22:45:19**					1.082	149.3	0.982
	07/21/11	**22:45:49**					1.094	149.3	0.982
	07/21/11	**22:46:19**					1.095	149.3	0.982
	07/21/11	**22:46:49**					1.089	149.3	0.982
		Average					1.093		

CF - Propanal = 1.11
Dilution = 15.71

	Date	Time	Acetaldehyde (ppmv)	CO (ppmv)	H2CO (ppmv)	Propanal (ppmv)	SF6 (ppmv)	Temp C	Pressure (Atm)
Dilution Check 1	07/24/11	**19:42:26**					1.143	149.3	0.988
	07/24/11	**19:42:56**					1.144	149.3	0.988
	07/24/11	**19:43:26**					1.146	149.4	0.988
	07/24/11	**19:43:56**					1.148	149.3	0.988
	07/24/11	**19:44:26**					1.147	149.3	0.988
	07/24/11	**19:44:56**					1.147	149.3	0.988
	07/24/11	**19:45:26**					1.147	149.3	0.988
		Average					1.147		
	07/24/11	**19:55:55**	BDL	17.00	BDL	BDL		149.3	0.988
	07/24/11	**19:56:25**	BDL	19.74	BDL	BDL		149.3	0.988
	07/24/11	**19:56:55**	BDL	10.35	BDL	BDL		149.3	0.988
	07/24/11	**19:57:25**	BDL	6.46	BDL	BDL		149.3	0.988
	07/24/11	**19:57:54**	BDL	4.91	BDL	BDL		149.3	0.988
	07/24/11	**19:58:24**	BDL	4.18	BDL	BDL		149.3	0.988
	07/24/11	**19:58:54**	BDL	3.61	BDL	BDL		149.3	0.988
	07/24/11	**19:59:24**	BDL	3.22	BDL	BDL		149.3	0.988
	07/24/11	**19:59:54**	BDL	2.90	BDL	BDL		149.3	0.988
	07/24/11	**20:00:24**	BDL	2.69	BDL	BDL		149.3	0.988
	07/24/11	**20:00:54**	BDL	2.48	BDL	BDL		149.3	0.988
	07/24/11	**20:01:24**	BDL	2.31	BDL	BDL		149.3	0.988
	07/24/11	**20:01:54**	BDL	2.15	BDL	BDL		149.3	0.988
	07/24/11	**20:02:24**	BDL	2.17	BDL	BDL		149.4	0.988
	07/24/11	**20:02:54**	BDL	1.96	BDL	BDL		149.4	0.988
	07/24/11	**20:03:24**	BDL	1.70	BDL	BDL		149.3	0.988
	07/24/11	**20:03:54**	BDL	1.77	BDL	BDL		149.4	0.988
	07/24/11	**20:04:24**	BDL	2.30	BDL	BDL		149.4	0.988
	07/24/11	**20:04:54**	BDL	2.58	BDL	BDL		149.4	0.988
	07/24/11	**20:05:24**	BDL	1.87	BDL	BDL		149.4	0.988
	07/24/11	**20:05:54**	BDL	1.89	BDL	BDL		149.4	0.988
	07/24/11	**20:06:25**	BDL	1.92	BDL	BDL		149.4	0.988
	07/24/11	**20:06:54**	BDL	2.27	BDL	BDL		149.4	0.988
	07/24/11	**20:07:24**	BDL	2.68	BDL	BDL		149.4	0.988
	07/24/11	**20:07:53**	BDL	2.65	BDL	BDL		149.4	0.988
	07/24/11	**20:08:23**	BDL	2.47	BDL	BDL		149.4	0.988
	07/24/11	**20:08:53**	BDL	2.08	BDL	BDL		149.4	0.988
	07/24/11	**20:09:23**	BDL	1.67	BDL	BDL		149.4	0.988
	07/24/11	**20:09:53**	BDL	1.72	BDL	BDL		149.4	0.988
	07/24/11	**20:10:23**	BDL	2.50	BDL	BDL		149.4	0.988
	07/24/11	**20:10:53**	BDL	2.62	BDL	BDL		149.4	0.988
	07/24/11	**20:11:23**	BDL	2.64	BDL	BDL		149.4	0.988
	07/24/11	**20:11:53**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**20:12:23**	BDL	2.63	BDL	BDL		149.4	0.988
	07/24/11	**20:12:53**	BDL	2.70	BDL	BDL		149.4	0.988
	07/24/11	**20:13:23**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**20:13:53**	BDL	2.39	BDL	BDL		149.4	0.988
	07/24/11	**20:14:23**	BDL	1.06	BDL	BDL		149.3	0.988
	07/24/11	**20:14:53**	BDL	1.49	BDL	BDL		149.4	0.988
	07/24/11	**20:15:23**	BDL	1.38	BDL	BDL		149.4	0.988
	07/24/11	**20:15:53**	BDL	2.07	BDL	BDL		149.4	0.988
	07/24/11	**20:16:22**	BDL	2.10	BDL	BDL		149.4	0.988
	07/24/11	**20:16:52**	BDL	2.07	BDL	BDL		149.4	0.988
	07/24/11	**20:17:22**	BDL	1.92	BDL	BDL		149.4	0.988
	07/24/11	**20:17:52**	BDL	2.06	BDL	BDL		149.4	0.988
	07/24/11	**20:18:22**	BDL	2.13	BDL	BDL		149.4	0.988
	07/24/11	**20:18:52**	BDL	2.14	BDL	BDL		149.4	0.988
	07/24/11	**20:19:22**	BDL	2.16	BDL	BDL		149.4	0.988
	07/24/11	**20:19:52**	BDL	2.08	BDL	BDL		149.4	0.988
	07/24/11	**20:20:22**	BDL	1.96	BDL	BDL		149.4	0.988

Run 3 (A3) Data	07/24/11	**20:20:52**	BDL	1.66	BDL	BDL	149.4	0.988
	07/24/11	**20:21:22**	BDL	1.56	BDL	BDL	149.3	0.988
	07/24/11	**20:21:52**	BDL	1.58	BDL	BDL	149.4	0.988
	07/24/11	**20:22:22**	BDL	2.10	BDL	BDL	149.4	0.988
	07/24/11	**20:22:52**	BDL	2.03	BDL	BDL	149.3	0.988
	07/24/11	**20:23:22**	BDL	1.98	BDL	BDL	149.4	0.988
	07/24/11	**20:23:52**	BDL	2.33	BDL	BDL	149.3	0.988
	07/24/11	**20:24:22**	BDL	2.51	BDL	BDL	149.3	0.988
	07/24/11	**20:24:52**	BDL	2.17	BDL	BDL	149.3	0.988
	07/24/11	**20:25:21**	BDL	2.22	BDL	BDL	149.3	0.988
	07/24/11	**20:25:51**	BDL	2.08	BDL	BDL	149.3	0.988
	07/24/11	**20:26:21**	BDL	1.66	BDL	BDL	149.3	0.988
	07/24/11	**20:26:51**	BDL	1.61	BDL	BDL	149.3	0.988
	07/24/11	**20:27:21**	BDL	2.43	BDL	BDL	149.3	0.988
	07/24/11	**20:27:51**	BDL	2.49	BDL	BDL	149.3	0.988
	07/24/11	**20:28:21**	BDL	2.55	BDL	BDL	149.3	0.988
	07/24/11	**20:28:51**	BDL	1.85	BDL	BDL	149.3	0.988
	07/24/11	**20:29:21**	BDL	1.74	BDL	BDL	149.3	0.988
	07/24/11	**20:29:51**	BDL	2.74	BDL	BDL	149.3	0.988
	07/24/11	**20:30:21**	BDL	2.85	BDL	BDL	149.3	0.988
	07/24/11	**20:30:51**	BDL	2.89	BDL	BDL	149.3	0.988
	07/24/11	**20:31:21**	BDL	2.91	BDL	BDL	149.3	0.988
	07/24/11	**20:31:51**	BDL	3.00	BDL	BDL	149.3	0.988
	07/24/11	**20:32:21**	BDL	3.05	BDL	BDL	149.3	0.988
	07/24/11	**20:32:51**	BDL	3.20	BDL	BDL	149.3	0.988
	07/24/11	**20:33:21**	BDL	3.04	BDL	BDL	149.3	0.988
	07/24/11	**20:33:51**	BDL	2.48	BDL	BDL	149.3	0.988
	07/24/11	**20:34:21**	BDL	1.61	BDL	BDL	149.3	0.988
	07/24/11	**20:34:51**	BDL	1.36	BDL	BDL	149.3	0.988
	07/24/11	**20:35:21**	BDL	2.22	BDL	BDL	149.3	0.988
	07/24/11	**20:35:50**	BDL	3.14	BDL	BDL	149.4	0.988
	07/24/11	**20:36:20**	BDL	3.23	BDL	BDL	149.4	0.988
	07/24/11	**20:36:50**	BDL	3.29	BDL	BDL	149.4	0.988
	07/24/11	**20:37:20**	BDL	3.22	BDL	BDL	149.4	0.988
	07/24/11	**20:37:50**	BDL	3.37	BDL	BDL	149.3	0.988
	07/24/11	**20:38:20**	BDL	3.46	BDL	BDL	149.3	0.988
	07/24/11	**20:38:50**	BDL	3.56	BDL	BDL	149.4	0.988
	07/24/11	**20:39:20**	BDL	3.56	BDL	BDL	149.4	0.988
	07/24/11	**20:39:50**	BDL	3.66	BDL	BDL	149.4	0.988
	07/24/11	**20:40:20**	BDL	3.78	BDL	BDL	149.4	0.988
	07/24/11	**20:40:50**	BDL	3.59	BDL	BDL	149.4	0.988
	07/24/11	**20:41:20**	BDL	3.87	BDL	BDL	149.4	0.988
	07/24/11	**20:41:50**	BDL	4.03	BDL	BDL	149.4	0.988
	07/24/11	**20:42:20**	BDL	4.02	BDL	BDL	149.4	0.988
	07/24/11	**20:42:50**	BDL	2.66	BDL	BDL	149.4	0.988
	07/24/11	**20:43:20**	BDL	1.83	BDL	BDL	149.4	0.988
	07/24/11	**20:43:50**	BDL	2.50	BDL	BDL	149.5	0.988
	07/24/11	**20:44:20**	BDL	1.63	BDL	BDL	149.4	0.988
	07/24/11	**20:44:49**	BDL	2.06	BDL	BDL	149.4	0.988
	07/24/11	**20:45:19**	BDL	3.62	BDL	BDL	149.4	0.988
	07/24/11	**20:45:49**	BDL	3.53	BDL	BDL	149.4	0.989
	07/24/11	**20:46:19**	BDL	3.49	BDL	BDL	149.4	0.988
	07/24/11	**20:46:49**	BDL	2.67	BDL	BDL	149.4	0.988
	07/24/11	**20:47:19**	BDL	1.49	BDL	BDL	149.4	0.988
	07/24/11	**20:47:49**	BDL	2.69	BDL	BDL	149.4	0.988
	07/24/11	**20:48:19**	BDL	1.79	BDL	BDL	149.4	0.988
	07/24/11	**20:48:49**	BDL	2.11	BDL	BDL	149.4	0.988
	07/24/11	**20:49:19**	BDL	3.34	BDL	BDL	149.4	0.988
	07/24/11	**20:49:49**	BDL	3.37	BDL	BDL	149.4	0.988
	07/24/11	**20:50:19**	BDL	2.83	BDL	BDL	149.3	0.988
	07/24/11	**20:50:49**	BDL	1.18	BDL	BDL	149.3	0.988
	07/24/11	**20:51:19**	BDL	2.60	BDL	BDL	149.3	0.988
	07/24/11	**20:51:49**	BDL	3.31	BDL	BDL	149.3	0.988

	07/24/11	**20:52:19**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:52:49**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:53:18**	BDL	3.26	BDL	BDL		149.3	0.988
	07/24/11	**20:53:48**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:54:18**	BDL	2.91	BDL	BDL		149.3	0.988
	07/24/11	**20:54:48**	BDL	1.56	BDL	BDL		149.3	0.988
	07/24/11	**20:55:18**	BDL	1.54	BDL	BDL		149.3	0.988
	07/24/11	**20:55:48**	BDL	3.16	BDL	BDL		149.3	0.988
	07/24/11	**20:56:18**	BDL	3.29	BDL	BDL		149.3	0.988
	07/24/11	**20:56:48**	BDL	3.24	BDL	BDL		149.3	0.988
	07/24/11	**20:57:18**	BDL	3.28	BDL	BDL		149.3	0.988
	07/24/11	**20:57:48**	BDL	3.26	BDL	BDL		149.4	0.988
	07/24/11	**20:58:18**	BDL	3.25	BDL	BDL		149.3	0.988
	07/24/11	**20:58:48**	BDL	3.30	BDL	BDL		149.3	0.988
	07/24/11	**20:59:18**	BDL	3.23	BDL	BDL		149.3	0.988
	07/24/11	**20:59:48**	BDL	3.27	BDL	BDL		149.3	0.988
	07/24/11	**21:00:18**	BDL	2.32	BDL	BDL		149.3	0.988
	07/24/11	**21:00:48**	BDL	2.14	BDL	BDL		149.3	0.988
	07/24/11	**21:01:18**	BDL	1.48	BDL	BDL		149.4	0.988
	07/24/11	**21:01:48**	BDL	3.36	BDL	BDL		149.4	0.988
	07/24/11	**21:02:17**	BDL	3.33	BDL	BDL		149.4	0.988
	07/24/11	**21:02:48**	BDL	3.27	BDL	BDL		149.3	0.988
	07/24/11	**21:03:17**	BDL	3.29	BDL	BDL		149.3	0.988
	07/24/11	**21:03:47**	BDL	3.39	BDL	BDL		149.3	0.988
	07/24/11	**21:04:17**	BDL	3.49	BDL	BDL		149.3	0.988
	07/24/11	**21:04:47**	BDL	3.01	BDL	BDL		149.3	0.983
	07/24/11	**21:05:17**	BDL	2.87	BDL	BDL		149.4	0.981
	07/24/11	**21:05:47**	BDL	4.23	BDL	BDL		149.4	0.990
	07/24/11	**21:06:17**	BDL	3.67	BDL	BDL		149.4	0.988
	07/24/11	**21:06:47**	BDL	3.60	BDL	BDL		149.4	0.988
	07/24/11	**21:07:17**	BDL	3.51	BDL	BDL		149.3	0.988
	07/24/11	**21:07:47**	BDL	3.57	BDL	BDL		149.3	0.988
	07/24/11	**21:08:17**	BDL	3.52	BDL	BDL		149.3	0.988
	07/24/11	**21:08:47**	BDL	3.57	BDL	BDL		149.3	0.988
	07/24/11	**21:09:17**	BDL	3.14	BDL	BDL		149.3	0.988
	07/24/11	**21:09:47**	BDL	2.69	BDL	BDL		149.4	0.988
	07/24/11	**21:10:17**	BDL	2.59	BDL	BDL		149.3	0.988
	07/24/11	**21:10:47**	BDL	3.39	BDL	BDL		149.3	0.988
	07/24/11	**21:11:17**	BDL	3.73	BDL	BDL		149.3	0.988
		Minimum	BDL	1.06	BDL	BDL			
		Maximum	BDL	19.74	BDL	BDL			
		Average	0.37	2.95	0.09	0.41			
		MDL	0.37	0.08	0.09	0.41			
Dilution Check 2	07/24/11	**21:11:47**					0.008	149.3	0.988
	07/24/11	**21:12:16**					1.003	149.4	0.988
	07/24/11	**21:12:46**					1.057	149.4	0.988
	07/24/11	**21:13:16**					1.053	149.3	0.988
	07/24/11	**21:13:46**					1.053	149.3	0.988
	07/24/11	**21:14:16**					1.053	149.3	0.988
	07/24/11	**21:14:46**					1.051	149.4	0.988
	07/24/11	**21:15:16**					1.051	149.3	0.988
	07/24/11	**21:15:46**					1.051	149.4	0.988
		Average					1.053		

CF - Propanal = 1.11

Dilution = 16.65

Date	**Time**	**Acetaldehyde (ppmv)**	**CO (ppmv)**	**H2CO (ppmv)**	**Propanal (ppmv)**	**SF6 (ppmv)**	**Temp C**	**Pressure (Atm)**
07/25/11	**14:40:51**	BDL	1.88	BDL	BDL		149.4	0.985
07/25/11	**14:41:21**	BDL	2.72	BDL	BDL		149.4	0.985
07/25/11	**14:41:51**	BDL	2.83	BDL	BDL		149.4	0.985
07/25/11	**14:42:21**	BDL	3.40	BDL	BDL		149.5	0.985
07/25/11	**14:42:51**	BDL	1.32	BDL	BDL		149.4	0.985
07/25/11	**14:43:21**	BDL	2.89	BDL	BDL		149.4	0.986
07/25/11	**14:43:51**	BDL	1.36	BDL	BDL		149.5	0.986
07/25/11	**14:44:21**	BDL	2.05	BDL	BDL		149.4	0.986
07/25/11	**14:44:51**	BDL	2.40	BDL	BDL		149.5	0.986
07/25/11	**14:45:21**	BDL	1.90	BDL	BDL		149.4	0.986
07/25/11	**14:45:51**	BDL	1.75	BDL	BDL		149.5	0.986
07/25/11	**14:46:21**	BDL	1.69	BDL	BDL		149.4	0.986
07/25/11	**14:46:51**	BDL	1.51	BDL	BDL		149.5	0.986
07/25/11	**14:47:21**	BDL	1.67	BDL	BDL		149.5	0.986
07/25/11	**14:47:51**	BDL	1.76	BDL	BDL		149.5	0.986
07/25/11	**14:48:21**	BDL	1.63	BDL	BDL		149.5	0.986
07/25/11	**14:48:51**	BDL	1.59	BDL	BDL		149.5	0.986
07/25/11	**14:49:20**	BDL	1.79	BDL	BDL		149.5	0.986
07/25/11	**14:49:50**	BDL	1.67	BDL	BDL		149.5	0.986
07/25/11	**14:50:20**	BDL	1.59	BDL	BDL		149.5	0.986
07/25/11	**14:50:50**	BDL	1.52	BDL	BDL		149.5	0.986
07/25/11	**14:51:20**	BDL	1.71	BDL	BDL		149.5	0.986
07/25/11	**14:51:50**	BDL	1.78	BDL	BDL		149.5	0.986
07/25/11	**14:52:20**	BDL	1.60	BDL	BDL		149.5	0.986
07/25/11	**14:52:50**	BDL	1.61	BDL	BDL		149.5	0.986
07/25/11	**14:53:20**	BDL	1.68	BDL	BDL		149.5	0.986
07/25/11	**14:53:50**	BDL	1.79	BDL	BDL		149.4	0.986
07/25/11	**14:54:20**	BDL	1.77	BDL	BDL		149.5	0.986
07/25/11	**14:54:50**	BDL	1.72	BDL	BDL		149.5	0.986
07/25/11	**14:55:20**	BDL	1.82	BDL	BDL		149.5	0.986
07/25/11	**14:55:50**	BDL	1.88	BDL	BDL		149.5	0.986
07/25/11	**14:56:20**	BDL	1.88	BDL	BDL		149.5	0.986
07/25/11	**14:56:50**	BDL	1.70	BDL	BDL		149.5	0.986
07/25/11	**14:57:20**	BDL	1.54	BDL	BDL		149.5	0.986
07/25/11	**14:57:50**	BDL	1.63	BDL	BDL		149.5	0.986
07/25/11	**14:58:19**	BDL	1.35	BDL	BDL		149.5	0.986
07/25/11	**14:58:49**	BDL	1.22	BDL	BDL		149.5	0.986
07/25/11	**14:59:19**	BDL	1.29	BDL	BDL		149.4	0.986
07/25/11	**14:59:49**	BDL	1.29	BDL	BDL		149.3	0.986
07/25/11	**15:00:19**	BDL	1.33	BDL	BDL		149.4	0.987
07/25/11	**15:00:49**	BDL	3.40	BDL	BDL		149.4	0.986
07/25/11	**15:01:19**	BDL	2.15	BDL	BDL		149.4	0.986
07/25/11	**15:01:49**	BDL	2.19	BDL	BDL		149.4	0.986
07/25/11	**15:02:19**	BDL	1.91	BDL	BDL		149.4	0.986
07/25/11	**15:02:49**	BDL	1.64	BDL	BDL		149.4	0.987
07/25/11	**15:03:19**	BDL	1.81	BDL	BDL		149.5	0.986
07/25/11	**15:03:49**	BDL	1.69	BDL	BDL		149.4	0.986
07/25/11	**15:04:19**	BDL	1.60	BDL	BDL		149.4	0.987
07/25/11	**15:04:49**	BDL	1.54	BDL	BDL		149.5	0.987
07/25/11	**15:05:19**	BDL	1.62	BDL	BDL		149.5	0.986
07/25/11	**15:05:49**	BDL	1.64	BDL	BDL		149.5	0.987
07/25/11	**15:06:19**	BDL	1.68	BDL	BDL		149.5	0.987
07/25/11	**15:06:49**	BDL	1.64	BDL	BDL		149.5	0.987
07/25/11	**15:07:18**	BDL	1.60	BDL	BDL		149.5	0.987
07/25/11	**15:07:48**	BDL	1.54	BDL	BDL		149.4	0.987
07/25/11	**15:08:18**	BDL	1.43	BDL	BDL		149.5	0.988
07/25/11	**15:08:48**	BDL	1.57	BDL	BDL		149.4	0.987
07/25/11	**15:09:18**	BDL	1.53	BDL	BDL		149.4	0.987
07/25/11	**15:09:48**	BDL	1.55	BDL	BDL		149.5	0.987
07/25/11	**15:10:18**	BDL	1.60	BDL	BDL		149.4	0.987

Run 4 (A4) Data	07/25/11	**15:10:48**	BDL	1.59	BDL	BDL	149.4	0.986
	07/25/11	**15:11:18**	BDL	1.63	BDL	BDL	149.4	0.986
	07/25/11	**15:11:48**	BDL	1.62	BDL	BDL	149.5	0.986
	07/25/11	**15:12:18**	BDL	1.64	BDL	BDL	149.4	0.986
	07/25/11	**15:12:48**	BDL	1.65	BDL	BDL	149.5	0.986
	07/25/11	**15:13:18**	BDL	1.60	BDL	BDL	149.4	0.986
	07/25/11	**15:13:48**	BDL	1.58	BDL	BDL	149.5	0.986
	07/25/11	**15:14:18**	BDL	1.57	BDL	BDL	149.5	0.986
	07/25/11	**15:14:48**	BDL	1.57	BDL	BDL	149.4	0.986
	07/25/11	**15:15:18**	BDL	1.63	BDL	BDL	149.5	0.988
	07/25/11	**15:15:48**	BDL	1.63	BDL	BDL	149.4	0.987
	07/25/11	**15:16:17**	BDL	1.64	BDL	BDL	149.5	0.986
	07/25/11	**15:16:47**	BDL	1.67	BDL	BDL	149.5	0.986
	07/25/11	**15:17:17**	BDL	1.62	BDL	BDL	149.5	0.986
	07/25/11	**15:17:48**	BDL	1.67	BDL	BDL	149.4	0.986
	07/25/11	**15:18:17**	BDL	1.57	BDL	BDL	149.4	0.986
	07/25/11	**15:18:47**	BDL	1.59	BDL	BDL	149.4	0.986
	07/25/11	**15:19:17**	BDL	1.63	BDL	BDL	149.4	0.986
	07/25/11	**15:19:47**	BDL	1.70	BDL	BDL	149.4	0.986
	07/25/11	**15:20:17**	BDL	3.42	BDL	BDL	149.4	0.986
	07/25/11	**15:20:47**	BDL	2.63	BDL	BDL	149.4	0.987
	07/25/11	**15:21:17**	BDL	1.77	BDL	BDL	149.4	0.987
	07/25/11	**15:21:47**	BDL	1.75	BDL	BDL	149.4	0.986
	07/25/11	**15:22:17**	BDL	1.74	BDL	BDL	149.4	0.986
	07/25/11	**15:22:47**	BDL	1.76	BDL	BDL	149.4	0.986
	07/25/11	**15:23:17**	BDL	1.77	BDL	BDL	149.4	0.986
	07/25/11	**15:23:47**	BDL	1.74	BDL	BDL	149.5	0.986
	07/25/11	**15:24:17**	BDL	1.75	BDL	BDL	149.5	0.986
	07/25/11	**15:24:47**	BDL	1.78	BDL	BDL	149.5	0.986
	07/25/11	**15:25:17**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:25:46**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:26:16**	BDL	1.72	BDL	BDL	149.5	0.986
	07/25/11	**15:26:46**	BDL	1.68	BDL	BDL	149.5	0.986
	07/25/11	**15:27:16**	BDL	1.74	BDL	BDL	149.5	0.986
	07/25/11	**15:27:46**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:28:16**	BDL	1.77	BDL	BDL	149.5	0.986
	07/25/11	**15:28:46**	BDL	1.77	BDL	BDL	149.4	0.986
	07/25/11	**15:29:16**	BDL	1.81	BDL	BDL	149.5	0.986
	07/25/11	**15:29:46**	BDL	1.81	BDL	BDL	149.4	0.986
	07/25/11	**15:30:16**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:30:46**	BDL	1.78	BDL	BDL	149.4	0.986
	07/25/11	**15:31:16**	BDL	1.83	BDL	BDL	149.4	0.986
	07/25/11	**15:31:46**	BDL	1.80	BDL	BDL	149.4	0.986
	07/25/11	**15:32:16**	BDL	1.80	BDL	BDL	149.5	0.986
	07/25/11	**15:32:46**	BDL	1.83	BDL	BDL	149.4	0.986
	07/25/11	**15:33:16**	BDL	1.86	BDL	BDL	149.5	0.986
	07/25/11	**15:33:46**	BDL	1.82	BDL	BDL	149.4	0.986
	07/25/11	**15:34:16**	BDL	1.82	BDL	BDL	149.4	0.986
	07/25/11	**15:34:45**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:35:15**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:35:45**	BDL	1.81	BDL	BDL	149.4	0.986
	07/25/11	**15:36:15**	BDL	1.85	BDL	BDL	149.4	0.986
	07/25/11	**15:36:45**	BDL	1.84	BDL	BDL	149.4	0.986
	07/25/11	**15:37:15**	BDL	1.86	BDL	BDL	149.4	0.986
	07/25/11	**15:37:45**	BDL	1.88	BDL	BDL	149.4	0.986
	07/25/11	**15:38:15**	BDL	1.88	BDL	BDL	149.4	0.986
	07/25/11	**15:38:45**	BDL	1.89	BDL	BDL	149.5	0.986
	07/25/11	**15:39:15**	BDL	1.86	BDL	BDL	149.5	0.986
	07/25/11	**15:39:45**	BDL	1.90	BDL	BDL	149.5	0.986
	07/25/11	**15:40:15**	BDL	1.91	BDL	BDL	149.5	0.986
	07/25/11	**15:40:45**	BDL	1.92	BDL	BDL	149.5	0.986
	07/25/11	**15:41:15**	BDL	1.90	BDL	BDL	149.5	0.986
	07/25/11	**15:41:45**	BDL	1.93	BDL	BDL	149.4	0.986

	07/25/11	**15:42:15**	BDL	1.93	BDL	BDL		149.5	0.986
		Minimum	BDL	1.22	BDL	BDL			
		Maximum	BDL	3.42	BDL	BDL			
		Average	0.37	1.79	0.09	0.49			
		MDL	0.37	0.08	0.09	0.49			
Dilution Check	07/25/11	**15:45:14**					0.500	149.5	0.986
	07/25/11	**15:45:44**					0.497	149.5	0.986
	07/25/11	**15:46:14**					0.457	149.5	0.986
	07/25/11	**15:46:44**					0.442	149.5	0.986
	07/25/11	**15:47:14**					0.501	149.5	0.986
	07/25/11	**15:47:44**					0.508	149.5	0.986
	07/25/11	**15:48:14**					0.512	149.5	0.986
		Average					0.507		

QA Spike Recovery and Validation Data

Formaldehyde Method 320 QA Spike Recoveries (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	8.44	0.130	0.154	0.168	109.2	Pass

Propanal Method 320 QA Spike Results (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	16.94	0.066	0.429	0.497	115.9	Pass
Spike 2	16.94	0.107	0.672	0.783	116.5	Pass

Acetaldehyde Method 320 QA Spike Results (Sulfur Hexafluoride Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
Spike 1	17.282	0.115	0.654	0.678	103.6	Pass

Carbon Monoxide Method 320 QA Spike Results (No Tracer)

Spike Level	Tracer Conc. (ppmv)	Dilution Factor	Expected Spike (ppmv)	Observed Spike (ppmv)	Percent Recovery	Comment
NA	NA	NA	NA	NA	NA	NA

Carbon monoxide (CO): Validation by Dynamic Analyte Spiking (biases taken into account)

Spiking Data

Total tracer conc. (ppm): 17.282

tracer conc. while line spiking (ppm): 0.318

Percentage of native exhaust in total spiked sample: 0.982

Certified cylinder conc. of analyte (ppm): 50.000 Certified

Conc. of analyte spiked into extracted exhaust (ppm): 0.919

Validation Data (conc. in ppm)

	Pair #	Analyte Concentrations					Tracer Concentrations	
		Unspiked Native Conc.	Corr. Native Conc.	Native + Spiked Conc.	Native + Spiked (meas.)	% Recovery	SF6 Unspiked	SF6 Spiked
	1	2.413	2.368	3.287	3.606	109.707	0.000	0.318
	2	1.956	1.920	2.839	2.527	88.994	0.000	0.318
	3	2.096	2.057	2.976	2.536	85.216	0.000	0.318
	4	2.264	2.222	3.141	2.867	91.278	0.000	0.318
	5	2.685	2.636	3.555	3.061	86.108	0.000	0.318
	6	2.794	2.742	3.661	3.221	87.969	0.000	0.318
	7	3.036	2.980	3.899	3.408	87.397	0.000	0.318
	8	3.255	3.196	4.115	3.660	88.951	0.000	0.318
	9	3.406	3.343	4.263	3.918	91.919	0.000	0.318
	10	3.867	3.796	4.715	4.296	91.119	0.000	0.318
	11	2.182	2.142	3.061	3.287	107.374	0.000	0.318
	12	4.822	4.734	5.653	5.031	88.994	0.000	0.318
Mean Conc.:		2.898	2.845	3.764	3.452	92.085	0.000	0.318

Method 320/301 Analyte Spiking Statistical Results

Mean of FTIR meas. spiked samples: 3.4515

Mean of FTIR meas. unspiked samp: 2.8980

CS Calculated value of Spiked Samples: 3.7638

SD St.Dev of spiked samples Eq 301-2: 0.7237 also Eq 301-5 in 2011 version of m301

SDM = SD/sqrt(12) 0.2089

F-test: 0.0833 For n=6, if 0.139<F<7.146, calculate pooled SD

SDpooled-pooled std. dev.: NA

RSD: **0.2097** RSD must be <= 0.20 for successful validation

RSD, if using pooled SD: NA RSD must be <= 0.50 for successful validation

B-bias at spike level m320 Eq. 7: -0.3123

t-statistic, Eq. 301-4: **1.4948** if t-stat.>=2.201 (11 degrees of freedom), then B is statistically significant must calc. and use CF (also Eq 301-6 in 2011 version of m301)

Br, Relative Bias Eq. 301-7 (2011 ver): 0.0830 If < 0.1 the CF not required (CF=1) if Br>0.3 then validation is unsucessful

CF-correction factor Eq. 301-5 (pre-2011): 1.0905 if 0.7<=CF<=1.3 or if B not statistically signif., then validation successful

Date	Time	CO (ppmv)	Temp C	Pressure (Atm)
07/19/11	**11:52:09**	0.00	149.48	0.98
07/19/11	**11:52:41**	-0.01	149.45	0.98
07/19/11	**11:53:11**	0.01	149.42	0.98
07/19/11	**11:53:41**	0.01	149.46	0.98
07/19/11	**11:54:11**	0.02	149.43	0.98
07/19/11	**11:54:41**	0.00	149.44	0.98
07/19/11	**11:55:11**	0.00	149.44	0.98
07/19/11	**11:55:41**	0.02	149.46	0.98
07/19/11	**11:56:11**	0.00	149.46	0.98
07/19/11	**11:56:41**	0.01	149.51	0.98
07/19/11	**11:57:11**	0.01	149.47	0.98
07/19/11	**11:57:41**	-0.01	149.47	0.98
07/19/11	**11:58:11**	-0.01	149.47	0.98
07/19/11	**11:58:40**	0.00	149.52	0.98
07/19/11	**11:59:10**	0.00	149.56	0.98
07/19/11	**11:59:40**	25.44	149.58	0.98
07/19/11	**12:00:10**	56.22	149.44	0.99
07/19/11	**12:00:40**	56.11	149.32	0.99
07/19/11	**12:01:10**	56.09	149.28	0.99
07/19/11	**12:01:40**	56.08	149.34	0.98
07/19/11	**12:02:10**	56.08	149.37	0.98
07/19/11	**12:02:40**	55.92	149.45	0.98
07/19/11	**12:03:10**	55.80	149.45	0.98
07/19/11	**12:03:40**	55.72	149.51	0.98
07/19/11	**12:04:10**	55.67	149.51	0.98
07/19/11	**12:04:40**	55.62	149.56	0.98
07/19/11	**12:05:10**	55.69	149.57	0.98
07/19/11	**12:05:40**	55.89	149.56	0.98
07/19/11	**12:06:10**	55.82	149.60	0.98
07/19/11	**12:06:40**	55.69	149.62	0.98
	Average	55.74		
07/19/11	**12:11:43**	137.82	149.61	0.98
07/19/11	**12:12:13**	1695.53	149.43	0.99
07/19/11	**12:12:43**	1695.35	149.28	0.99
07/19/11	**12:13:13**	1692.64	149.15	0.99
07/19/11	**12:13:43**	1695.34	149.12	0.99
07/19/11	**12:14:13**	1694.84	149.09	0.99
07/19/11	**12:15:13**	9174.01	149.11	0.99
07/19/11	**12:15:43**	9164.98	149.10	0.99
07/19/11	**12:16:13**	9174.41	149.12	0.99
07/19/11	**12:16:43**	9174.63	149.12	0.99
07/19/11	**12:17:13**	9172.34	149.12	0.99
07/19/11	**12:17:43**	9163.91	149.11	0.99
07/19/11	**12:18:13**	9123.96	149.18	0.98
07/19/11	**12:18:43**	9091.80	149.40	0.98
07/19/11	**12:19:13**	9099.35	149.52	0.98
07/19/11	**12:19:43**	9095.32	149.60	0.98
07/19/11	**12:20:13**	9092.06	149.60	0.98

Date	Time	SF6 (ppmv)	CO (ppmv)	Temp C	Pressure (Atm)
07/19/11	**14:23:45**	0.03	6.50	149.43	0.99
07/19/11	**14:24:15**	-0.03	30.45	149.46	0.99
07/19/11	**14:24:45**	-0.03	12.23	149.44	0.99
07/19/11	**14:25:15**	-0.02	7.86	149.45	0.99
07/19/11	**14:25:45**	-0.02	4.20	149.45	0.99
07/19/11	**14:26:14**	-0.02	3.41	149.49	0.99
07/19/11	**14:26:44**	-0.02	1.14	149.53	0.99
07/19/11	**14:27:14**	-0.02	0.95	149.52	0.99
07/19/11	**14:27:45**	-0.02	0.85	149.54	0.99
07/19/11	**14:28:14**	-0.02	0.81	149.56	0.99
07/19/11	**14:28:44**	-0.02	0.83	149.54	0.99
07/19/11	**14:29:14**	-0.02	1.26	149.54	0.99
07/19/11	**14:29:44**	-0.02	1.00	149.53	0.99
07/19/11	**14:30:14**	-0.02	1.11	149.49	0.99
07/19/11	**14:30:44**	-0.02	1.41	149.48	0.99
07/19/11	**14:31:14**	-0.02	0.90	149.49	0.99
07/19/11	**14:31:44**	-0.02	1.14	149.45	0.99
07/19/11	**14:32:14**	-0.02	1.55	149.46	0.99
07/19/11	**14:32:44**	-0.02	1.70	149.51	0.99
07/19/11	**14:33:14**	-0.02	1.69	149.48	0.99
07/19/11	**14:33:44**	-0.02	1.69	149.47	0.99
07/19/11	**14:34:14**	-0.02	1.66	149.46	0.99
07/19/11	**14:34:44**	-0.02	1.58	149.45	0.99
07/19/11	**14:35:14**	-0.02	0.96	149.45	0.99
07/19/11	**14:35:44**	-0.02	1.44	149.48	0.99
07/19/11	**14:36:13**	-0.02	1.66	149.49	0.99
07/19/11	**14:36:43**	-0.02	1.70	149.49	0.99
07/19/11	**14:37:13**	-0.02	1.68	149.54	0.99
07/19/11	**14:37:43**	-0.02	1.69	149.57	0.99
07/19/11	**14:38:13**	-0.02	1.07	149.54	0.99
07/19/11	**14:38:43**	-0.02	1.00	149.55	0.99
07/19/11	**14:39:13**	-0.02	1.24	149.55	0.99
07/19/11	**14:39:43**	-0.02	1.68	149.55	0.99
07/19/11	**14:40:13**	-0.02	2.00	149.48	0.99
07/19/11	**14:40:43**	-0.02	1.89	149.51	0.99
07/19/11	**14:41:13**	-0.02	2.07	149.48	0.99
07/19/11	**14:41:43**	-0.02	2.04	149.49	0.99
07/19/11	**14:42:13**	-0.02	1.91	149.49	0.99
07/19/11	**14:42:43**	-0.02	1.86	149.47	0.99
07/19/11	**14:43:13**	-0.02	1.78	149.51	0.99
07/19/11	**14:43:43**	-0.02	1.62	149.53	0.99
07/19/11	**14:44:13**	-0.02	1.64	149.50	0.99
07/19/11	**14:44:43**	-0.02	1.65	149.50	0.99
07/19/11	**14:45:13**	-0.03	1.65	149.51	0.99
07/19/11	**14:45:43**	-0.03	1.72	149.46	0.99
07/19/11	**14:46:12**	-0.03	1.80	149.45	0.99
07/19/11	**14:46:42**	-0.02	1.83	149.50	0.99
07/19/11	**14:47:12**	-0.03	1.82	149.47	0.99
07/19/11	**14:47:42**	-0.03	1.85	149.43	0.99
07/19/11	**14:48:12**	-0.03	1.81	149.44	0.99
07/19/11	**14:48:42**	-0.03	1.79	149.44	0.99
07/19/11	**14:49:12**	-0.03	1.77	149.44	0.99
07/19/11	**14:49:42**	-0.03	1.52	149.47	0.99
07/19/11	**14:50:12**	-0.03	1.40	149.48	0.99
07/19/11	**14:50:42**	-0.03	0.95	149.47	0.99
07/19/11	**14:51:12**	-0.03	0.88	149.46	0.99
07/19/11	**14:51:42**	-0.03	1.18	149.45	0.99
07/19/11	**14:52:12**	-0.03	1.28	149.42	0.99
07/19/11	**14:52:42**	-0.03	1.27	149.41	0.99
07/19/11	**14:53:12**	-0.03	1.34	149.46	0.99
07/19/11	**14:53:42**	-0.03	1.42	149.43	0.99
07/19/11	**14:54:12**	-0.03	1.43	149.42	0.99
07/19/11	**14:54:45**	-0.03	1.45	149.44	0.99
07/19/11	**14:55:15**	-0.03	1.38	149.34	0.99
07/19/11	**14:55:45**	-0.03	1.33	149.34	0.99
07/19/11	**14:56:15**	-0.03	1.27	149.34	0.99
07/19/11	**14:56:45**	-0.03	1.22	149.32	0.99
07/19/11	**14:57:15**	-0.03	1.17	149.31	0.99

07/19/11	**14:57:45**	-0.03	1.18	149.37	0.99	
07/19/11	**14:58:15**	-0.03	1.30	149.47	0.99	
07/19/11	**14:58:45**	-0.03	1.32	149.48	0.99	
07/19/11	**14:59:15**	-0.03	1.25	149.56	0.99	
07/19/11	**14:59:45**	-0.03	1.29	149.55	0.99	
07/19/11	**15:00:15**	-0.03	1.09	149.57	0.99	
07/19/11	**15:00:45**	-0.03	1.04	149.55	0.99	
07/19/11	**15:01:15**	-0.03	1.07	149.55	0.99	
07/19/11	**15:01:45**	-0.03	1.15	149.51	0.99	
07/19/11	**15:02:15**	-0.03	1.28	149.51	0.99	
07/19/11	**15:02:45**	-0.03	1.32	149.51	0.99	
07/19/11	**15:03:14**	-0.03	1.35	149.47	0.99	
07/19/11	**15:03:44**	-0.03	1.33	149.51	0.99	
07/19/11	**15:04:14**	-0.03	1.22	149.50	0.99	
07/19/11	**15:04:44**	-0.03	1.21	149.58	0.99	
07/19/11	**15:05:14**	-0.03	1.27	149.56	0.99	
07/19/11	**15:05:44**	-0.03	1.32	149.56	0.99	
07/19/11	**15:06:14**	-0.03	1.29	149.52	0.99	
07/19/11	**15:06:44**	-0.03	1.30	149.52	0.99	
07/19/11	**15:07:14**	-0.03	1.33	149.55	0.99	
07/19/11	**15:07:44**	-0.03	1.31	149.51	0.99	
07/19/11	**15:08:14**	-0.03	1.33	149.48	0.99	
07/19/11	**15:08:44**	-0.03	1.35	149.49	0.99	
07/19/11	**15:09:14**	-0.03	1.49	149.48	0.99	
07/19/11	**15:09:44**	-0.03	1.51	149.48	0.99	
07/19/11	**15:10:14**	-0.03	1.56	149.45	0.99	
07/19/11	**15:10:44**	-0.03	1.60	149.47	0.99	
07/19/11	**15:11:14**	-0.03	1.62	149.46	0.99	
07/19/11	**15:11:44**	-0.04	1.61	149.48	0.99	
07/19/11	**15:12:14**	-0.04	1.57	149.50	0.99	
07/19/11	**15:12:44**	-0.04	1.65	149.54	0.99	
07/19/11	**15:13:13**	-0.04	1.69	149.58	0.99	
07/19/11	**15:13:43**	-0.04	1.72	149.57	0.99	
07/19/11	**15:14:13**	-0.04	1.79	149.58	0.99	
07/19/11	**15:14:43**	-0.04	1.85	149.55	0.99	
07/19/11	**15:15:13**	-0.03	2.44	149.56	0.99	
07/19/11	**15:15:43**	-0.03	2.52	149.58	0.99	
07/19/11	**15:16:13**	-0.04	2.07	149.56	0.99	
07/19/11	**15:16:43**	-0.04	2.02	149.51	0.99	
07/19/11	**15:17:13**	-0.02	3.29	149.49	0.99	
07/19/11	**15:17:43**	-0.01	4.03	149.45	0.99	
07/19/11	**15:18:13**	-0.03	3.62	149.48	0.99	
07/19/11	**15:18:43**	-0.04	2.43	149.47	0.99	
07/19/11	**15:19:13**	-0.04	2.61	149.44	0.99	
07/19/11	**15:19:43**	-0.03	2.24	149.44	0.99	
07/19/11	**15:20:13**	-0.03	2.31	149.44	0.99	1
07/19/11	**15:20:43**	-0.04	2.51	149.37	0.99	
07/19/11	**15:21:13**	-0.04	2.64	149.37	0.99	
07/19/11	**15:21:43**	-0.04	3.58	149.36	0.99	
07/19/11	**15:22:13**	-0.04	3.20	149.37	0.99	
07/19/11	**15:22:43**	-0.04	3.22	149.38	0.99	
07/19/11	**15:23:12**	-0.04	3.44	149.38	0.99	
07/19/11	**15:23:42**	-0.05	3.56	149.39	0.99	1
07/19/11	**15:24:12**	-0.05	3.66	149.42	0.99	
07/19/11	**15:24:42**	-0.05	3.74	149.43	0.99	
07/19/11	**15:25:12**	-0.07	3.70	149.43	0.99	
07/19/11	**15:25:42**	-0.08	3.42	149.43	0.99	
07/19/11	**15:26:12**	-0.10	3.02	149.43	0.99	
07/19/11	**15:26:42**	-0.10	2.24	149.36	0.99	
07/19/11	**15:27:12**	-0.10	1.95	149.40	0.99	2
07/19/11	**15:27:42**	-0.09	1.97	149.39	0.99	
07/19/11	**15:28:12**	-0.08	3.66	149.36	0.99	
07/19/11	**15:28:42**	-0.07	2.71	149.35	0.99	2
07/19/11	**15:29:12**	-0.07	2.34	149.37	0.99	
07/19/11	**15:29:42**	-0.08	1.66	149.36	0.99	
07/19/11	**15:30:12**	-0.08	2.33	149.31	0.99	
07/19/11	**15:30:42**	-0.08	2.17	149.32	0.99	
07/19/11	**15:31:12**	-0.07	2.09	149.37	0.99	3
07/19/11	**15:31:42**	-0.07	2.10	149.36	0.99	

07/19/11	**15:32:12**	-0.06	2.22	149.33	0.99	
07/19/11	**15:32:42**	-0.06	2.50	149.34	0.99	
07/19/11	**15:33:11**	-0.06	2.53	149.31	0.99	3
07/19/11	**15:33:41**	-0.05	2.55	149.35	0.99	
07/19/11	**15:34:11**	-0.06	2.38	149.35	0.99	
07/19/11	**15:34:41**	-0.05	2.23	149.35	0.99	4
07/19/11	**15:35:11**	-0.05	2.30	149.39	0.99	
07/19/11	**15:35:41**	-0.05	2.53	149.34	0.99	
07/19/11	**15:36:11**	-0.04	2.87	149.33	0.99	4
07/19/11	**15:36:41**	-0.04	2.87	149.35	0.99	
07/19/11	**15:37:11**	-0.04	2.93	149.30	0.99	
07/19/11	**15:37:41**	-0.05	2.69	149.34	0.99	5
07/19/11	**15:38:11**	-0.05	2.68	149.34	0.99	
07/19/11	**15:38:41**	-0.04	2.88	149.32	0.99	
07/19/11	**15:39:11**	-0.04	3.06	149.34	0.99	5
07/19/11	**15:39:41**	-0.04	3.07	149.33	0.99	
07/19/11	**15:40:11**	-0.04	2.92	149.38	0.99	
07/19/11	**15:40:41**	-0.04	2.79	149.40	0.99	6
07/19/11	**15:41:11**	-0.04	2.79	149.40	0.99	
07/19/11	**15:41:41**	-0.04	2.94	149.49	0.99	
07/19/11	**15:42:11**	-0.04	3.19	149.52	0.99	
07/19/11	**15:42:41**	-0.04	3.24	149.49	0.99	6
07/19/11	**15:43:10**	-0.04	3.20	149.50	0.99	
07/19/11	**15:43:40**	-0.04	2.99	149.49	0.99	
07/19/11	**15:44:10**	-0.04	3.03	149.46	0.99	7
07/19/11	**15:44:40**	-0.04	3.04	149.51	0.99	
07/19/11	**15:45:10**	-0.04	3.16	149.49	0.99	
07/19/11	**15:45:40**	-0.04	3.42	149.49	0.99	7
07/19/11	**15:46:10**	-0.03	3.39	149.47	0.99	
07/19/11	**15:46:40**	-0.04	3.43	149.46	0.99	
07/19/11	**15:47:10**	-0.04	3.26	149.44	0.99	8
07/19/11	**15:47:40**	-0.04	3.25	149.45	0.99	
07/19/11	**15:48:10**	-0.04	3.42	149.45	0.99	
07/19/11	**15:48:40**	-0.03	3.66	149.40	0.99	8
07/19/11	**15:49:10**	-0.03	3.66	149.41	0.99	
07/19/11	**15:49:40**	-0.04	3.74	149.41	0.99	
07/19/11	**15:50:10**	-0.04	3.58	149.42	0.99	
07/19/11	**15:50:40**	-0.04	2.05	149.41	0.99	
07/19/11	**15:51:10**	-0.04	3.20	149.50	0.99	
07/19/11	**15:51:40**	-0.04	3.40	149.49	0.99	9
07/19/11	**15:52:10**	-0.04	3.41	149.49	0.99	
07/19/11	**15:52:39**	-0.04	2.73	149.51	0.99	
07/19/11	**15:53:09**	-0.03	3.80	149.45	0.99	9
07/19/11	**15:53:39**	-0.04	4.04	149.40	0.99	
07/19/11	**15:54:09**	-0.03	3.34	149.45	0.99	
07/19/11	**15:54:39**	-0.04	2.48	149.43	0.99	
07/19/11	**15:55:09**	-0.04	3.20	149.44	0.99	
07/19/11	**15:55:39**	-0.04	3.60	149.46	0.99	
07/19/11	**15:56:09**	-0.04	2.71	149.45	0.99	
07/19/11	**15:56:39**	-0.04	3.83	149.47	0.99	
07/19/11	**15:57:09**	-0.04	3.40	149.49	0.99	
07/19/11	**15:57:39**	-0.04	3.84	149.48	0.99	10
07/19/11	**15:58:09**	-0.04	3.89	149.48	0.99	
07/19/11	**15:58:39**	-0.04	4.19	149.47	0.99	
07/19/11	**15:59:09**	-0.03	3.41	149.47	0.99	
07/19/11	**15:59:39**	-0.04	4.04	149.41	0.99	
07/19/11	**16:00:09**	-0.04	4.20	149.37	0.99	10
07/19/11	**16:00:39**	-0.04	4.39	149.33	0.99	
07/19/11	**16:01:09**	-0.03	3.13	149.35	0.99	
07/19/11	**16:01:39**	-0.04	2.62	149.36	0.99	
07/19/11	**16:02:09**	-0.04	3.87	149.38	0.99	
07/19/11	**16:02:38**	-0.04	2.09	149.39	0.99	
07/19/11	**16:03:08**	-0.04	3.06	149.44	0.99	
07/19/11	**16:03:38**	-0.04	4.13	149.46	0.99	
07/19/11	**16:04:08**	-0.03	3.00	149.49	0.99	
07/19/11	**16:04:38**	-0.04	2.15	149.49	0.99	
07/19/11	**16:05:08**	-0.03	3.83	149.50	0.99	
07/19/11	**16:05:38**	-0.03	3.83	149.51	0.99	
07/19/11	**16:06:08**	-0.03	2.74	149.49	0.99	
07/19/11	**16:06:38**	-0.03	3.04	149.46	0.99	11

07/19/11	**16:07:08**	-0.03	1.32	149.45	0.99	
07/19/11	**16:07:38**	-0.03	1.32	149.45	0.99	11
07/19/11	**16:08:08**	-0.03	1.11	149.44	0.99	
07/19/11	**16:08:38**	-0.03	0.65	149.43	0.99	
07/19/11	**16:09:08**	-0.03	3.82	149.41	0.99	
07/19/11	**16:09:38**	-0.03	4.09	149.38	0.99	
07/19/11	**16:10:08**	-0.03	4.21	149.37	0.99	
07/19/11	**16:10:38**	-0.03	4.84	149.38	0.99	
07/19/11	**16:11:08**	-0.03	4.89	149.35	0.99	12
07/19/11	**16:11:38**	-0.03	4.76	149.31	0.99	
07/19/11	**16:12:08**	-0.03	4.81	149.31	0.99	
07/19/11	**16:12:37**	-0.03	5.01	149.34	0.99	12
07/19/11	**16:13:07**	-0.03	5.05	149.38	0.99	
07/19/11	**16:13:37**	-0.03	5.77	149.39	0.99	
07/19/11	**16:14:07**	-0.03	5.87	149.35	0.99	
07/19/11	**16:14:37**	-0.03	4.98	149.32	0.99	
07/19/11	**16:15:07**	-0.01	4.23	149.30	0.99	
07/19/11	**16:15:37**	-0.01	3.60	149.32	0.99	
07/19/11	**16:16:07**	-0.01	3.59	149.30	0.99	
07/19/11	**16:16:37**	-0.01	3.58	149.34	0.99	
07/19/11	**16:17:07**	-0.01	3.53	149.30	0.99	
07/19/11	**16:17:38**	-0.01	3.55	149.36	0.99	
07/19/11	**16:18:07**	-0.01	3.56	149.35	0.99	
07/19/11	**16:18:37**	-0.01	3.54	149.35	0.99	
07/19/11	**16:19:07**	-0.01	3.74	149.35	0.99	
07/19/11	**16:19:37**	-0.06	6.60	149.35	0.99	
07/19/11	**16:20:07**	0.07	5.07	149.36	0.99	
07/19/11	**16:20:37**	0.96	0.66	149.33	0.99	
07/19/11	**16:21:07**	0.96	0.57	149.40	0.99	
07/19/11	**16:21:37**	0.97	0.58	149.45	0.99	
07/19/11	**16:22:06**	0.97	0.56	149.47	0.99	
07/19/11	**16:22:36**	0.97	0.58	149.51	0.99	
07/19/11	**16:23:06**	0.96	0.55	149.50	0.99	
07/19/11	**16:23:36**	0.36	5.10	149.46	0.99	
07/19/11	**16:24:06**	0.30	5.06	149.50	0.99	
07/19/11	**16:24:36**	0.31	4.93	149.45	0.99	
07/19/11	**16:25:06**	0.26	5.01	149.38	0.99	
07/19/11	**16:25:36**	0.30	4.92	149.33	0.99	
07/19/11	**16:26:06**	0.31	4.91	149.39	0.99	
07/19/11	**16:26:36**	0.31	4.97	149.37	0.99	
07/19/11	**16:27:06**	0.31	4.86	149.46	0.99	
07/19/11	**16:27:36**	0.31	4.78	149.41	0.99	
07/19/11	**16:28:06**	0.31	1.42	149.45	0.99	
07/19/11	**16:28:36**	0.31	0.60	149.44	0.99	
07/19/11	**16:29:06**	0.31	0.60	149.40	0.99	
07/19/11	**16:29:36**	0.30	0.62	149.40	0.99	
07/19/11	**16:30:06**	0.60	0.60	149.47	0.99	
07/19/11	**16:30:36**	0.14	0.59	149.39	0.99	
07/19/11	**16:31:06**	-0.02	0.55	149.40	0.99	
07/19/11	**16:31:36**	-0.02	0.63	149.36	0.99	
07/19/11	**16:32:05**	0.00	0.65	149.46	0.99	
07/19/11	**16:32:35**	-0.01	0.66	149.45	0.99	
07/19/11	**16:33:05**	0.00	0.64	149.42	0.99	
07/19/11	**16:33:35**	-0.01	0.62	149.40	0.99	
07/19/11	**16:34:05**	-0.01	0.64	149.39	0.99	
07/19/11	**16:34:35**	-0.01	0.62	149.36	0.99	
07/19/11	**16:35:05**	0.00	0.60	149.36	0.98	
07/19/11	**16:35:35**	0.00	0.62	149.48	0.98	
07/19/11	**16:36:05**	0.00	0.64	149.45	0.98	
07/19/11	**16:36:35**	-0.01	0.61	149.52	0.98	
07/19/11	**16:37:05**	-0.01	0.63	149.54	0.98	
07/19/11	**16:37:35**	-0.01	0.66	149.53	0.98	
07/19/11	**16:38:05**	-0.02	0.67	149.51	0.98	
07/19/11	**16:38:35**	-0.02	0.66	149.53	0.98	
07/19/11	**16:39:05**	-0.01	0.14	149.47	0.98	
07/19/11	**16:39:35**	0.00	-0.03	149.47	0.98	

0.318

Section R
Method 0010 – Semi-VOC

Laboratory Report

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

PROJECT NO. 40942317

BP-Husky Toledo -M0010

Lot #: H1H010411

Chris Weber

URS Corporation
9400 Amberglen Boulevard
Austin, TX 78729

TESTAMERICA LABORATORIES, INC.

Kevin S. Woodcock
Project Manager

August 22, 2011

ANALYTICAL METHODS SUMMARY

H1H010411

PARAMETER	ANALYTICAL METHOD
PAHs & Selected SVOCs by HRGC/LRMS	KNOX ID-0016
Semivolatile Organic Compounds by GC/MS	SW846 8270C

References:

KNOX	TestAmerica Laboratories Inc., Knoxville Laboratory Standard Operating Procedure
SW846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

SAMPLE SUMMARY

H1H010411

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MLAHW	001	BP-WV-A1-M0010-COMBINED	07/21/11	
MLAHX	002	BP-WV-A2-M0010-COMBINED	07/21/11	22:31
MLAH2	003	BP-WV-A3-M0010-COMBINED	07/24/11	21:25
MLAH3	004	BP-WV-A4-M0010-COMBINED	07/25/11	15:43
MLAH4	005	BP-WV-AFB-M0010-COMBINED	07/26/11	17:27
MLAJE	011	A-6484,A-6485 MEDIA CHECK	07/21/11	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H1H010411

The results reported herein are applicable to the samples submitted for analysis only. If you have any questions about this report, please call (865) 291-3000 to speak with the TestAmerica project manager listed on the cover page.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

Samples BP-WV-A1-M0010-PostCond C, BP-WV-A2-M0010-PostCond C, BP-WV-A2-M0010-PostCond D, BP-WV-A2-M0010-PostCond E, BP-WV-A3-M0010-PostCond C BP-WV-A3-M0010-PostCond D BP-WV-A3-M0010-PostCond E, and BP-FB-M0010-1R-MeCl were received, but were not listed on the chain of custody documentation.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

Semivolatiles

The semivolatile organic sampling train components were extracted and analyzed using TestAmerica Knoxville standard operating procedures KNOX-OP-0009 and KNOX-MS-0016, based on the following methods:

- SW-846 3542, "Extraction of Semivolatile Analytes Collected Using Method 0010 (Modified Method 5 Sampling Train)"
- SW-846 8270C, "Semivolatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)".

The sampling trains are prepared as one analytical fraction: The particulate filter and front half of the filter holder, nozzle and probe solvent rinses, XAD-2 resin trap and back half of the filter holder, coil condenser and connecting glassware solvent rinses are combined as a single sample.

The combined sample components are spiked with the method 8270C surrogates and Soxhlet extracted with methylene chloride. The extracts are concentrated to 1 mL and analyzed by GCMS.

Sample results were calculated using the following equation:

TestAmerica Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Lab #88-0688, California ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Lab #PH-0223, DoD ELAP Cert. #ADE-1434, Florida DOH Lab #E87177, Georgia DNR Lab #906, Hawaii DOH, Indiana DOH Lab #C-TN-02, Iowa DNR Lab #375, Kansas DHE Cert. #E-10349, Kentucky EEC Lab #90101, Louisiana DEQ AI# 83979 Cert. #03079, Louisiana DOHH, Maryland DOE Cert #277, Michigan DNRE Lab #9933, Minnesota DOH ELAP Lab #047-999-429, Nevada DEP Lab #TN00009, New Jersey DEP Lab #TN001, New York DOH Lab #10781, North Carolina DHHS Lab #21705, North Carolina DENR Cert. #64, Ohio EPA VAP Lab #CL0059, Oklahoma DEQ Lab #9415, Pennsylvania DEP Lab #68-00576, South Carolina DHEC Cert #84001001, Tennessee DEC Lab #02014, Texas CEQ, Utah DOH Lab # QUAN3, Virginia DGS Lab #00165, Washington DOE Lab #C593, West Virginia DEP Cert. #345, West Virginia DHHR Cert #9955C, Wisconsin DNR Lab #998044300, and USDA Soil Permit #P330-11-00035. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

PROJECT NARRATIVE

H1H010411

$$\text{Result, ug} = (\text{On column concentration, ng/uL}) \times \left(\frac{\text{Volume final extract, uL}}{\text{1 Sample}}\right) \times \left(\frac{\text{1 ug}}{\text{1000 ng}}\right) \times \text{DF} \times \text{SF}$$

Where: DF = Bench Dilution Factor
SF = Extraction Split Factor

The dilution factor reported on the sample result form represents a combination of factors (such as dilution, sample weight/volume adjustment, split ratio, etc.) used to adjust the reporting limits and method detection limits.

Samples BP-WV-A1-M0010-COMBINED, BP-WV-A2-M0010-COMBINED, BP-WV-A3-M0010-COMBINED and BP-WV-A4-M0010-COMBINED were reported with elevated reporting limits for all analytes. Based on screening results, a dilution was necessary prior to analysis; the reporting limits were adjusted accordingly.

The concentration of naphthalene and/or 2-methylnaphthalene in samples -WV-A1-M0010-COMBINED, BP-WV-A2-M0010-COMBINED, BP-WV-A3-M0010-COMBINED and BP-WV-A4-M0010-COMBINED exceeded the calibration level of the instrument. The samples were analyzed at a dilution to bring the concentration of the compound into the instrument calibration range. The results for both analyses are reported in order to provide the lowest possible reporting limits.

SIM PAH

The labeled internal standards added prior to extraction serve both as a measure of extraction efficiency and as a measure of cleanup recovery.

Method 0010 Sampling Train Preparation and Analysis

The method 0010 sampling train components were extracted and analyzed for polyaromatic hydrocarbons (PAHs) using TestAmerica Knoxville standard operating procedures KNOX-OP-0009 and KNOX-ID-0016, based on the following methods:

- SW-846 3542, “Extraction of Semivolatile Analytes Collected Using Method 0010 (Modified Method 5 Sampling Train)”
- Method 429 - Determination of Polycyclic Aromatic Hydrocarbon (PAH) emissions from Stationary Sources, California Environmental Protection Agency Air Resources Board, Adopted: September 12, 1989, Amended: July 28, 1997.

The sampling trains are prepared as two analytical fractions and the extracts from these fractions are combined into a single sample for analysis. The first fraction consists of the particulate filter and the XAD-2 resin trap. The second fraction includes the condensate, impinger contents and their related glassware solvent rinses, as well as the front half and back half solvent rinses.

PROJECT NARRATIVE
H1H010411

The filters and XAD components are spiked with SIM PAH internal standards and the components are Soxhlet extracted with methylene chloride. The condensates are extracted using a continuous liquid-liquid extractor. The extracts are combined and concentrated to 0.5 mL and analyzed by by SIM-HRGC/LRMS.

Sample results were calculated using the following equation:

$$\text{Result, ng} = (\text{On column conc, ug/mL}) \times \left(\frac{\text{Nominal Vol final extract, (500 uL)}}{\text{1 Sample}}\right) \times \left(\frac{\text{1 mL}}{\text{1000 uL}}\right) \times \left(\frac{\text{1000 ng}}{\text{1 ug}}\right) \times \text{SF}$$

Where: SF = Extraction Split Factor

*If the entire sample is not extracted, the fractional amount of sample used is entered into the above equation.

Sampling surrogates fluorene-$d_{10,}$ 13C_6-fluorene & terphenyl-d_{14} are added to the XAD by the laboratory prior to sampling. Their results appear with the "Internal Standard" percent recovery results. However these field surrogates were diluted out in samples BP-WV-A1-M0010-COMBINED, BP-WV-A2-M0010-COMBINED, BP-WV-A3-M0010-COMBINED, and BP-WV-A4-M0010-COMBINED.

The dilution factor reported on the sample result form represents a combination of factors (such as dilution, sample weight/volume adjustment, split ratio, etc.) used to adjust the reporting limits and method detection limits.

All QC criteria were met with the following exceptions:

Sample extracts; A-6484, A-6485 MEDIA CHECK, BP-WV-A1-M0010-COMBINED, BP-WV-A2-M0010-COMBINED, BP-WV-A3-M0010-COMBINED, and BP-WV-A4-M0010-COMBINED in the batch had internal standard recovery for benzo(a)anthracene-d12 that exceeded QC limits (including the LCS). Also, sample BP-WV-A2-M0010-COMBINED had internal standard recovery for chrysene-d12 outside QC limits. As indicted by the referenced method, isotope dilution techniques produce results that are independent of internal standard recovery. The affected internal standards are flagged on the final result forms.

Samples BP-WV-A1-M0010-COMBINED, BP-WV-A2-M0010-COMBINED, BP-WV-A3-M0010-COMBINED, and BP-WV-A4-M0010-COMBINED were reported with elevated reporting limits for all analytes due to the difficult sample matrix. These extracts could not be concentrated to the nominal final volume of 500 uL. These extracts were further diluted and post-spiked with recovery and internal standards and the reporting limits were adjusted accordingly. The samples were analyzed with minimum dilution even though some analytes were outside of the calibration range. Compounds that exceeded calibration range were flagged with an "E" qualifier; please refer to the 8270 analysis for results of these compounds within calibration range.

Sample BP-WV-AFB-M0010-COMBINED had concentrations of several compounds that exceeded the calibration level of the instrument. The samples were analyzed at a dilution to bring the compound concentrations within the instrument calibration range. The reporting limits have been adjusted accordingly.

QC DATA ASSOCIATION SUMMARY

H1H010411

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	
002	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	
003	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	
004	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	
005	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	
011	AIR	SW846 8270C		1214035	
	AIR	KNOX ID-0016		1214037	

Sample Data Summary

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-001	Work Order #...:	MLAHW1AA	Matrix.........:	AIR
Date Sampled...:	07/21/11	Date Received..:	07/29/11		
Prep Date......:	08/02/11	Analysis Date..:	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	500	Method.........:	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**3200 J**	**5000**	**ug**	**1400**
Acenaphthylene	ND	5000	ug	1400
Aniline	ND	5000	ug	4300
Anthracene	**16000**	**5000**	**ug**	**1600**
Benz(a)anthracene	**2800 J**	**5000**	**ug**	**1600**
Benzidine	ND	50000	ug	30000
Benzo(b)fluoranthene	ND	5000	ug	2000
Benzo(k)fluoranthene	ND	5000	ug	2400
Benzo(ghi)perylene	**2000 J**	**5000**	**ug**	**1600**
Benzo(a)pyrene	**4200 J**	**5000**	**ug**	**1900**
Benzo(e)pyrene	**1600 J**	**5000**	**ug**	**420**
Biphenyl	**5700**	**5000**	**ug**	**500**
Chrysene	**3000 J**	**5000**	**ug**	**1600**
Cresols (total)	**9500**	**5000**	**ug**	**4000**
Dibenz(a,h)anthracene	ND	5000	ug	1500
Dibenzofuran	**4800 J**	**5000**	**ug**	**1400**
Dibenzo(a,e)pyrene	**2800 J**	**5000**	**ug**	**340**
3,3'-Dimethoxybenzidine	ND	50000	ug	7000
p-Dimethylaminoazobenzene	ND	5000	ug	1200
7,12-Dimethylbenz(a)-anthracene	ND	5000	ug	1800
3,3'-Dimethylbenzidine	ND	50000	ug	9000
alpha,alpha-Dimethylphenethylamine	ND	12000	ug	4200
2,4-Dimethylphenol	**5000**	**5000**	**ug**	**3300**
Fluoranthene	**1800 J**	**5000**	**ug**	**1800**
Fluorene	**14000**	**5000**	**ug**	**1500**
Indeno(1,2,3-cd)pyrene	ND	5000	ug	1600
Isophorone	ND	5000	ug	1400
3-Methylcholanthrene	ND	5000	ug	1900
2-Methylnaphthalene	**190000 E**	**5000**	**ug**	**1400**
Naphthalene	**110000 E**	**5000**	**ug**	**1600**
Nitrobenzene	ND	5000	ug	1400
Perylene	ND	5000	ug	380
Phenanthrene	**36000**	**5000**	**ug**	**1500**
Phenol	**2800 J**	**5000**	**ug**	**1600**
1,4-Phenylenediamine	ND	50000	ug	12000
Pyrene	**7100**	**5000**	**ug**	**1800**
o-Toluidine	ND	5000	ug	1400

(Continued on next page)

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-001 **Work Order #...:** MLAHW1AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

E Estimated result. Result concentration exceeds the calibration range.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-001	**Work Order #...:**	MLAHW2AA	**Matrix.........:**	AIR
Date Sampled...:	07/21/11	**Date Received..:**	07/29/11		
Prep Date......:	08/02/11	**Analysis Date..:**	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	2000	**Method.........:**	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
2-Methylnaphthalene	**190000 D**	**20000**	**ug**	**5800**
Naphthalene	**110000 D**	**20000**	**ug**	**6200**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

D Result was obtained from the analysis of a dilution.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A2-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-002	Work Order #...:	MLAHX1AA	Matrix.........:	AIR
Date Sampled...:	07/21/11	Date Received..:	07/29/11		
Prep Date......:	08/02/11	Analysis Date..:	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	500	Method.........:	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**2400 J**	**5000**	**ug**	**1400**
Acenaphthylene	ND	5000	ug	1400
Aniline	ND	5000	ug	4300
Anthracene	**15000**	**5000**	**ug**	**1600**
Benz(a)anthracene	**1600 J**	**5000**	**ug**	**1600**
Benzidine	ND	50000	ug	30000
Benzo(b)fluoranthene	ND	5000	ug	2000
Benzo(k)fluoranthene	ND	5000	ug	2400
Benzo(ghi)perylene	ND	5000	ug	1600
Benzo(a)pyrene	**2200 J**	**5000**	**ug**	**1900**
Benzo(e)pyrene	**570 J**	**5000**	**ug**	**420**
Biphenyl	**4700 J**	**5000**	**ug**	**500**
Chrysene	**1600 J**	**5000**	**ug**	**1600**
Cresols (total)	**15000**	**5000**	**ug**	**4000**
Dibenz(a,h)anthracene	ND	5000	ug	1500
Dibenzofuran	**4000 J**	**5000**	**ug**	**1400**
Dibenzo(a,e)pyrene	ND	5000	ug	340
3,3'-Dimethoxybenzidine	ND	50000	ug	7000
p-Dimethylaminoazobenzene	ND	5000	ug	1200
7,12-Dimethylbenz(a)-anthracene	ND	5000	ug	1800
3,3'-Dimethylbenzidine	ND	50000	ug	9000
alpha,alpha-Dimethylphenethylamine	ND	12000	ug	4200
2,4-Dimethylphenol	**5800**	**5000**	**ug**	**3300**
Fluoranthene	**2000 J**	**5000**	**ug**	**1800**
Fluorene	**11000**	**5000**	**ug**	**1500**
Indeno(1,2,3-cd)pyrene	ND	5000	ug	1600
Isophorone	ND	5000	ug	1400
3-Methylcholanthrene	ND	5000	ug	1900
2-Methylnaphthalene	**150000 E**	**5000**	**ug**	**1400**
Naphthalene	**88000**	**5000**	**ug**	**1600**
Nitrobenzene	ND	5000	ug	1400
Perylene	ND	5000	ug	380
Phenanthrene	**35000**	**5000**	**ug**	**1500**
Phenol	**6300**	**5000**	**ug**	**1600**
1,4-Phenylenediamine	ND	50000	ug	12000
Pyrene	**7400**	**5000**	**ug**	**1800**
o-Toluidine	**1800 J**	**5000**	**ug**	**1400**

(Continued on next page)

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A2-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-002 **Work Order #...:** MLAHX1AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

E Estimated result. Result concentration exceeds the calibration range.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A2-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-002	**Work Order #...:**	MLAHX2AA	**Matrix.........:**	AIR
Date Sampled...:	07/21/11	**Date Received..:**	07/29/11		
Prep Date......:	08/02/11	**Analysis Date..:**	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	1000	**Method.........:**	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
2-Methylnaphthalene	**160000 D**	**10000**	**ug**	**2900**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

D Result was obtained from the analysis of a dilution.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A3-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-003 **Work Order #...:** MLAH21AA **Matrix.........:** AIR
Date Sampled...: 07/24/11 **Date Received..:** 07/29/11
Prep Date......: 08/02/11 **Analysis Date..:** 08/10/11
Prep Batch #...: 1214035
Dilution Factor: 500 **Method.........:** SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**4800 J**	**5000**	**ug**	**1400**
Acenaphthylene	ND	5000	ug	1400
Aniline	ND	5000	ug	4300
Anthracene	**22000**	**5000**	**ug**	**1600**
Benz(a)anthracene	ND	5000	ug	1600
Benzidine	ND	50000	ug	30000
Benzo(b)fluoranthene	ND	5000	ug	2000
Benzo(k)fluoranthene	ND	5000	ug	2400
Benzo(ghi)perylene	ND	5000	ug	1600
Benzo(a)pyrene	**2100 J**	**5000**	**ug**	**1900**
Benzo(e)pyrene	**470 J**	**5000**	**ug**	**420**
Biphenyl	**8700**	**5000**	**ug**	**500**
Chrysene	ND	5000	ug	1600
Cresols (total)	**12000**	**5000**	**ug**	**4000**
Dibenz(a,h)anthracene	ND	5000	ug	1500
Dibenzofuran	**7900**	**5000**	**ug**	**1400**
Dibenzo(a,e)pyrene	ND	5000	ug	340
3,3'-Dimethoxybenzidine	ND	50000	ug	7000
p-Dimethylaminoazobenzene	ND	5000	ug	1200
7,12-Dimethylbenz(a)-anthracene	ND	5000	ug	1800
3,3'-Dimethylbenzidine	ND	50000	ug	9000
alpha,alpha-Dimethylphenethylamine	ND	12000	ug	4200
2,4-Dimethylphenol	**6600**	**5000**	**ug**	**3300**
Fluoranthene	**1900 J**	**5000**	**ug**	**1800**
Fluorene	**21000**	**5000**	**ug**	**1500**
Indeno(1,2,3-cd)pyrene	ND	5000	ug	1600
Isophorone	ND	5000	ug	1400
3-Methylcholanthrene	ND	5000	ug	1900
2-Methylnaphthalene	**340000 E**	**5000**	**ug**	**1400**
Naphthalene	**200000 E**	**5000**	**ug**	**1600**
Nitrobenzene	ND	5000	ug	1400
Perylene	ND	5000	ug	380
Phenanthrene	**54000**	**5000**	**ug**	**1500**
Phenol	**4300 J**	**5000**	**ug**	**1600**
1,4-Phenylenediamine	ND	50000	ug	12000
Pyrene	**5900**	**5000**	**ug**	**1800**
o-Toluidine	**2300 J**	**5000**	**ug**	**1400**

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URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A3-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-003 **Work Order #...:** MLAH21AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

E Estimated result. Result concentration exceeds the calibration range.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A3-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-003	**Work Order #...:**	MLAH22AA	**Matrix.........:**	AIR
Date Sampled...:	07/24/11	**Date Received..:**	07/29/11		
Prep Date......:	08/02/11	**Analysis Date..:**	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	3000	**Method.........:**	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
2-Methylnaphthalene	**330000 D**	**30000**	**ug**	**8700**
Naphthalene	**190000 D**	**30000**	**ug**	**9300**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

D Result was obtained from the analysis of a dilution.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A4-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-004	Work Order #...:	MLAH31AA	Matrix.........:	AIR
Date Sampled...:	07/25/11	Date Received..:	07/29/11		
Prep Date......:	08/02/11	Analysis Date..:	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	100	Method.........:	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**1000**	**1000**	**ug**	**270**
Acenaphthylene	ND	1000	ug	280
Aniline	ND	1000	ug	860
Anthracene	**6100**	**1000**	**ug**	**320**
Benz(a)anthracene	**1500**	**1000**	**ug**	**310**
Benzidine	ND	10000	ug	6000
Benzo(b)fluoranthene	**530 J**	**1000**	**ug**	**410**
Benzo(k)fluoranthene	ND	1000	ug	490
Benzo(ghi)perylene	**1100**	**1000**	**ug**	**320**
Benzo(a)pyrene	**1700**	**1000**	**ug**	**380**
Benzo(e)pyrene	**900 J**	**1000**	**ug**	**84**
Biphenyl	**1000**	**1000**	**ug**	**100**
Chrysene	**1800**	**1000**	**ug**	**310**
Cresols (total)	**4500**	**1000**	**ug**	**810**
Dibenz(a,h)anthracene	**510 J**	**1000**	**ug**	**300**
Dibenzofuran	**1100**	**1000**	**ug**	**280**
Dibenzo(a,e)pyrene	**610 J**	**1000**	**ug**	**68**
3,3'-Dimethoxybenzidine	ND	10000	ug	1400
p-Dimethylaminoazobenzene	ND	1000	ug	240
7,12-Dimethylbenz(a)-anthracene	**590 J**	**1000**	**ug**	**350**
3,3'-Dimethylbenzidine	ND	10000	ug	1800
alpha,alpha-Dimethylphenethylamine	ND	2500	ug	830
2,4-Dimethylphenol	**2000**	**1000**	**ug**	**660**
Fluoranthene	**1500**	**1000**	**ug**	**360**
Fluorene	**4200**	**1000**	**ug**	**300**
Indeno(1,2,3-cd)pyrene	**420 J**	**1000**	**ug**	**310**
Isophorone	ND	1000	ug	280
3-Methylcholanthrene	ND	1000	ug	380
2-Methylnaphthalene	**45000 E**	**1000**	**ug**	**290**
Naphthalene	**23000 E**	**1000**	**ug**	**310**
Nitrobenzene	ND	1000	ug	290
Perylene	**120 J**	**1000**	**ug**	**77**
Phenanthrene	**16000**	**1000**	**ug**	**300**
Phenol	**1700**	**1000**	**ug**	**310**
1,4-Phenylenediamine	ND	10000	ug	2500
Pyrene	**5700**	**1000**	**ug**	**350**
o-Toluidine	**640 J**	**1000**	**ug**	**280**

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URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A4-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-004 **Work Order #...:** MLAH31AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

E Estimated result. Result concentration exceeds the calibration range.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A4-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-004	**Work Order #...:**	MLAH32AA	**Matrix.........:**	AIR
Date Sampled...:	07/25/11	**Date Received..:**	07/29/11		
Prep Date......:	08/02/11	**Analysis Date..:**	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	500	**Method.........:**	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
2-Methylnaphthalene	44000 D	5000	ug	1400
Naphthalene	22000 D	5000	ug	1600

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

D Result was obtained from the analysis of a dilution.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-AFB-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-005 **Work Order #...:** MLAH41AA **Matrix.........:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 07/29/11
Prep Date......: 08/02/11 **Analysis Date..:** 08/10/11
Prep Batch #...: 1214035
Dilution Factor: 2 **Method.........:** SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	20	ug	5.4
Acenaphthylene	ND	20	ug	5.6
Aniline	ND	20	ug	17
Anthracene	**6.6 J**	**20**	**ug**	**6.4**
Benz(a)anthracene	ND	20	ug	6.2
Benzidine	ND	200	ug	120
Benzo(b)fluoranthene	ND	20	ug	8.2
Benzo(k)fluoranthene	ND	20	ug	9.8
Benzo(ghi)perylene	ND	20	ug	6.4
Benzo(a)pyrene	ND	20	ug	7.6
Benzo(e)pyrene	ND	20	ug	1.7
Biphenyl	ND	20	ug	2.0
Chrysene	ND	20	ug	6.2
Cresols (total)	ND	20	ug	16
Dibenz(a,h)anthracene	ND	20	ug	6.0
Dibenzofuran	ND	20	ug	5.6
Dibenzo(a,e)pyrene	ND	20	ug	1.4
3,3'-Dimethoxybenzidine	ND	200	ug	28
p-Dimethylaminoazobenzene	ND	20	ug	4.8
7,12-Dimethylbenz(a)-anthracene	ND	20	ug	7.0
3,3'-Dimethylbenzidine	ND	200	ug	36
alpha,alpha-Dimethylphenethylamine	ND	50	ug	17
2,4-Dimethylphenol	ND	20	ug	13
Fluoranthene	ND	20	ug	7.2
Fluorene	ND	20	ug	6.0
Indeno(1,2,3-cd)pyrene	ND	20	ug	6.2
Isophorone	ND	20	ug	5.6
3-Methylcholanthrene	ND	20	ug	7.6
2-Methylnaphthalene	**42**	**20**	**ug**	**5.8**
Naphthalene	**14 J**	**20**	**ug**	**6.2**
Nitrobenzene	ND	20	ug	5.8
Perylene	ND	20	ug	1.5
Phenanthrene	**19 J**	**20**	**ug**	**6.0**
Phenol	ND	20	ug	6.2
1,4-Phenylenediamine	ND	200	ug	50
Pyrene	ND	20	ug	7.0
o-Toluidine	ND	20	ug	5.6

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URRS Austin Source Testing #1427536

Client Sample ID: BP-WV-AFB-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-005 **Work Order #...:** MLAH41AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	84	(22 - 105)
Phenol-d5	95	(48 - 118)
Nitrobenzene-d5	88	(43 - 110)
2-Fluorobiphenyl	91	(48 - 111)
2,4,6-Tribromophenol	75	(34 - 125)

NOTE(S):

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: A-6484,A-6485 MEDIA CHECK

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-011 **Work Order #...:** MLAJE1AA **Matrix.........:** AIR
Date Sampled...: 07/21/11 **Date Received..:** 07/29/11
Prep Date......: 08/02/11 **Analysis Date..:** 08/10/11
Prep Batch #...: 1214035
Dilution Factor: 2 **Method.........:** SW846 8270C

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	20	ug	5.4
Acenaphthylene	ND	20	ug	5.6
Aniline	ND	20	ug	17
Anthracene	ND	20	ug	6.4
Benz(a)anthracene	ND	20	ug	6.2
Benzidine	ND	200	ug	120
Benzo(b)fluoranthene	ND	20	ug	8.2
Benzo(k)fluoranthene	ND	20	ug	9.8
Benzo(ghi)perylene	ND	20	ug	6.4
Benzo(a)pyrene	ND	20	ug	7.6
Benzo(e)pyrene	ND	20	ug	1.7
Biphenyl	ND	20	ug	2.0
Chrysene	ND	20	ug	6.2
Cresols (total)	ND	20	ug	16
Dibenz(a,h)anthracene	ND	20	ug	6.0
Dibenzofuran	ND	20	ug	5.6
Dibenzo(a,e)pyrene	ND	20	ug	1.4
3,3'-Dimethoxybenzidine	ND	200	ug	28
p-Dimethylaminoazobenzene	ND	20	ug	4.8
7,12-Dimethylbenz(a)-anthracene	ND	20	ug	7.0
3,3'-Dimethylbenzidine	ND	200	ug	36
alpha,alpha-Dimethylphenethylamine	ND	50	ug	17
2,4-Dimethylphenol	ND	20	ug	13
Fluoranthene	ND	20	ug	7.2
Fluorene	ND	20	ug	6.0
Indeno(1,2,3-cd)pyrene	ND	20	ug	6.2
Isophorone	ND	20	ug	5.6
3-Methylcholanthrene	ND	20	ug	7.6
2-Methylnaphthalene	ND	20	ug	5.8
Naphthalene	ND	20	ug	6.2
Nitrobenzene	ND	20	ug	5.8
Perylene	ND	20	ug	1.5
Phenanthrene	ND	20	ug	6.0
Phenol	ND	20	ug	6.2
1,4-Phenylenediamine	ND	200	ug	50
Pyrene	ND	20	ug	7.0
o-Toluidine	ND	20	ug	5.6

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URS Austin Source Testing #1427536

Client Sample ID: A-6484,A-6485 MEDIA CHECK

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-011 **Work Order #...:** MLAJE1AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	81	(22 - 105)
Phenol-d5	85	(48 - 118)
Nitrobenzene-d5	82	(43 - 110)
2-Fluorobiphenyl	84	(48 - 111)
2,4,6-Tribromophenol	98	(34 - 125)

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 **Work Order #...:** MLA7X1AA **Matrix.........:** AIR
MB Lot-Sample #: H1H020000-035
Prep Date......: 08/02/11
Analysis Date..: 08/10/11 **Prep Batch #...:** 1214035
Dilution Factor: 2

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acenaphthene	ND	20	ug	SW846 8270C
Acenaphthylene	ND	20	ug	SW846 8270C
Aniline	ND	20	ug	SW846 8270C
Anthracene	ND	20	ug	SW846 8270C
Benz(a)anthracene	ND	20	ug	SW846 8270C
Benzidine	ND	200	ug	SW846 8270C
Benzo(b)fluoranthene	ND	20	ug	SW846 8270C
Benzo(k)fluoranthene	ND	20	ug	SW846 8270C
Benzo(ghi)perylene	ND	20	ug	SW846 8270C
Benzo(a)pyrene	ND	20	ug	SW846 8270C
Benzo(e)pyrene	ND	20	ug	SW846 8270C
Biphenyl	ND	20	ug	SW846 8270C
Chrysene	ND	20	ug	SW846 8270C
Cresols (total)	ND	20	ug	SW846 8270C
Dibenz(a,h)anthracene	ND	20	ug	SW846 8270C
Dibenzofuran	ND	20	ug	SW846 8270C
Dibenzo(a,e)pyrene	ND	20	ug	SW846 8270C
3,3'-Dimethoxybenzidine	ND	200	ug	SW846 8270C
p-Dimethylaminoazobenzene	ND	20	ug	SW846 8270C
7,12-Dimethylbenz(a)-anthracene	ND	20	ug	SW846 8270C
3,3'-Dimethylbenzidine	ND	200	ug	SW846 8270C
alpha,alpha-Dimethylphene	ND	50	ug	SW846 8270C
2,4-Dimethylphenol	ND	20	ug	SW846 8270C
Fluoranthene	ND	20	ug	SW846 8270C
Fluorene	ND	20	ug	SW846 8270C
Indeno(1,2,3-cd)pyrene	ND	20	ug	SW846 8270C
Isophorone	ND	20	ug	SW846 8270C
3-Methylcholanthrene	ND	20	ug	SW846 8270C
2-Methylnaphthalene	ND	20	ug	SW846 8270C
Naphthalene	ND	20	ug	SW846 8270C
Nitrobenzene	ND	20	ug	SW846 8270C
Perylene	ND	20	ug	SW846 8270C
Phenanthrene	ND	20	ug	SW846 8270C
Phenol	ND	20	ug	SW846 8270C
1,4-Phenylenediamine	ND	200	ug	SW846 8270C
Pyrene	ND	20	ug	SW846 8270C
o-Toluidine	ND	20	ug	SW846 8270C

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METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 **Work Order #...:** MLA7X1AA **Matrix.........:** AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	52	(22 - 105)
Phenol-d5	75	(48 - 118)
Nitrobenzene-d5	81	(43 - 110)
2-Fluorobiphenyl	81	(48 - 111)
2,4,6-Tribromophenol	94	(34 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 Work Order #...: MLA7X1AC-LCS Matrix.........: AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD
Prep Date......: 08/02/11 Analysis Date..: 08/10/11
Prep Batch #...: 1214035
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Acenaphthene	102	(63 - 107)			SW846 8270C
	95	(63 - 107)	6.7	(0-36)	SW846 8270C
Acenaphthylene	102	(64 - 112)			SW846 8270C
	95	(64 - 112)	7.5	(0-36)	SW846 8270C
Aniline	95	(48 - 109)			SW846 8270C
	87	(48 - 109)	8.5	(0-50)	SW846 8270C
Anthracene	104	(59 - 114)			SW846 8270C
	99	(59 - 114)	5.0	(0-36)	SW846 8270C
Benz(a)anthracene	109	(50 - 130)			SW846 8270C
	108	(50 - 130)	0.92	(0-50)	SW846 8270C
Benzidine	92	(10 - 150)			SW846 8270C
	88	(10 - 150)	3.3	(0-50)	SW846 8270C
Benzo(b)fluoranthene	120	(63 - 122)			SW846 8270C
	119	(63 - 122)	0.83	(0-50)	SW846 8270C
Benzo(k)fluoranthene	99	(69 - 118)			SW846 8270C
	98	(69 - 118)	0.81	(0-50)	SW846 8270C
Benzo(ghi)perylene	105	(71 - 122)			SW846 8270C
	103	(71 - 122)	1.9	(0-50)	SW846 8270C
Benzo(a)pyrene	99	(67 - 122)			SW846 8270C
	98	(67 - 122)	0.71	(0-50)	SW846 8270C
Benzo(e)pyrene	100	(50 - 130)			SW846 8270C
	97	(50 - 130)	3.1	(0-50)	SW846 8270C
Biphenyl	90	(50 - 130)			SW846 8270C
	82	(50 - 130)	8.8	(0-50)	SW846 8270C
Chrysene	103	(67 - 114)			SW846 8270C
	103	(67 - 114)	0.0	(0-41)	SW846 8270C
Cresols (total)	98	(50 - 130)			SW846 8270C
	92	(50 - 130)	6.3	(0-50)	SW846 8270C
Dibenz(a,h)anthracene	105	(67 - 122)			SW846 8270C
	105	(67 - 122)	0.0	(0-50)	SW846 8270C
Dibenzofuran	101	(60 - 108)			SW846 8270C
	95	(60 - 108)	6.3	(0-37)	SW846 8270C
Dibenzo(a,e)pyrene	96	(50 - 130)			SW846 8270C
	97	(50 - 130)	1.0	(0-50)	SW846 8270C
3,3'-Dimethoxybenzidine	109	(30 - 130)			SW846 8270C
	108	(30 - 130)	0.92	(0-50)	SW846 8270C
p-Dimethylaminoazobenzene	106	(50 - 130)			SW846 8270C
	106	(50 - 130)	0.0	(0-50)	SW846 8270C
7,12-Dimethylbenz(a)-anthracene	74	(50 - 130)			SW846 8270C
	73	(50 - 130)	1.9	(0-50)	SW846 8270C

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 Work Order #...: MLA7X1AC-LCS Matrix.........: AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
3,3'-Dimethylbenzidine	117	(30 - 130)			SW846 8270C
	116	(30 - 130)	0.85	(0-50)	SW846 8270C
alpha,alpha-Dimethylphenet	85	(30 - 130)			SW846 8270C
	74	(30 - 130)	13	(0-50)	SW846 8270C
2,4-Dimethylphenol	98	(10 - 125)			SW846 8270C
	92	(10 - 125)	7.0	(0-41)	SW846 8270C
Fluoranthene	110	(55 - 120)			SW846 8270C
	107	(55 - 120)	2.8	(0-34)	SW846 8270C
Fluorene	105	(64 - 114)			SW846 8270C
	99	(64 - 114)	6.2	(0-36)	SW846 8270C
Indeno(1,2,3-cd)pyrene	111	(72 - 126)			SW846 8270C
	110	(72 - 126)	0.90	(0-50)	SW846 8270C
Isophorone	101	(56 - 111)			SW846 8270C
	97	(56 - 111)	3.6	(0-37)	SW846 8270C
3-Methylcholanthrene	93	(50 - 130)			SW846 8270C
	91	(50 - 130)	1.8	(0-30)	SW846 8270C
2-Methylnaphthalene	99	(56 - 111)			SW846 8270C
	94	(56 - 111)	5.1	(0-38)	SW846 8270C
Naphthalene	103	(59 - 104)			SW846 8270C
	97	(59 - 104)	6.0	(0-38)	SW846 8270C
Nitrobenzene	93	(58 - 109)			SW846 8270C
	88	(58 - 109)	6.2	(0-38)	SW846 8270C
Perylene	98	(50 - 130)			SW846 8270C
	97	(50 - 130)	0.61	(0-50)	SW846 8270C
Phenanthrene	103	(58 - 109)			SW846 8270C
	97	(58 - 109)	6.0	(0-35)	SW846 8270C
Phenol	85	(54 - 114)			SW846 8270C
	82	(54 - 114)	4.3	(0-39)	SW846 8270C
1,4-Phenylenediamine	21	(5.0- 130)			SW846 8270C
	25	(5.0- 130)	17	(0-50)	SW846 8270C
Pyrene	104	(76 - 118)			SW846 8270C
	101	(76 - 118)	2.9	(0-41)	SW846 8270C
o-Toluidine	96	(30 - 130)			SW846 8270C
	90	(30 - 130)	6.7	(0-50)	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	54	(22 - 105)
	50	(22 - 105)
Phenol-d5	82	(48 - 118)
	77	(48 - 118)
Nitrobenzene-d5	93	(43 - 110)
	83	(43 - 110)
2-Fluorobiphenyl	95	(48 - 111)

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LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 **Work Order #...:** MLA7X1AC-LCS **Matrix.........:** AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
	86	(48 - 111)
2,4,6-Tribromophenol	111	(34 - 125)
	102	(34 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 **Work Order #...:** MLA7X1AC-LCS **Matrix.........:** AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD
Prep Date......: 08/02/11 **Analysis Date..:** 08/10/11
Prep Batch #...: 1214035
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Acenaphthene	100	102	ug	102		SW846 8270C
	100	95.4	ug	95	6.7	SW846 8270C
Acenaphthylene	100	102	ug	102		SW846 8270C
	100	94.6	ug	95	7.5	SW846 8270C
Aniline	100	94.6	ug	95		SW846 8270C
	100	86.9	ug	87	8.5	SW846 8270C
Anthracene	100	104	ug	104		SW846 8270C
	100	98.9	ug	99	5.0	SW846 8270C
Benz(a)anthracene	100	109	ug	109		SW846 8270C
	100	108	ug	108	0.92	SW846 8270C
Benzidine	200	183	ug	92		SW846 8270C
	200	177	ug	88	3.3	SW846 8270C
Benzo(b)fluoranthene	100	120	ug	120		SW846 8270C
	100	119	ug	119	0.83	SW846 8270C
Benzo(k)fluoranthene	100	99.0	ug	99		SW846 8270C
	100	98.2	ug	98	0.81	SW846 8270C
Benzo(ghi)perylene	100	105	ug	105		SW846 8270C
	100	103	ug	103	1.9	SW846 8270C
Benzo(a)pyrene	100	98.6	ug	99		SW846 8270C
	100	97.9	ug	98	0.71	SW846 8270C
Benzo(e)pyrene	100	100	ug	100		SW846 8270C
	100	96.9	ug	97	3.1	SW846 8270C
Biphenyl	100	90.0	ug	90		SW846 8270C
	100	82.4	ug	82	8.8	SW846 8270C
Chrysene	100	103	ug	103		SW846 8270C
	100	103	ug	103	0.0	SW846 8270C
Cresols (total)	200	197	ug	98		SW846 8270C
	200	185	ug	92	6.3	SW846 8270C
Dibenz(a,h)anthracene	100	105	ug	105		SW846 8270C
	100	105	ug	105	0.0	SW846 8270C
Dibenzofuran	100	101	ug	101		SW846 8270C
	100	94.8	ug	95	6.3	SW846 8270C
Dibenzo(a,e)pyrene	100	96.2	ug	96		SW846 8270C
	100	97.2	ug	97	1.0	SW846 8270C
3,3'-Dimethoxybenzidine	100	109	ug	109		SW846 8270C
	100	108	ug	108	0.92	SW846 8270C
p-Dimethylaminoazobenzene	100	106	ug	106		SW846 8270C
	100	106	ug	106	0.0	SW846 8270C
7,12-Dimethylbenz(a)-anthracene	100	74.0	ug	74		SW846 8270C
	100	72.6	ug	73	1.9	SW846 8270C

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LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 Work Order #...: MLA7X1AC-LCS Matrix.........: AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
3,3'-Dimethylbenzidine	100	117	ug	117		SW846 8270C
	100	116	ug	116	0.85	SW846 8270C
alpha,alpha-Dimethylphenet	100	84.7	ug	85		SW846 8270C
	100	74.1	ug	74	13	SW846 8270C
2,4-Dimethylphenol	100	98.3	ug	98		SW846 8270C
	100	91.6	ug	92	7.0	SW846 8270C
Fluoranthene	100	110	ug	110		SW846 8270C
	100	107	ug	107	2.8	SW846 8270C
Fluorene	100	105	ug	105		SW846 8270C
	100	98.7	ug	99	6.2	SW846 8270C
Indeno(1,2,3-cd)pyrene	100	111	ug	111		SW846 8270C
	100	110	ug	110	0.90	SW846 8270C
Isophorone	100	101	ug	101		SW846 8270C
	100	97.4	ug	97	3.6	SW846 8270C
3-Methylcholanthrene	100	92.7	ug	93		SW846 8270C
	100	91.0	ug	91	1.8	SW846 8270C
2-Methylnaphthalene	100	99.0	ug	99		SW846 8270C
	100	94.1	ug	94	5.1	SW846 8270C
Naphthalene	100	103	ug	103		SW846 8270C
	100	97.0	ug	97	6.0	SW846 8270C
Nitrobenzene	100	93.1	ug	93		SW846 8270C
	100	87.5	ug	88	6.2	SW846 8270C
Perylene	100	97.7	ug	98		SW846 8270C
	100	97.1	ug	97	0.61	SW846 8270C
Phenanthrene	100	103	ug	103		SW846 8270C
	100	97.0	ug	97	6.0	SW846 8270C
Phenol	100	85.1	ug	85		SW846 8270C
	100	81.5	ug	82	4.3	SW846 8270C
1,4-Phenylenediamine	100	21.2	ug	21		SW846 8270C
	100	25.1	ug	25	17	SW846 8270C
Pyrene	100	104	ug	104		SW846 8270C
	100	101	ug	101	2.9	SW846 8270C
o-Toluidine	100	95.9	ug	96		SW846 8270C
	100	89.7	ug	90	6.7	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	54	(22 - 105)
	50	(22 - 105)
Phenol-d5	82	(48 - 118)
	77	(48 - 118)
Nitrobenzene-d5	93	(43 - 110)
	83	(43 - 110)
2-Fluorobiphenyl	95	(48 - 111)

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LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Semivolatiles

Client Lot #...: H1H010411 **Work Order #...:** MLA7X1AC-LCS **Matrix.........:** AIR
LCS Lot-Sample#: H1H020000-035 MLA7X1AD-LCSD

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
	86	(48 - 111)
2,4,6-Tribromophenol	111	(34 - 125)
	102	(34 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Sample Data Summary

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-001	**Work Order #...:**	MLAHW2AC	**Matrix.........:**	AIR
Date Sampled...:	07/21/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/15/2011		
Prep Batch #...:	1214037				
Dilution Factor:	25000	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	3800000	500000	ng/sample	120000
Acenaphthylene	710000	500000	ng/sample	60000
Anthracene	15000000	250000	ng/sample	95000
Benzo(a)anthracene	1900000	250000	ng/sample	95000
Benzo(b)fluoranthene	870000 J	2500000	ng/sample	750000
Benzo(k)fluoranthene	ND	2500000	ng/sample	1100000
Benzo(ghi)perylene	2000000	250000	ng/sample	130000
Benzo(a)pyrene	3000000	250000	ng/sample	72000
Benzo(e)pyrene	1500000	250000	ng/sample	140000
Chrysene	2800000	250000	ng/sample	62000
Dibenz(a,h)anthracene	730000	250000	ng/sample	98000
Fluoranthene	1600000	250000	ng/sample	160000
Fluorene	15000000	250000	ng/sample	100000
Indeno(1,2,3-cd)pyrene	600000	250000	ng/sample	65000
2-Methylnaphthalene	190000000 E	1200000	ng/sample	520000
Naphthalene	120000000 E	10000000	ng/sample	6200000
Perylene	220000 J	250000	ng/sample	78000
Phenanthrene	40000000	750000	ng/sample	600000
Pyrene	6200000	1500000	ng/sample	900000

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	96	(30 - 120)
Naphthalene-d8	98	(30 - 120)
2-Methylnaphthalene-d10	102	(30 - 120)
1-Methylnaphthalene-d10	97	(30 - 120)
Acenaphthylene-d8	95	(30 - 120)
Phenanthrene-d10	96	(30 - 120)
2,6-Dimethylnaphthalene-d12	105	(30 - 120)
Fluoranthene-d10	107	(30 - 120)
Benzo(a)anthracene-d12	171 *	(30 - 120)
Chrysene-d12	116	(30 - 120)
Benzo(b)fluoranthene-d12	110	(30 - 120)
Benzo(k)fluoranthene-d12	85	(30 - 120)
Benzo(a)pyrene-d12	97	(30 - 120)
Perylene-d12	87	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	109	(30 - 120)
Dibenz(ah)anthracene-d14	112	(30 - 120)
Benzo(ghi)perylene-d12	102	(30 - 120)

NOTE(S):

* Surrogate recovery is outside stated control limits.

E Estimated result. Result concentration exceeds the calibration range.

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A2-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-002 **Work Order #...:** MLAHX2AC **Matrix.........:** AIR
Date Sampled...: 07/21/11 **Date Received..:** 07/29/2011
Prep Date......: 08/02/11 **Analysis Date..:** 08/15/2011
Prep Batch #...: 1214037
Dilution Factor: 25000 **Method.........:** KNOX ID-0016

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**3200000**	**500000**	ng/sample	120000
Acenaphthylene	**670000**	**500000**	ng/sample	60000
Anthracene	**15000000**	**250000**	ng/sample	95000
Benzo(a)anthracene	**1100000**	**250000**	ng/sample	95000
Benzo(b)fluoranthene	ND	2500000	ng/sample	750000
Benzo(k)fluoranthene	ND	2500000	ng/sample	1100000
Benzo(ghi)perylene	**620000**	**250000**	ng/sample	130000
Benzo(a)pyrene	**960000**	**250000**	ng/sample	72000
Benzo(e)pyrene	**530000**	**250000**	ng/sample	140000
Chrysene	**1600000**	**250000**	ng/sample	62000
Dibenz(a,h)anthracene	**220000 J**	**250000**	ng/sample	98000
Fluoranthene	**1900000**	**250000**	ng/sample	160000
Fluorene	**14000000**	**250000**	ng/sample	100000
Indeno(1,2,3-cd)pyrene	**170000 J**	**250000**	ng/sample	65000
2-Methylnaphthalene	**160000000 E**	**1200000**	ng/sample	520000
Naphthalene	**100000000 E**	**10000000**	ng/sample	6200000
Perylene	ND	250000	ng/sample	78000
Phenanthrene	**42000000**	**750000**	ng/sample	600000
Pyrene	**7000000**	**1500000**	ng/sample	900000

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	96	(30 - 120)
Naphthalene-d8	102	(30 - 120)
2-Methylnaphthalene-d10	106	(30 - 120)
1-Methylnaphthalene-d10	100	(30 - 120)
Acenaphthylene-d8	98	(30 - 120)
Phenanthrene-d10	95	(30 - 120)
2,6-Dimethylnaphthalene-d12	106	(30 - 120)
Fluoranthene-d10	104	(30 - 120)
Benzo(a)anthracene-d12	175 *	(30 - 120)
Chrysene-d12	126 *	(30 - 120)
Benzo(b)fluoranthene-d12	112	(30 - 120)
Benzo(k)fluoranthene-d12	86	(30 - 120)
Benzo(a)pyrene-d12	94	(30 - 120)
Perylene-d12	86	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	111	(30 - 120)
Dibenz(ah)anthracene-d14	115	(30 - 120)
Benzo(ghi)perylene-d12	105	(30 - 120)

NOTE(S):

* Surrogate recovery is outside stated control limits.

E Estimated result. Result concentration exceeds the calibration range.

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A3-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-003	**Work Order #...:**	MLAH22AC	**Matrix.........:**	AIR
Date Sampled...:	07/24/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/15/2011		
Prep Batch #...:	1214037				
Dilution Factor:	50000	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**6600000**	**1000000**	ng/sample	240000
Acenaphthylene	**1200000**	**1000000**	ng/sample	120000
Anthracene	**22000000**	**500000**	ng/sample	190000
Benzo(a)anthracene	**930000**	**500000**	ng/sample	190000
Benzo(b)fluoranthene	ND	5000000	ng/sample	1500000
Benzo(k)fluoranthene	ND	5000000	ng/sample	2200000
Benzo(ghi)perylene	**480000 J**	**500000**	ng/sample	260000
Benzo(a)pyrene	**790000**	**500000**	ng/sample	140000
Benzo(e)pyrene	**490000 J**	**500000**	ng/sample	280000
Chrysene	**1200000**	**500000**	ng/sample	120000
Dibenz(a,h)anthracene	ND	500000	ng/sample	200000
Fluoranthene	**1700000**	**500000**	ng/sample	320000
Fluorene	**26000000**	**500000**	ng/sample	200000
Indeno(1,2,3-cd)pyrene	**140000 J**	**500000**	ng/sample	130000
2-Methylnaphthalene	**370000000 E**	**2500000**	ng/sample	1000000
Naphthalene	**230000000 E**	**20000000**	ng/sample	12000000
Perylene	ND	500000	ng/sample	160000
Phenanthrene	**63000000**	**1500000**	ng/sample	1200000
Pyrene	**5900000**	**3000000**	ng/sample	1800000

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	87	(30 - 120)
Naphthalene-d8	96	(30 - 120)
2-Methylnaphthalene-d10	101	(30 - 120)
1-Methylnaphthalene-d10	96	(30 - 120)
Acenaphthylene-d8	92	(30 - 120)
Phenanthrene-d10	90	(30 - 120)
2,6-Dimethylnaphthalene-d12	103	(30 - 120)
Fluoranthene-d10	98	(30 - 120)
Benzo(a)anthracene-d12	133 *	(30 - 120)
Chrysene-d12	109	(30 - 120)
Benzo(b)fluoranthene-d12	108	(30 - 120)
Benzo(k)fluoranthene-d12	90	(30 - 120)
Benzo(a)pyrene-d12	84	(30 - 120)
Perylene-d12	80	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	110	(30 - 120)
Dibenz(ah)anthracene-d14	115	(30 - 120)
Benzo(ghi)perylene-d12	106	(30 - 120)

NOTE(S):

* Surrogate recovery is outside stated control limits.

E Estimated result. Result concentration exceeds the calibration range.

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A4-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-004	**Work Order #...:**	MLAH32AC	**Matrix.........:**	AIR
Date Sampled...:	07/25/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/15/2011		
Prep Batch #...:	1214037				
Dilution Factor:	5000	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	1500000	100000	ng/sample	24000
Acenaphthylene	220000	100000	ng/sample	12000
Anthracene	6500000	50000	ng/sample	19000
Benzo(a)anthracene	1200000	50000	ng/sample	19000
Benzo(b)fluoranthene	420000 J	500000	ng/sample	150000
Benzo(k)fluoranthene	ND	500000	ng/sample	220000
Benzo(ghi)perylene	1100000	50000	ng/sample	26000
Benzo(a)pyrene	1800000	50000	ng/sample	14000
Benzo(e)pyrene	960000	50000	ng/sample	28000
Chrysene	1800000	50000	ng/sample	12000
Dibenz(a,h)anthracene	400000	50000	ng/sample	20000
Fluoranthene	1300000	50000	ng/sample	32000
Fluorene	4900000	50000	ng/sample	20000
Indeno(1,2,3-cd)pyrene	320000	50000	ng/sample	13000
2-Methylnaphthalene	43000000 E	250000	ng/sample	100000
Naphthalene	27000000 E	2000000	ng/sample	1200000
Perylene	110000	50000	ng/sample	16000
Phenanthrene	19000000 E	150000	ng/sample	120000
Pyrene	4900000	300000	ng/sample	180000

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	83	(30 - 120)
Naphthalene-d8	91	(30 - 120)
2-Methylnaphthalene-d10	101	(30 - 120)
1-Methylnaphthalene-d10	95	(30 - 120)
Acenaphthylene-d8	90	(30 - 120)
Phenanthrene-d10	84	(30 - 120)
2,6-Dimethylnaphthalene-d12	103	(30 - 120)
Fluoranthene-d10	106	(30 - 120)
Benzo(a)anthracene-d12	152 *	(30 - 120)
Chrysene-d12	102	(30 - 120)
Benzo(b)fluoranthene-d12	104	(30 - 120)
Benzo(k)fluoranthene-d12	79	(30 - 120)
Benzo(a)pyrene-d12	83	(30 - 120)
Perylene-d12	72	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	101	(30 - 120)
Dibenz(ah)anthracene-d14	106	(30 - 120)
Benzo(ghi)perylene-d12	97	(30 - 120)

NOTE(S):

* Surrogate recovery is outside stated control limits.

E Estimated result. Result concentration exceeds the calibration range.

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-AFB-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-005	**Work Order #...:**	MLAH41AC	**Matrix.........:**	AIR
Date Sampled...:	07/26/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/11/2011		
Prep Batch #...:	1214037				
Dilution Factor:	2	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	1100	40	ng/sample	9.8
Acenaphthylene	180	40	ng/sample	4.8
Anthracene	5800 E	20	ng/sample	7.6
Benzo(a)anthracene	700	20	ng/sample	7.6
Benzo(b)fluoranthene	270	200	ng/sample	60
Benzo(k)fluoranthene	140 J	200	ng/sample	86
Benzo(ghi)perylene	500	20	ng/sample	10
Benzo(a)pyrene	770	20	ng/sample	5.8
Benzo(e)pyrene	450	20	ng/sample	11
Chrysene	1800	20	ng/sample	5.0
Dibenz(a,h)anthracene	250	20	ng/sample	7.8
Fluoranthene	1400	20	ng/sample	13
Fluorene	5100 E	20	ng/sample	8.2
Indeno(1,2,3-cd)pyrene	180	20	ng/sample	5.2
2-Methylnaphthalene	22000 E	100	ng/sample	42
Naphthalene	12000 E	800	ng/sample	500
Perylene	53	20	ng/sample	6.2
Phenanthrene	13000 E	60	ng/sample	48
Pyrene	4400	120	ng/sample	72

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Fluorene d-10	122	(50 - 150)
Terphenyl-d14	87	(50 - 150)
13C6-Fluorene	101	(50 - 150)
Anthracene-d10	81	(30 - 120)
Naphthalene-d8	77	(30 - 120)
2-Methylnaphthalene-d10	82	(30 - 120)
Acenaphthylene-d8	100	(30 - 120)
Phenanthrene-d10	71	(30 - 120)
Fluoranthene-d10	93	(30 - 120)
Benzo(a)anthracene-d12	113	(30 - 120)
Chrysene-d12	46	(30 - 120)
Benzo(b)fluoranthene-d12	94	(30 - 120)
Benzo(k)fluoranthene-d12	66	(30 - 120)
Benzo(a)pyrene-d12	91	(30 - 120)
Perylene-d12	79	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	96	(30 - 120)
Dibenz(ah)anthracene-d14	96	(30 - 120)
Benzo(ghi)perylene-d12	90	(30 - 120)

NOTE(S):

1 13C6-anthracene recovery = 63 %

E Estimated result. Result concentration exceeds the calibration range.

J Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-AFB-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-005	**Work Order #...:**	MLAH42AC	**Matrix.........:**	AIR
Date Sampled...:	07/26/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/11/2011		
Prep Batch #...:	1214037				
Dilution Factor:	20	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Anthracene	**6500 D**	**200**	ng/sample	76
Fluorene	**5600 D**	**200**	ng/sample	82
2-Methylnaphthalene	**42000 D**	**1000**	ng/sample	420
Naphthalene	**17000 D**	**8000**	ng/sample	5000
Phenanthrene	**22000 D**	**600**	ng/sample	480

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	94	(30 - 120)
Naphthalene-d8	75	(30 - 120)
2-Methylnaphthalene-d10	81	(30 - 120)
Phenanthrene-d10	82	(30 - 120)

NOTE(S):

D Result was obtained from the analysis of a dilution.

URS Austin Source Testing #1427536

Client Sample ID: A-6484,A-6485 MEDIA CHECK

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-011	**Work Order #...:**	MLAJE1AC	**Matrix.........:**	AIR
Date Sampled...:	07/21/11	**Date Received..:**	07/29/2011		
Prep Date......:	08/02/11	**Analysis Date..:**	08/11/2011		
Prep Batch #...:	1214037				
Dilution Factor:	2	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	40	ng/sample	9.8
Acenaphthylene	ND	40	ng/sample	4.8
Anthracene	ND	20	ng/sample	7.6
Benzo(a)anthracene	ND	20	ng/sample	7.6
Benzo(b)fluoranthene	ND	200	ng/sample	60
Benzo(k)fluoranthene	ND	200	ng/sample	86
Benzo(ghi)perylene	ND	20	ng/sample	10
Benzo(a)pyrene	ND	20	ng/sample	5.8
Benzo(e)pyrene	ND	20	ng/sample	11
Chrysene	ND	20	ng/sample	5.0
Dibenz(a,h)anthracene	ND	20	ng/sample	7.8
Fluoranthene	ND	20	ng/sample	13
Fluorene	**11 J**	**20**	ng/sample	8.2
Indeno(1,2,3-cd)pyrene	ND	20	ng/sample	5.2
2-Methylnaphthalene	ND	100	ng/sample	42
Naphthalene	ND	800	ng/sample	500
Perylene	ND	20	ng/sample	6.2
Phenanthrene	ND	60	ng/sample	48
Pyrene	ND	120	ng/sample	72

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	98	(30 - 120)
Naphthalene-d8	91	(30 - 120)
2-Methylnaphthalene-d10	97	(30 - 120)
Acenaphthylene-d8	110	(30 - 120)
Phenanthrene-d10	84	(30 - 120)
Fluoranthene-d10	100	(30 - 120)
Benzo(a)anthracene-d12	138 *	(30 - 120)
Chrysene-d12	96	(30 - 120)
Benzo(b)fluoranthene-d12	112	(30 - 120)
Benzo(k)fluoranthene-d12	86	(30 - 120)
Benzo(a)pyrene-d12	105	(30 - 120)
Perylene-d12	99	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	109	(30 - 120)
Dibenz(ah)anthracene-d14	108	(30 - 120)
Benzo(ghi)perylene-d12	103	(30 - 120)

NOTE(S):

* Surrogate recovery is outside stated control limits.

J Estimated result. Result is less than RL.

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...:	H1H010411				
MB Lot-Sample #:	H1H020000-037	**Work Order #...:**	MLA711AA	**Matrix.........:**	AIR
Prep Date......:	08/02/11	**Analysis Date..:**	08/11/2011		
Prep Batch #...:	1214037				
Dilution Factor:	2	**Method.........:**	KNOX ID-0016		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	ND	40	ng/sample	9.8
Acenaphthylene	ND	40	ng/sample	4.8
Anthracene	ND	20	ng/sample	7.6
Benzo(a)anthracene	ND	20	ng/sample	7.6
Benzo(b)fluoranthene	ND	200	ng/sample	60
Benzo(k)fluoranthene	ND	200	ng/sample	86
Benzo(ghi)perylene	ND	20	ng/sample	10
Benzo(a)pyrene	ND	20	ng/sample	5.8
Benzo(e)pyrene	ND	20	ng/sample	11
Chrysene	ND	20	ng/sample	5.0
Dibenz(a,h)anthracene	ND	20	ng/sample	7.8
Fluoranthene	ND	20	ng/sample	13
Fluorene	ND	20	ng/sample	8.2
Indeno(1,2,3-cd)pyrene	ND	20	ng/sample	5.2
2-Methylnaphthalene	ND	100	ng/sample	42
Naphthalene	ND	800	ng/sample	500
Perylene	ND	20	ng/sample	6.2
Phenanthrene	ND	60	ng/sample	48
Pyrene	ND	120	ng/sample	72

Internal Standard	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	98	(30 - 120)
Naphthalene-d8	88	(30 - 120)
2-Methylnaphthalene-d10	94	(30 - 120)
Acenaphthylene-d8	107	(30 - 120)
Phenanthrene-d10	85	(30 - 120)
Fluoranthene-d10	98	(30 - 120)
Benzo(a)anthracene-d12	133 *	(30 - 120)
Chrysene-d12	96	(30 - 120)
Benzo(b)fluoranthene-d12	106	(30 - 120)
Benzo(k)fluoranthene-d12	87	(30 - 120)
Benzo(a)pyrene-d12	103	(30 - 120)
Perylene-d12	99	(30 - 120)
Indeno(1,2,3-cd)pyrene-d12	111	(30 - 120)
Dibenz(ah)anthracene-d14	110	(30 - 120)
Benzo(ghi)perylene-d12	104	(30 - 120)

NOTE(S):

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1 13C6-anthracene recovery = 75 %

* Surrogate recovery is outside stated control limits.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...:	H1H010411	Work Order #...:	MLA711AC-LCS MLA711AD-LCSD	Matrix......:	AIR
LCS Lot-Sample#:	H1H020000-037				
Prep Date .....:	08/02/11	Analysis Date..:	08/11/11		
Prep Batch #...:	1214037				
Dilution Factor:	1			Method......:	KNOX ID-0016

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS
Acenaphthene	250	234	ng/sample	94	(60 - 140)		
	250	236	ng/sample	94	(60 - 140)	0.85	(0-25)
Acenaphthylene	250	233	ng/sample	93	(60 - 140)		
	250	232	ng/sample	93	(60 - 140)	0.43	(0-25)
Anthracene	250	224	ng/sample	90	(60 - 140)		
	250	224	ng/sample	90	(60 - 140)	0.0	(0-25)
Benzo(a)anthracene	250	201	ng/sample	80	(60 - 140)		
	250	203	ng/sample	81	(60 - 140)	0.99	(0-25)
Benzo(b)fluoranthene	250	212	ng/sample	85	(60 - 140)		
	250	208	ng/sample	83	(60 - 140)	1.9	(0-25)
Benzo(k)fluoranthene	250	264	ng/sample	106	(60 - 140)		
	250	264	ng/sample	106	(60 - 140)	0.0	(0-25)
Benzo(ghi)perylene	250	242	ng/sample	97	(60 - 140)		
	250	240	ng/sample	96	(60 - 140)	0.83	(0-25)
Benzo(a)pyrene	250	241	ng/sample	96	(60 - 140)		
	250	239	ng/sample	96	(60 - 140)	0.83	(0-25)
Benzo(e)pyrene	250	220	ng/sample	88	(60 - 140)		
	250	217	ng/sample	87	(60 - 140)	1.4	(0-25)
Chrysene	250	267	ng/sample	107	(60 - 140)		
	250	263	ng/sample	105	(60 - 140)	1.5	(0-25)
Dibenz(a,h)anthracene	250	253	ng/sample	101	(60 - 140)		
	250	241	ng/sample	96	(60 - 140)	4.8	(0-25)
Fluoranthene	250	238	ng/sample	95	(60 - 140)		
	250	236	ng/sample	94	(60 - 140)	0.84	(0-25)
Fluorene	250	257	ng/sample	103	(60 - 140)		
	250	256	ng/sample	102	(60 - 140)	0.39	(0-25)
Indeno(1,2,3-cd)pyrene	250	234	ng/sample	94	(60 - 140)		
	250	229	ng/sample	92	(60 - 140)	2.2	(0-25)
2-Methylnaphthalene	250	273	ng/sample	109	(60 - 140)		
	250	274	ng/sample	110	(60 - 140)	0.36	(0-25)
Naphthalene	2000	2080	ng/sample	104	(60 - 140)		
	2000	2100	ng/sample	105	(60 - 140)	0.95	(0-25)
Perylene	250	231	ng/sample	92	(60 - 140)		
	250	229	ng/sample	92	(60 - 140)	0.87	(0-25)
Phenanthrene	250	266	ng/sample	106	(60 - 140)		
	250	269	ng/sample	108	(60 - 140)	1.1	(0-25)
Pyrene	250	232	ng/sample	93	(60 - 140)		
	250	230	ng/sample	92	(60 - 140)	0.86	(0-25)

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
Anthracene-d10	98	(60 - 140)
	98	(60 - 140)
Naphthalene-d8	92	(60 - 140)
	92	(60 - 140)
2-Methylnaphthalene-d10	98	(60 - 140)
	97	(60 - 140)
1-Methylnaphthalene-d10	94	(60 - 140)

(Continued on next Page)

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...:	H1H010411	**Work Order #...:**	MLA711AC-LCS	**Matrix......:**	AIR
LCS Lot-Sample#:	H1H020000-037		MLA711AD-LCSD		

INTERNAL STANDARD	PERCENT RECOVERY	RECOVERY LIMITS
	94	(60 - 140)
Acenaphthylene-d8	111	(60 - 140)
	111	(60 - 140)
Phenanthrene-d10	87	(60 - 140)
	86	(60 - 140)
2,6-Dimethylnaphthalene-d12	100	(60 - 140)
	98	(60 - 140)
Fluoranthene-d10	102	(60 - 140)
	102	(60 - 140)
Benzo(a)anthracene-d12	144 *	(60 - 140)
	119	(60 - 140)
Chrysene-d12	95	(60 - 140)
	79	(60 - 140)
Benzo(b)fluoranthene-d12	116	(60 - 140)
	114	(60 - 140)
Benzo(k)fluoranthene-d12	88	(60 - 140)
	88	(60 - 140)
Benzo(a)pyrene-d12	110	(60 - 140)
	110	(60 - 140)
Perylene-d12	102	(60 - 140)
	102	(60 - 140)
Indeno(1,2,3-cd)pyrene-d12	116	(60 - 140)
	120	(60 - 140)
Dibenz(ah)anthracene-d14	112	(60 - 140)
	120	(60 - 140)
Benzo(ghi)perylene-d12	109	(60 - 140)
	112	(60 - 140)

Note(s):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

* Surrogate recovery is outside stated control limits.

Sample Receipt Documentation

URS

Chain of Custody Record

41H010411

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A1-M0010-PNR-Ace	PNR - Acetone	7/21/11 0355	X			X			HOLD ALL 'A1' SAMPLES - EXTRACT BUT DO NOT ANALYZE. Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A1-M0010-PNR-MeCl	PNR - Methylene Chloride		X			X			
BP-WV-A1-M0010-Filt	Filter		X			X			
BP-WV-A1-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X			X			
BP-WV-A1-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X			X			
BP-WV-A1-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X			X			
BP-WV-A1-M0010-XAD	XAD Sorbent Cartridge		X			X			
BP-WV-A1-M0010-PostCondA	Post-XAD Condensate - Bottle A		X			X			
BP-WV-A1-M0010-PostCondB	Post-XAD Condensate - Bottle B		X			X			
BP-WV-A1-M0010-CR-Ace	Condenser Rns - Acetone		X			X			
BP-WV-A1-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X			X			
BP-WV-A1-M0010-IR-Ace	Impinger Rinse - Acetone		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	1745						

Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	17:45			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks 3 cooler's Rec'd @ 2°c
without custody Seal
7/29/11
3 cooler's Hand delivered

6x1L
2x500
4x250
HL/XAD

41H0D411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A1-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/21/11 0355	X			X			HOLD ALL 'A1' SAMPLES - EXTRACT BUT DO NOT ANALYZE. Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

H1H010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M0010-PNR-Ace	PNR - Acetone	7/21/11 2231	**X**						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A2-M0010-PNR-MeCl	PNR - Methylene Chloride		**X**						
BP-WV-A2-M0010-Filt	Filter		**X**						
BP-WV-A2-M0010-PreCondA	Pre-XAD Condensate - Bottle A		**X**						
BP-WV-A2-M0010-PreCondB	Pre-XAD Condensate - Bottle B		**X**						
BP-WV-A2-M0010-PreCondC	Pre-XAD Condensate - Bottle C		**X**						
BP-WV-A2-M0010-XAD	XAD Sorbent Cartridge		**X**						
BP-WV-A2-M0010-PostCondA	Post-XAD Condensate - Bottle A		**X**						
BP-WV-A2-M0010-PostCondB	Post-XAD Condensate - Bottle B		**X**						
BP-WV-A2-M0010-CR-Ace	Condenser Rns - Acetone		**X**						
BP-WV-A2-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		**X**						
BP-WV-A2-M0010-IR-Ace	Impinger Rinse - Acetone		**X**						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks
8x1L
4x500
2x250
FIL/XAD

41H010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/21/11 2231	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

L-11H010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A3-M0010-PNR-Ace	PNR - Acetone	7/24/11 2125	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A3-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-A3-M0010-Filt	Filter		X						
BP-WV-A3-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X						
BP-WV-A3-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X						
BP-WV-A3-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X						
BP-WV-A3-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-A3-M0010-PostCondA	Post-XAD Condensate - Bottle A		X						
BP-WV-A3-M0010-PostCondB	Post-XAD Condensate - Bottle B		X						
BP-WV-A3-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-A3-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						
BP-WV-A3-M0010-IR-Ace	Impinger Rinse - Acetone		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	1745						
Received by:	Date	Time	Relinquished by:	Date	Time			
	7/29/11	17:45						

Received for Lab by	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

8X1L
6X250
FIL/XAD

URS

Chain of Custody Record

H1H010411

Samples from SW-846 Method 0010 Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A3-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/24/11 2125	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks:

URS

Chain of Custody Record H1H010411

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A4-M0010-PNR-Ace	PNR - Acetone	7/25/11 1543	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A4-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-A4-M0010-Filt	Filter		X						
BP-WV-A4-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X						
BP-WV-A4-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X						
BP-WV-A4-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X						
BP-WV-A4-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-A4-M0010-PostCondA	Post-XAD Condensate - Bottle A		X						
BP-WV-A4-M0010-PostCondB	Post-XAD Condensate - Bottle B		X						
BP-WV-A4-M0010-PostCondC			X						
BP-WV-A4-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-A4-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

6x1L
6x250
Fil/XAD

4114010411

URS

Chain of Custody Record

Page 2 of 2

Samples from SW-846 Method 0010 Sampling Trains

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A4-M0010-IR-Ace	Impinger Rinse - Acetone	7/25/11 1543	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A4-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

4117010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-AFB-M0010-PNR-Ace	PNR - Acetone	7/26/11 1727	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-AFB-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-AFB-M0010-Filt	Filter		X						
BP-WV-AFB-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-AFB-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-AFB-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						
BP-WV-AFB-M0010-IR-Ace	Impinger Rinse - Acetone	7/24/11 1330	X						
BP-WV-TARB-M0010-Filt	Filter		X						
BP-WV-TARB-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-TARB-M0010-Ace	Acetone		X						
BP-WV-TARB-M0010-MeCl	Methylene Chloride		X						
BP-WV-TARB-M0010-Water	Water		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

6x250
XAD
FIL

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Lot Number: H1H010411

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	4A Hand delivered 5A BP-WV-A1-M0010-PostCond C not listed on COC " " A2 " " " C, D, E, not listed " " A3 " " " " " " " " 5A BP-FB-M0010-1R-MeCl not on COC.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C)	✓			☐ 2a Temp Blank = ____ ☐ 2b Cooler Temp = ____ ☐ 2c Cooling initiated for recently collected samples, ice present.	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?		✓		☑ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? ____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 89172 PM Instructions: ____

Sample Receiving Associate: ____ Date: ~~7/29/11~~ 8/1/11

Semivolatiles

Raw Sample Data

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...:	H1H010411-001	**Work Order #...:**	MLAHW1AA	**Matrix.........:**	AIR
Date Sampled...:	07/21/11	**Date Received..:**	07/29/11		
Prep Date......:	08/02/11	**Analysis Date..:**	08/10/11		
Prep Batch #...:	1214035				
Dilution Factor:	500	**Method.........:**	SW846 8270C		

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Acenaphthene	**3200 J**	**5000**	**ug**	**1400**
Acenaphthylene	ND	5000	ug	1400
Aniline	ND	5000	ug	4300
Anthracene	**16000**	**5000**	**ug**	**1600**
Benz(a)anthracene	**2800 J**	**5000**	**ug**	**1600**
Benzidine	ND	50000	ug	30000
Benzo(b)fluoranthene	ND	5000	ug	2000
Benzo(k)fluoranthene	ND	5000	ug	2400
Benzo(ghi)perylene	**2000 J**	**5000**	**ug**	**1600**
Benzo(a)pyrene	**4200 J**	**5000**	**ug**	**1900**
Benzo(e)pyrene	**1600 J**	**5000**	**ug**	**420**
Biphenyl	**5700**	**5000**	**ug**	**500**
Chrysene	**3000 J**	**5000**	**ug**	**1600**
Cresols (total)	**9500**	**5000**	**ug**	**4000**
Dibenz(a,h)anthracene	ND	5000	ug	1500
Dibenzofuran	**4800 J**	**5000**	**ug**	**1400**
Dibenzo(a,e)pyrene	**2800 J**	**5000**	**ug**	**340**
3,3'-Dimethoxybenzidine	ND	50000	ug	7000
p-Dimethylaminoazobenzene	ND	5000	ug	1200
7,12-Dimethylbenz(a)-anthracene	ND	5000	ug	1800
3,3'-Dimethylbenzidine	ND	50000	ug	9000
alpha,alpha-Dimethylphenethylamine	ND	12000	ug	4200
2,4-Dimethylphenol	**5000**	**5000**	**ug**	**3300**
Fluoranthene	**1800 J**	**5000**	**ug**	**1800**
Fluorene	**14000**	**5000**	**ug**	**1500**
Indeno(1,2,3-cd)pyrene	ND	5000	ug	1600
Isophorone	ND	5000	ug	1400
3-Methylcholanthrene	ND	5000	ug	1900
2-Methylnaphthalene	**190000 E**	**5000**	**ug**	**1400**
Naphthalene	**110000 E**	**5000**	**ug**	**1600**
Nitrobenzene	ND	5000	ug	1400
Perylene	ND	5000	ug	380
Phenanthrene	**36000**	**5000**	**ug**	**1500**
Phenol	**2800 J**	**5000**	**ug**	**1600**
1,4-Phenylenediamine	ND	50000	ug	12000
Pyrene	**7100**	**5000**	**ug**	**1800**
o-Toluidine	ND	5000	ug	1400

(Continued on next page)

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-A1-M0010-COMBINED

GC/MS Semivolatiles

Lot-Sample #...: H1H010411-001 **Work Order #...:** MLAHW1AA **Matrix.........:** AIR

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
2-Fluorophenol	NC,DIL	(22 - 105)
Phenol-d5	NC,DIL	(48 - 118)
Nitrobenzene-d5	NC,DIL	(43 - 110)
2-Fluorobiphenyl	NC,DIL	(48 - 111)
2,4,6-Tribromophenol	NC,DIL	(34 - 125)

NOTE(S):

NC The recovery and/or RPD were not calculated.

DIL The concentration is estimated or not reported due to dilution or the presence of interfering analytes.

J Estimated result. Result is less than RL.

E Estimated result. Result concentration exceeds the calibration range.

Sample Receipt Documentation

URS

Chain of Custody Record

41H010411

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A1-M0010-PNR-Ace	PNR - Acetone	7/21/11 0355	X			X			HOLD ALL 'A1' SAMPLES - EXTRACT BUT DO NOT ANALYZE. Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A1-M0010-PNR-MeCl	PNR - Methylene Chloride		X			X			
BP-WV-A1-M0010-Filt	Filter		X			X			
BP-WV-A1-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X			X			
BP-WV-A1-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X			X			
BP-WV-A1-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X			X			
BP-WV-A1-M0010-XAD	XAD Sorbent Cartridge		X			X			
BP-WV-A1-M0010-PostCondA	Post-XAD Condensate - Bottle A		X			X			
BP-WV-A1-M0010-PostCondB	Post-XAD Condensate - Bottle B		X			X			
BP-WV-A1-M0010-CR-Ace	Condenser Rns - Acetone		X			X			
BP-WV-A1-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X			X			
BP-WV-A1-M0010-IR-Ace	Impinger Rinse - Acetone		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks: 3 cooler's Rec'd @ 2°C without custody Seal ~~[illegible]~~ 7/29/11 3 cooler's Hand delivered

6x1L
2x500
4x250
HL/XAD

H1H0D411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A1-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/21/11 0355	X			X			HOLD ALL 'A1' SAMPLES - EXTRACT BUT DO NOT ANALYZE. Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks:

H1A010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M0010-PNR-Ace	PNR - Acetone	7/21/11 2231	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A2-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-A2-M0010-Filt	Filter		X						
BP-WV-A2-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X						
BP-WV-A2-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X						
BP-WV-A2-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X						
BP-WV-A2-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-A2-M0010-PostCondA	Post-XAD Condensate - Bottle A		X						
BP-WV-A2-M0010-PostCondB	Post-XAD Condensate - Bottle B		X						
BP-WV-A2-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-A2-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						
BP-WV-A2-M0010-IR-Ace	Impinger Rinse - Acetone		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks:
8x1L
4x500
2x250
FIL/XAD

4117010411

URS

Chain of Custody Record

<u>Samples from SW-846 Method 0010 Sampling Trains</u>

Page 2 of 2

Project DCU3

Site BP-Husky Toledo

Project Number 40942317

Prepared by URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A2-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/21/11 2231	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

L11H010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 2

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A3-M0010-PNR-Ace	PNR - Acetone	7/24/11 2125	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A3-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-A3-M0010-Filt	Filter		X						
BP-WV-A3-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X						
BP-WV-A3-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X						
BP-WV-A3-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X						
BP-WV-A3-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-A3-M0010-PostCondA	Post-XAD Condensate - Bottle A		X						
BP-WV-A3-M0010-PostCondB	Post-XAD Condensate - Bottle B		X						
BP-WV-A3-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-A3-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						
BP-WV-A3-M0010-IR-Ace	Impinger Rinse - Acetone		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

6X12
6X250
FIL/XAD

URS

Chain of Custody Record H1H010411

Page 2 of 2

Samples from SW-846 Method 0010 Sampling Trains

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A3-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride	7/24/11 2125	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

URS

Chain of Custody Record H1H010411

Page 1 of 2

Samples from SW-846 Method 0010 Sampling Trains

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A4-M0010-PNR-Ace	PNR - Acetone	7/25/11 1543	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A4-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-A4-M0010-Filt	Filter		X						
BP-WV-A4-M0010-PreCondA	Pre-XAD Condensate - Bottle A		X						
BP-WV-A4-M0010-PreCondB	Pre-XAD Condensate - Bottle B		X						
BP-WV-A4-M0010-PreCondC	Pre-XAD Condensate - Bottle C		X						
BP-WV-A4-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-A4-M0010-PostCondA	Post-XAD Condensate - Bottle A		X						
BP-WV-A4-M0010-PostCondB	Post-XAD Condensate - Bottle B		X						
BP-WV-A4-M0010-PostCondC			X						
BP-WV-A4-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-A4-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by: Wonlede	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks:

6x1L
6x250
FIL/XAD

4117010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-A4-M0010-IR-Ace	Impinger Rinse - Acetone	7/25/11 1543	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-A4-M0010-IR-MeCl	Impinger Rinse - Methylene Chloride		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	1745						
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			
	7/29/11	17:45						

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks:

4117010411

URS

Chain of Custody Record

Samples from SW-846 Method 0010 Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Semivolatile Organic Compounds by GC/MS - SW-846 Method			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-AFB-M0010-PNR-Ace	PNR - Acetone	7/26/11 1727	X						Combine for single extraction and analysis per EPA Refinery ICR instructions. Delayed coking unit vent gas matrix contains high concentrations of some SVOCs (e.g., naphthalene) and will require significant dilutions.
BP-WV-AFB-M0010-PNR-MeCl	PNR - Methylene Chloride		X						
BP-WV-AFB-M0010-Filt	Filter		X						
BP-WV-AFB-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-AFB-M0010-CR-Ace	Condenser Rns - Acetone		X						
BP-WV-AFB-M0010-CR-MeCl	Condenser Rns - Methylene Chloride		X						
BP-WV-AFB-M0010-IR-Ace	Impinger Rinse - Acetone	7/24/11 1330	X						
BP-WV-TARB-M0010-Filt	Filter		X						
BP-WV-TARB-M0010-XAD	XAD Sorbent Cartridge		X						
BP-WV-TARB-M0010-Ace	Acetone		X						
BP-WV-TARB-M0010-MeCl	Methylene Chloride		X						
BP-WV-TARB-M0010-Water	Water		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks:

6x250
XAD
Filt

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Lot Number: H1H010411

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ 1a Do not match COC ☐ 1b Incomplete information ☐ 1c Marking smeared ☐ 1d Label torn ☐ 1e No label ☐ 1f COC not received ☐ 1g Other:	4A Hand delivered 5A BP-WV-A1-M0010-PostCond C not listed on coc " " A2 " " " C, D, E, not listed " " A3 " " " " " " " 5A BP-FB-M0010-1R-MeCl not on coc.
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C)	✓			☐ 2a Temp Blank = _____ ☐ 2b Cooler Temp = _____ ☐ 2c Cooling initiated for recently collected samples, ice present.	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ 3a Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ 4a Not present ☐ 4b Not intact ☐ 4c Other:	
5. Were all of the samples listed on the COC received?		✓		☑ 5a Samples received-not on COC ☐ 5b Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ 6a Leaking ☐ 6b Broken	
7. Were VOA samples received without headspace?			✓	☐ 7a Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ 8a Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ 9a Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ 10a Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? _____	
13. Are the shipping containers intact?	✓			☐ 13a Leaking ☐ 13b Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ 14a Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ 15a Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ 15a Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ 15a Incomplete information	
18. Is the client and project name/# identified?	✓			☐ 15a Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 89172 PM Instructions: _____

Sample Receiving Associate: _____ Date: ~~7/29/11~~ 8/1/11

QA026R22.doc, 012811

Spreadsheet Calculations

				SAMPLEBP-WV-A1-M0010-COMBINED dil500		SAMPLEBP-WV-A1-M0010-COMBINED dil2000		SAMPLEBP-WV-A1-M0010-COMBINED dil25000		SAMPLEBP-WV-A2-M0010-COMBINED dil500		SAMPLEBP-WV-A2-M0010-COMBINED dil1000		SAMPLEBP-WV-A2-M0010-COMBINED dil25000		SAMPLEBP-WV-A3-M0010-COMBINED dil500		SAMPLEBP-WV-A3-M0010-COMBINED dil3000		SAMPLEBP-WV-A3-M0010-COMBINED dil50000		SAMPLEBP-WV-A4-M0010-COMBINED dil100		SAMPLEB P-WV-A4-M0010-COMBINE Ddil500		SAMPLEB P-WV-A4-M0010-COMBINE Ddil5000		SAMPLEB P-WV-AFB M0010-COMBINE Ddil2		SAMPLEB P-WV-AFB M0010-COMBINE Ddil20	
				SAMPLEBP-WV-A1-M0010-COMBINED dil500 q result	PLEB P-WV A1- M001 0- flags	SAMPLEBP-WV-A1-M0010-COMBINED dil2000 q result	PLEB P- WV- A1- M00 flags	SAMPLEBP-WV-A1-M0010-COMBINED dil25000 q result	PLEB P-WV A1- M001 0- flags	SAMPLEBP-WV-A2-M0010-COMBINED dil500 q result	SAMPLEBP-WV-A2-M0010-COMBINED dil500 flags	SAMPLEBP-WV-A2-M0010-COMBINED dil1000 q result	SAMPLEBP-WV-A2-M0010-COMBINED dil1000 flags	SAMPLEBP-WV-A2-M0010-COMBINED dil25000 q result	SAMPLEBP-WV-A2-M0010-COMBINED dil25000 flags	SAMPLEBP-WV-A3-M0010-COMBINED dil500 q result	SAMPLEBP-WV-A3-M0010-COMBINED dil500 flags	SAMPLEBP-WV-A3-M0010-COMBINED dil3000 q result	SAMPLEBP-WV-A3-M0010-COMBINED dil3000 flags	SAMPLEBP-WV-A3-M0010-COMBINED dil50000 q result	SAMPLEBP-WV-A3-M0010-COMBINED dil50000 flags	SAMPLEBP-WV-A4-M0010-COMBINED dil100 q result	SAMPLEB P-WV-A4-M0010-COMBINE Ddil100 flags	SAMPLEB P-WV-A4-M0010-COMBINE Ddil500 q result	SAMPLEB P-WV-A4-M0010-COMBINE Ddil500 flags	SAMPLEB P-WV-A4-M0010-COMBINE Ddil5000 q result	SAMPLEB P-WV-A4-M0010-COMBINE Ddil5000 flags	SAMPLEB P-WV-AFB M0010-COMBINE Ddil2 q result	SAMPLEB P-WV-AFB M0010-COMBINE Ddil2 flags	SAMPLEB P-WV-AFB M0010-COMBINE Ddil20 q result	SAMPLEB P-WV-AFB M0010-COMBINE Ddil20 flags
54	TRG1,4-Phenylenediamine	TRG1,4-Phenylenediamine	FALSE	<12000	0	–	–	–	–	<12000	0	–	–	–	–	<12000	0	–	–	–	–	<2500	0	–	–	–	–	<50	0	–	–
42	TRG2,4-Dimethylphenol	TRG2,4-Dimethylphenol	FALSE	5000	0	–	–	–	–	5800	0	–	–	–	–	6600	0	–	–	–	–	2000	0	–	–	–	–	<11	0	–	–
48	TRG2-Methylnaphthalene	TRG2-Methylnaphthalene	FALSE	190000	E	190000	D	–	–	150000	E	160000	D	–	–	140000	E	320000	D	–	–	45000	E	44000	D	–	–	42	0	–	–
15	TRG2-MethylnaphthaleneKNID-0016	TRG2-Methylnaphthalene	TRUE	–	–	–	–	190000000	E	–	–	–	–	160000000	E	–	–	–	–	170000000	E	–	–	–	–	43000000	E	22000	E	42000	D
37	TRG3,3'-Dimethoxybenzidine	TRG3,3'-Dimethoxybenzidine	FALSE	<7000	0	–	–	–	–	<7000	0	–	–	–	–	<7000	0	–	–	–	–	<1400	0	–	–	–	–	<28	0	–	–
40	TRG3,3'-Dimethylbenzidine	TRG3,3'-Dimethylbenzidine	FALSE	<9000	0	–	–	–	–	<9000	0	–	–	–	–	<9000	0	–	–	–	–	<1800	0	–	–	–	–	<36	0	–	–
47	TRG3-Methylcholanthrene	TRG3-Methylcholanthrene	FALSE	<1900	0	–	–	–	–	<1900	0	–	–	–	–	<1900	0	–	–	–	–	<380	0	–	–	–	–	<7.6	0	–	–
39	TRG7,12-Dimethylbenz(a)anthracene	TRG7,12-Dimethylbenz(a)anthracene	FALSE	<1800	0	–	–	–	–	<1800	0	–	–	–	–	<1800	0	–	–	–	–	590	J	–	–	–	–	<7	0	–	–
20	TRGAcenaphthene	TRGAcenaphthene	FALSE	3200	J	–	–	–	–	2400	J	–	–	–	–	4900	J	–	–	–	–	1000	0	–	–	–	–	<5.4	0	–	–
1	TRGAcenaphtheneKNID-0016	TRGAcenaphthene	TRUE	–	–	–	–	3800000	0	–	–	–	–	3200000	0	–	–	–	–	4600000	0	–	–	–	–	1500000	0	1100	0	–	–
21	TRGAcenaphthylene	TRGAcenaphthylene	FALSE	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<290	0	–	–	–	–	<5.6	0	–	–
2	TRGAcenaphthyleneKNID-0016	TRGAcenaphthylene	TRUE	–	–	–	–	710000	0	–	–	–	–	670000	0	–	–	–	–	1200000	0	–	–	–	–	220000	0	180	0	–	–
41	TRGalpha,alpha-Dimethylphenethylaml	TRGalpha,alpha-Dimethylphenethylaml	FALSE	<4200	0	–	–	–	–	<4200	0	–	–	–	–	<4200	0	–	–	–	–	<830	0	–	–	–	–	<17	0	–	–
22	TRGAniline	TRGAniline	FALSE	<4300	0	–	–	–	–	<4300	0	–	–	–	–	<4300	0	–	–	–	–	<860	0	–	–	–	–	<17	0	–	–
23	TRGAnthracene	TRGAnthracene	FALSE	16000	0	–	–	–	–	15000	0	–	–	–	–	22000	0	–	–	–	–	6100	0	–	–	–	–	6.6	J	–	–
3	TRGAnthraceneKNID-0016	TRGAnthracene	TRUE	–	–	–	–	15000000	0	–	–	–	–	15000000	0	–	–	–	–	22000000	0	–	–	–	–	6500000	0	5800	E	6500	D
24	TRGBenz(a)anthracene	TRGBenz(a)anthracene	FALSE	2000	J	–	–	–	–	1600	J	–	–	–	–	<1600	0	–	–	–	–	1500	0	–	–	–	–	<6.2	0	–	–
25	TRGBenzidine	TRGBenzidine	FALSE	<30000	0	–	–	–	–	<30000	0	–	–	–	–	<30000	0	–	–	–	–	<6000	0	–	–	–	–	<120	0	–	–
4	TRGBenzo(a)anthraceneKNID-0016	TRGBenzo(a)anthracene	FALSE	–	–	–	–	1900000	0	–	–	–	–	1100000	0	–	–	–	–	930000	0	–	–	–	–	1200000	0	700	0	–	–
26	TRGBenzo(a)pyrene	TRGBenzo(a)pyrene	FALSE	4200	J	–	–	–	–	2200	J	–	–	–	–	2100	J	–	–	–	–	1700	0	–	–	–	–	<7.6	0	–	–
5	TRGBenzo(a)pyreneKNID-0016	TRGBenzo(a)pyrene	TRUE	–	–	–	–	3000000	0	–	–	–	–	980000	0	–	–	–	–	790000	0	–	–	–	–	1800000	0	770	0	–	–
27	TRGBenzo(b)fluoranthene	TRGBenzo(b)fluoranthene	FALSE	<2000	0	–	–	–	–	<2000	0	–	–	–	–	<2000	0	–	–	–	–	530	J	–	–	–	–	<8.2	0	–	–
6	TRGBenzo(b)fluorantheneKNID-0016	TRGBenzo(b)fluoranthene	TRUE	–	–	–	–	870000	J	–	–	–	–	<780000	0	–	–	–	–	<1800000	0	–	–	–	–	420000	J	270	0	–	–
28	TRGBenzo(e)pyrene	TRGBenzo(e)pyrene	FALSE	1600	J	–	–	–	–	570	J	–	–	–	–	670	J	–	–	–	–	900	J	–	–	–	–	<1.7	0	–	–
7	TRGBenzo(e)pyreneKNID-0016	TRGBenzo(e)pyrene	TRUE	–	–	–	–	1500000	0	–	–	–	–	830000	0	–	–	–	–	490000	J	–	–	–	–	980000	0	450	0	–	–
29	TRGBenzo(ghi)perylene	TRGBenzo(ghi)perylene	FALSE	2000	J	–	–	–	–	<1600	0	–	–	–	–	<1600	0	–	–	–	–	1100	0	–	–	–	–	<6.4	0	–	–
8	TRGBenzo(ghi)peryleneKNID-0016	TRGBenzo(ghi)perylene	TRUE	–	–	–	–	2000000	0	–	–	–	–	620000	0	–	–	–	–	480000	J	–	–	–	–	1100000	0	500	0	–	–
30	TRGBenzo(k)fluoranthene	TRGBenzo(k)fluoranthene	FALSE	<2400	0	–	–	–	–	<2400	0	–	–	–	–	<2400	0	–	–	–	–	<490	0	–	–	–	–	<9.8	0	–	–
9	TRGBenzo(k)fluorantheneKNID-0016	TRGBenzo(k)fluoranthene	TRUE	–	–	–	–	<1100000	0	–	–	–	–	<1100000	0	–	–	–	–	<2200000	0	–	–	–	–	<220000	0	140	J	–	–
31	TRGBiphenyl	TRGBiphenyl	FALSE	5700	0	–	–	–	–	4700	J	–	–	–	–	8700	0	–	–	–	–	1600	0	–	–	–	–	<2	0	–	–
32	TRGChrysene	TRGChrysene	FALSE	3000	J	–	–	–	–	1600	J	–	–	–	–	<1600	0	–	–	–	–	1800	0	–	–	–	–	<6.2	0	–	–
10	TRGChryseneKNID-0016	TRGChrysene	TRUE	–	–	–	–	2800000	0	–	–	–	–	1600000	0	–	–	–	–	1200000	0	–	–	–	–	1800000	0	1800	0	–	–
33	TRGCresols (total)	TRGCresols (total)	FALSE	9500	0	–	–	–	–	18000	0	–	–	–	–	12000	0	–	–	–	–	4800	0	–	–	–	–	<16	0	–	–
34	TRGDibenz(a,h)anthracene	TRGDibenz(a,h)anthracene	FALSE	<1500	0	–	–	–	–	<1500	0	–	–	–	–	<1500	0	–	–	–	–	510	J	–	–	–	–	<6	0	–	–
11	TRGDibenz(a,h)anthraceneKNID-0016	TRGDibenz(a,h)anthracene	TRUE	–	–	–	–	730000	0	–	–	–	–	220000	J	–	–	–	–	<2000000	0	–	–	–	–	400000	0	250	0	–	–
35	TRGDibenzo(a,e)pyrene	TRGDibenzo(a,e)pyrene	FALSE	2800	J	–	–	–	–	<340	0	–	–	–	–	<340	0	–	–	–	–	610	J	–	–	–	–	<1.4	0	–	–
36	TRGDibenzofuran	TRGDibenzofuran	FALSE	4800	J	–	–	–	–	4000	J	–	–	–	–	2900	0	–	–	–	–	1100	0	–	–	–	–	<5.6	0	–	–
43	TRGFluoranthene	TRGFluoranthene	FALSE	1800	J	–	–	–	–	2000	J	–	–	–	–	1900	J	–	–	–	–	1500	0	–	–	–	–	<7.2	0	–	–
12	TRGFluorantheneKNID-0016	TRGFluoranthene	TRUE	–	–	–	–	1600000	0	–	–	–	–	1900000	0	–	–	–	–	1700000	0	–	–	–	–	1300000	0	1400	0	–	–
44	TRGFluorene	TRGFluorene	FALSE	14000	0	–	–	–	–	11000	0	–	–	–	–	21000	0	–	–	–	–	4200	0	–	–	–	–	<6	0	–	–
13	TRGFluoreneKNID-0016	TRGFluorene	TRUE	–	–	–	–	15000000	0	–	–	–	–	14000000	0	–	–	–	–	26000000	0	–	–	–	–	4900000	0	5100	E	5600	D
45	TRGIndeno(1,2,3-cd)pyrene	TRGIndeno(1,2,3-cd)pyrene	FALSE	<1600	0	–	–	–	–	<1600	0	–	–	–	–	<1600	0	–	–	–	–	420	J	–	–	–	–	<6.2	0	–	–
14	TRGIndeno(1,2,3-cd)pyreneKNID-0016	TRGIndeno(1,2,3-cd)pyrene	TRUE	–	–	–	–	600000	0	–	–	–	–	170000	J	–	–	–	–	140000	J	–	–	–	–	320000	0	180	0	–	–
46	TRGIsophorone	TRGIsophorone	FALSE	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<280	0	–	–	–	–	<5.6	0	–	–
49	TRGNaphthalene	TRGNaphthalene	FALSE	110000	E	110000	D	–	–	88000	0	–	–	–	–	200000	E	190000	D	–	–	23000	E	22000	D	–	–	14	J	–	–
16	TRGNaphthaleneKNID-0016	TRGNaphthalene	TRUE	–	–	–	–	120000000	E	–	–	–	–	100000000	E	–	–	–	–	230000000	E	–	–	–	–	27000000	E	12000	E	17000	D
50	TRGNitrobenzene	TRGNitrobenzene	FALSE	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<1400	0	–	–	–	–	<290	0	–	–	–	–	<5.8	0	–	–
56	TRGo-Toluidine	TRGo-Toluidine	FALSE	<1400	0	–	–	–	–	1800	J	–	–	–	–	2300	J	–	–	–	–	640	J	–	–	–	–	<3.6	0	–	–
38	TRGp-Dimethylaminoazobenzene	TRGp-Dimethylaminoazobenzene	FALSE	<1200	0	–	–	–	–	<1200	0	–	–	–	–	<1200	0	–	–	–	–	<240	0	–	–	–	–	<4.8	0	–	–
51	TRGPerylene	TRGPerylene	FALSE	<380	0	–	–	–	–	<380	0	–	–	–	–	<380	0	–	–	–	–	120	J	–	–	–	–	<1.5	0	–	–
17	TRGPeryleneKNID-0016	TRGPerylene	TRUE	–	–	–	–	220000	J	–	–	–	–	<78000	0	–	–	–	–	<110000	0	–	–	–	–	110000	0	53	0	–	–
52	TRGPhenanthrene	TRGPhenanthrene	FALSE	36000	0	–	–	–	–	35000	0	–	–	–	–	14000	0	–	–	–	–	16000	0	–	–	–	–	19	J	–	–
18	TRGPhenanthreneKNID-0016	TRGPhenanthrene	TRUE	–	–	–	–	40000000	0	–	–	–	–	42000000	0	–	–	–	–	63000000	0	–	–	–	–	19000000	E	13000	E	22000	D
53	TRGPhenol	TRGPhenol	FALSE	2800	J	–	–	–	–	6300	0	–	–	–	–	4300	J	–	–	–	–	1700	0	–	–	–	–	<6.2	0	–	–
55	TRGPyrene	TRGPyrene	FALSE	7100	0	–	–	–	–	7400	0	–	–	–	–	8900	0	–	–	–	–	5700	0	–	–	–	–	<7	0	–	–
19	TRGPyreneKNID-0016	TRGPyrene	TRUE	–	–	–	–	6200000	0	–	–	–	–	7000000	0	–	–	–	–	3900000	0	–	–	–	–	4900000	0	4400	0	–	–

		a1	a2	a3	a4
TRG1,4-Phenylenediamine	FALSE	<12000	<12000	<12000	<2500
TRG2,4-Dimethylphenol	FALSE	5000	5800	6600	2000
TRG2-Methylnaphthalene	FALSE	190000	160000	330000	44000
TRG3,3'-Dimethoxybenzidine	FALSE	<7000	<7000	<7000	<1400
TRG3,3'-Dimethylbenzidine	FALSE	<9000	<9000	<9000	<1800
TRG3-Methylcholanthrene	FALSE	<1900	<1900	<1900	<380
TRG7,12-Dimethylbenz(a)anthracene	FALSE	<1800	<1800	<1800	590
TRGAcenaphthene	FALSE	3800	3200	6600	1000
TRGAcenaphthylene	FALSE	710	670	1200	220
TRGalpha,alpha-Dimethylphenethylamine	FALSE	<4200	<4200	<4200	<830
TRGAniline	FALSE	<4300	<4300	<4300	<860
TRGAnthracene	FALSE	16000	15000	22000	6100
TRGBenz(a)anthracene	FALSE	2800	1600	<1600	1500
TRGBenzidine	FALSE	1900	1100	930	1200
TRGBenzo(a)anthracene	FALSE	--	--	--	--
TRGBenzo(a)pyrene	FALSE	3000	960	790	1700
TRGBenzo(b)fluoranthene	FALSE	870	<750	<1500	420
TRGBenzo(e)pyrene	FALSE	1500	530	490	960
TRGBenzo(ghi)perylene	FALSE	2000	620	480	1100
TRGBenzo(k)fluoranthene	FALSE	<1100	<1100	<2200	<220
TRGBiphenyl	FALSE	5700	4700	8700	1000
TRGChrysene	FALSE	2800	1600	1200	1800
TRGCresols (total)	FALSE	9500	15000	12000	4500
TRGDibenz(a,h)anthracene	FALSE	730	220	<200	400
TRGDibenzo(a,e)pyrene	FALSE	2800	<340	<340	610
TRGDibenzofuran	FALSE	4800	4000	7900	1100
TRGFluoranthene	FALSE	1600	1900	1700	1500
TRGFluorene	FALSE	14000	11000	21000	4200
TRGIndeno(1,2,3-cd)pyrene	FALSE	600	170	140	320
TRGIsophorone	FALSE	<1400	<1400	<1400	<280
TRGNaphthalene	FALSE	110000	88000	190000	22000
TRGNitrobenzene	FALSE	<1400	<1400	<1400	<290
TRGo-Toluidine	FALSE	<1400	1800	2300	640
TRGp-Dimethylaminoazobenzene	FALSE	<1200	<1200	<1200	<240
TRGPerylene	FALSE	220	<78	<160	110
TRGPhenanthrene	FALSE	36000	35000	54000	16000
TRGPhenol	FALSE	2800	6300	4300	1700
TRGPyrene	FALSE	7100	7400	5900	5700

Field Data Sheets

Sample Type: **Semivolatile Organics (Method 0010)**	Date 7/21/11	Condition - A	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF NA	Run 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A164041	Operator RF	Initial 0.005 @ 20"
Location (Source) – DCU3 West Vent	DGMCF 0.990	Nozzle Dia (in) 0.190	Final 0.005 @ 23"
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID M0010 -1	Pitot Tube ID n/a
Elevation (relative to Barometer) (ft) 0	Kf NA	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calibration Caliper ID 700904 — 0.192 / 0.189 \ 0.190		Bar. Press. (in. Hg) 29.	Initial (+) (-)
		Stat. Press. (in. H_2O) n/a	Final (+) n/a (-)

Point	5-min Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) ~~Stack~~ XAD	Probe	Filter	Cond Exit	Imp Exit	DGM In	DGM Out	Ht Trc Exit	Vacuum (in. Hg)
P3	0215	459.910		1.0	67	320	344	60	66	93	91	252	2"
	0220	460.450		0	62	276	344	65	80	92	91	253	20"
	0225	460.598		0	63	270	344	64	84	92	90	250	20"
	0230	460.779		0	53	267	344	65	84	92	90	249	20"
	0235	460.935		0	51	267	343	65	85	92	90	249	20
	0240	461.083		0	65	266	347	65	84	92	90	250	20
	0245	461.227		0	52	267	345	64	84	92	90	250	20
	0250	461.374		0	60	267	345	60	80	92	89	250	20
	0255	461.554		0	58	266	345	61	80	92	89	250	20
	0300	461.713		0	59	267	344	60	81	92	89	250	20
	0305	461.867		0	59	268	344	57	82	92	91	250	20
	0310	462.042		0	56	267	343	54	83	92	89	250	20
	0315	462.210		0	57	265	345	54	83	92	90	250	20
	0320	462.375		0	61	265	343	55	84	92	89	250	20
	0325	462.554		0	59	265	345	53	84	92	89	250	20
	0330	462.720		0	60	265	343	52	85	91	89	250	20
	0335	~~462.902~~	RF 7/21 462.902	0	61	267	344	53	85	92	89	250	20
	0340	463.083		0	61	268	344	53	82	91	89	250	20
	0345	463.242		0	60	268	349	52	82	91	89	250	20
	0350	463.428		0	56	269	348	52	82	91	89	250	20
	0355	463.587		0	59	244	338	50	82	91	89	250	20
0356	~~3:55:30~~	463.694											

Comments:

SDS-09 Semis by SW-846 0010
Per EM SOP-030
Revision Date: April 2011

Sample Type: **Semivolatile Organics (Method 0010)**	Date 7/21/11	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number – 40942317	Console No A167041	Operator RF	Initial 0.006 @ 22"
Location (Source) – DCU3 East Vent	DGMCF 0.990	Nozzle Dia (in) 0.190	Final 0.005 @ 24"
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID M0010-1	Pitot Tube ID
Elevation (relative to Barometer) (ft)	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calibration		Bar. Press. (in. Hg) 29.00	Initial (+) (-)
Caliper ID 700904	0.190 / 0.189 / 0.190	Stat. Press. (in. H₂O) n/a	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)								Vacuum (in. Hg)
					XAD ~~Stack~~	Probe	Filter	Cond Exit	Imp Exit	DGM In	DGM Out	Ht Trc Exit	
2A	2057	465.89		1.0	42	335	334	51	86	110	109	130*	20
	2102	466.406		0	42	296	333	62	95	110	108	189	20
	2107	466.575		0	61	286	337	62	98	109	107	225	20
	2112	466.724		0	40	283	334	67	101	109	106	280	20
	2117	466.870		0	72	284	334	63	101	109	106	293	20
	2122	467.028		0	70	286	335	77	102	109	106	298	20
	2127	467.206		0	63	287	334	75	102	109	106	298	20
	2132	467.387		0	56	285	334	58	101	109	106	275	20
	2137	467.578		0	57	283	333	55	101	109	107	264	20
	2142	467.741		0	54	282	334	54	101	109	106	260	20
	2147	467.940		0	55	282	334	53	101	109	106	252	20
	2152	468.110		0	55	282	334	53	101	109	106	259	20
	2157	468.293		0	56	281	334	53	101	109	106	261	20
	2202	468.461		0	55	282	334	52	102	109	106	260	20
	2207	468.621		0	54	282	334	52	99	109	106	264	20
	2212	468.783		0	54	283	335	52	98	110	107	267	20
	2217	468.913		0	55	283	334	51	99	110	107	254	20
	2222	469.041		0	58	283	335	52	100	110	106	259	20
	2227	469.174		0	58	284	335	53	100	110	107	255	20
STOP	2231	469.215											

Comments: * was not heating correctly at start of run

SDS-09 Semis by SW-846 0010
Per EM SOP-030
Revision Date: April 2011

Sample Type: **Semivolatile Organics (Method 0010)**	Date July 24th 2011	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number – 40942317	Console No. A1167041	Operator EDF	Initial 0.006 @ 20"
Location (Source) – DCU3 East Vent	DGMCF 0.990	Nozzle Dia (in) 0.190	Final 0.002 @ 21"
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID M0010-1	Pitot Tube ID n/a
Elevation (relative to Barometer) (ft) 0	Kf N/A	Barometer ID BR-2	Pitot Tube Leak Check
Nozzle Calibration		Bar. Press. (in. Hg) 29.16	Initial (+) (-)
Caliper ID 700904	0.190 0.190 0.191	Stat. Press. (in. H_2O)	Final (+) n/a (-)

Point	5-min Clock Time	Dry Gas Vol. (ft³)	X40(F°) ~~ΔP (in. H_2O)~~	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	Cond Exit	Imp Exit	DGM In	DGM Out	Ht Trc Exit	Vacuum (in. Hg)
P2A	19:55	472.800	46		N/A	374	337	129	86	95	94	299	20
↓	20:00	473.515	46			326	335	61	90	94	92	300	20
	20:05	473.860	46			319	336	61	90	94	92	302	20
	20:10	474.215	47			318	334	58	89	94	92	301	20
	20:15	474.560	45			318	335	63	89	94	91	298	20
	20:20	474.825	45			318	334	61	89	94	91	297	20
	20:25	475.065	44			319	335	60	89	94	91	297	20
	20:30	475.495	45			319	335	57	89	94	91	297	20
	20:35	475.835	44			320	335	57	90	94	91	299	20
	20:40	476.330	45			321	335	56	89	94	91	300	20
	20:45	476.840	46			321	336	89	86	94	91	302	20
	20:50	477.240	45			320	338	60	84	94	91	301	20
	20:55	477.620	45			320	338	55	85	93	90	299	20
	21:00	478.000	46			320	337	58	84	93	90	297	20
	21:05	478.385	45			320	336	58	85	92	89	298	20
	21:10	478.775	44			321	334	68	86	92	89	299	20
	21:15	479.175	46			320	335	58	86	93	89	298	20
↓	21:20	479.590	46			321	335	58	86	93	89	299	20
STOP	21:25	480.025	46			320	334	57	86	93	89	300	20

Comments:

SDS-09 Semis by SW-846 0010
Per EM SOP-030
Revision Date: April 2011

Sample Type: **Semivolatile Organics (Method 0010)**	Date 7/25/11	Condition A	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 4	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A167041	Operator RF	Initial 0.006 @ 22"
Location (Source) – DCU3	DGMCF 0.990	Nozzle Dia (in) 0.190	Final 0.005 @ 21"
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID M0010-1	Pitot Tube ID n/a
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID BP-2	Pitot Tube Leak Check
Nozzle Calibration Caliper ID 700904	0.190 0.189 0.190	Bar. Press. (in. Hg) 29.20	Initial (+) n/a (-)
		Stat. Press. (in. H_2O) n/a	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)								Vacuum (in. Hg)
					XAD ~~Stack~~	Probe	Filter	Cond Exit	Imp Exit	DGM In	DGM Out	Ht Trc Exit	
P3A	2:40 PM	481.710	1	1.0	75	373	338	51	91	102	101	255	20
	2:45	~~48[illegible].989~~ RF ~~7/25~~	481.989	0	69	332	337	58	89	102	99	255	20
	2:50	482.068		0	59	324	337	55	89	101	99	256	20
	2:55	482.156		0	42	320	336	53	87	101	99	256	20
	3:00	482.255		0	42	315	336	54	86	102	99	256	20
	3:05	482.344		0	42	312	337	58	86	102	99	256	20
	3:10	482.429		0	42	310	338	55	86	102	100	256	20
	3:15	482.495		0	44	309	337	54	87	103	100	256	20
	3:20	482.581		0	40	308	337	53	87	103	101	256	20
	3:25	482.652		0	41	308	337	53	88	104	101	256	20
	3:30	482.728		0	40	308	337	51	87	104	101	256	20
	3:35	482.827		0	40	309	338	51	88	105	102	256	20
	3:40	482.923		0	40	309	338	50	88	105	102	256	20
STOP	3:43 PM	482.975											

Comments:

SDS-09 Semis by SW-846 0010
Per EM SOP-030
Revision Date: April 2011

Sample Type: **Semivolatile Organics (Method 0010)**	Date 7/26/11	Condition FB	Page 1 of
Plant Name – BP-Husky Toledo	PTCF NA	Run FB	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A167041	Operator AR	Initial see @ below
Location (Source) – DCU3	DGMCF 0.990	Nozzle Dia (in) NA	Final @
Duct Dimension(s) 8"	ΔH@ 1.937	Nozzle ID NA	~~Pitot Tube ID~~
Elevation (relative to Barometer) (ft) 0'	Kf NA	Barometer ID NA	~~Pitot Tube Leak Check~~ NA
Nozzle Calibration Caliper ID NA ● NA ● NA ● NA		Bar. Press. (in. Hg) NA	~~Initial (+) (-)~~
		Stat. Press. (in. H_2O) NA	~~Final (+) (-)~~

					Temperature (°F)								
Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Stack	Probe	Filter	Cond Exit	Imp Exit	DGM In	DGM Out	Ht Trc Exit	Vacuum (in. Hg)
	1725	483.600	0.004	@15"									
		483.681											
	1727	483.681	0.006	@15									
		483.930											

Comments:

Sample Recovery Sheets

Project No. 40942317.02
Recovered by (Initials) NR
Balance ID — PE6000

Semi-Volatile Organics
SW-846 – Method 0010

Condition No. A
Run No. 1
Date: 7/21/11

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	3277.0	-	922.8	=	2304.2
2	--		KO Fatty	3438.3	-	958.0	=	2480.3
3	H₂O	200	Mod Fatty	3672.1	-	1333.9	=	2338.2
4	H₂O	100	G/S	789.2	-	764.5	=	24.7
5	--		KO	628.0	-	573.5	=	54.5
6	Zinc Acetate	200	G/S	704.0	-	854.7		-150.7
7	Zinc Acetate	200	G/S	716.5	-	847.9		-131.4
8	--		KO	792.9		614.4		178.5
9	Silica Gel	~ 300g	Mod.	986.1	-	926.6	=	59.5
						Total Net Gain (g)	=	7157.8

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-UW - A1 -M0010-PNR -Ace -MeCl	2	Probe and Nozzle Rinse
___-___-M0010-Filt	1	Filter
___-___-M0010-CR -Ace -MeCl	2	Condenser Rinse
___-___-M0010-XAD	1	XAD
___-___-M0010-~~Imps~~ Pre Cond	~~2~~ 3	Impinger Catch
___-___-M0010-IR -Ace -MeCl	2	Impinger Rinse

___-___-M0010-Post Cond 3

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone and methylene chloride into appropriate PNR bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean pre-rinsed , glass petri dish. Complete Filt sample label.

✓ Seal XAD trap ends. Complete XAD sample label.

✓ Rinse front half of filter holder three times with acetone and methylene chloride into appropriate PNR bottle. Complete PNR sample labels.

✓ Pour contents of first impinger in Pre Cond bottle(s).

✓ Rinse coil condenser, back half of filter holder, impinger, and all connecting glassware between the filter and XAD three times with acetone and methylene chloride into the appropriate CR (condenser rinse) bottle. Complete CR sample labels.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first post-XAD ~~three~~ impinger~~s~~ (condensate) into the Post Cond ~~Imps (impinger catch)~~ bottle(s). Complete ~~Imps~~ Post Cond sample labels.

✓ Rinse the first post-XAD impinger and connecting glassware with acetone and methylene chloride three times into the appropriate IR (impinger rinse) bottle(s). Complete IR sample labels.

✓ Log samples into logbook and place in refrigerator or ice chest.

RDS-10 Semis SW-846 Method 0010
- Per EM SOP-030
Revision Date: April 2011

Project No. 40942317

Recovered by (Initials) KMM

Semi-Volatile Organics
SW-846 – Method 0010

Condition No. A

Run No. 2

Date 7/21/11

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	3246.6	-	923.1	=	2323.5
2	--		KO Fatty	3397.1	-	959.0	=	2438.1
3	H_2O	200	Mod Fatty	3491.4	-	1320.0	=	2171.4
4	H_2O	100	G / S	763.7	-	742.8	=	20.9
5	--		Mod	574.7	-	574.8	=	-0.1
6	Zinc Acetate	200	G/S	734.5	-	803.7	=	-69.2
7	Zinc Acetate	200	G/S	714.4	-	824.4	=	-110
8	--		KO	755.8	-	613.3	=	142.5
9	Silica Gel	~ 300g	Mod.	1039.6	-	987.5	=	52.1
				Total Net Gain (g) =				

Sample Log

Sample ID Number	No. of Sample Containers	Description
QQWV - AL -M0010-PNR-Ace	1	Probe and Nozzle Rinse - Acetone
____-____-M0010-PNR-MeCl	1	Probe and Nozzle Rinse – Methylene Chloride
____-____-M0010-Filt	1	Filter
____-____-M0010-CR-Ace	1	Condenser Rinse - Acetone
____-____-M0010-CR-MeCl	1	Condenser Rinse – Methylene Chloride
____-____-M0010-XAD	1	XAD
____-____-M0010-PreCond	3 (A-C)	Pre-XAD Impinger Catch
____-____-M0010-PostCond	5 (A-E)	Post-XAD Impinger Catch
____-____-M0010-IR-Ace	1	Impinger Rinse - Acetone
____-____-M0010-IR-MeCl	1	Impinger Rinse – Methylene Chloride

Sample Recovery Checklist

AT LOCATION

____ Rinse and brush probe and nozzle three times each with acetone and then methylene chloride into separate PNR bottles.

IN LABORATORY

✓ Separate filter holder and place filter in clean pre-rinsed, glass petri dish. Complete Filt sample label.

✓ Seal XAD trap ends. Complete XAD sample label.

✓ Rinse front half of filter holder three times each with acetone and methylene chloride into separate PNR bottles. Complete PNR sample labels.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first impinger (pre-XAD) in PreCond bottle(s). Complete PreCond sample labels.

✓ Rinse coil condenser, back half of filter holder, first impinger, and all connecting glassware between the filter and XAD three times each with acetone and methylene chloride into two separate CR (condenser rinse) bottles. Complete CR sample labels.

✓ Pour contents of second impinger (post-XAD) into the PostCond bottle(s). Complete PostCond sample labels.

✓ Rinse the second impinger and connecting glassware with acetone and methylene chloride three times each into two separate IR (impinger rinse) bottle(s). Complete IR sample labels.

✓ Log samples into logbook and place in refrigerator or ice chest.

Project No. 40942317

Recovered by (Initials) Kum

Semi-Volatile Organics
SW-846 – Method 0010

Condition No. A

Run No. 3

Date 7/24/11

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	3270.9	-	922.4	=	2348.5
2	--		KO Fatty	3405.4	-	958.0	=	2447.4
3	H_2O	200	Mod Fatty	2809.4	-	1323.5	=	1485.9
4	H_2O	100	G / S	743.5	-	743.2	=	0.3
5	--		Mod	575.9	-	575.7	=	0.2
6	Zinc Acetate	200	G/S	729.9	-	810.4	=	-80.5
7	Zinc Acetate	200	G/S	727.6	-	817.1	=	-89.5
8	--		KO	773.5	-	613.5	=	160
9	Silica Gel	~ 300g	Mod.	986.6	-	960.6	=	26
						Total Net Gain (g)	=	6298.3

Sample Log

Sample ID Number	No. of Sample Containers	Description
BPWV - A3 -M0010-PNR-Ace	1	Probe and Nozzle Rinse - Acetone
____-____-M0010-PNR-MeCl	1	Probe and Nozzle Rinse – Methylene Chloride
____-____-M0010-Filt	1	Filter
____-____-M0010-CR-Ace	1	Condenser Rinse - Acetone
____-____-M0010-CR-MeCl	1	Condenser Rinse – Methylene Chloride
____-____-M0010-XAD	1	XAD
____-____-M0010-PreCond	3	Pre-XAD Impinger Catch
____-____-M0010-PostCond	5	Post-XAD Impinger Catch
____-____-M0010-IR-Ace	1	Impinger Rinse - Acetone
____-____-M0010-IR-MeCl	1	Impinger Rinse – Methylene Chloride

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle three times each with acetone and then methylene chloride into separate PNR bottles.

IN LABORATORY

✓ Separate filter holder and place filter in clean pre-rinsed, glass petri dish. Complete Filt sample label.

✓ Seal XAD trap ends. Complete XAD sample label.

✓ Rinse front half of filter holder three times each with acetone and methylene chloride into separate PNR bottles. Complete PNR sample labels.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first impinger (pre-XAD) in PreCond bottle(s). Complete PreCond sample labels.

✓ Rinse coil condenser, back half of filter holder, first impinger, and all connecting glassware between the filter and XAD three times each with acetone and methylene chloride into two separate CR (condenser rinse) bottles. Complete CR sample labels.

✓ Pour contents of second impinger (post-XAD) into the PostCond bottle(s). Complete PostCond sample labels.

✓ Rinse the second impinger and connecting glassware with acetone and methylene chloride three times each into two separate IR (impinger rinse) bottle(s). Complete IR sample labels.

✓ Log samples into logbook and place in refrigerator or ice chest.

Project No. 40942317
Recovered by (Initials) KMM
Balance ID TE4101A

Semi-Volatile Organics
SW-846 – Method 0010

Condition No. A
Run No. 4
Date: 7/25/11

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	3265.6	-	923.2	=	2342.4
2	--		KO Fatty	3210.3	-	959.8	=	1350.5
3	H₂O	200	Mod Fatty	1288.6	-	1336.5	=	-47.9
4	H₂O	100	G/S	750.4	-	750.7	=	-0.3
5	--		KO	576.0	-	575.9	=	0.1
6	Zinc Acetate	200	G/S	716.8	-	872.9	=	-156.1
7	Zinc Acetate	200	G/S	950.9	-	~~8~~860.5	=	90.4
8	--		KO	679.3	-	614.7	=	64.6
9	Silica Gel	~ 300g	Mod.	944.4	-	~~923~~927.3	=	17.1
						Total Net Gain (g)	=	3660.8

Sample Log

Sample ID Number	No. of Sample Containers	Description
BPWV - A4 -M0010-PNR	1	Probe and Nozzle Rinse
______-______-M0010-Filt	1	Filter
______-______-M0010-CR Acc MeCl	2	~~Pre~~ Condenser Rinse
______-______-M0010-XAD	1	XAD
______-______-M0010-~~Imps~~ PreCon	3	Pre XAD Impinger Catch
______-______-M0010-IR Acc MeCl	2	Impinger Rinse
BPWV-A4-M0010-PostCon	3	Post XAD Condensor ~~Rins~~

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone and methylene chloride into PNR bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean pre-rinsed , glass petri dish. Complete Filt sample label.

✓ Seal XAD trap ends. Complete XAD sample label.

✓ Rinse front half of filter holder three times with acetone and methylene chloride into PNR bottle. Complete PNR sample label.

✓ Rinse coil condenser, back half of filter holder and all connecting glassware between the filter and XAD three times with acetone and methylene chloride into the CR (condenser rinse) bottle. Complete CR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first three impingers (condensate) into the Imps (impinger catch) bottle(s). Complete Imps sample label. *

✓ Rinse the impinger and connecting glassware with acetone and methylene chloride three times into the IR (impinger rinse) bottle(s). Complete IR sample label.

✓ Log samples into logbook and place in refrigerator or ice chest.

* pre and post XAD imp catch in separate bottles

RDS-10 Semis SW-846 Method 0010
Per EM SOP-030
Revision Date: April 2011

Project No. 40942317
Recovered by (Initials) KMM
Balance ID TE4101A

Semi-Volatile Organics
SW-846 – *Method 0010*

Condition No. A
Run No. FB
Date: 7/26/14

Moisture Determination

Impinger No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	--		KO Fatty	919.1	-	922.7	=	-3.6
2	--		KO Fatty	954.1	-	958.6	=	-4.5
3	H_2O	200	Mod Fatty	1288.8	-	1289.0	=	-0.2
4	H_2O	100	G/S	750.5	-	750.4	=	0.1
5	--		KO	576.2	-	576.0	=	0.2
6	Zinc Acetate	200	G/S			—		
7	Zinc Acetate	200	G/S			—		
8	--		KO			—		
9	Silica Gel	~ 300g	Mod.	950.8	-	944.4	=	6.4
				Total Net Gain (g)			=	-1.6

Sample Log

Sample ID Number	No. of Sample Containers	Description
BPWP-FB-M0010-PNR ACE MeCl	2	Probe and Nozzle Rinse
-M0010-Filt	1	Filter
-M0010-CR ACE MeCl	2	Condenser Rinse
-M0010-XAD	1	XAD
-M0010-Imps	—	Impinger Catch
-M0010-IR ACE MeCl	2	Impinger Rinse

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with acetone and methylene chloride into PNR bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean pre-rinsed , glass petri dish. Complete Filt sample label.

✓ Seal XAD trap ends. Complete XAD sample label.

✓ Rinse front half of filter holder three times with acetone and methylene chloride into PNR bottle. Complete PNR sample label.

✓ Rinse coil condenser, back half of filter holder and all connecting glassware between the filter and XAD three times with acetone and methylene chloride into the CR (condenser rinse) bottle. Complete CR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first three impingers (condensate) into the Imps (impinger catch) bottle(s). Complete Imps sample label.

✓ Rinse the impinger and connecting glassware with acetone and methylene chloride three times into the IR (impinger rinse) bottle(s). Complete IR sample label.

✓ Log samples into logbook and place in refrigerator or ice chest.

RDS-10 Semis SW-846 Method 0010
Per EM SOP-030
Revision Date: April 2011

Section S

Method OTM-29 – HCN

Laboratory Report

URS Corporation

9400 Amberglen Blvd
Austin, TX 78729

BP-Husky Refining LLC - DCU3
Toledo, OH

Project # 40942317
PO # 253716.US

Analytical Report
(0711-09)

EPA Method 26A

Hydrogen chloride, Hydrogen fluoride
Chloride

EPA OTM 29

Hydrogen cyanide

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I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)

This analytical report was prepared in Portable Document Format (.PDF) and contains 190 pages.

Bonnie L Evans

QA Review Performed by – Bonnie L Evans

Report Issued: 09/14/2011

Summary of Results

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA OTM 29

Client #	40942317
Job #	0711-09
# Samples	6 Runs, 6 Blanks, 1 Spike

Compound	Sample ID / Catch Weight (ug)		
	C1-NaOH	***C2-NaOH***	***C3-NaOH***
Hydrogen Cyanide	463	36.5 ND	424
	CFB-NaOH	***EntFS-Field Spike***	***EntRB-0.1N NaOH***
Hydrogen Cyanide	35.4 ND	844	1.49 ND
	EntRB-6N NaOH		
Hydrogen Cyanide	7.30 ND		
	C1-PbA-ImpA-E	***C2-PbA-ImpA-C***	***C3-PbA-ImpA-D***
Hydrogen Cyanide	420 ND	390 ND	802 J
	CFB-PbA-ImpA	***EntRB-PbA***	
Hydrogen Cyanide	52.6 ND	0.978 ND	

Results

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA OTM 29

Client #	40942317
Job #	0711-09
# Samples	6 Runs, 6 Blanks, 1 Spike

MDL 0.0146 (ug/mL)
LOQ 0.0998 (ug/mL)
Compound Hydrogen Cyanide

Lower Curve Limit 0.0998 (ug/mL)
Upper Curve Limit 2.50 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
C1-NaOH Imp A	hplc60pg22 #97	hplc60pg22 #98	HCN-Method	7.82	7.80	0.2	0.208	0.212	0.9	0.210	5	440	463	
C1-NaOH Imp B	hplc60pg22 #103	hplc60pg22 #104	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	180	13.1	ND
													463	
C2-NaOH Imp A	hplc60pg22 #105	hplc60pg22 #106	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	500	36.5	ND
C2-NaOH Imp B	hplc60pg22 #111	hplc60pg22 #112	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	189	13.8	ND
													36.5	ND
C3-NaOH Imp A	hplc60pg22 #113	hplc60pg22 #114	HCN-Method	7.88	7.88	0.0	0.192	0.177	4.2	0.184	5	460	424	
C3-NaOH Imp B	hplc60pg22 #115	hplc60pg22 #116	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	130	9.49	ND
													424	
CFB-NaOH Imp A	hplc60pg22 #117	hplc60pg22 #118	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	485	35.4	ND
CFB-NaOH Imp B	hplc60pg22 #119	hplc60pg22 #120	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	140	10.22	ND
													35.4	ND
EntFS-Field Spike	hplc60pg22 #125	hplc60pg22 #126	HCN-Method	7.93	7.95	0.2	0.431	0.421	1.2	0.426	10	198	844	
												Spike Amount (ug)	1,016	
												Spike Recovery (%)	83.1%	
EntRB-0.1N NaOH	hplc60pg22 #127	hplc60pg22 #128	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	1	102	1.49	ND
EntRB-6N NaOH	hplc60pg22 #129	hplc60pg22 #130	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	100	7.30	ND

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA OTM 29

Client #	40942317
Job #	0711-09
# Samples	6 Runs, 6 Blanks, 1 Spike

MDL 0.0146 (ug/mL)
LOQ 0.0998 (ug/mL)
Compound Hydrogen Cyanide

Lower Curve Limit 0.0998 (ug/mL)
Upper Curve Limit 2.50 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
C1-PbA-ImpA-E	hplc60pg22 #131	hplc60pg22 #132	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	5,750	420	ND
C2-PbA-ImpA-C	hplc60pg22 #133	hplc60pg22 #134	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	5,340	390	ND
C3-PbA-ImpA-D	hplc60pg22 #139	hplc60pg22 #140	HCN-Method	7.92	7.92	0.0	0.0241	0.0214	5.9	0.0228	5	7,050	802	J
CFB-PbA-ImpA	hplc60pg22 #141	hplc60pg22 #142	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	5	720	52.6	ND
EntRB-PbA	hplc60pg22 #143	hplc60pg22 #144	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	1	67.0	0.978	ND
Hplc60pg20 #RB	hplc60pg22 #13	hplc60pg22 #14	HCN-Method	NA	NA	NA	0.0146	0.0146	0.0	0.0146	1	1.00	0.0146	ND
MS/C1-NaOH-Imp A	hplc60pg22 #99	hplc60pg22 #100	HCN-Method	7.82	7.82	0.0	1.26	1.25	0.6	1.25	1	1.05	1.32	
												Spike Amount (ug)	1.25	
												Native Amount (ug)	0.210	
												Spike Recovery (%)	88.4%	
MSD/C1-NaOH-Imp A	hplc60pg22 #101	hplc60pg22 #102	HCN-Method	7.82	7.82	0.0	1.24	1.24	0.2	1.24	1	1.05	1.300	
												Spike Amount (ug)	1.25	
												Native Amount (ug)	0.210	
												Spike Recovery (%)	87.0%	
LCS-1	hplc60pg22 #145	hplc60pg22 #146	HCN-Method	7.87	7.87	0.0	0.556	0.502	5.1	0.529	200	10.0	1,059	
												Spike Amount (ug)	1,016	
												Spike Recovery (%)	104%	
LCS-2	hplc60pg22 #147	hplc60pg22 #148	HCN-Method	7.85	7.85	0.0	0.567	0.539	2.5	0.553	200	10.0	1,106	
												Spike Amount (ug)	1,016	
												Spike Recovery (%)	109%	

Narrative Summary

Enthalpy Analytical Narrative Summary

Company	URS Corp. - Austin
Analyst	AMP
Parameters	EPA OTM-29

Client #	40942317
Job #	0711-09
# Samples	6 runs, 6 blanks, 1 spike

Custody

Steve Eckard received the samples on 7/30/11 at 5.7°C after being relinquished by URS Corporation of Austin, TX. Lindsey Chatterton logged in the samples on 8/1/11 at 3.2°C in good condition. Prior to, during, and after analysis, the samples were kept under lock with access only to authorized personnel by Enthalpy Analytical, Inc.

Analysis

The samples were analyzed for hydrogen cyanide (HCN) using the analytical procedures in OTM-29, Sampling and Analysis of Hydrogen Cyanide Emissions from Stationary Sources.

The pH of the NaOH samples was 14. The pH of the PbA samples was 4.

Multiple containers were received for the samples, ***C1-3*** and the ***CFB*** sample. Due to the number of containers and the large volume of sample, proportional aliquots were taken and combined for a single analysis.

The ICS-3000 Ion Chromatograph ("Flanders") was equipped with an Electrochemical Detector and a Dionex Ion Pac AS7, 4 x 250 mm (S/N 011640) column, for these analyses.

Calibration

The calibration curve is located in the back of this report and referenced in the Analysis Method column on the Detailed Results page.

For each calibration curve used, the first page of the curve contains all method specific parameters (i.e., curve type, origin, weight, etc.) used to quantify the samples. The calibration curve section also includes a table with the Retention Time (RetTime), Level (Lvl), Amount (corresponding units), Area, Response Factor (Amt/Area) and the analyte Name. The calibration table is used to identify (by retention time) and quantify each target compound.

Due to an instrument error only one injection of the second source standard was analyzed after the calibration curve.

Some of the calibration check standards analyzed with the samples were not within the 10% method criteria. The recoveries of the check standards ranged from 88.7% to 133%.

Chromatographic Conditions

The acquisition method (HCN.Back) is included in the Calibration Curve Chromatograms section of this report.

Enthalpy Analytical Narrative Summary

(continued)

QC Notes

Hydrogen cyanide was not detected in any of the field reagent blanks or the laboratory reagent blanks.

The samples were analyzed 22 days outside the method recommended holding time of 30 days.

Prior to sample collection, the laboratory prepared aqueous spikes containing 1,016 µg of HCN. Two spikes were shipped to the client and two were retained to prepare Laboratory Control Samples (LCS). The LCSs were analyzed and exhibited recoveries of 104% and 109%.

The ***EntFS-Field Spike*** recovery value was 83.1%.

A matrix spike was performed in duplicate (MS and MSD) on sample ***C1-NaOH-ImpA***. The recovery values were 88.4% and 87.0%.

The sample ***C3-PbA-ImpA-D*** did not meet 5% difference in concentration between duplicate injections. The concentration of this sample was below the limit of quantitation and is considered to be an estimated value.

Reporting Notes

The results presented in this report are representative of the samples as provided to the laboratory.

Due to time constraints the samples analyzed with the failing calibration check standards were not reanalyzed.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. data reports, unless specifically noted otherwise.

- The acronym ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot determine the presence of the analyte of interest reliably.
- The acronym ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The acronym ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The letter ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The letter ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point. The associated value should be considered as an estimate.
- The acronym ***DF*** represents Dilution Factor. This number represents dilution of the sample during the preparation and/or analysis process. The analytical result taken from a laboratory instrument is multiplied by the DF to determine the final undiluted sample results.
- The addition of ***MS*** to the Sample ID represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix interferes with the analysis of the analyte(s).
- The addition of ***MSD*** to the Sample ID represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times.
- The addition of ***LD*** to the Sample ID represents a Laboratory Duplicate. The analyst prepares an additional aliquot of sample for testing and the results of the duplicate analysis are compared to the initial result. The result should have a difference value of within 10% of the initial result (if the results of the original analysis are greater than the LOQ).
- The addition of ***AD*** to the Sample ID represents an Alternate Dilution. The analyst prepares an additional aliquot at a different dilution factor (usually double the initial factor). This analysis helps confirm that no additional compound is present and coeluting or sharing absorbance with the analyte of interest, as they would have a different response/absorbance than the analyte of interest.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Clean matrix, similar to the client sample matrix, prepared and analyzed by the laboratory using the same reagents, spiking standards and procedures used for the client samples. The LCS is used to assess the control of the laboratory's analytical system. Whenever spikes are prepared for our client projects, two extra spikes are prepared. The extras (randomly chosen) are labeled with the associated project number and kept in-house at the appropriate temperature conditions. When the project samples are received for analysis, the LCSs are analyzed to confirm that the analyte could be recovered from the media, separate from the samples which were used on the project and which may have been affected by source matrix, sample collection and/or sample transport.

General Reporting Notes

(continued)

- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed, the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits displayed, but no confidence should be placed on more than two significant digits.
- **Manual Integration**: The data systems used for processing will flag manually integrated peaks with an "M". There are several reasons a peak may be manually integrated. These reasons will be identified by the following two letter designations. The peak was ***not integrated*** by the software **"NI"**, the peak was ***integrated incorrectly*** by the software **"II"** or the ***wrong peak*** was integrated by the software **"WP"**. These codes will accompany the analyst's manual integration stamp placed next to the compound name.

Sample Custody

URS

Chain of Custody Record

HCN Samples from OTM 29 Sampling Train

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Hydrogen Cyanide by HPLC/Ion Chromatography (OTM 29)			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C1-OTM29-NaOH ImpA	NaOH Impinger Catch - Bottle A	7/18/11 21~~25~~ 45 WDO 7/28/11	X						
BP-WV-C1-OTM29-NaOH ImpB	NaOH Impinger Catch - Bottle B		X						
BP-WV-C1-OTM29-PbA ImpA	Lead Acetate Impinger Catch - Bottle A		X						Combine for single analysis per U.S. EPA's request. Non-homogenous samples may contain PbS. 10% lead acetate prepared in dilute acetic acid for 600 mL (initial) impinger absorbing solution. pH < 3. Call Chris Weber (URS) for details: 512.419.5369.
BP-WV-C1-OTM29-PbA ImpB	Lead Acetate Impinger Catch - Bottle B		X						
BP-WV-C1-OTM29-PbA ImpC	Lead Acetate Impinger Catch - Bottle C		X						
BP-WV-C1-OTM29-PbA ImpD	Lead Acetate Impinger Catch - Bottle D		X						
BP-WV-C1-OTM29-PbA ImpE	Lead Acetate Impinger Catch - Bottle E		X						
									Per Source Test Plan, delayed coking unit vent gas matrix may present analytical difficulties. Consider additional qualitative technique (i.e., ISE) for confirmation of results (see Section 1.3 of U.S. EPA OTM29).

Remarks: Raw data package required

RG #2 5.7°C

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
Nathan Re	7/30/11	1245		7/30/11	1245			
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)
Liz M	8/1/11	2:39 pm						3.2° Raytek Gun #2

Seal #	Condition
	Good

Remarks

URS

Chain of Custody Record

HCN Samples from OTM 29 Sampling Train

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

Sample ID Code	**Sample Matrix**	Date/Time	Hydrogen Cyanide by HPLC/Ion Chromatography (OTM 29)			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C2-OTM29-NaOH ImpA	NaOH Impinger Catch - Bottle A	7/19/11 1520	X						
BP-WV-C2-OTM29-NaOH ImpB	NaOH Impinger Catch - Bottle B		X						
BP-WV-C2-OTM29-PbA ImpA	Lead Acetate Impinger Catch - Bottle A		X						Combine for single analysis per U.S. EPA's request. Non-homogenous samples may contain PbS. 10% lead acetate prepared in dilute acetic acid for 600 mL (initial) impinger absorbing solution. pH < 3. Call Chris Weber (URS) for details: 512.419.5369.
BP-WV-C2-OTM29-PbA ImpB	Lead Acetate Impinger Catch - Bottle B		X						
BP-WV-C2-OTM29-PbA ImpC	Lead Acetate Impinger Catch - Bottle C		X						
BP-WV-C2-OTM29-PbA ImpD DNR LMC 8/1/11	Lead Acetate Impinger Catch - Bottle D		X						
									Per Source Test Plan, delayed coking unit vent gas matrix may present analytical difficulties. Consider additional qualitative technique (i.e., ISE) for confirmation of results (see Section 1.3 of U.S. EPA OTM29).

Remarks: Raw data package required

Relinquished by:	Date 7/30/11	Time 1235	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 2:40 pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 3.2° Raytek Gun #2
Seal #	Condition Good							

Remarks

URS

Chain of Custody Record

HCN Samples from OTM 29 Sampling Train

Page 1 of 1

Project DCU3

Site BP-Husky Toledo

Project Number 40942317

Prepared by URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Hydrogen Cyanide by HPLC/Ion Chromatography (OTM 29)				Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-C3-OTM29-NaOH ImpA	NaOH Impinger Catch - Bottle A	7/20/11 0950	X							
BP-WV-C3-OTM29-NaOH ImpB	NaOH Impinger Catch - Bottle B		X							
BP-WV-C3-OTM29-PbA ImpA	Lead Acetate Impinger Catch - Bottle A		X							Combine for single analysis per U.S. EPA's request. Non-homogenous samples may contain PbS. 10% lead acetate prepared in dilute acetic acid for 600 mL (initial) impinger absorbing solution. pH < 3. Call Chris Weber (URS) for details: 512.419.5369.
BP-WV-C3-OTM29-PbA ImpB	Lead Acetate Impinger Catch - Bottle B		X							
BP-WV-C3-OTM29-PbA ImpC	Lead Acetate Impinger Catch - Bottle C		X							
BP-WV-C3-OTM29-PbA ImpD	Lead Acetate Impinger Catch - Bottle D		X							
										Per Source Test Plan, delayed coking unit vent gas matrix may present analytical difficulties. Consider additional qualitative technique (i.e., ISE) for confirmation of results (see Section 1.3 of U.S. EPA OTM29).

Remarks: Raw data package required

Relinquished by:	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	Date 8/1/11	Time 2:40 pm	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C) 3.2°	Raytek Gun #2
Seal #	Condition Good								

Remarks

URS

Chain of Custody Record

HCN Samples from OTM 29 Sampling Train

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Hydrogen Cyanide by HPLC/Ion Chromatography (OTM 29)			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-CFB-OTM29-NaOH ImpA	NaOH Impinger Catch - Bottle A	7/20/11 1905	X						
BP-WV-CFB-OTM29-NaOH ImpB	NaOH Impinger Catch - Bottle B		X						
BP-WV-CFB-OTM29-PbA ImpA	Lead Acetate Impinger Catch - Bottle A		X						600 mL 10% lead acetate in dilute acetic acid, pH < 3
BP-WV-EntFS-OTM29-Field Spike	Field Spike	7/27/11 1330	X						
BP-WV-EntRB-OTM29-6.0N NaOH	Sodium Hydroxide Impinger Solution	7/24/11 1330	X						
BP-WV-EntRB-OTM29-0.1N NaOH	Sodium Hydroxide Rinse Solution		X						
BP-WV-EntRB-OTM29-PbA	10% Lead Acetate in Acetic Acid	7/25/11 1720	X						

Remarks: Raw data package required

Relinquished by: Nathan [illegible]	Date 7/30/11	Time 1245	Received by:	Date 7/30/11	Time 1245	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Lab by:	**Date** 8/1/11	**Time** 2:40pm	**Airbill No.**	**Opened by:**	**Seal #**	**Date**	**Time**	**Temp (C)** 3.2° Raytek Gun #2
Seal #	**Condition** Good							

Remarks

Sample Chromatograms

Field Data Sheets

Sample Type – HCN (OTM-29)	Date July 18th 2011	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF n/a	Run 8 1	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161361	Operator EF	Initial 0.006 @ 24"
Location (Source) – DCU3 East Vent	DGMCF 0.998	Nozzle Dia (in) 0.190	Final 0.003 @ 22"
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID OTM29-1	Pitot Tube ID — n/a
Elevation (relative to Barometer) (ft) 0	Kf n/a	Barometer ID B9-2	Pitot Tube Leak Check
Nozzle Calib	● 0.189 ● 0.190 ● 0.190	Bar. Press. (in. Hg) 29.22	Initial (+) (-)
Caliper ID 700904		Stat. Press. (in. H₂O) n/a	Final (+) n/a (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	HtTrc Exit	Cond. Temp	Vacuum (in. Hg)
2A	2029	721.351	N/A	0.1	N/A	335	343	81	99	98	250	44	~~20~~ 10 EF 7/18
	2034	721.718		0		314	343	84	99	98		47	20
	2039	721.771		0		312	343	85	99	98		49	20
	2044	721.845		0		311	342	84	94	94		44	20
	2049	721.902		0		311	343	84	99	98		52	20
	2054	721.961		0		309	343	85	99	98		54	20
	2059	722.018		0		305	343	85	99	98		58	20
	EF 2104 ~~3004~~	722.079		0		305	343	85	99	98		53	20
	EF 2109 ~~3009~~	722.136		0		308	343	85	99	98		56	20
	2114	722.183		0		308	343	85	99	98		62	20
	2119	722.245		0		309	342	85	99	98		61	20
	2124	722.280		0		309	339	86	99	98		53	20
	2129	722.339		0		310	343	86	99	98		58	20
	2134	722.393		0		311	342	86	99	98		65	20
	2139	722.430		0		311	343	86	99	98		57	20
	2144	722.490		0		312	342	86	99	98		55	20
Stop	2145	722.504											

Comments: purge 0032- 0103 @ 10L/min

Sample Type – HCN (OTM-29)	Date 7/19/11	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF ~~0~~ n/a	Run 2	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. 016361	Operator NR	Initial 0.003 @ 20"
Location (Source) – DCU3 West	DGMCF 0.998	Nozzle Dia (in) 0.220	Final 0.004 @ 22"
Duct Dimension(s) 8"	ΔH@ 1.660	Nozzle ID ~~AA~~ HCN-2 7/19/11	~~Pitot Tube ID~~ n/a
Elevation (relative to Barometer) (ft) 0	Kf — n/a	Barometer ID BP-2	~~Pitot Tube Leak Check~~ N/A
Nozzle Calib		Bar. Press. (in. Hg) 29.16	Initial (+) (-)
Caliper ID 700904	0.220 0.220 0.220	Stat. Press. (in. H₂O) n/a	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	HtTrc Exit	Cond.	Vacuum (in. Hg)
P3B	1423	727.230		0.01		347	344	87	102	102	250	56	20
	1428	727.60		0.01		324	342	92	103	102		56	20
	1433	727.77		0.01		324	343	94	103	102		53	20
	1438	727.98		0.01		326	342	93	103	102		48	21
	1443	728.123		0.01		327	343	93	103	102		48	21
	1448	728.30		0.01		328	343	92	103	102		48	21
	1453	728.45		0.01		328	342	92	103	102		52	21
	1458	728.60		0.01		327	345	91	103	102		52	21
NR 7/19/11	~~14~~ 1503	728.70		0.01		328	344	93	103	102		52	21
	1508	728.85		0.01		331	343	92	104	102		51	21
	1513	728.95		0.01		333	343	92	104	103		49	21
	1518	729.26		0.01		336	343	92	104	103		46	21
	~~1523~~	NR 7/19/11											
STOP	1519	729.390		STOP									

Comments: N₂ purge: 14 L/min start 1734 stop 1804

Sample Type – HCN (OTM-29)	Date 7/20/11	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF NA	Run 3	Sampling Train Leak Rate (ft³ @ "Hg)
Project Number - 40942317	Console No. A161361	Operator NR	Initial .006 @ 22"
Location (Source) – DCU3 East	DGMCF 0.998	Nozzle Dia (in) 0.220	Final 0.004 @ 25"
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID HCN-2	~~Pitot Tube ID~~ n/a
Elevation (relative to Barometer) (ft) 0'	Kf — n/a	Barometer ID BP-1	~~Pitot Tube Leak Check~~
Nozzle Calib		Bar. Press. (in. Hg) 29.08	Initial (+) (-)
Caliper ID 700904	0.220 0.220 0.220	Stat. Press. (in. H₂O) n/a	Final (+) (-)

NR 7/20/11

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	HtTrc Exit	Con	Vacuum (in. Hg)
P3B	0905	733.000	—	0.01	34	343	341	79	98	98	250	49	20
	0910	733.28		0.01		322	341	86	98	97		50	20
	0915	733.31		0.01		321	341	89	98	97		50	20
	0920	733.40		0.01		290	343	90	98	97		49	20
	0925	733.45		0.01		278	343	90	97	96		50	20
	0930	733.505		0.01		276	338	90	97	96		99	20
	0935	733.55		0.01		274	340	90	97	96		49	20
	0940	733.72		0.01		272	339	91	97	95		49	20
	0945	733.82		0.01		248	336	92	97	95		50	20
STOP	0956	733.890											

Comments: N₂ purge: 13 L/min start stop
1459 1529

Sample Type – HCN (OTM-29)	Date 7/20/11	Condition C	Page 1 of 1
Plant Name – BP-Husky Toledo	PTCF —	Run FB	Sampling Train Leak Rate (ft^3 @ "Hg)
Project Number - 40942317	Console No. A161361	Operator RF	Initial .008 @ 22"
Location (Source) – DCU3	DGMCF 0.998	Nozzle Dia (in) —	Final n/a
Duct Dimension(s) 8"	ΔH@ 1.600	Nozzle ID —	~~Pitot Tube ID~~
Elevation (relative to Barometer) (ft) 0'	Kf —	Barometer ID BP-2	Pitot Tube Leak Check N/A
Nozzle Calib Caliper ID NA	● NA ● NA ● NA	Bar. Press. (in. Hg) —	Initial (+) (-)
		Stat. Press. (in. H$_2$O) —	Final (+) (-)

Point	Clock Time	Dry Gas Vol. (ft^3)	ΔP (in. H$_2$O)	ΔH (in. H$_2$O)	Temperature (°F)								Vacuum (in. Hg)
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	HtTrc Exit		

Comments: N_2 purge: 11 L/min Start stop
1640 1710

Sample Recovery Sheets

Project No. 40942317
Operator Initials KMM

Sample Recovery
OTM 29 HCN

Run No. C1
Condition No. C
Date: 7/18/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)	
1	Lead Acetate	300	Mod Fatty	3226.3		1367.2	=	1859.1	pH 3.5
2	Lead Acetate	300	Mod Fatty	3139.6	-	1300.8	=	1838.8	pH 3.5
3	--		KO	1806.6	-	943.3	=	863.3	pH 3.5
4	6N NaOH	100	G/S	782.6	-	781.0	=	1.6	pH 14
5	6N NaOH	100	G/S	798.8	-	798.5	=	0.3	pH 14
6	6N NaOH	100	G/S	745.5	-	745.3	=	0.2	pH 14
7	6N NaOH	100	G/S	780.6	-	780.4	=	0.2	pH 14
8	--		G/S	649.3	-	649.9	=	-0.6	
9	Silica Gel	~300g	Mod	970.5	-	962.8	=	7.7	
			Total Net Gain (g) =			4570.6			

Sample Recovery Notes

AT LOCATION

KMM 7/18/11
✓ ~~Rinse and brush probe and nozzle with 0.1 N NaOH into PNR sample bottle.~~
rinse + brushed w/ acetone to clean; acetone discarded
____ ~~Transfer bottle(s) to laboratory with impinger train.~~
N/A KMM 7/18/11

IN LABORATORY

✓ Before recovery record pH of absorbing solution. Record in comments section. see to right of impingers
✓ Separate filter holder and place ~~filter in clean pre-rinsed glass petri dish.~~ Discarded, no pH determination KMM 7/18/11
Complete ~~filter sample label~~. Do not rinse the back half of the filter holder.

____ Rinse transfer line with 0.1 N NaOH into the NaOHImpA impinger sample bottle. recover contents of PbAc impingers
✓ Pour contents of the 1st, 2nd, and 3rd NaOH impingers into the NaOHImpsA catch bottle(s). Rinse impingers and connecting glassware with 0.1 N NaOH into the same bottle(s). Complete NaOHImp sample label.

✓ Pour contents of the 4th impinger into the Final NaOH catch bottle(s). Rinse impingers and connecting glassware with NaOH into the same bottle(s). Complete Final NaOH sample label.

✓ Log samples into logbook and store appropriately.

Sample Log

Sample ID Number	No. of Sample Containers	Description
~~BP- - -OTM29-Filt~~		~~Filter~~
BP-~~NW~~ C1 -OTM29-NaOH Imp	1	NaOH Impingers
BP-~~NW~~ C1 -OTM29-Final NaOH	1	Final NaOH Impinger
BP-~~NW~~ C1 -OTM29-PbA Imp	5 (A-E)	Lead Acetate Impingers

Comments:

pH: see above

Sampling train operated until Impinger 3 (lead acetate + condensate) was close to bubbling over to Impinger 4.

Project No. 40942317

Operator Initials hmm

Sample Recovery

OTM 29 HCN

Run No. 2

Condition No. C

Date: 7/19/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	Lead Acetate	300	Mod Fatty	3028.4	-	1364.9	=	1663.5
2	Lead Acetate	300	Mod Fatty	3010.5		1286.7	=	1723.8
3	--		KO	1436.2		938.4	=	497.8
4	6N NaOH	100	G/S	786.4		785.0	=	1.4
5	6N NaOH	100	G/S	794.2		794.0	=	0.2
6	6N NaOH	100	G/S	751.6	-	751.9	=	-0.3
7	6N NaOH	100	G/S	770.4	-	770.6	=	-0.2
8	--		G/S	661.1	-	661.2	=	-0.1
9	Silica Gel	~300g	Mod	976.2		970.4	=	5.8
			Total Net Gain (g)	=				3891.9

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-____-OTM29-Filt		Filter
BP-__-____-OTM29-NaOH Imp	see sample logbook	NaOH Impingers
BP-__-____-OTM29-Final NaOH		Final NaOH Impinger
BP-__-____-OTM29-PbA Imp		Lead Acetate Impingers

Sample Recovery Notes

AT LOCATION

✓ Rinse and brush probe and nozzle with ~~0.1 N NaOH~~ Acetone into ~~PNR sample~~ solvent waste bottle.

___ ~~Transfer bottle(s) to laboratory with impinger train.~~

IN LABORATORY

✓ Before recovery record pH of absorbing solution. Record in comments section.

✓ Separate filter holder and Discard ~~place filter in clean pre-rinsed glass petri dish. Complete filter sample label. Do not rinse the back half of the filter holder.~~

✓ Rinse heated transfer line with 0.1 N NaOH ~~into the NaOHImpA impinger sample bottle.~~ and discard.

✓ Recover 1,2,+3 PbAc Impingers with PbAc into PbA Imp sample bottles

✓ Pour contents of the 1st, 2nd, and 3rd NaOH impingers into the NaOHImpsA catch bottle(s). Rinse impingers and connecting glassware with 0.1 N NaOH into the same bottle(s). Complete NaOHImp sample label.

✓ Pour contents of the 4th impinger into the Final NaOH catch bottle(s). Rinse impingers and connecting glassware with NaOH into the same bottle(s). Complete Final NaOH sample label.

✓ Log samples into logbook and store appropriately.

Comments:

pH: 1) 3 2) 3 3) 3 4) 14 5) 14 6) 14 7) 14

RDS-06 General Sample Recovery
Revision Date: November 2008
Reviewed: October 2010

Project No. 40942317

Operator Initials RCW

Sample Recovery

OTM 29 HCN

Run No. 3

Condition No. C

Date: 7/20/21

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	- Initial Wt. (g)	= Net Gain (g)
1	Lead Acetate	300	Mod Fatty	3220.9	1398.2	1872.7
2	Lead Acetate	300	Mod Fatty	3110.6	1286.9	1823.7
3	--		KO	3125.6	941.8	2183.8
4	6N NaOH	100	G/S	789.0	787.0	2.0
5	6N NaOH	100	G/S	795.0	794.3	0.7
6	6N NaOH	100	G/S	754.8	754.6	0.2
7	6N NaOH	100	G/S	765.9	766.1	-0.2
8	--		KO ~~G/S~~	608.1	607.9	0.2
9	Silica Gel	~300g	Mod	977.7	976.2	1.5
			Total Net Gain (g) =			5884.6

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-____-OTM29-Filt		Filter
BP-__-____-OTM29-NaOH Imp	see sample logbook	NaOH Impingers
BP-__-____-OTM29-Final NaOH		Final NaOH Impinger
BP-__-____-OTM29-PbA Imp		Lead Acetate Impingers

Sample Recovery Notes

AT LOCATION

✓ Rinse and brush probe and nozzle with ~~0.1 N NaOH~~ Acetone into ~~PNR sample~~ solvent waste bottle.

____ T~~ransfer bottle(s) to laboratory with impinger train~~.

IN LABORATORY

✓ Before recovery record pH of absorbing solution. Record in comments section.

✓ Separate filter holder and ~~place filter in clean pre-rinsed glass petri dish.~~ discard
~~Complete filter sample label. Do not rinse the back half of the filter holder.~~

✓ Rinse heated transfer line with 0.1 N NaOH ~~into the NaOHImpA impinger sample bottle.~~ and discard

✓ Recover 1,2 + 3 PbAc Impingers with PbAc into PbA Imp sample bottles

✓ Pour contents of the 1st, 2nd, and 3rd NaOH impingers into the NaOHImpsA catch bottle(s). Rinse impingers and connecting glassware with 0.1 N NaOH into the same bottle(s). Complete NaOHImp sample label.

✓ Pour contents of the 4th impinger into the Final NaOH catch bottle(s). Rinse impingers and connecting glassware with NaOH into the same bottle(s). Complete Final NaOH sample label.

✓ Log samples into logbook and store appropriately.

Comments:

pH: Lead acetate ph = 3 (all)

NaOH ph = 14 (all)

Final NaOH ph = 14

Project No. 40942317

Operator Initials KMM

Sample Recovery

OTM 29 HCN

Run No. FB

Condition No. C

Date: 7/20/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g)	-	Initial Wt. (g)	=	Net Gain (g)
1	Lead Acetate	300	Mod Fatty	1363.2		1369.7	=	-6.5
2	Lead Acetate	300	Mod Fatty	1332.4		1333.0	=	-0.6
3	--		KO	1105.7	-	1105.5	=	0.2
4	6N NaOH	100	G/S	773.4	-	772.3	=	1.1
5	6N NaOH	100	G/S	766.5	-	766.3	=	0.2
6	6N NaOH	100	G/S	778.9	-	778.8	=	0.1
7	6N NaOH	100	G/S	786.7	-	786.6	=	0.1
8	--		G/S	663.3	-	663.5	=	-0.2
9	Silica Gel	~300g	Mod	987.4	-	987.2	=	0.2
			Total Net Gain (g)	=				-5.4

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-____-OTM29-Filt	see sample logbook	Filter
BP-__-____-OTM29-NaOH Imp		NaOH Impingers
BP-__-____-OTM29-Final NaOH		Final NaOH Impinger
BP-__-____-OTM29-PbA Imp		Lead Acetate Impingers

Sample Recovery Notes

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N NaOH into ~~PNR sample bottle~~. solvent waste

___ ~~Transfer bottle(s) to laboratory with impinger train.~~

IN LABORATORY

___ ~~Before recovery record pH of absorbing solution. Record in comments section.~~

✓ Separate filter holder and ~~place filter in clean pre-rinsed glass petri dish.~~ discard ~~Complete filter sample label. Do not rinse the back half of the filter holder.~~

✓ Rinse transfer line with 0.1 N NaOH ~~into the NaOHImpA impinger sample bottle.~~ and discard

✓ Pour contents of the 1st, 2nd, and 3rd NaOH impingers into the NaOHImpsA catch bottle(s). Rinse impingers and connecting glassware with 0.1 N NaOH into the same bottle(s). Complete NaOHImp sample label.

✓ Pour contents of the 4th impinger into the Final NaOH catch bottle(s). Rinse impingers and connecting glassware with NaOH into the same bottle(s). Complete Final NaOH sample label.

✓ Log samples into logbook and store appropriately.

✓ recover 1,2 & 3 PbA impingers with PbA into PbA Imp sample bottles

Comments:

pH: n/a

RDS-06 General Sample Recovery
Revision Date: November 2008
Reviewed: October 2010

Section T

Method ASTM D6784-02 – Mercury

Laboratory Report

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

ANALYTICAL REPORT

PROJECT NO. 40942317

BP-Husky Toledo - OH

Lot #: H1H030402

Chris Weber

URS Corporation
9400 Amberglen Boulevard
Austin, TX 78729

TESTAMERICA LABORATORIES, INC.

Kevin S. Woodcock
Project Manager

August 11, 2011

ANALYTICAL METHODS SUMMARY

H1H030402

PARAMETER	ANALYTICAL METHOD
Mercury (Ontario Hydro)	ASTM D6784-02

References:

ASTM	Annual Book Of ASTM Standards.

SAMPLE SUMMARY

H1H030402

WO #	SAMPLE#	CLIENT SAMPLE ID	SAMPLED DATE	SAMP TIME
MLC5X	001	BP-WV-DI-OH-PNR/FILT	07/15/11	04:10
MLC50	002	BP-WV-DI-OH-KCLA-J	07/15/11	04:10
MLC51	003	BP-WV-DI-OH-NPI	07/15/11	04:10
MLC52	004	BP-WV-DI-OH-PERM	07/15/11	04:10
MLC53	005	BP-WV-D2-OH-PNR/FILT	07/15/11	21:25
MLC54	006	BP-WV-D2-OH-KCLA-I	07/15/11	21:25
MLC55	007	BP-WV-D2-OH-NPI	07/15/11	21:25
MLC56	008	BP-WV-D2-OH-PERM	07/15/11	21:25
MLC57	009	BP-WV-D4-OH-PNR/FILT	07/18/11	03:32
MLC58	010	BP-WV-D4-OH-KCLA-F	07/18/11	03:32
MLC59	011	BP-WV-D4-OH-NPI	07/18/11	03:32
MLC6A	012	BP-WV-D4-OH-PERM	07/18/11	03:32
MLC6C	013	BP-WV-D5-OH-PNR/FILT	07/27/11	02:51
MLC6D	014	BP-WV-D5-OH-KCLA-H	07/27/11	02:51
MLC6E	015	BP-WV-D5-OH-NPI	07/27/11	02:51
MLC6F	016	BP-WV-D5-OH-PERM	07/27/11	02:51
MLC6G	017	BP-WV-DFB-OH-PNR/FILT	07/26/11	17:55
MLC6H	018	BP-WV-DFB-OH-KCLA-B	07/26/11	17:55
MLC6J	019	BP-WV-DFB-OH-NPI	07/26/11	17:55
MLC6K	020	BP-WV-DFB-OH-PERM	07/26/11	17:55

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

PROJECT NARRATIVE
H1H030402

The results reported herein are applicable to the samples submitted for analysis only. If you have any questions about this report, please call (865) 291-3000 to speak with the TestAmerica project manager listed on the cover page.

This report shall not be reproduced except in full, without the written approval of the laboratory.

The original chain of custody documentation is included with this report.

Sample Receipt

Custody seals were not present.

Quality Control and Data Interpretation

Unless otherwise noted, all holding times and QC criteria were met and the test results shown in this report meet all applicable NELAC requirements.

These stack gas samples were prepared and analyzed using TestAmerica Knoxville standard operating procedure KNOX-IP-0006 which is based on ASTM Method D6784-02, "Standard Test Method for Elemental, Oxidized, Particle-Bound and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario Hydro Method)" with modifications from EPA Method 29. SW-846 Method 7470A, as incorporated in TestAmerica Knoxville standard operating procedure KNOX-MT-0009, was used to perform the final instrument analysis.

Acid digestion was performed on the front half particulate filter and the nitric acid probe rinse fractions separately using HNO_3, HCl and HF. After digestion, these two fractions were combined, and the HF was sequestered using H_3BO_3 followed by another heating cycle. This digestate was adjusted to final volume and a portion was digested for CVAA analysis in order to determine the particle-bound mercury. Results were calculated using the following equation:

$$\text{Hg, ug} = (\text{Hg, ug/L}) * (\text{Micr. Digestate Volume, L}) * \left(\frac{\text{Final Volume Hg Digestate (mL)}}{\text{Volume Micr. Digestate Used (mL)}}\right) * \text{Bench Dilution}$$

For the $5\%HNO_3/10\%H_2O_2$ impinger samples, a 10 milliliter portion of the sample as received was processed for mercury. The KCl and $4\%\ KMnO_4/10\%H_2SO_4$ impinger samples were treated with hydroxylamine hydrochloride, followed by removal of a 25 mL portion of sample for mercury processing. Results were calculated using the equation listed below. For the KCl and $4\%\ KMnO_4/10\%H_2SO_4$ impinger samples, the sample volume includes the volume of hydroxylamine hydrochloride added to the sample.

TestAmerica Knoxville maintains the following certifications, approvals and accreditations: Arkansas DEQ Lab #88-0688, California ELAP Cert. #2423, Colorado DPHE, Connecticut DPH Lab #PH-0223, DoD ELAP Cert. #ADE-1434, Florida DOH Lab #E87177, Georgia DNR Lab #906, Hawaii DOH, Indiana DOH Lab #C-TN-02, Iowa DNR Lab #375, Kansas DHE Cert. #E-10349, Kentucky EEC Lab #90101, Louisiana DEQ AI# 83979 Cert. #03079, Louisiana DOHH, Maryland DOE Cert #277, Michigan DNRE Lab #9933, Minnesota DOH ELAP Lab #047-999-429, Nevada DEP Lab #TN00009, New Jersey DEP Lab #TN001, New York DOH Lab #10781, North Carolina DHHS Lab #21705, North Carolina DENR Cert. #64, Ohio EPA VAP Lab #CL0059, Oklahoma DEQ Lab #9415, Pennsylvania DEP Lab #68-00576, South Carolina DHEC Cert #84001001, Tennessee DEC Lab #02014, Texas CEQ, Utah DOH Lab # QUAN3, Virginia DGS Lab #00165, Washington DOE Lab #C593, West Virginia DEP Cert. #345, West Virginia DHHR Cert #9955C, Wisconsin DNR Lab #998044300, and USDA Soil Permit #P330-11-00035. This list of approvals is subject to change and does not imply that laboratory certification is available for all parameters reported in this environmental sample data report.

PROJECT NARRATIVE
H1H030402

$$\text{Hg, ug} = (\text{Hg,ug/L}) * (\text{Sample Volume, L}) * \left(\frac{\text{FinalVolume Hg Digestate (mL)}}{\text{Volume Sample Digested (mL)}}\right) * \text{Bench Dilution}$$

Please note that the dilution factor reported on the sample result form is actually the combination of preparation factors (not just a dilution factor) required by the method to convert the Hg reporting limits and method detection limits in concentration units from ug/L to a total ug unit:

$$\text{DilutionFactor} = (\text{Volume, L}) * \left(\frac{\text{FinalVolume Hg Digestate (mL)}}{\text{Volume Sample Digested (mL)}}\right) * \text{Bench Dilution}$$

The matrix spike recovery and RPDs for sample BP-WV-D4-OH-NP1 were outside control limits for mercury. However, the laboratory control samples showed acceptable results indicating that the analysis was in control. The matrix spike results are, therefore, attributed to matrix effects. The affected analytes are flagged appropriately on the matrix spike/matrix spike duplicate report. A post digestion spike/post digestion spike duplicate was analyzed on this sample with acceptable recoveries.

For the KCl impinger portion of the Ontario-Hydro train multiple one liter containers were received by the laboratory. In order to achieve a representative composite for this portion the samples were volumetrically measured and a ten percent aliquot was taken from each individual container. Once the composite was built a twenty-five mL aliquot was processed for mercury using the standard methodology. The container volumes, portions taken from individual containers and total volume calculations are displayed in the compositing records included in the data package.

QC DATA ASSOCIATION SUMMARY

H1H030402

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	AIR	ASTM D6784-02		1220018	
002	AIR	ASTM D6784-02		1220031	
003	AIR	ASTM D6784-02		1220022	
004	AIR	ASTM D6784-02		1220031	
005	AIR	ASTM D6784-02		1220018	
006	AIR	ASTM D6784-02		1220031	
007	AIR	ASTM D6784-02		1220022	
008	AIR	ASTM D6784-02		1220031	
009	AIR	ASTM D6784-02		1220018	
010	AIR	ASTM D6784-02		1220031	1220017
011	AIR	ASTM D6784-02		1220022	1220011
012	AIR	ASTM D6784-02		1220031	1220018
013	AIR	ASTM D6784-02		1220018	
014	AIR	ASTM D6784-02		1220031	
015	AIR	ASTM D6784-02		1220022	
016	AIR	ASTM D6784-02		1220031	
017	AIR	ASTM D6784-02		1220018	
018	AIR	ASTM D6784-02		1220031	
019	AIR	ASTM D6784-02		1220022	
020	AIR	ASTM D6784-02		1220031	

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDS MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011.PRN

Element	PDS MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.872	ND	1.0	87.2

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.878	ND	1.0	87.8

Sample Receipt Documentation

H1H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D1-OH-PNR	Probe and Nozzle Rinse	7/15/11 0410	X			X			HOLD ALL 'D1' SAMPLES - DO NOT ANALYZE
BP-WV-D1-OH-Filt	Filter		X			X			
BP-WV-D1-OH-KClA	Potassium Chloride Impingers - Bottle A		X			X			Combine for single analysis.
BP-WV-D1-OH-KClB	Potassium Chloride Impinger - Bottle B		X			X			
BP-WV-D1-OH-KClC	Potassium Chloride Impinger - Bottle C		X			X			
BP-WV-D1-OH-KClD	Potassium Chloride Impinger - Bottle D		X			X			
BP-WV-D1-OH-KClE	Potassium Chloride Impingers - Bottle E		X			X			
BP-WV-D1-OH-KClF	Potassium Chloride Impingers - Bottle F		X			X			
BP-WV-D1-OH-KClG	Potassium Chloride Impingers - Bottle G		X			X			
BP-WV-D1-OH-KClH	Potassium Chloride Impingers - Bottle H		X			X			
BP-WV-D1-OH-KClI	Potassium Chloride Impingers - Bottle I		X			X			
BP-WV-D1-OH-KClJ	Potassium Chloride Impingers - Bottle J		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	17:45						
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			
	7/29/11	17:45						

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal#	Condition	

Remarks 3 Boxes, 1 cooler Rec'd @ Ambient Temp
without custody Seals DJH 8/1/11
3 Boxes, 1 cooler hand delivered

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D1-OH-NPI	Nitric/Peroxide Impingers	7/15/11 0410	X			X			HOLD ALL 'D1' SAMPLES - DO NOT ANALYZE
BP-WV-D1-OH-Perm	Permanganate Impinger		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by: Nathan R	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp.(C)

Seal #	Condition

Remarks

H1H030402

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Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-OH-PNR	Probe and Nozzle Rinse	7/15/11 2125	X						
BP-WV-D2-OH-Filt	Filter		X						
BP-WV-D2-OH-KCIA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis
BP-WV-D2-OH-KCIB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D2-OH-KCIC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D2-OH-KCID	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D2-OH-KCIE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D2-OH-KCIF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D2-OH-KCIG	Potassium Chloride Impingers - Bottle G		X						
BP-WV-D2-OH-KCIH	Potassium Chloride Impingers - Bottle H		X						
BP-WV-D2-OH-KCII	Potassium Chloride Impingers - Bottle I		X						
BP-WV-D2-OH-NPI	Nitric/Peroxide Impingers		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

H1H030402

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Samples from Ontario Hydro Sampling Trains

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Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-OH-Perm	Permanganate Impinger	7/15/11 2125	X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

L11H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D4-OH-PNR	Probe and Nozzle Rinse	7/18/11 0332	X						
BP-WV-D4-OH-Filt	Filter		X						
BP-WV-D4-OH-KClA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis.
BP-WV-D4-OH-KClB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D4-OH-KClC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D4-OH-KClD	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D4-OH-KClE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D4-OH-KClF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D4-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-D4-OH-Perm	Permanganate Impinger		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

41H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D5-OH-PNR	Probe and Nozzle Rinse	7/27/11 0251	X						
BP-WV-D5-OH-Filt	Filter		X						
BP-WV-D5-OH-KCIA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis.
BP-WV-D5-OH-KCIB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D5-OH-KCIC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D5-OH-KCID	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D5-OH-KCIE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D5-OH-KCIF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D5-OH-KCIG	Potassium Chloride Impingers - Bottle G		X						
BP-WV-D5-OH-KCIH	Potassium Chloride Impingers - Bottle H		X						
BP-WV-D5-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-D5-OH-Perm	Permanganate Impinger		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

H11H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project DCU3

Site BP-Husky Toledo

Project Number 40942317

Prepared by URS Corporation

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A				Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-DFB-OH-PNR	Probe and Nozzle Rinse	7/26/11 1755	X							
BP-WV-DFB-OH-Filt	Filter		X							
BP-WV-DFB-OH-KCIA	Potassium Chloride Impingers - Bottle A		X							Combine for single analysis.
BP-WV-DFB-OH-KCIB	Potassium Chloride Impinger - Bottle B		X							
BP-WV-DFB-OH-NPI	Nitric/Peroxide Impingers		X							
BP-WV-DFB-OH-Perm	Permanganate Impinger		X							

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	17:45						
Received by:	Date	Time	Relinquished by:	Date	Time			
	7/29/11	17:45						

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

HIH030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

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Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-TARB-OH-Filt	Filter	7/26/11 1600	X						
BP-WV-TARB-OH-KCl	Potassium Chloride Impingers		X						
BP-WV-TARB-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-TARB-OH-Perm	Permanganate Impinger		X						
BP-WV-TARB-OH-NA Rns Soln	Nitric Acid Rinse Solution		X						
BP-WV-TARB-OH-10% NA	10% Nitric Acid Rinse Solution		X						
BP-WV-TARB-HA	Hydroxylamine solution	7/26/11 1600	X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

3 Boxes, 1 cooler Recd @ Ambient Temp
with out custody seals 8/1/11
3 Boxes, 1 cooler hand delivered

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Lot Number: HHD030402

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **1a** Do not match COC ☐ **1b** Incomplete information ☐ **1c** Marking smeared ☐ **1d** Label torn ☐ **1e** No label ☐ **1f** COC not received ☐ **1g** Other:	4A – Hand Delivered
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C)	✓			☐ **2a** Temp Blank = ____ ☐ **2b** Cooler Temp = ____ ☐ **2c** Cooling initiated for recently collected samples, ice present.	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **3a** Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ **4a** Not present ☐ **4b** Not intact ☐ **4c** Other: Hand-Del	
5. Were all of the samples listed on the COC received?	✓			☐ **5a** Samples received-not on COC ☐ **5b** Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ **6a** Leaking ☐ **6b** Broken	
7. Were VOA samples received without headspace?			✓	☐ **7a** Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ **8a** Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ **9a** Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ **10a** Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? ____	
13. Are the shipping containers intact?	✓			☐ **13a** Leaking ☐ **13b** Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **14a** Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ **15a** Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ **15a** Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ **15a** Incomplete information	
18. Is the client and project name/# identified?	✓			☐ **15a** Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 8972 PM Instructions: ____

Sample Receiving Associate: George P [illegible] Date: 8/1/11

Metals

Sample Results

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DI-OH-PNR/FILT

TOTAL Metals

Lot-Sample #...: H1H030402-001 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220018					
Mercury	ND	0.010	ug	ASTM D6784-02	08/08-08/10/11	MLC5X1AA
		Dilution Factor: 0.1		Analysis Time..: 10:42	MDL...........: 0.0060	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DI-OH-KCLA-J

TOTAL Metals

Lot-Sample #...: H1H030402-002 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220031					
Mercury	ND	1.7	ug	ASTM D6784-02	08/09-08/10/11	MLC501AA
		Dilution Factor: 16.89		Analysis Time..: 11:57	MDL...........: 1.0	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DI-OH-NPI

TOTAL Metals

Lot-Sample #...: H1H030402-003 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220022						
Mercury	ND	0.075	ug	ASTM D6784-02	08/09-08/10/11	MLC511AA
		Dilution Factor: 0.75		Analysis Time..: 11:16	MDL...........: 0.045	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DI-OH-PERM

TOTAL Metals

Lot-Sample #...: H1H030402-004 **Matrix.......:** AIR

Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220031						
Mercury	ND	0.090	ug	ASTM D6784-02	08/09-08/10/11	MLC521AA
		Dilution Factor: 0.9		Analysis Time..: 12:26	MDL............: 0.054	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D2-OH-PNR/FILT

TOTAL Metals

Lot-Sample #...: H1H030402-005 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220018					
Mercury	ND	0.010	ug	ASTM D6784-02	08/08-08/10/11	MLC531AA
		Dilution Factor: 0.1		Analysis Time..: 10:44	MDL...........: 0.0060	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D2-OH-KCLA-I

TOTAL Metals

Lot-Sample #...: H1H030402-006 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220031					
Mercury	ND	1.6	ug	ASTM D6784-02	08/09-08/10/11	MLC541AA
		Dilution Factor: 15.7		Analysis Time..: 11:59	MDL...........: 0.94	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D2-OH-NPI

TOTAL Metals

Lot-Sample #...: H1H030402-007 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220022					
Mercury	ND	0.083	ug	ASTM D6784-02	08/09-08/10/11	MLC551AA
		Dilution Factor: 0.83		Analysis Time..: 11:18	MDL...........: 0.050	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D2-OH-PERM

TOTAL Metals

Lot-Sample #...: H1H030402-008 **Matrix.......:** AIR
Date Sampled...: 07/15/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220031					
Mercury	ND	0.098	ug	ASTM D6784-02	08/09-08/10/11	MLC561AA
		Dilution Factor: 0.98		Analysis Time..: 12:28	MDL............: 0.059	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D4-OH-PNR/FILT

TOTAL Metals

Lot-Sample #...: H1H030402-009 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220018					
Mercury	**0.0074 B**	**0.010**	**ug**	**ASTM D6784-02**	**08/08-08/10/11**	**MLC571AA**
		Dilution Factor: 0.1		Analysis Time..: 10:47	MDL...........: 0.0060	

NOTE(S):

B Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D4-OH-KCLA-F

TOTAL Metals

Lot-Sample #...: H1H030402-010 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220031					
Mercury	ND	1.1	ug	ASTM D6784-02	08/09-08/10/11	MLC581AA
		Dilution Factor: 11.12		Analysis Time..: 12:01	MDL............: 0.67	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D4-OH-NPI

TOTAL Metals

Lot-Sample #...: H1H030402-011 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220022					
Mercury	ND	0.13	ug	ASTM D6784-02	08/09-08/10/11	MLC591AA
		Dilution Factor: 1.3		Analysis Time..: 11:24	MDL............: 0.078	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D4-OH-PERM

TOTAL Metals

Lot-Sample #...: H1H030402-012 **Matrix.......:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220031						
Mercury	**0.24**	**0.16**	**ug**	**ASTM D6784-02**	**08/09-08/10/11**	**MLC6A1AA**
		Dilution Factor: 1.57		Analysis Time..: 12:30	MDL...........: 0.094	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D5-OH-PNR/FILT

TOTAL Metals

Lot-Sample #...: H1H030402-013 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220018					
Mercury	ND	0.010	ug	ASTM D6784-02	08/08-08/10/11	MLC6C1AA
		Dilution Factor: 0.1		Analysis Time..: 10:52	MDL...........: 0.0060	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D5-OH-KCLA-H

TOTAL Metals

Lot-Sample #...: H1H030402-014 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220031					
Mercury	**1.2 B**	**1.4**	**ug**	**ASTM D6784-02**	**08/09-08/10/11**	**MLC6D1AA**
		Dilution Factor: 14.24		Analysis Time..: 12:06	MDL...........: 0.85	

NOTE(S):

B Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D5-OH-NPI

TOTAL Metals

Lot-Sample #...: H1H030402-015 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220022						
Mercury	ND	0.16	ug	ASTM D6784-02	08/09-08/10/11	MLC6E1AA
		Dilution Factor: 1.6		Analysis Time..: 11:29	MDL............: 0.096	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-D5-OH-PERM

TOTAL Metals

Lot-Sample #...: H1H030402-016 **Matrix.......:** AIR
Date Sampled...: 07/27/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220031						
Mercury	ND	0.16	ug	ASTM D6784-02	08/09-08/10/11	MLC6F1AA
		Dilution Factor: 1.59		Analysis Time..: 12:40	MDL...........: 0.095	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DFB-OH-PNR/FILT

TOTAL Metals

Lot-Sample #...: H1H030402-017 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...:	1220018					
Mercury	**0.0064 B**	**0.010**	**ug**	**ASTM D6784-02**	**08/08-08/10/11**	**MLC6G1AA**
		Dilution Factor: 0.1		Analysis Time..: 10:54	MDL...........: 0.0060	

NOTE(S):

B Estimated result. Result is less than RL.

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DFB-OH-KCLA-B

TOTAL Metals

Lot-Sample #...: H1H030402-018 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220031						
Mercury	ND	0.23	ug	ASTM D6784-02	08/09-08/10/11	MLC6H1AA
		Dilution Factor: 2.33		Analysis Time..: 12:08	MDL...........: 0.14	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DFB-OH-NPI

TOTAL Metals

Lot-Sample #...: H1H030402-019 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220022						
Mercury	ND	0.11	ug	ASTM D6784-02	08/09-08/10/11	MLC6J1AA
		Dilution Factor: 1.13		Analysis Time..: 11:31	MDL...........: 0.068	

URS Austin Source Testing #1427536

Client Sample ID: BP-WV-DFB-OH-PERM

TOTAL Metals

Lot-Sample #...: H1H030402-020 **Matrix.......:** AIR
Date Sampled...: 07/26/11 **Date Received..:** 07/29/11

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 1220031						
Mercury	**0.45**	**0.17**	**ug**	**ASTM D6784-02**	**08/09-08/10/11**	**MLC6K1AA**
		Dilution Factor: 1.67		Analysis Time..: 12:42	MDL...........: 0.10	

QC Summary

METHOD BLANK REPORT

TOTAL Metals

Client Lot #...: H1H030402

Matrix.........: AIR

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: H1H080000-018		**Prep Batch #...:** 1220018				
Mercury	ND	0.010	ug	ASTM D6784-02	08/08-08/10/11	MLFWQ1AA
		Dilution Factor: 0.1 Analysis Time..: 10:35				
MB Lot-Sample #: H1H080000-022		**Prep Batch #...:** 1220022				
Mercury	ND	0.025	ug	ASTM D6784-02	08/09-08/10/11	MLFXE1AA
		Dilution Factor: 0.25 Analysis Time..: 11:12				
MB Lot-Sample #: H1H080000-031		**Prep Batch #...:** 1220031				
Mercury	ND	0.010	ug	ASTM D6784-02	08/09-08/10/11	MLFX21AA
		Dilution Factor: 0.1 Analysis Time..: 11:52				
Mercury	ND	0.010	ug	ASTM D6784-02	08/09-08/10/11	MLFX21AD
		Dilution Factor: 0.1 Analysis Time..: 11:52				

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Lot-Sample #...: H1H030402 **Matrix.........:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION- ANALYSIS DATE	PREP- BATCH #
Mercury	110	(80 - 120)			ASTM D6784-02	08/08-08/10/11	1220018
	112	(80 - 120)	1.6	(0-20)	ASTM D6784-02	08/08-08/10/11	1220018

Dilution Factor: 0.1 Analysis Time..: 10:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Lot-Sample #...: H1H030402 **Matrix.........:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION- ANALYSIS DATE	PREP BATCH #
Mercury	0.500	0.552	ug	110		ASTM D6784-02	08/08-08/10/11	1220018
	0.500	0.561	ug	112	1.6	ASTM D6784-02	08/08-08/10/11	1220018

Dilution Factor: 0.1 Analysis Time..: 10:38

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#:	H1H080000-022	**Prep Batch #...:** 1220022			
Mercury	88	(80 - 120)	ASTM D6784-02	08/09-08/10/11	MLFXE1AC
		Dilution Factor: 0.25		Analysis Time..: 11:14	
LCS Lot-Sample#:	H1H080000-031	**Prep Batch #...:** 1220031			
Mercury	103	(80 - 120)	ASTM D6784-02	08/09-08/10/11	MLFX21AC
		Dilution Factor: 0.1		Analysis Time..: 11:54	
Mercury	103	(80 - 120)	ASTM D6784-02	08/09-08/10/11	MLFX21AE
		Dilution Factor: 0.1		Analysis Time..: 11:54	

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCNT RECVRY	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: H1H080000-022 **Prep Batch #...:** 1220022							
Mercury	1.25	1.10	ug	88	ASTM D6784-02	08/09-08/10/11	MLFXE1AC
			Dilution Factor: 0.25		Analysis Time..: 11:14		
LCS Lot-Sample#: H1H080000-031 **Prep Batch #...:** 1220031							
Mercury	0.500	0.515	ug	103	ASTM D6784-02	08/09-08/10/11	MLFX21AC
			Dilution Factor: 0.1		Analysis Time..: 11:54		
Mercury	0.500	0.515	ug	103	ASTM D6784-02	08/09-08/10/11	MLFX21AE
			Dilution Factor: 0.1		Analysis Time..: 11:54		

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H1H030402-011 **Prep Batch #...:** 1220022							
Mercury	52 N	(80 - 120)			ASTM D6784-02	08/09-08/10/11	MLC591AC
	84 *	(80 - 120)	47	(0-20)	ASTM D6784-02	08/09-08/10/11	MLC591AD

Dilution Factor: 1.3
Analysis Time..: 11:26

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

* Relative percent difference (RPD) is outside stated control limits.

N Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H1H030402-011 **Prep Batch #...:** 1220022									
Mercury									
	ND	1.30	0.672 N	ug	52		ASTM D6784-02	08/09-08/10/11	MLC591AC
	ND	1.30	1.09 *	ug	84	47	ASTM D6784-02	08/09-08/10/11	MLC591AD
			Dilution Factor: 1.3 Analysis Time..: 11:26						

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

* Relative percent difference (RPD) is outside stated control limits.

N Spiked analyte recovery is outside stated control limits.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H1H030402-010 **Prep Batch #...:** 1220031							
Mercury	104	(80 - 120)			ASTM D6784-02	08/09-08/10/11	MLC581AC
	104	(80 - 120)	0.0	(0-20)	ASTM D6784-02	08/09-08/10/11	MLC581AD
		Dilution Factor: 11.12 Analysis Time..: 12:02					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H1H030402-010 **Prep Batch #...:** 1220031									
Mercury									
	ND	11.1	11.6	ug	104		ASTM D6784-02	08/09-08/10/11	MLC581AC
	ND	11.1	11.6	ug	104	0.0	ASTM D6784-02	08/09-08/10/11	MLC581AD

Dilution Factor: 11.12
Analysis Time..: 12:02

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: H1H030402-012 **Prep Batch #...:** 1220031							
Mercury	90	(80 - 120)			ASTM D6784-02	08/09-08/10/11	MLC6A1AC
	88	(80 - 120)	1.9	(0-20)	ASTM D6784-02	08/09-08/10/11	MLC6A1AD

Dilution Factor: 1.57
Analysis Time..: 12:33

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

MATRIX SPIKE SAMPLE DATA REPORT

TOTAL Metals

Client Lot #...: H1H030402 **Matrix.........:** AIR
Date Sampled...: 07/18/11 **Date Received..:** 07/29/11

MS Lot-Sample #: H1H030402-012 **Prep Batch #...:** 1220031

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Mercury									
	0.24	1.57	1.66	ug	90		ASTM D6784-02	08/09-08/10/11	MLC6A1AC
	0.24	1.57	1.63	ug	88	1.9	ASTM D6784-02	08/09-08/10/11	MLC6A1AD

Dilution Factor: 1.57
Analysis Time..: 12:33

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDS MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDS MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.872	ND	1.0	87.2

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.878	ND	1.0	87.8

Quality Control
Results
Mercury

TestAmerica Knoxville

Mercury Data Reporting Form

Initial Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

		Ck2icv 8/10/2011 10:25 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	2.5	2.52	**100.8**										

TestAmerica Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

		Ck3ccv 8/10/2011 10:31 AM		Ck3ccv 8/10/2011 10:56 AM		Ck3ccv 8/10/2011 11:20 AM		Ck3ccv 8/10/2011 11:46 AM		Ck3ccv 8/10/2011 12:10 PM		Ck3ccv 8/10/2011 12:34 PM	
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	5.05	**101.0**	5.04	**100.8**	5.07	**101.4**	5.06	**101.2**	5.11	**102.2**	4.86	**97.2**

TestAmerica Knoxville

Mercury Data Reporting Form

Continuing Calibration Verification

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

		Ck3ccv 8/10/2011 12:58 PM		Ck3ccv 8/10/2011 1:09 PM									
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	5.0	5.03	**100.6**	5.04	**100.8**								

TestAmerica Knoxville

Mercury Data Reporting Form

Contract Required Detection Limit Standard(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

		CRA 8/10/2011 10:29 AM											
Elem	True Conc	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec	Found	% Rec
Hg	0.2	0.20	**97.5**										

TestAmerica Knoxville

Mercury Data Reporting Form

Initial Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

Elem	Reporting Limit	ICB 8/10/2011 10:27 AM											
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.2	0.06	U										

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

TestAmerica Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

Elem	Reporting Limit	Ck1ccb 8/10/2011 10:33 AM		Ck1ccb 8/10/2011 10:58 AM		Ck1ccb 8/10/2011 11:22 AM		Ck1ccb 8/10/2011 11:49 AM		Ck1ccb 8/10/2011 12:12 PM		Ck1ccb 8/10/2011 12:37 PM	
		Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.2	0.06	U	-0.07	B	-0.07	B	0.06	U	-0.07	B	0.06	U

Mercury Report Generator Version 2.0

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

Form 3 Equivalent

TestAmerica Knoxville

Mercury Data Reporting Form

Continuing Calibration Blank(s)

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

		Ck1ccb 8/10/2011 1:00 PM		Ck1ccb 8/10/2011 1:11 PM									
Elem	Reporting Limit	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag	Found	Flag
Hg	0.2	-0.07	B	0.06	U								

B - Analyte concentration is between IDL and Reporting Limit
U - Analyte concentration is less than IDL

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDS MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC57A	Original Sample MLC57	Spike Added	Percent Recovery
Hg	1.17	0.0666	1.0	110

Original sample result = 0.074 ug/L

Original sample result adjusted for PDS dilution = 0.074 ug/L x 9 mL / 10 mL = 0.0666 ug/L

Spike added = 10 ug/L x 1 mL / 10 mL = 1.0 ug/L

PDS Result = 1.17 ug/L

PDS Recovery = [(1.17 ug/L – 0.0666 ug/L) / 1.0 ug/L] x 100 = 110%

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDS MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.872	ND	1.0	87.2

TestAmerica Knoxville

Mercury Data Reporting Form

Post Digestion Spike

Units: ug/L (ppb)

Instrument ID: Leeman HydraAA Hg

Data File Name: M081011. PRN

Element	PDSD MLC59A	Original Sample MLC59	Spike Added	Percent Recovery
Hg	0.878	ND	1.0	87.8

TestAmerica Knoxville

Mercury Data Reporting Form

Instrument Detection Limits

Units: ug/L (ppb)

IDL Completion Date: 12/8/2010

Instrument ID: Leeman HydraAA Hg An

Data File Name: M081011.PRN

Element	Wavelength (nm)	Reporting Limit	IDL
Hg	253.70	0.2	0.06

TestAmerica Knoxville

Sample ID Nomenclature

The sample ID consists of 5 alpha-numeric characters followed by a suffix in the 6th position that designates the sample type:

Suffix	Sample Type:
B	Method Blank
C	Laboratory Control Sample
L	Laboratory Control Sample Duplicate
S	Matrix Spike
D	Matrix Spike Duplicate
X	Sample Duplicate
P	Serial Dilution
A	Post Digestion Spike
Z#	Dilution; # = Dilution Factor

Sample Receipt Documentation

H1H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D1-OH-PNR	Probe and Nozzle Rinse	7/15/11 0410	X			X			HOLD ALL 'D1' SAMPLES - DO NOT ANALYZE
BP-WV-D1-OH-Filt	Filter		X			X			
BP-WV-D1-OH-KCIA	Potassium Chloride Impingers - Bottle A		X			X			Combine for single analysis.
BP-WV-D1-OH-KCIB	Potassium Chloride Impinger - Bottle B		X			X			
BP-WV-D1-OH-KCIC	Potassium Chloride Impinger - Bottle C		X			X			
BP-WV-D1-OH-KCID	Potassium Chloride Impinger - Bottle D		X			X			
BP-WV-D1-OH-KCIE	Potassium Chloride Impingers - Bottle E		X			X			
BP-WV-D1-OH-KCIF	Potassium Chloride Impingers - Bottle F		X			X			
BP-WV-D1-OH-KCIG	Potassium Chloride Impingers - Bottle G		X			X			
BP-WV-D1-OH-KCIH	Potassium Chloride Impingers - Bottle H		X			X			
BP-WV-D1-OH-KCII	Potassium Chloride Impingers - Bottle I		X			X			
BP-WV-D1-OH-KCIJ	Potassium Chloride Impingers - Bottle J		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
	7/29/11	17:45						
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			
	7/29/11	19:45						

Received for Lab by:	Date	Time	Airbill No	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks 3 Boxes, 1 cooler Rec'd @ Ambient Temp
without custody Seals DJH 8/1/11
3 Boxes, 1 cooler hand delivered

H1H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D1-OH-NPI	Nitric/Peroxide Impingers	7/15/11 0410	X			X			HOLD ALL 'D1' SAMPLES - DO NOT ANALYZE
BP-WV-D1-OH-Perm	Permanganate Impinger		X			X			

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
Nathan	7/29/11	1745						
Received by:	**Date**	**Time**	**Relinquished by:**	**Date**	**Time**			
	7/29/11	17:45						

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition

Remarks

H11H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 2

Project DCU3

Site BP-Husky Toledo

Project Number 40942317

Prepared by URS Corporation

Sample ID Code	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-OH-PNR	Probe and Nozzle Rinse	7/15/11 2125	X						
BP-WV-D2-OH-Filt	Filter		X						
BP-WV-D2-OH-KCIA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis
BP-WV-D2-OH-KCIB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D2-OH-KCIC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D2-OH-KCID	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D2-OH-KCIE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D2-OH-KCIF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D2-OH-KCIG	Potassium Chloride Impingers - Bottle G		X						
BP-WV-D2-OH-KCIH	Potassium Chloride Impingers - Bottle H		X						
BP-WV-D2-OH-KCII	Potassium Chloride Impingers - Bottle I		X						
BP-WV-D2-OH-NPI	Nitric/Peroxide Impingers		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by	Seal #	Date	Time	Temp (C)
Seal #	Condition							

Remarks

H14030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 2 of 2

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

Sample ID Code	**Sample Matrix**	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D2-OH-Perm	Permanganate Impinger	7/15/11 2125	X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

41H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D4-OH-PNR	Probe and Nozzle Rinse	7/18/11 0332	X						
BP-WV-D4-OH-Filt	Filter		X						
BP-WV-D4-OH-KClA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis.
BP-WV-D4-OH-KClB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D4-OH-KClC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D4-OH-KClD	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D4-OH-KClE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D4-OH-KClF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D4-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-D4-OH-Perm	Permanganate Impinger		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

41H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 1

Project	**DCU3**
Site	**BP-Husky Toledo**
Project Number	**40942317**
Prepared by	**URS Corporation**

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-D5-OH-PNR	Probe and Nozzle Rinse	7/27/11 0251	X						
BP-WV-D5-OH-Filt	Filter		X						
BP-WV-D5-OH-KCIA	Potassium Chloride Impingers - Bottle A		X						Combine for single analysis.
BP-WV-D5-OH-KCIB	Potassium Chloride Impinger - Bottle B		X						
BP-WV-D5-OH-KCIC	Potassium Chloride Impinger - Bottle C		X						
BP-WV-D5-OH-KCID	Potassium Chloride Impinger - Bottle D		X						
BP-WV-D5-OH-KCIE	Potassium Chloride Impingers - Bottle E		X						
BP-WV-D5-OH-KCIF	Potassium Chloride Impingers - Bottle F		X						
BP-WV-D5-OH-KCIG	Potassium Chloride Impingers - Bottle G		X						
BP-WV-D5-OH-KCIH	Potassium Chloride Impingers - Bottle H		X						
BP-WV-D5-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-D5-OH-Perm	Permanganate Impinger		X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

H1H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A				Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-DFB-OH-PNR	Probe and Nozzle Rinse	7/26/11 1755	X							
BP-WV-DFB-OH-Filt	Filter		X							
BP-WV-DFB-OH-KClA	Potassium Chloride Impingers - Bottle A		X							Combine for single analysis.
BP-WV-DFB-OH-KClB	Potassium Chloride Impinger - Bottle B		X							
BP-WV-DFB-OH-NPI	Nitric/Peroxide Impingers		X							
BP-WV-DFB-OH-Perm	Permanganate Impinger		X							

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 17:45	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

H1H030402

URS

Chain of Custody Record

Samples from Ontario Hydro Sampling Trains

Page 1 of 1

Project	DCU3
Site	BP-Husky Toledo
Project Number	40942317
Prepared by	URS Corporation

	Sample Matrix	Date/Time	Mercury by CVAAS - SW-846 Method 7470A			Hold	MS/MSD	Shipping Container Number	Comments
BP-WV-TARB-OH-Filt	Filter	7/26/11 1600	X						
BP-WV-TARB-OH-KCl	Potassium Chloride Impingers		X						
BP-WV-TARB-OH-NPI	Nitric/Peroxide Impingers		X						
BP-WV-TARB-OH-Perm	Permanganate Impinger		X						
BP-WV-TARB-OH-NA Rns Soln	Nitric Acid Rinse Solution		X						
BP-WV-TARB-OH-10% NA	10% Nitric Acid Rinse Solution		X						
BP-WV-TARB-HA	Hydroxylamine solution	7/26/11 1600	X						

Remarks: Provide results in total micrograms per sample. Raw data package required

Relinquished by:	Date 7/29/11	Time 1745	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date 7/29/11	Time 17:45	Relinquished by:	Date	Time			

Received for Lab by:	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

3 Boxes, 1 cooler Rec'd @ Ambient Temp.
with out custody seals 8/1/11
3 Boxes, 1 cooler hand delivered

TESTAMERICA KNOXVILLE SAMPLE RECEIPT/CONDITION UPON RECEIPT ANOMALY CHECKLIST

Lot Number: HHH030402

Review Items	Yes	No	NA	If No, what was the problem?	Comments/Actions Taken
1. Do sample container labels match COC? (IDs, Dates, Times)	✓			☐ **1a** Do not match COC ☐ **1b** Incomplete information ☐ **1c** Marking smeared ☐ **1d** Label torn ☐ **1e** No label ☐ **1f** COC not received ☐ **1g** Other:	4A – Hand Delivered
2. Is the cooler temperature within limits? (> freezing temp. of water to 6 °C, VOST: 10°C)	✓			☐ **2a** Temp Blank = ______ ☐ **2b** Cooler Temp = ______ ☐ **2c** Cooling initiated for recently collected samples, ice present.	
3. Were samples received with correct chemical preservative (excluding Encore)?			✓	☐ **3a** Sample preservative =	
4. Were custody seals present/intact on cooler and/or containers?		✓		☑ **4a** Not present ☐ **4b** Not intact ☐ **4c** Other: Hand-Del	
5. Were all of the samples listed on the COC received?	✓			☐ **5a** Samples received-not on COC ☐ **5b** Samples not received-on COC	
6. Were all of the sample containers received intact?	✓			☐ **6a** Leaking ☐ **6b** Broken	
7. Were VOA samples received without headspace?			✓	☐ **7a** Headspace (VOA only)	
8. Were samples received in appropriate containers?	✓			☐ **8a** Improper container	
9. Did you check for residual chlorine, if necessary?			✓	☐ **9a** Could not be determined due to matrix interference	
10. Were samples received within holding time?	✓			☐ **10a** Holding time expired	
11. For rad samples, was sample activity info. provided?			✓	☐ Incomplete information	
12. For 1613B water samples is pH<9?			✓	If no, was pH adjusted to pH 7 - 9 with sulfuric acid? ______	
13. Are the shipping containers intact?	✓			☐ **13a** Leaking ☐ **13b** Other:	
14. Was COC relinquished? (Signed/Dated/Timed)	✓			☐ **14a** Not relinquished	
15. Are tests/parameters listed for each sample?	✓			☐ **15a** Incomplete information	
16. Is the matrix of the samples noted?	✓			☐ **15a** Incomplete information	
17. Is the date/time of sample collection noted?	✓			☐ **15a** Incomplete information	
18. Is the client and project name/# identified?	✓			☐ **15a** Incomplete information	
19. Was the sampler identified on the COC?		✓			

Quote #: 8972 PM Instructions: ______

Sample Receiving Associate: George P Hamode Date: 8/1/11 QA026R22.doc, 012811

Field Data Sheets

FS

Sample Type – **Ontario Hydro**	Start Time 02:20	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 04:08	Run # 1	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Duration (min) 110	Operator K.E.N	Initial not performed
Date July 15th 2011	PTCF n/a	Nozzle Dia (in) 0.207	Final 0.005 @ 22
Location (Source) – DCU3 West Vent	Console No. A161398	Nozzle ID OH-1	Pitot Tube ID n/a
Duct Dimension(s) 8"	DGMCF 1.011	Kf n/a	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0	ΔH@ 1.856	Bar. Press. (in. H₂O) 29.50	Initial (+) X (-) X
700904 Nozzle Calib. 0.206 0.206 0.208		Stat. Press. (in. H₂O) n/a	Final (-) X (-) X

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)						Vacuum (in. Hg)	Conden.
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
P2A	02:20	014.372	N A			292	327	61	100	100	20"	68
	02:25	014.875		.02		248	328	64	100	99	20"	68
	02:30	014.881		.02		240	330	62	100	99	20"	66
	02:35	014.900		.02		240	330	65	99	100	20"	65
	02:40	014.996		.01		241	331	63	100	99	20"	66
	02:45	015:086		.01		242	330	64	100	98	20"	63
	02:50	015.174		.01		241	331	63	100	98	20"	64
	02:55	015.251		.01		240	330	63	100	99	20"	65
	03:00	015.343		.01		241	330	64	100	99	20"	64
	03:05	015.437		.01		241	329	62	100	99	20"	64
	03:10	015.513		.01		242	329	64	100	99	20"	65
	03:15	015.595		.01		242	328	63	101	99	20"	66
	03:20	015.685		.01		242	327	64	101	99	20"	67
	03:25	015.748		.01		242	327	65	101	99	20"	68
	03:30	015.828		.01		241	327	65	101	99	20"	69
	03:35	015.879		.01		241	327	67	101	100	20"	68
	03:40	015.952		.01		242	327	65	101	100	20"	65
	03:45	016.000		.01		242	327	66	100	100	20"	64
	03:50	016.068		.01		243	327	62	100	100	20"	70
	03:55	016.117		.01		242	327	65	101	100	20"	74
	04:00	016.186		.01		243	327	66	101	100	20"	70
	04:05	016.235		.01		244	327	68	101	100	20"	67
STOP	04:10	016.268										

Comments:

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Type – **Ontario Hydro**	Start Time 19:39	Condition D	Page	1 of 1	
Plant Name – BP-Husky Toledo	End Time 2125	Run #2	Sampling Train Leak Rate (ft³ @ in. Hg)		
Project Number - 40942317	Duration (min) 106	Operator K·E·N	Initial	0.007 @ 22"	
Date July 15th 2011	PTCF n/a	Nozzle Dia (in) ~~.220~~ 0.207	Final	0.004 @ 23"	
Location (Source) – DCU3 ~~Fort~~ East	Console No. A161398	Nozzle ID ~~N/A~~ OH-1	Pitot Tube ID n/a		
Duct Dimension(s) 8"	DGMCF 1.011	Kf N/A	Pitot Tube Leak Check		
Elevation (relative to Barometer) (ft) 0	ΔH@ 1.856	Bar. Press. (in. H₂O) 29.26	Initial	(+)	(-)
T00904 Nozzle Calib. 5 min. ● 0.208 ~~0.220~~ ● 0.206 ● 0.206		Stat. Press. (in. H₂O) N — A	Final	(-)	(-)

Pitot Tube Leak Check: N/A

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H₂O)	ΔH (in. H₂O)	Temperature (°F)						Vacuum (in. Hg)	Cond.
3A	K·E·N				Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
1939	~~19:36~~	017.394	~~.01~~	0.01	N/A	332	332	84	107	107	20"	42
1944	~~19:44~~	019.660	~~.01~~	0.01		303	328	87	107	106	23"	48
1949	~~19:54~~	019.732	~~.01~~	0.01		310	332	91	107	106	22"	47
19:54		019.843	~~.01~~	0.01		316	333	92	107	106	20"	44
	19:59	019.971	~~.01~~	0.01		320	333	92	106	105	20"	45
	20:04	020.113	~~.01~~	0.01		323	332	89	104	105	20"	45
	20:09	020.240	~~.01~~	0.01		321	332	88	103	104	20"	45
	20:14	020.354	~~.01~~	0.01		320	332	88	101	102	20"	46
	20:19	020.465	~~.01~~	0.01		318	332	87	100	101	20"	46
	20:24	020.564	~~.01~~	0.01		317	333	87	99	99	20"	47
	20:29	020.644	~~.01~~	0.01		317	334	85	98	98	20"	47
	20:34	020.723	~~.01~~	0.01		316	335	85	97	97	20"	48
	20:39	020.811	~~.01~~	0.01		317	333	85	96	97	20"	48
	20:44	020.882	~~.01~~	0.01		317	333	85	95	96	20"	50
	20:49	020.962	~~.01~~	0.01		317	333	85	95	95	20"	53
	20:54	021.038	~~.01~~	0.01		317	332	84	94	93	20"	61
	20:59	021.100	~~.01~~	0.01		317	334	84	94	94	20"	50
	21:04	021.183	~~.01~~	0.01		318	334	83	93	93	20"	48
	21:09	021.243	~~.01~~	0.01		319	334	83	93	93	20"	48
	21:14	021.331	~~.01~~	0.01		321	333	83	92	92	20"	52
	21:19	021.415	~~.01~~	0.01		324	332	84	92	92	20"	56
21:25	~~21:24~~	021.534										

Comments:

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Type – **Ontario Hydro**		Start Time	1322	Condition	D	Page	1 of 1
Plant Name – BP-Husky Toledo		End Time	1518	Run	3	Sampling Train Leak Rate (ft³ @ in. Hg)	
Project Number - 40942317		Duration (min)	116	Operator	NR	Initial	0.004 @ 20"
Date	7/16/11	PTCF	— n/a	Nozzle Dia (in)	0.~~220~~ 0.207	Final	0.004 @ 25"
Location (Source) – DCU3	~~P2A~~ West	Console No.	A16/398	Nozzle ID	— OH-1	~~Pitot Tube ID~~	
Duct Dimension(s)	8"	DGMCF	1.011	Kf	— n/a	~~Pitot Tube Leak Check~~ N/A	
Elevation (relative to Barometer) (ft)	0	ΔH@	1,856	Bar. Press. (in. H_2O)	29.38	Initial	(+) / (-)
Nozzle Calib.	● 0.207 ~~0.210~~ ● 0.208 ~~0.225~~ ● 0.207 ~~0.220~~ NR 7/16/11			Stat. Press. (in. H_2O)	— n/a	Final	(-) / (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	
P2A	1322	24.60	NA	0.01	NA	302	327	77	96	96	20	58
	1327	24.95		0.01		286	331	84	97	96	20	58
	1332	25.05		0.01		288	331	88	96	96	20	57
	1337	25.15		0.01		290	330	83	97	96	20	56
	1342	25.24		0.01		290	328	79	98	97	20	54
	1347	25.34		0.01		291	328	75	99	98	20	53
	1352	25.44		0.01		291	330	74	100	99	20	56
	1357	25.53		0.01		292	330	72	100	99	20	56
	1402	25.61		0.01		290	330	72	100	99	21	54
	1407	25.71		0.01		289	330	71	100	99	21	55
	1412	25.795		0.01		290	331	71	101	100	22	52
	1417	25.87		0.01		290	332	71	101	100	23	58
	1422	25.96		0.01		290	333	70	100	100	23	61
	1427	26.025		0.01		291	332	71	100	100	24	66
	1432	26.10		0.01		291	331	71	100	99	25	85
	1437	26.18		0.01		293	330	73	99	99	25	82
	1442	26.23		0.01		293	330	78	99	99	25	88
	1447	26.30		0.01		295	330	81	99	98	25	99
	1452	26.35		0.01		297	330	83	100	99	25	98
	1457	26.41		0.01		296	330	84	100	99	25	122
	1502	26.47		0.01		299	331	86	101	100	25	109
	1507	26.525		0.01		301	330	88	101	100	25	107
	1512	26.58		0.01		304	329	88	101	100	25	112
	1517	26.65		0.01		307	331	89	101	100	25	132
STOP	1518	26.77										

Comments:

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Type – **Ontario Hydro**	Start Time 02:20	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 03:32	Run 4	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Duration (min) ~~72~~ 65	Operator K.E.N	Initial 0.002 @ 20"
Date July 18th 2011	PTCF n/a	Nozzle Dia (in) 0.207	Final 0.004 @ 23"
Location (Source) – DCU3 West Vent	Console No. A161398	Nozzle ID 041-1	Pitot Tube ID n/a
Duct Dimension(s) 8"	DGMCF 1.011	Kf N/A	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0	ΔH@ 1.8511	Bar. Press. (in. H_2O) 29.38	Initial (+) (-)
Nozzle Calib. 0.207 0.208 0.207		Stat. Press. (in. H_2O) N/A	Final (-) (-)

Point	5-min Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)						Vacuum (in. Hg)	Condit.
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
P-2A	02:20	028.113	~~.01~~	0.01	N A	331	332	78	92	92	20"	68
	02:25	028.432	~~.01~~	0.01	N A	316	333	84	92	92	20"	67
	02:30	028.711	~~.01~~	0.01		323	336	84	92	92	20"	61
	02:35	028.913	~~.01~~	0.01		325	335	84	91	91	20"	65
	02:40	029.105	~~.01~~	0.01		326	332	84	91	91	20"	64
Power out →	02:45	029.213	~~.01~~	0.01		325	331	89	91	91	20"	58
	02:52	029.213	~~.01~~	0.01		324	316	85	91	91	20"	61
	02:57	029.774	~~.01~~	0.01		320	331	86	91	90	20"	62
	03:02	029.976	~~.01~~	0.01		320	330	86	91	90	20"	66
	03:07	030.178	~~.01~~	0.01		321	331	87	91	90	20"	65
	03:12	030.347	~~.01~~	0.01		322	333	87	91	91	20"	64
	03:17	030.546	~~.01~~	0.01		325	330	87	91	91	20"	64
	03:22	030.712	~~.01~~	0.01		324	331	87	92	91	20"	64
	03:27	030.895	~~.01~~	0.01		322	331	87	92	91	20"	65
END T	03:32	030.056										

Comments: N₂ purge: 10 L/min start stop
0420 0650

Sampling train paused 0245-0252

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Type – **Ontario Hydro**	Start Time 0129	Condition D	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time 0251	Run 5	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Duration (min) 82	Operator WDD	Initial .005 @ 20"
Date ~~July 26th 2011~~ 7/27/11	PTCF —— n/a	Nozzle Dia (in) 0.189	Final 0.005 @ 28"
Location (Source) – DCU3 West	Console No. A167041	Nozzle ID OH-3	~~Pitot Tube ID~~
Duct Dimension(s) 8"	DGMCF 0.990	Kf N/A	~~Pitot Tube Leak Check~~
Elevation (relative to Barometer) (ft) 0'	ΔH@ 1.937	Bar. Press. (in. H_2O) 29.10	~~Initial (+) (-)~~
700904 Nozzle Calib. 0.189 0.189 0.189		Stat. Press. (in. H_2O) n/a	~~Final (-) n/a (-)~~

WDD 7/27/11

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F)						Vacuum (in. Hg)	Condenser (°F)
					Stack	Probe	Filter	Imp Exit	DGM In	DGM Out		
P2A	0129 ~~132~~	489.465		0.01	N/A	339	327	76	91	90	20"	46
	0134	489.915		0.01		321	326	80	91	89	20"	51
	0139	489.993		0.01		321	328	82	91	89	20"	51
	0144	490.082		0.01		322	329	82	91	89	20"	52
	0149	490.319		0.01		320	328	81	91	88	23"	57
	0154	49[illegible].416		0.01		320	328	81	91	88	24"	56
	0159	490.508		0.01		320	330	81	91	87	24"	59
	0204	490.595		0.01		320	328	81	91	87	24"	61
	0209	490.691		0.01		319	330	81	91	87	24"	56
	0214	490.764		0.01		319	328	81	90	87	24"	57
	0219	490.842		0.01		320	328	80	90	87	24"	57
	0224	490.925		0.01		320	328	79	91	87	24"	57
	0229	490.984		0.01		320	329	79	90	87	24"	56
	0234	491.061		0.01		320	328	79	91	86	24"	57
	0239	491.123		0.01		320	329	80	90	86	24"	60
	0244	491.212		0.01		320	330	80	91	87	24"	58
	0249	491.289		0.01		319	328	80	91	87	24"	59
STOP	0251	491.325										

WDD 7/27/11

WDD 7/27/11

Comments:

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Type – **Ontario Hydro**	Start Time NA	Condition FB	Page 1 of 1
Plant Name – BP-Husky Toledo	End Time NA	Run FB	Sampling Train Leak Rate (ft³ @ in. Hg)
Project Number - 40942317	Duration (min) NA	Operator JR	Initial See@
Date 7/26/11	PTCF NA	Nozzle Dia (in) N/A	Final Below
Location (Source) – DCU3	Console No. A167041	Nozzle ID NA	~~Pitot Tube ID~~ N/A
Duct Dimension(s) 8"	DGMCF 0.990	Kf NA	Pitot Tube Leak Check
Elevation (relative to Barometer) (ft) 0'	ΔH@ 1.939	Bar. Press. (in. H_2O) NA	Initial (+) (-)
Nozzle Calib. NA NA NA		Stat. Press. (in. H_2O) NA	Final (-) (-)

Point	Clock Time	Dry Gas Vol. (ft³)	ΔP (in. H_2O)	ΔH (in. H_2O)	Temperature (°F) Stack	Probe	Filter	Imp Exit	DGM In	DGM Out	Vacuum (in. Hg)	
	1753	485.301	@ 15" = 0.006									
		485.415										
	1755	485.415	@ 15" = 0.006									
		485.715										

Comments:

SDS-06 Mercury by Ontario Hydro
Revision Date: August 2007
Reviewed: July 2010

Sample Recovery Sheets

Project No. 40942317
Recovered by (Initials) DCW
Balance ID PE6000

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: 1
Date: 7/15/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g)	=	Net Gain (g)
1	KCl Soln	200	Mod Fatty	3134.6	1203.6	=	1931.0
2	KCl Soln	200	Mod Fatty	3610.5	1322.5	=	2288.0
3	KCl Soln	100	G/S	783.7	734.1	=	49.6
4	KCl Soln	100	G/S	755.2	754.9	=	0.3
5	Nitric/Peroxide	100	Mod	770.6	770.3	=	0.3
6	KMnO₄ Soln	100	Mod	758.3	758.1	=	0.2
7	KMnO₄ Soln	100	Mod	751.8	749.9	=	1.9
8	KMnO₄ Soln	100	G/S	753.8	755.3	=	-1.5
9	--		KO	576.5	576.2	=	0.3
10	Silica Gel	~ 300g	Mod	1011.4	1008.7	=	2.7
				Total Net Gain (g) =			6201.2

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-________-OH-PNR		Probe and Nozzle Rinse
BP-__-________-OH-Filt		Filter
BP-__-________-OH-KCl		KCl Impingers
BP-__-________-OH-NPI		Nitric Acid Impinger
BP-__-________-OH-Perm		Permanganate Impingers

see sample logbook

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first 4 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 N nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% KMnO₄. Complete KCl sample label(s).

✓ Pour the contents of the 5th (nitric acid/ hydrogen peroxide) impinger into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 M nitric acid into the same bottle(s). Complete NPI sample label.

✓ Pour the contents of the 6th, 7th, and 8th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 M nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1M nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.

✓ Log samples into logbook and store appropriately.

Comments Imp 0 - empty - KO - Final 3145.6 g -
initial ~~1203.6~~ 1217.2 g - net gain 1928.4 g

Project No. 40942317
Recovered by (Initials) KMM
Balance ID PE6000

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: 2
Date: 7/15/11

0 KCl 200 Mod Fatty 1820.5 1238.6

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g) =	Net Gain (g)
1	KCl Soln	200	Mod Fatty	2131.2	~~123~~ 1328.9	
2	KCl Soln	200	Mod Fatty	2674.9	1221.5	
3	KCl Soln	100	G/S	756.1	756.6	
4	KCl Soln	100	G/S	738.0	737.7	
5	Nitric/Peroxide	100	Mod	778.2	777.6	
6	KMnO₄ Soln	100	Mod	767.8	767.6	
7	KMnO₄ Soln	100	Mod	757.8	~~569.4~~ 757.3	
8	KMnO₄ Soln	100	G/S	767.3	~~797.7~~ 766.8	
9	--		KO	572.6	~~8~~ 569.4	
10	Zinc Acetate	200	G/S	714.2	797.8	
11	--		KO	655.6	576.2	
10	Silica Gel	~ 300g	Mod	993.1	987.8	
				Total Net Gain (g) =		

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV D2 -OH-PNR	1	Probe and Nozzle Rinse
BP-WV D2 -OH-Filt	1	Filter
BP-WV D2 -OH-KCl	9	KCl Impingers
BP-WV D2 -OH-NPI	1	Nitric Acid Impinger
BP-WV D2 -OH-Perm	1	Permanganate Impingers

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first 4 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 N nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% KMnO₄. Complete KCl sample label(s).

✓ Pour the contents of the 5th (nitric acid/ hydrogen peroxide) impinger into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 M nitric acid into the same bottle(s). Complete NPI sample label.

✓ Pour the contents of the 6th, 7th, and 8th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 M nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1M nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.

✓ Log samples into logbook and store appropriately.

Comments purge @ 16 L/min 0112-0144
ZnA- green bucket
KMnO4 black Imps 6-8

Bottle A 1345.6 417.3
Bottle B 1332.0 417.2
Bottle C 1328.2 416.1

RDS-28: Mercury by Ontario Hydro, ASTM D6784
Per EM SOP-050
Revision Date: March 2011

Project No. 40942317
Recovered by (Initials) RCW
Balance ID PE6000

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: 3
Date: 7-16-11

Moisture Determination

1335.5 2349.9

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g)	=	Net Gain (g)
1	KCl Soln	200	Mod Fatty	3085.4	~~1335.~~ 1213.8	=	2003.6
2	KCl Soln	200	Mod Fatty	3217.4	1230.5	=	2034.5
3	KCl Soln	100	G/S	~~2423.~~ 3265.0	765.0	=	176.9
4	KCl Soln	100	G/S	941.9	744.3	=	128.6
5	Nitric/Peroxide	100	Mod	872.9	784.6	=	153.2
6	KMnO₄ Soln	200	Mod	937.8	872.6	=	47.2
7	KMnO₄ Soln	100	Mod	919.8	754.3	=	196.5
8	KMnO₄ Soln	100	G/S	950.8	764.3	=	75.2
9	--		KO	839.5	572.6	=	477.5
10	Zinc Acetate	200	G/S	1050.1	884.5	=	-176.2
11	--		KO	708.3	576.7	=	246.7
10	Silica Gel	~ 300g	Mod	823.4	993.0	=	6.1
				999.1	Total Net Gain (g)	=	7719.7

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-________-OH-PNR		Probe and Nozzle Rinse
BP-__-________-OH-Filt		Filter
BP-__-________-OH-KCl	na	KCl Impingers
BP-__-________-OH-NPI		Nitric Acid Impinger
BP-__-________-OH-Perm		Permanganate Impingers

Sample Recovery Checklist

AT LOCATION

______ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

______ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

______ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.

______ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

______ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

______ Pour contents of first 4 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 N nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% KMnO₄. Complete KCl sample label(s).

______ Pour the contents of the 5th (nitric acid/ hydrogen peroxide) impinger into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 M nitric acid into the same bottle(s). Complete NPI sample label.

______ Pour the contents of the 6th, 7th, and 8th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 M nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1M nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.

______ Log samples into logbook and store appropriately.

Comments
samples not collected → Imps. 6-8 clear
(reduced)

RDS-28: Mercury by Ontario Hydro, ASTM D6784
Per EM SOP-050
Revision Date: March 2011

Project No. 40942317
Recovered by (Initials) MOD
Balance ID PE6000

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: 4
Date: 7/18/11

0 — — Mod Fatty 2947.3 - 1000.6 = 1946.7

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g)	=	Net Gain (g)
1	KCl Soln	200	Mod Fatty	3330.1	1327.4	=	2002.7
2	KCl Soln	200	Mod Fatty	1151.7	1228.4	=	-76.7
3	KCl Soln	100	G/S	759.0	758.8	=	0.2
4	KCl Soln	100	G/S	739.0	739.3	=	-0.3
5	Nitric/Peroxide	~~100~~ 200	Mod	879.0	880.0	=	-1
~~6~~ 7	KMnO₄ Soln	~~100~~ 200	Mod	~~6~~868.9	869.5	=	~~1.5~~ -0.6
~~7~~ 8	KMnO₄ Soln	~~100~~ 200	Mod	861.8	862.7	=	~~0.6~~ -0.9
~~8~~ 9	KMnO₄ Soln	~~100~~ 200	G/S	867.3	867.6	=	~~-0.9~~ -0.3
~~9~~ 10	--		KO	573.0	572.5	=	~~-0.5~~ 0.5
~~10~~ 11	Zinc Acetate	200	G/S	883.3	884.0	=	~~0.5~~ -0.7
~~11~~ 13	--		KO	609.4	579.8	=	29.6
~~10~~ 14	Silica Gel	~ 300g	Mod	982.8	977.9	=	~~29.4~~ 4.9
				Total Net Gain (g) = 3876.1			

6 Mod 658.1 - 656.6 = 1.5
12 Zinc Acetate 200 G/S 826.2 - 855.7 = -29.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-__-________-OH-PNR	see sample logbook	Probe and Nozzle Rinse
BP-__-________-OH-Filt		Filter
BP-__-________-OH-KCl		KCl Impingers
BP-__-________-OH-NPI		Nitric Acid Impinger
BP-__-________-OH-Perm		Permanganate Impingers

Sample Recovery Checklist

AT LOCATION

- ✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.
- ✓ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

- ✓ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.
- ✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.
- ✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.
- ✓ Pour contents of first 4 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 N nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% $KMnO_4$. Complete KCl sample label(s).
- ✓ Pour the contents of the 5th (nitric acid/ hydrogen peroxide) impinger into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 M nitric acid into the same bottle(s). Complete NPI sample label.
- ✓ Pour the contents of the 6th, 7th, and 8th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 M nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1M nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.
- ✓ Log samples into logbook and store appropriately.

Comments: Sampling train stopped after permanganate impingers began to turn black in color.

RDS-28; Mercury by Ontario Hydro, ASTM D6784
Per EM SOP-050
Revision Date: March 2011

Project No. 40942317
Recovered by (Initials) kmr
Balance ID TE4101A

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: 5
Date: 7/27/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g)	= Net Gain (g)
1	KCl Soln	200	Mod Fatty	3021.7	1223.8	1797.9
2	KCl Soln	200	Mod Fatty	3048.5	1277.9	1770.6
3	KCl Soln	200	Mod Fatty	2932.7	1242.7	1690
4	KCl Soln	100	G/S	793.6	762.0	31.6
5	KCl Soln	100	G/S	775.7	776.0	-0.3
6	Nitric/Peroxide	200	Mod	827.4	846.8	-19.4
7	--		Mod	669.2	649.0	20.2
8	$KMnO_4$ Soln	200	Mod	864.0	887.8	-23.8
9	$KMnO_4$ Soln	200	Mod	900.2	877.3	22.9
10	$KMnO_4$ Soln	200	S/G	873.6	873.4	0.2
11	--		KO	605.6	586.1	19.5
12	Zinc Acetate	200	G/S	862.4	865.2	-2.8
13	Zinc Acetate	200	G/S	820.8	848.7	-27.9
14	--		KO	624.4	613.3	11.1
15	Silica Gel	~ 300g	Mod	997.0	989.6	7.4
				Total Net Gain (g) =		5297.2

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-WV-D5-OH-PNR	1	Probe and Nozzle Rinse
BP-___-______-OH-Filt	1	Filter
BP-___-______-OH-KCl	8	KCl Impingers
BP-___-______-OH-NPI	1	Nitric Acid Impinger
BP-___-______-OH-Perm	1	Permanganate Impingers

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first 5 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 M nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% $KMnO_4$ to each bottle. Complete KCl sample label(s).

✓ Pour the contents of the 6th and 7th (nitric acid/hydrogen peroxide) impingers into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 N nitric acid into the same bottle(s). Complete NI sample label.

✓ Pour the contents of the 8th, 9th, and 10th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 N nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1N nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.

✓ Discard contents of 12th and 13th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments
Start purge 0650 – 0725
1st impinger brownish in color

RDS-28; Mercury by Ontario Hydro, ASTM D6784
Per EM SOP-050
Revision Date: March 2011

Project No. 40942317
Recovered by (Initials) WDD
Balance ID PE6000

Ontario Hydro
ASTM Method D6784

Condition No. D
Run No.: FB
Date: 7/20/11

Moisture Determination

Imp No.	Contents	Volume (mL)	Configuration	Final Wt (g) -	Initial Wt. (g)	=	Net Gain (g)
1	KCl Soln	200	Mod Fatty	1224.7 -	1224.6	=	0.1
2	KCl Soln	200	Mod Fatty	1273.4 -	1273.5	=	-0.1
3	KCl Soln	200	Mod Fatty	1233.6 -	1233.3	=	0.3
4	KCl Soln	100	G/S	760.8 -	761.1	=	-0.3
5	KCl Soln	100	G/S	764.0 -	763.9	=	0.1
6	Nitric/Peroxide	200	Mod	826.3 -	826.5	=	-0.2
7	--		Mod	644.5 -	644.7	=	-0.2
8	KMnO₄ Soln	200	Mod	888.2 -	889.2	=	-1
9	KMnO₄ Soln	200	Mod	877.3 -	878.6	=	-1.3
10	KMnO₄ Soln	200	S/G	879.0 -	879.6	=	-0.6
11	--		KO	586.1 -	586.0	=	0.1
12	Zinc Acetate	200	G/S	865.2 -	865.1	=	0.1
13	Zinc Acetate	200	G/S	848.7 -	849.9	=	-1.2
14	--		KO	613.3 -	613.3	=	0
15	Silica Gel	~ 300g	Mod	989.6 -	981.9	=	7.7
					Total Net Gain (g)	=	3.5

Sample Log

Sample ID Number	No. of Sample Containers	Description
BP-~~WV~~ DFB-OH-PNR	1	Probe and Nozzle Rinse
BP-__-____-OH-Filt	1	Filter
BP-__-____-OH-KCl	2	KCl Impingers
BP-__-____-OH-NPI	1	Nitric Acid Impinger
BP-↓-↓-OH-Perm	1	Permanganate Impingers

Sample Recovery Checklist

AT LOCATION

✓ Rinse and brush probe and nozzle with 0.1 N Nitric Acid into PNR bottle. Note – use Teflon brush.

✓ Rinse Teflon transfer line with 0.1 N Nitric Acid into KCl bottle.

IN LABORATORY

✓ Separate filter holder and place filter in clean Petri dish. Complete Filt sample label.

✓ Rinse front half of filter holder with 0.1 N nitric acid into PNR bottle. Complete PNR sample label.

✓ Disassemble sample train, wipe off excess water and weigh each impinger. Record the final weights in the Moisture Determination section.

✓ Pour contents of first 5 impingers into the KCl impinger catch bottle(s). Rinse the impingers, filter support, back-half of the filter holder and connecting glassware once with 10% nitric acid and twice with 0.1 M nitric acid. Collect the rinses in the same sample bottle(s). Add 100 mL of 5% $KMnO_4$ to each bottle. Complete KCl sample label(s).

✓ Pour the contents of the 6th and 7th (nitric acid/hydrogen peroxide) impingers into the nitric acid impinger catch bottle (NPI). Rinse the impinger and connecting glassware with 0.1 N nitric acid into the same bottle(s). Complete NI sample label.

✓ Pour the contents of the 8th, 9th, and 10th impingers (permanganate impingers) into the permanganate impinger catch bottle (Perm Rinse). Collect all rinses into the same sample bottle(s). Rinse the impingers and connecting glassware twice with 0.1 N nitric acid. Add 4-5 drops of 10% hydroxylamine sulfate solution to each impinger. Verify that permanganate color is gone. Rinse two more times with 0.1N nitric acid. Add 1 mL of 5% dichromate solution. Complete Perm sample label.

✓ Discard contents of 12th and 13th impingers (Zinc Acetate).

✓ Log samples into logbook and store appropriately.

Comments

DVG-806-836 @ 10 Lpm

Section U
IRM Data – Group A

Section X
Isokinetic Data

Spreadsheet Calculations

ISOKINETIC SUMMARY

Test Run	Date	Sampling Train	Test Run Duration (minutes)	Moisture (%)	Dry Gas Sample Volume (dscf)	Vent Gas Temperature (°F)	Average SQRT ΔP	Isokinetic Sampling Rate (%)	dscfm
D2	7/15/2011	Ontario Hydro	106	99.37	1.664	230	3.507	81.9	28.6
D2	7/15/2011	M29	102	99.32	1.550	230	3.507	86.0	31.3
D2	7/15/2011	M5/202	111	99.21	2.435	230	3.507	91.7	36.1
D4	7/18/2011	Ontario Hydro	72	99.12	1.630	228	3.637	80.4	42.1
D4	7/18/2011	M29	140	98.75	4.485	221	3.285	88.5	54.1
D4	7/18/2011	M5/202	138	98.67	5.115	221	3.289	97.3	57.4
D5	7/27/2011	Ontario Hydro	82	99.43	1.426	227	6.462	63.9	48.8
D5	7/27/2011	M29	131	99.53	1.630	227	5.643	54.0	35.1
D5	7/27/2011	M5/202	129	99.59	1.478	227	5.675	56.5	30.9
C1	7/18/2011	M26A	127	99.66	1.197	220	3.266	97.9	14.5
C1	7/18/2011	OTM29	76	99.59	0.897	220	3.904	98.1	21.3
C2	7/19/2011	M26A	57	98.95	1.926	232	2.272	199	30.6
C2	7/19/2011	OTM29	56	99.00	1.850	232	2.257	149	29.4
C3	7/20/2011	M26A	45	99.73	0.781	214	3.628	236	13.4
C3	7/20/2011	OTM29	45	99.75	0.687	214	3.628	166	12.1
A1	7/21/2011	M0010	101	99.06	3.201	221	4.899	92.3	60.9
A2	7/21/2011	M0010	94	99.19	2.693	216	5.916	81.2	62.5
A3	7/24/2011	M0010	90	97.79	6.735	230	4.433	105	126.9
A4	7/25/2011	M0010	63	99.47	0.918	237	5.207	71.6	36.1

Group A

BP-Husky DCU3 Vent Emissions Test - Isokinetic Data

Location	DCU3 West	DCU3 East	DCU3 East	DCU3 West
Parameter	M0010	M0010	M0010	M0010
Run Designation	A1	A2	A3	A4
Date	7/21/2011	7/21/2011	7/24/2011	7/25/2011
Time Start	02:15	20:57	19:55	14:40
Time Stop	03:56	22:31	21:25	15:43
	02:15-03:56	20:57-22:31	19:55-21:25	14:40-15:43
Duct Diameter (ft) (equivalent if square duct)	0.67	0.67	0.67	0.67
Pitot Tube Correction Factor	0.84	0.84	0.84	0.84
Nozzle Diameter (inches)	0.190	0.190	0.190	0.190
DGMCF	0.988	0.988	1.030	1.023
Standard Temperature (°F)	68	68	68	68
Barometric Pressure Measured (" Hg)	29.12	29.00	29.16	29.20
Stack Elevation (ft) (relative to Barometer)	0	0	0	0
Barometric Pressure (" Hg)	29.12	29	29.16	29.2
Average Stack Temperature (°F)	221.2	215.6	230.5	237.1
Average DGM Temp (°F)	90.7	107.9	92.1	101.5
Average Delta H (in wc)	0.05	0.05	0.05	0.08
Condensed Water (g)	7157.8	6969.2	6298.3	4560.8
Test Duration (minutes)	101	94	90	63
Static Pressure (in wc)	19.20	3.21	3.41	18.96
% CO	0.0	0.0	0.0	0.0
% CO2	0.0	0.0	0.0	0.0
% O2	0.0	0.0	0.0	0.0
% H2	0.0	0.0	0.0	0.0
% CH4	0	0	0	0
% N2	100.0	100.0	100.0	100.0
Meter Volume (acf)	3.430	2.988	7.225	1.001
Average square root of delta p	4.654	5.916	4.433	5.207
Absolute Stack Pressure (in Hg)	30.53	29.24	29.41	30.59
Absolute Stack Temperature (°R)	681.2	675.6	690.5	697.1
Flue Gas Moisture (%)	99.07	99.20	97.72	99.57
Moisture at saturation	N/A	N/A	N/A	N/A
Moisture used in Calculation	99.07	99.20	97.72	99.57
Volume of Water Condensed (scf)	338.03	329.13	297.44	215.39
Gas Molecular Weight (Wet) (g/g-mole)	18.09	18.08	18.23	18.04
Corrected Volume of Gas sampled (acf)	3.389	2.952	7.442	1.024
Volume at Meter (dscf)	3.163	2.661	6.937	0.940
Average Gas Velocity (f/sec)	371.13	480.27	361.32	420.23
Avg Flow Rate (acfh)	466,375	603,526	454,047	528,075
Avg Flow Rate (acfm)	7,773	10,059	7,567	8,801
Avg Flow Rate (scfh)	368,905	460,913	341,286	408,994
Avg Flow Rate (scfm)	6,148	7,682	5,688	6,817
Avg Flow Rate (dscfh)	3,420	3,696	7,778	1,776
Avg Flow Rate (dscfm)	57	61.6	129.6	29.6
Isokinetic Sampling Rate (%)	97.41	81.46	105.41	89.31
Sample Flow Rate (cfm)	0.037	0.035	0.080	0.020
Sample Flow Rate (L/min)	1.061	1.002	2.273	0.569

Group C

BP-Husky DCU3 Vent Emissions Test - Isokinetic Data

Location	DCU3 East	DCU3 East	DCU3 West	DCU3 West	DCU3 East	DCU3 East
Parameter	M26A	OTM29	M26A	OTM29	M26A	OTM29
Run Designation	C1	C1	C2	C2	C3	C3
Date	7/18/2011	7/18/2011	7/19/2011	7/19/2011	7/20/2011	7/20/2011
Time Start	20:29	20:29	14:23	14:23	09:05	09:05
Time Stop	22:36	21:45	15:20	15:19	09:50	09:50
	20:29-22:36	20:29-21:45	14:23-15:20	14:23-15:19	09:05-09:50	09:05-09:50
Duct Diameter (ft) (equivalent if square duct)	0.67	0.67	0.67	0.67	0.67	0.67
Pitot Tube Correction Factor	0.84	0.84	0.84	0.84	0.84	0.84
Nozzle Diameter (inches)	0.206	0.190	0.187	0.220	0.187	0.220
DGMCF	1.023	1.013	0.988	1.014	1.023	1.013
Standard Temperature (°F)	68	68	68	68	68	68
Barometric Pressure Measured (" Hg)	29.22	29.22	29.16	29.16	29.08	29.08
Stack Elevation (ft) (relative to Barometer)	0	0	0	0	0	0
Barometric Pressure (" Hg)	29.22	29.22	29.16	29.16	29.08	29.08
Average Stack Temperature (°F)	220.1	220.1	232.3	231.9	214.1	214.1
Average DGM Temp (°F)	95.2	98.2	99.5	102.7	93.2	96.9
Average Delta H (in wc)	0.01	0.01	0.01	0.01	0.01	0.01
Condensed Water (g)	7458.4	4570.6	3910.9	3891.9	6044.5	5884.6
Test Duration (minutes)	127	76	57	56	45	45
Static Pressure (in wc)	9.78	14.80	12.80	12.80	36.14	36.14
% CO	0.0	0.0	0.0	0.0	0.0	0.0
% CO2	0.0	0.0	0.0	0.0	0.0	0.0
% O2	0.0	0.0	0.0	0.0	0.0	0.0
% H2	0.0	0.0	0.0	0.0	0.0	0.0
% CH4	0	0	0	0	0	0
% N2	100.0	100.0	100.0	100.0	100.0	100.0
Meter Volume (acf)	1.289	0.930	2.094	2.022	0.841	0.746
Average square root of delta p	3.388	4.230	2.272	2.257	3.628	3.628
Absolute Stack Pressure (in Hg)	29.94	30.31	30.10	30.10	31.74	31.74
Absolute Stack Temperature (°R)	680.1	680.1	692.3	691.9	674.1	674.1
Flue Gas Moisture (%)	99.65	99.60	98.98	98.99	99.72	99.75
Moisture at saturation	N/A	N/A	N/A	N/A	N/A	N/A
Moisture used in Calculation	99.65	99.60	98.98	98.99	99.72	99.75
Volume of Water Condensed (scf)	352.23	215.85	184.70	183.80	285.46	277.91
Gas Molecular Weight (Wet) (g/g-mole)	18.03	18.04	18.10	18.10	18.03	18.02
Corrected Volume of Gas sampled (acf)	1.319	0.942	2.069	2.051	0.861	0.755
Volume at Meter (dscf)	1.225	0.870	1.903	1.876	0.799	0.696
Average Gas Velocity (f/sec)	273.09	338.82	183.89	182.66	282.81	282.83
Avg Flow Rate (acfh)	343,172	425,778	231,079	229,533	355,388	355,417
Avg Flow Rate (acfm)	5,720	7,096	3,851	3,826	5,923	5,924
Avg Flow Rate (scfh)	266,588	334,835	177,312	176,214	295,281	295,305
Avg Flow Rate (scfm)	4,443	5,581	2,955	2,937	4,921	4,922
Avg Flow Rate (dscfh)	924	1,344	1,808	1,780	824	738
Avg Flow Rate (dscfm)	15	22	30	30	14	12
Isokinetic Sampling Rate (%)	94.47	90.59	202.74	149.28	236.57	166.34
Sample Flow Rate (cfm)	0.014	0.015	0.039	0.039	0.025	0.020
Sample Flow Rate (L/min)	0.385	0.415	1.109	1.092	0.700	0.560

Group D

BP-Husky DCU3 Vent Emissions Test - Isokinetic Data

Location	DCU3 East	DCU3 East	DCU3 East	DCU3 East	DCU3 West	DCU3 West	DCU3 West	DCU3 West
Parameter	Flowrate	OH	M29	M5/202	OH	M29	M5/202	OH
Run Designation	Preliminary	D2	D2	D2	D3	D3	D3	D1
Date	7/14/2011	7/15/2011	7/15/2011	7/15/2011	7/16/2011	7/16/2011	7/16/2011	7/15/2011
Time Start	08:00	19:39	19:39	19:39	13:22	13:22	13:22	02:20
Time Stop	09:50	21:25	21:21	21:30	15:18	15:18	15:17	04:10
	08:00-09:50	19:39-21:25	19:39-21:21	19:39-21:30	13:22-15:18	13:22-15:18	13:22-15:17	02:20-04:10
Duct Diameter (ft) (equivalent if square duct)	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Pitot Tube Correction Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Nozzle Diameter (inches)	0.225	0.207	0.190	0.206	0.207	0.190	0.206	0.207
DGMCF	1.000	1.034	1.013	1.023	1.034	1.013	1.023	1.034
Standard Temperature (°F)	68	68	68	68	68	68	68	68
Barometric Pressure Measured (" Hg)	29.38	29.26	29.26	29.26	29.38	29.38	29.38	29.50
Stack Elevation (ft) (relative to Barometer)	0	0	0	0	0	0	0	0
Barometric Pressure (" Hg)	29.38	29.26	29.26	29.26	29.38	29.38	29.38	29.5
Average Stack Temperature (°F)	212.7	229.7	229.7	229.7	227.1	227.1	227.1	216.9
Average DGM Temp (°F)	106.4	99.1	99.2	98.8	99.0	100.9	96.3	99.8
Average Delta H (in wc)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Condensed Water (g)	7012.9	5598.7	4764.3	6493.4	7719.7	6798.5	7794.7	6201.2
Test Duration (minutes)	110	106	102	111	116	116	115	110
Static Pressure (in wc)	10.00	10.24	10.24	10.24	20.12	20.12	20.12	10.00
% CO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% CO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% O2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% H2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% CH4	0	0	0	0	100	100	100	100
% N2	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0
Meter Volume (acf)	2.035	1.802	1.678	2.635	1.793	1.729	2.028	1.422
Average square root of delta p	2.822	3.508	3.508	3.508	1.685	1.685	1.685	3.879
Absolute Stack Pressure (in Hg)	30.12	30.01	30.01	30.01	30.86	30.86	30.86	30.24
Absolute Stack Temperature (°R)	672.7	689.7	689.7	689.7	687.1	687.1	687.1	676.9
Flue Gas Moisture (%)	99.44	99.35	99.31	99.19	99.53	99.50	99.48	99.54
Moisture at saturation	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Moisture used in Calculation	99.44	99.35	99.31	99.19	99.53	99.50	99.48	99.54
Volume of Water Condensed (scf)	331.19	264.40	225.00	306.66	364.57	321.07	368.11	292.86
Gas Molecular Weight (Wet) (g/g-mole)	18.06	18.06	18.07	18.08	17.99	17.99	17.99	17.99
Corrected Volume of Gas sampled (acf)	2.035	1.863	1.700	2.696	1.854	1.751	2.075	1.470
Volume at Meter (dscf)	1.863	1.721	1.570	2.491	1.719	1.619	1.934	1.367
Average Gas Velocity (f/sec)	225.41	284.16	284.12	284.03	134.61	134.61	134.61	310.75
Avg Flow Rate (acfh)	283,264	357,080	357,034	356,923	169,153	169,156	169,158	390,504
Avg Flow Rate (acfm)	4,721	5,951	5,951	5,949	2,819	2,819	2,819	6,508
Avg Flow Rate (scfh)	223,786	274,220	274,185	274,099	134,061	134,063	134,065	307,825
Avg Flow Rate (scfm)	3,730	4,570	4,570	4,568	2,234	2,234	2,234	5,130
Avg Flow Rate (dscfh)	1,252	1,773	1,900	2,209	629	673	701	1,430
Avg Flow Rate (dscfm)	21	30	32	37	10	11	12	24
Isokinetic Sampling Rate (%)	102.63	82.05	86.17	91.95	210.41	220.72	217.19	77.62
Sample Flow Rate (cfm)	0.019	0.020	0.021	0.026	0.019	0.015	0.020	0.017
Sample Flow Rate (L/min)	0.546	0.572	0.584	0.728	0.530	0.433	0.562	0.488

Group D (2)

BP-Husky DCU3 Vent Emissions Test - Isokinetic Data

Location	DCU3 West	DCU3 West	DCU3 West	DCU3 West	DCU3 West	DCU3 West
Parameter	OH	M29	M5/202	OH	M29	M5/202
Run Designation	D4	D4	D4	D5	D5	D5
Date	7/18/2011	7/18/2011	7/18/2011	7/27/2011	7/27/2011	7/27/2011
Time Start	02:20	02:20	02:20	01:29	01:28	01:29
Time Stop	03:32	04:40	04:38	02:51	03:39	03:38
	02:20-03:32	02:20-04:40	02:20-04:38	01:29-02:51	01:28-03:39	01:29-03:38
Duct Diameter (ft) *(equivalent if square duct)*	0.67	0.67	0.67	0.67	0.67	0.67
Pitot Tube Correction Factor	0.84	0.84	0.84	0.84	0.84	0.84
Nozzle Diameter (inches)	0.207	0.207	0.206	0.189	0.205	0.205
DGMCF	1.034	1.014	0.988	1.023	1.013	1.034
Standard Temperature (°F)	68	68	68	68	68	68
Barometric Pressure Measured (" Hg)	29.38	29.38	29.38	29.10	29.10	29.10
Stack Elevation (ft) (relative to Barometer)	0	0	0	0	0	0
Barometric Pressure (" Hg)	29.38	29.38	29.38	29.1	29.1	29.1
Average Stack Temperature (°F)	227.1	227.1	227.1	226.9	226.9	226.9
Average DGM Temp (°F)	91.2	92.4	88.4	89.1	92.1	94.3
Average Delta H (in wc)	0.01	0.05	0.01	0.01	0.01	0.01
Condensed Water (g)	3876.1	7480.3	8039.9	5297.2	7302.4	7580.7
Test Duration (minutes)	65	140	138	82	131	129
Static Pressure (in wc)	7.54	7.54	7.54	20.86	20.86	20.86
% CO	0.0	0.0	0.0	0.0	0.0	0.0
% CO2	0.0	0.0	0.0	0.0	0.0	0.0
% O2	0.0	0.0	0.0	0.0	0.0	0.0
% H2	0.0	0.0	0.0	0.0	0.0	0.0
% CH4	0	0	0	0	0	0
% N2	100.0	100.0	100.0	100.0	100.0	100.0
Meter Volume (acf)	1.761	4.778	5.410	1.524	1.752	1.595
Average square root of delta p	3.198	3.198	3.198	5.552	5.552	5.552
Absolute Stack Pressure (in Hg)	29.93	29.93	29.93	30.63	30.63	30.63
Absolute Stack Temperature (°R)	687.1	687.1	687.1	686.9	686.9	686.9
Flue Gas Moisture (%)	99.07	98.73	98.69	99.42	99.52	99.57
Moisture at saturation	N/A	N/A	N/A	N/A	N/A	N/A
Moisture used in Calculation	99.07	98.73	98.69	99.42	99.52	99.57
Volume of Water Condensed (scf)	183.05	353.26	379.69	250.17	344.86	358.01
Gas Molecular Weight (Wet) (g/g-mole)	18.09	18.13	18.13	18.06	18.05	18.04
Corrected Volume of Gas sampled (acf)	1.821	4.845	5.345	1.559	1.775	1.649
Volume at Meter (dscf)	1.713	4.547	5.053	1.458	1.651	1.528
Average Gas Velocity (f/sec)	258.66	258.41	258.38	444.28	444.40	444.47
Avg Flow Rate (acfh)	325,037	324,728	324,690	558,293	558,453	558,532
Avg Flow Rate (acfm)	5,417	5,412	5,411	9,305	9,308	9,309
Avg Flow Rate (scfh)	249,896	249,659	249,630	439,406	439,531	439,594
Avg Flow Rate (scfm)	4,165	4,161	4,160	7,323	7,326	7,327
Avg Flow Rate (dscfh)	2,316	3,173	3,279	2,547	2,095	1,868
Avg Flow Rate (dscfm)	39	53	55	42	35	31
Isokinetic Sampling Rate (%)	101.94	91.74	101.06	75.07	54.99	57.93
Sample Flow Rate (cfm)	0.030	0.036	0.042	0.023	0.015	0.016
Sample Flow Rate (L/min)	0.846	1.011	1.176	0.642	0.419	0.446

Leak Checks

PRELIM LEAK CHECK

Leak Correction per equation EPA Method 5-1 (a) Case I:

Preliminary Moisture and Flow rate	
meter volume (acf)	2.12
4% of average sampling rate (cfm)	0.00077
final leak rate (cfm)	0.003
final leak rate - 4% leak rate	0.00223
leak volume (acf)	0.085
corrected meter volume (acf)	2.035

GROUP A LEAK CHECK

Leak Correction per equation EPA Method 5-1 (a) Case I:

M0010 - Run 1

meter volume (acf)	3.784
4% of average sampling rate (cfm)	0.00150
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00350
leak volume (acf)	0.354
corrected meter volume (acf)	3.430

M0010 - Run 2

meter volume (acf)	3.325
4% of average sampling rate (cfm)	0.00141
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00359
leak volume (acf)	0.337
corrected meter volume (acf)	2.988

M0010 - Run 3

meter volume (acf)	7.225
4% of average sampling rate (cfm)	0.00321
final leak rate (cfm)	0.002
final leak rate - 4% leak rate	0.00000
leak volume (acf)	0.000
corrected meter volume (acf)	7.225

M0010 - Run 4

meter volume (acf)	1.265
4% of average sampling rate (cfm)	0.00080
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00420
leak volume (acf)	0.264
corrected meter volume (acf)	1.001

GROUP C LEAK CHECK

Leak Correction per equation EPA Method 5-1 (a) Cas

M26A - Run 1

meter volume (acf)	1.728
4% of average sampling rate (cfm)	0.00054
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00346
leak volume (acf)	0.439
corrected meter volume (acf)	1.289

OTM29 - Run 1

meter volume (acf)	1.153
4% of average sampling rate (cfm)	0.00061
final leak rate (cfm)	0.003
final leak rate - 4% leak rate	0.00239
leak volume (acf)	0.182
corrected meter volume (acf)	0.971

M26A- Run 2

meter volume (acf)	2.233
4% of average sampling rate (cfm)	0.00157
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00243
leak volume (acf)	0.139
corrected meter volume (acf)	2.094

OTM29 - Run 2

meter volume (acf)	2.16
4% of average sampling rate (cfm)	0.00154
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00246
leak volume (acf)	0.138
corrected meter volume (acf)	2.022

M26A - Run 3

meter volume (acf)	1.112
4% of average sampling rate (cfm)	0.00099
final leak rate (cfm)	0.007

final leak rate - 4% leak rate	0.00601
leak volume (acf)	0.271
corrected meter volume (acf)	0.841

OTM29- Run 3

meter volume (acf)	0.890
4% of average sampling rate (cfm)	0.00079
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00321
leak volume (acf)	0.144
corrected meter volume (acf)	0.746

GROUP D LEAK CHECK

Leak Correction per equation EPA Method 5-1 (a) Case I:

OH - Run 2

meter volume (acf)	1.896
4% of average sampling rate (cfm)	0.00069
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00431
leak volume (acf)	0.474
corrected meter volume (acf)	1.422

OH - Run 2

meter volume (acf)	2.14
4% of average sampling rate (cfm)	0.00081
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00319
leak volume (acf)	0.338
corrected meter volume (acf)	1.802

M29- Run 2

meter volume (acf)	2.104
4% of average sampling rate (cfm)	0.00083
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00417
leak volume (acf)	0.426
corrected meter volume (acf)	1.678

M5/202- Run 2

meter volume (acf)	2.854
4% of average sampling rate (cfm)	0.00103
final leak rate (cfm)	0.003
final leak rate - 4% leak rate	0.00197
leak volume (acf)	0.219
corrected meter volume (acf)	2.635

OH - Run 3

meter volume (acf)	2.170
4% of average sampling rate (cfm)	0.00075
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00325
leak volume (acf)	0.377
corrected meter volume (acf)	1.793

M29- Run 3

meter volume (acf)	1.774
4% of average sampling rate (cfm)	0.00061
final leak rate (cfm)	0.001
final leak rate - 4% leak rate	0.00039
leak volume (acf)	0.045
corrected meter volume (acf)	1.729

M5/202- Run 3

meter volume (acf)	2.282

4% of average sampling rate (cfm)	0.00079
final leak rate (cfm)	0.003
final leak rate - 4% leak rate	0.00221
leak volume (acf)	0.254
corrected meter volume (acf)	2.028

OH - Run 4

meter volume (acf)	1.943
4% of average sampling rate (cfm)	0.00108
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00292
leak volume (acf)	0.210
corrected meter volume (acf)	1.733

M29- Run 4

meter volume (acf)	4.998
4% of average sampling rate (cfm)	0.00143
final leak rate (cfm)	0.003
final leak rate - 4% leak rate	0.00157
leak volume (acf)	0.220
corrected meter volume (acf)	4.778

M5/202- Run 4

meter volume (acf)	5.733
4% of average sampling rate (cfm)	0.00166
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00234
leak volume (acf)	0.323
corrected meter volume (acf)	5.410

OH - Run 5

meter volume (acf)	1.860
4% of average sampling rate (cfm)	0.00091
final leak rate (cfm)	0.005
final leak rate - 4% leak rate	0.00409
leak volume (acf)	0.336
corrected meter volume (acf)	1.524

M29- Run 5

meter volume (acf)	1.937
4% of average sampling rate (cfm)	0.00059
final leak rate (cfm)	0.002
final leak rate - 4% leak rate	0.00141
leak volume (acf)	0.185
corrected meter volume (acf)	1.752

M5/202- Run 5

meter volume (acf)	2.03
4% of average sampling rate (cfm)	0.00063
final leak rate (cfm)	0.004
final leak rate - 4% leak rate	0.00337
leak volume (acf)	0.435
corrected meter volume (acf)	1.595

APPENDIX 5 – URS FIELD NOTES

Test Run Log

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A~~1~~4-M308-CondA	Wet Vent - Method 308 (MeOH)	Condensate - Bottle A	A	~~1~~4	7/25/11	1540	—	—	
~~BP-WV-A1-M308-CondB~~	~~Wet Vent - Method 308 (MeOH)~~	~~Condensate - Bottle B~~	~~A~~	~~1~~					
BP-WV-A~~1~~4-M308-Silica	Wet Vent - Method 308 (MeOH)	Silica	A	~~1~~4	7/25/11	1540	—	—	3704500197
BP-WV-A2-M308-CondA	Wet Vent - Method 308 (MeOH)	Condensate - Bottle A	A	2	7/21	2207	31.3	—	
~~BP-WV-A2-M308-CondB~~	~~Wet Vent - Method 308 (MeOH)~~	~~Condensate - Bottle B~~	~~A~~	~~2~~					
BP-WV-A2-M308-Silica	Wet Vent - Method 308 (MeOH)	Silica	A	2	7/21	2207	—	—	3704500142
BP-WV-A3-M308-CondA	Wet Vent - Method 308 (MeOH)	Condensate - Bottle A	A	3	7/24	2103	—	—	
~~BP-WV-A3-M308-CondB~~	~~Wet Vent - Method 308 (MeOH)~~	~~Condensate - Bottle B~~	~~A~~	~~3~~					
BP-WV-A3-M308-Silica	Wet Vent - Method 308 (MeOH)	Silica	A	3	7/24	2103	—	—	3704500107
~~BP-WV-C1-OTM29-Filt~~	~~Wet Vent - HCN~~	~~Filter~~	~~C~~	~~1~~					
BP-WV-C1-OTM29-NaOH ImpA	Wet Vent - HCN	NaOH Impinger Catch - Bottle A	C	1	7/18/11	2145	128.8	631.3	
BP-WV-C1-OTM29-NaOH ImpB	Wet Vent - HCN	NaOH Impinger Catch - Bottle B	C	1	↓	↓	130.2	337.8	
BP-WV-C1-OTM29-PbA ImpA	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle A	C	1	↓	↓	129.1	1243.2	
BP-WV-C1-OTM29-PbA ImpB	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle B	C	1	↓	↓	129.0	1217.3	
BP-WV-C1-OTM29-PbA ImpC	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle C	C	1	↓	↓	129.1	1248.4	
BP-WV-C1-OTM29-PbA ImpD	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle D	C	1	↓	↓	128.9	1199.0	
~~BP-WV-C2-OTM29-Filt~~	~~Wet Vent - HCN~~	~~Filter~~	~~C~~	~~2~~					
BP-WV-C2-OTM29-NaOH ImpA	Wet Vent - HCN	NaOH Impinger Catch - Bottle A	C	2	7/19/11	1520	62.1	624.6	
BP-WV-C2-OTM29-NaOH ImpB	Wet Vent - HCN	NaOH Impinger Catch - Bottle B	C	2	↓	↓	45.5	252.0	
BP-WV-C2-OTM29-PbA ImpA	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle A	C	2	↓	↓	303.7	2430.0	
BP-WV-C2-OTM29-PbA ImpB	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle B	C	2	↓	↓	304.0	2471.1	
BP-WV-C2-OTM29-PbA ImpC	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle C	C	2	⊥	⊥	304.0	1337.1	
~~BP-WV-C2-OTM29-PbA ImpD~~	~~Wet Vent - HCN~~	~~Lead Acetate Impinger Catch - Bottle D~~	~~C~~	~~2~~					
~~BP-WV-C3-OTM29-Filt~~	~~Wet Vent - HCN~~	~~Filter~~	~~C~~	~~3~~					
BP-WV-C3-OTM29-NaOH ImpA	Wet Vent - HCN	NaOH Impinger Catch - Bottle A	C	3	7/20/11	0950	62.2 ~~303.7~~	583.7 ~~2390.6~~	
BP-WV-C3-OTM29-NaOH ImpB	Wet Vent - HCN	NaOH Impinger Catch - Bottle B	C	3	⊥	⊥	46.1 ~~303.8~~	192.2 ~~2394.2~~	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-C3-OTM29-PbA ImpA	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle A	C	3	7/20/11	0950	303.7	2366.6	
BP-WV-C3-OTM29-PbA ImpB	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle B	C	3			303.8	2394.2	
BP-WV-C3-OTM29-PbA ImpC	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle C	C	3			303.8	2438.7	
BP-WV-C3-OTM29-PbA ImpD	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle D	C	3			305.6	991.6	
~~BP-WV-CFB-OTM29-Filt~~	~~Wet Vent - HCN~~	~~Filter~~	~~C~~	~~FB~~					~~Field Blank Train~~
BP-WV-CFB-OTM29-NaOH ImpA	Wet Vent - HCN	NaOH Impinger Catch - Bottle A	C	FB	7/20/11	1905	129.9	656.5	Field Blank Train
BP-WV-CFB-OTM29-NaOH ImpB	Wet Vent - HCN	NaOH Impinger Catch - Bottle B	C	FB			46.1	204.2	Field Blank Train
BP-WV-CFB-OTM29-PbA ImpA	Wet Vent - HCN	Lead Acetate Impinger Catch - Bottle A	C	FB			305.5	1079.9	Field Blank Train
~~BP-WV-CFB-OTM29-PbA ImpB~~	~~Wet Vent - HCN~~	~~Lead Acetate Impinger Catch - Bottle B~~	~~C~~	~~FB~~					~~Field Blank Train~~
~~BP-WV-CFB-OTM29-PbA ImpC~~	~~Wet Vent - HCN~~	~~Lead Acetate Impinger Catch - Bottle C~~	~~C~~	~~FB~~					~~Field Blank Train~~
~~BP-WV-CFB-OTM29-PbA ImpD~~	~~Wet Vent - HCN~~	~~Lead Acetate Impinger Catch - Bottle D~~	~~C~~	~~FB~~					~~Field Blank Train~~
BP-WV-EntFS-OTM29-Field Spike	Wet Vent - HCN	Field Spike	Ent	FS	7/27/11	1330	62.6	282.8	field spike. Spike matl from lab, spike done in field spike-1
~~BP-WV-EntRB-OTM29-Filt~~	~~Wet Vent - HCN~~	~~Filter~~	~~Ent~~	~~RB~~					~~Reagent Blank~~
BP-WV-EntRB-OTM29-6.0N NaOH	Wet Vent - HCN	Sodium Hydroxide Impinger Solution	Ent	RB	7/24/11	1330	46.0	168.2	Reagent Blank
BP-WV-EntRB-OTM29-0.1N NaOH	Wet Vent - HCN	Sodium Hydroxide Rinse Solution	Ent	RB			46.0	144.8	Reagent Blank
BP-WV-A1-M0010-PNR-Ace	Wet Vent - M0010 (Semi-Volatiles)	PNR - Acetone	A	1	7/21/11	0355	180.8	252.0	
BP-WV-A1-M0010-PNR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	PNR - Methylene Chloride	A	1			181.8	320.5	
BP-WV-A1-M0010-Filt	Wet Vent - M0010 (Semi-Volatiles)	Filter	A	1			—	—	
BP-WV-A1-M0010-PreCondA	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle A	A	1			415.5	1361.6	
BP-WV-A1-M0010-PreCondB	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle B	A	1			417.2	1351.9	
BP-WV-A1-M0010-PreCondC	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle C	A	1			418.9	893.8	
BP-WV-A1-M0010-XAD	Wet Vent - M0010 (Semi-Volatiles)	XAD Sorbent Cartridge	A	1			—	—	
BP-WV-A1-M0010-PostCondA	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle A	A	1			414.5	1310.4	
BP-WV-A1-M0010-PostCondB	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle B	A	1			418.5	1304.9	
BP-WV-A1-M0010-CR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Acetone	A	1			286.1	395.3	
BP-WV-A1-M0010-CR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Methylene Chloride	A	1			285.6	547.0	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trair	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A1-M0010-IR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Acetone	A	1	7/21/11	0355	181.0 ~~180.5~~	227.6 ~~252.0~~	NR 7/21/11
BP-WV-A1-M0010-IR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Methylene Chloride	A	1			181.8	~~320.5~~	254.2 NR 7/21/11
BP-WV-A2-M0010-PNR-Ace	Wet Vent - M0010 (Semi-Volatiles)	PNR - Acetone	A	2	7/21/11	2231	180.8	229.6	
BP-WV-A2-M0010-PNR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	PNR - Methylene Chloride	A	2			180.9	266.5	
BP-WV-A2-M0010-Filt	Wet Vent - M0010 (Semi-Volatiles)	Filter	A	2			—	—	
BP-WV-A2-M0010-PreCondA	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle A	A	2			417.0	1365.5	
BP-WV-A2-M0010-PreCondB	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle B	A	2			417.0	1387.0	
BP-WV-A2-M0010-PreCondC	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle C	A	2			415.7	827.6	
BP-WV-A2-M0010-XAD	Wet Vent - M0010 (Semi-Volatiles)	XAD Sorbent Cartridge	A	2			—	—	
BP-WV-A2-M0010-PostCondA	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle A	A	2			417.7	1369.4	
BP-WV-A2-M0010-PostCondB	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle B	A	2			415.5	1391.1	
BP-WV-A2-M0010-CR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Acetone	A	2			285.5	359.0	
BP-WV-A2-M0010-CR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Methylene Chloride	A	2			283.2	415.0	
BP-WV-A2-M0010-IR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Acetone	A	2			283.3	330.4	
BP-WV-A2-M0010-IR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Methylene Chloride	A	2			285.6	382.3	
BP-WV-A3-M0010-PNR-Ace	Wet Vent - M0010 (Semi-Volatiles)	PNR - Acetone	A	3	7/24/11	2125	180.7	225.5	
BP-WV-A3-M0010-PNR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	PNR - Methylene Chloride	A	3			181.9	265.9	
BP-WV-A3-M0010-Filt	Wet Vent - M0010 (Semi-Volatiles)	Filter	A	3			—	—	
BP-WV-A3-M0010-PreCondA	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle A	A	3			417.4	1378.0	
BP-WV-A3-M0010-PreCondB	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle B	A	3			417.0	1379.9	
BP-WV-A3-M0010-PreCondC	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle C	A	3			417.8	839.6	
BP-WV-A3-M0010-XAD	Wet Vent - M0010 (Semi-Volatiles)	XAD Sorbent Cartridge	A	3			—	—	
BP-WV-A3-M0010-PostCondA	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle A	A	3			417.6	1363.3	
BP-WV-A3-M0010-PostCondB	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle B	A	3			414.7	1378.6	
BP-WV-A3-M0010-CR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Acetone	A	3			182.0	225.5	
BP-WV-A3-M0010-CR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Methylene Chloride	A	3			181.7	334.4	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A3-M0010-IR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Acetone	A	3	7/24/11	2125	181.8 ~~180.8~~	235.2	
BP-WV-A3-M0010-IR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Methylene Chloride	A	3	↓	↓	180.7	283.2	
BP-WV-AFB-M0010-PNR-Ace	Wet Vent - M0010 (Semi-Volatiles)	PNR - Acetone	A	FB	7/26/11	1727	178.6	200.7	Field Blank Train
BP-WV-AFB-M0010-PNR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	PNR - Methylene Chloride	A	FB			178.5	226.6	Field Blank Train
BP-WV-AFB-M0010-Filt	Wet Vent - M0010 (Semi-Volatiles)	Filter	A	FB			—	—	Field Blank Train
BP-WV-AFB-M0010-PreCondA	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle A	A	FB					Field Blank Train
BP-WV-AFB-M0010-PreCondB	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle B	A	FB					Field Blank Train
BP-WV-AFB-M0010-PreCondC	Wet Vent - M0010 (Semi-Volatiles)	Pre-XAD Condensate - Bottle C	A	FB					Field Blank Train
BP-WV-AFB-M0010-XAD	Wet Vent - M0010 (Semi-Volatiles)	XAD Sorbent Cartridge	A	FB			—	—	Field Blank Train
BP-WV-AFB-M0010-PostCondA	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle A	A	FB					Field Blank Train
BP-WV-AFB-M0010-PostCondB	Wet Vent - M0010 (Semi-Volatiles)	Post-XAD Condensate - Bottle B	A	FB					Field Blank Train
BP-WV-AFB-M0010-CR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Acetone	A	FB			179.4	228.9	Field Blank Train
BP-WV-AFB-M0010-CR-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Condenser Rns - Methylene Chloride	A	FB			179.3	294.8	Field Blank Train
BP-WV-AFB-M0010-IR-Ace	Wet Vent - M0010 (Semi-Volatiles)	Impinger Rinse - Acetone	A	FB	⊥	⊥	178.4	201.9	Field Blank Train
BP-WV-TARB-M0010-Filt	Wet Vent - M0010 (Semi-Volatiles)	Filter	TA	RB	7/24/11	1330	—	—	Reagent Blank
BP-WV-TARB-M0010-XAD	Wet Vent - M0010 (Semi-Volatiles)	XAD Sorbent Cartridge	TA	RB			—	—	Reagent Blank
BP-WV-TARB-M0010-Ace	Wet Vent - M0010 (Semi-Volatiles)	Acetone	TA	RB			178.5	360.0	Reagent Blank
BP-WV-TARB-M0010-MeCl	Wet Vent - M0010 (Semi-Volatiles)	Methylene Chloride	TA	RB			178.7	359.1	Reagent Blank
BP-WV-TARB-M0010-Water	Wet Vent - M0010 (Semi-Volatiles)	Water	TA	RB	↓	↓	179.2	339.8	Reagent Blank
~~BP-WV-A1-M0011-Imp/RnsA~~	~~Wet Vent - M0011 (Aldehydes/Ketones)~~	~~Comb Impinger Catch and Rinses A~~	~~A~~	~~1~~					
BP-WV-A1-M0011-Imp/RnsB	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses B	A	1					
BP-WV-A1-M0011-Imp/RnsC	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses C	A	1					
BP-WV-A1-M0011-Imp/RnsD	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses D	A	1					
BP-WV-A1-M0011-Imp/RnsE	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses E	A	1					
BP-WV-A2-M0011-Imp/RnsA	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses A	A	2					
~~BP-WV-A2-M0011-Imp/RnsB~~	~~Wet Vent - M0011 (Aldehydes/Ketones)~~	~~Comb Impinger Catch and Rinses B~~	~~A~~	~~2~~					

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
~~BP-WV-A2-M0011-Imp/RnsC~~	~~Wet Vent - M0011 (Aldehydes/Ketones)~~	~~Comb Impinger Catch and Rinses C~~	~~A~~	~~2~~					
BP-WV-A2-M0011-Imp/RnsD	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses D	A	2					
BP-WV-A2-M0011-Imp/RnsE	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses E	A	2					
BP-WV-A3-M0011-Imp/RnsA	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses A	A	3					
BP-WV-A3-M0011-Imp/RnsB	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses B	A	3					
BP-WV-A3-M0011-Imp/RnsC	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses C	A	3					
BP-WV-A3-M0011-Imp/RnsD	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses D	A	3					
BP-WV-A3-M0011-Imp/RnsE	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses E	A	3					
BP-WV-AFB-M0011-Imp/RnsA	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses A	A	FB					Field Blank Train
BP-WV-AFB-M0011-Imp/RnsB	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses B	A	FB					Field Blank Train
BP-WV-AFB-M0011-Imp/RnsC	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses C	A	FB					Field Blank Train
BP-WV-AFB-M0011-Imp/RnsD	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses D	A	FB					Field Blank Train
BP-WV-AFB-M0011-Imp/RnsE	Wet Vent - M0011 (Aldehydes/Ketones)	Comb Impinger Catch and Rinses E	A	FB					Field Blank Train
BP-WV-EntFS-M0011-Field Spike	Wet Vent - M0011 (Aldehydes/Ketones)	Field Spike	Ent	FS					field spike. Spike matl from lab, spike done in field
BP-WV-EntRB-M0011-DNPH	Wet Vent - M0011 (Aldehydes/Ketones)	DNPH derivatizing agent	Ent	RB					Reagent Blank
~~BP-WV-EntRB-M0011-MeCl~~	~~Wet Vent - M0011 (Aldehydes/Ketones)~~	~~Methylene Chloride~~	~~Ent~~	~~RB~~					~~Reagent Blank~~
BP-WV-C1-M26A-AcdImpA	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle A	C	1	7/18	2236	130.2	1310.9	
BP-WV-C1-M26A-AcdImpB	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle B	C	1			128.8	1215.4	
BP-WV-C1-M26A-AcdImpC	Wet Vent - Method 26A	Sulfuric Acid " -Bottle C	C	1			128.7	1281.2	
BP-WV-C1-M26A-AcdImpD	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle D	C	1			128.7	1238.8	
BP-WV-C1-M26A-AcdImpE	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle E	C	1			129.0	1282.6	
BP-WV-C1-M26A-AlkImpA	Wet Vent - Method 26A	Sodium Hydroxide Impinger Catch	C	1			129.2	1198.8	
BP-WV-C2-M26A-AcdImpA	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle A	C	2	7/19/11	1520	303.8	2382.2	
BP-WV-C2-M26A-AcdImpB	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle B	C	2			303.6	2250.3	
BP-WV-C2-M26A-AcdImpC	Wet Vent - Method 26A	Sulfuric Acid " - Bottle C	C	2			303.8	1703.4	
~~BP-WV-C2-M26A-AcdImpD~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle D~~	~~C~~	~~2~~					

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
~~BP-WV-C2-M26A-AcdImpE~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle E~~	~~C~~	~~2~~					
BP-WV-C2-M26A-AlkImp	Wet Vent - Method 26A	Sodium Hydroxide Impinger Catch	C	2	7/19/11	1520	130.0	545.3	
BP-WV-C3-M26A-AcdImpA	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle A	C	3	7/20/11	0953	304.0	2354.7	
BP-WV-C3-M26A-AcdImpB	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle B	C	3			303.9	2320.7	
BP-WV-C3-M26A-AcdImpC	Wet Vent - Method 26A	Sulfuric Acid - Bottle C	C	3			303.9	2333.4	
BP-WV-C3-M26A-AcdImpD	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle D	C	3			305.8	1472.8	
~~BP-WV-C3-M26A-AcdImpE~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle E~~	~~C~~	~~3~~					
BP-WV-C3-M26A-AlkImp	Wet Vent - Method 26A	Sodium Hydroxide Impinger Catch	C	3	7/20/11	0953	129.7	486.6	
BP-WV-CFB-M26A-AcdImpA	Wet Vent - Method 26A	Sulfuric Acid Impinger Catch - Bottle A	C	FB	7/20/11	0300	305.7	1367.1	Field Blank Train
~~BP-WV-CFB-M26A-AcdImpB~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle B~~	~~C~~	~~FB~~					~~Field Blank Train~~
~~BP-WV-CFB-M26A-AcdImpC~~	~~Wet Vent - Method 26A~~		~~C~~	~~FB~~					~~Field Blank Train~~
~~BP-WV-CFB-M26A-AcdImpD~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle D~~	~~C~~	~~FB~~					~~Field Blank Train~~
~~BP-WV-CFB-M26A-AcdImpE~~	~~Wet Vent - Method 26A~~	~~Sulfuric Acid Impinger Catch - Bottle E~~	~~C~~	~~FB~~					~~Field Blank Train~~
BP-WV-CFB-M26A-AlkImp	Wet Vent - Method 26A	Sodium Hydroxide Impinger Catch	C	FB	7/20/11	0300	62.3	388.0	Field Blank Train
BP-WV-EntRB-M26A-Water	Wet Vent - Method 26A	Water	Ent	RB	7/24/11	1330	62.2	363.6	Reagent Blank
BP-WV-EntRB-M26A-NaOH Soln	Wet Vent - Method 26A	Sodium Hydroxide Solution	Ent	RB			46.2	247.2	Reagent Blank
BP-WV-EntRB-M26A-H2SO4 Soln	Wet Vent - Method 26A	Sulfuric Acid Solution	Ent	RB			130.0	728.8	Reagent Blank
BP-WV-D~~1~~4-M5/202-PNR-Ace	Wet Vent - Method 5/202	PNR - Acetone	D	4	7/18/11	0438	180.7	219.2	
BP-WV-D~~1~~4-M5/202-FPM Filt	Wet Vent - Method 5/202	Filter for Filterable PM	D	4	↓	↓	0.36091	—	Filter ID = ~~0711-09-UAS~~ 3874 SEH 7/18/11
BP-WV-D~~1~~4-M5/202-CPM Filt	Wet Vent - Method 5/202	Filter for Condensable PM	D	4	7/18/11	0438	—	—	
BP-WV-D~~1~~4-M5/202-CondA	Wet Vent - Method 5/202	Condensate - Bottle A	D	4			415.9	1241.6	
BP-WV-D~~1~~4-M5/202-CondB	Wet Vent - Method 5/202	Condensate - Bottle B	D	4			415.1	1307.2	
BP-WV-D~~1~~4-M5/202-CondC	Wet Vent - Method 5/202	Condensate - Bottle C	D	4	↓	↓	416.0	1296.9	
BP-WV-D~~1~~4-M5/202-CondD	Wet Vent - Method 5/202	Condensate - Bottle D	D	4	7/18/11	0436	416.2	1312.7	
~~BP-WV-D1-M5/202-BHRns-Wtr~~	~~Wet Vent - Method 5/202~~	~~Back Half Rinse - Water~~	~~D~~	~~1~~					SEH 7/18/11
BP-WV-D~~1~~4-M5/202-BHRns-Ace	Wet Vent - Method 5/202	Back Half Rinse - Acetone	D	4	7/18/11	0438	266.1	433.5	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-D4-M5/202-BHRns-Hex	Wet Vent - Method 5/202	Back Half Rinse - Hexane	D	4	7/17/11	0438	285.2	495.4	
BP-WV-D2-M5/202-PNR-Ace	Wet Vent - Method 5/202	PNR - Acetone	D	2	7/15	2130	179.1	211.4	PCW
BP-WV-D2-M5/202-FPM Filt	Wet Vent - Method 5/202	Filter for Filterable PM	D	2			—	—	3878
BP-WV-D2-M5/202-CPM Filt	Wet Vent - Method 5/202	Filter for Condensable PM	D	2			—	—	
BP-WV-D2-M5/202-CondA	Wet Vent - Method 5/202	Condensate - Bottle A	D	2			417.3	1355.2	
BP-WV-D2-M5/202-CondB	Wet Vent - Method 5/202	Condensate - Bottle B	D	2			414.8	1371.1	
BP-WV-D2-M5/202-CondC	Wet Vent - Method 5/202	Condensate - Bottle C	D	2			416.5	1375.0	
BP-WV-D2-M5/202-CondD	Wet Vent - Method 5/202	Condensate - Bottle D	D	2			417.6	1378.5	
~~BP-WV-D2-M5/202-BHRns-Wtr~~	~~Wet Vent - Method 5/202~~	~~Back Half Rinse - Water~~	~~D~~	~~2~~					
BP-WV-D2-M5/202-BHRns-Ace	Wet Vent - Method 5/202	Back Half Rinse - Acetone	D	2			282.7	568.3	
BP-WV-D2-M5/202-BHRns-Hex	Wet Vent - Method 5/202	Back Half Rinse - Hexane	D	2	↓	↓	~~282.7~~	~~568.3~~	TW 285.0 GW 576.6
BP-WV-D3-M5/202-PNR-Ace	Wet Vent - Method 5/202	PNR - Acetone	D	3	7/16/11	1517	178.6	222.3	
BP-WV-D3-M5/202-FPM Filt	Wet Vent - Method 5/202	Filter for Filterable PM	D	3	7/16/11	1517	0138085	—	Filter ID => 3871
BP-WV-D3-M5/202-CPM Filt	Wet Vent - Method 5/202	Filter for Condensable PM	D	3	7/16/11	1517	—	—	ID- 0711-09URS
BP-WV-D3-M5/202-CondA	Wet Vent - Method 5/202	Condensate - Bottle A	D	3	7/16/11	1517	409.9	1241.6	
BP-WV-D3-M5/202-CondB	Wet Vent - Method 5/202	Condensate - Bottle B	D	3			420.2	1279.2	
BP-WV-D3-M5/202-CondC	Wet Vent - Method 5/202	Condensate - Bottle C	D	3	↓	↓	418.8	1262.1	
BP-WV-D3-M5/202-CondD	Wet Vent - Method 5/202	Condensate - Bottle D	D	3	7/16/11	1517	416.4	1315.2	
~~BP-WV-D3-M5/202-BHRns-Wtr~~	~~Wet Vent - Method 5/202~~	~~Back Half Rinse - Water~~	~~D~~	~~3~~					
BP-WV-D3-M5/202-BHRns-Ace	Wet Vent - Method 5/202	Back Half Rinse - Acetone	D	3	7/16/11	1517	286.1	401.0	
BP-WV-D3-M5/202-BHRns-Hex	Wet Vent - Method 5/202	Back Half Rinse - Hexane	D	3	↓	↓	283.0	421.7	
BP-WV-DFB-M5/202-PNR-Ace	Wet Vent - Method 5/202	PNR - Acetone	D	FB	7/24/11	1735	180.2	198.7	Field Blank Train
BP-WV-DFB-M5/202-FPM Filt	Wet Vent - Method 5/202	Filter for Filterable PM	D	FB			—	—	Field Blank Train ID- 3873
BP-WV-DFB-M5/202-CPM Filt	Wet Vent - Method 5/202	Filter for Condensable PM	D	FB			—	—	Field Blank Train
BP-WV-DFB-M5/202-CondA	Wet Vent - Method 5/202	Condensate - Bottle A	D	FB			179.2	266.8	Field Blank Train
~~BP-WV-DFB-M5/202-CondB~~	~~Wet Vent - Method 5/202~~	~~Condensate - Bottle B~~	~~D~~	~~FB~~	↓	↓	—	—	~~Field Blank Train~~

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
~~BP-WV-DFB-M5/202-CondC~~	~~Wet Vent - Method 5/202~~	~~Condensate - Bottle C~~	D	FB					Field Blank Train
~~BP-WV-DFB-M5/202-CondD~~	~~Wet Vent - Method 5/202~~	~~Condensate - Bottle D~~	D	FB					Field Blank Train
~~BP-WV-DFB-M5/202-BHRns-Wtr~~	~~Wet Vent - Method 5/202~~	~~Back Half Rinse - Water~~	~~D~~	~~FB~~					Field Blank Train
BP-WV-DFB-M5/202-BHRns-Ace	Wet Vent - Method 5/202	Back Half Rinse - Acetone	D	FB	7/26/11	1735	180.2	274.1	Field Blank Train
BP-WV-DFB-M5/202-BHRns-Hex	Wet Vent - Method 5/202	Back Half Rinse - Hexane	D	FB			180.3	297.9	Field Blank Train
BP-WV-DPB-M5/202-Ace	Wet Vent - Method 5/202	Acetone	D	PB	7/19/11	2130	283.2	592.9	
BP-WV-DPB-M5/202-Water	Wet Vent - Method 5/202	Water	D	PB			285.9	714.5	
BP-WV-DPB-M5/202-Hex	Wet Vent - Method 5/202	Hexane	D	PB			284.9	518.5	
BP-WV-EntRB-M5/202-FPM Filt	Wet Vent - Method 5/202	Filter for Filterable PM	Ent	RB	7/27/11	1330	—	—	Reagent Blank #3876
BP-WV-EntRB-M5/202-CPM Filt	Wet Vent - Method 5/202	Filter for Condensable PM	Ent	RB			—	—	Reagent Blank
BP-WV-EntRB-M5/202-Ace	Wet Vent - Method 5/202	Acetone	Ent	RB			179.4	343.7	Reagent Blank
BP-WV-EntRB-M5/202-Water	Wet Vent - Method 5/202	Water	Ent	RB			178.6	377.6	Reagent Blank
~~BP-WV-EntRB-M5/202-MeCl~~	~~Wet Vent - Method 5/202~~	~~Methylene Chloride~~	~~Ent~~	~~RB~~					~~Reagent Blank~~
BP-WV-EntRB-M5/202-Hex	Wet Vent - Method 5/202	Hexane	Ent	RB	3/27/11	1330	179.5	323.8	Reagent Blank
BP-WV-D4-M29-PNR-NA	Wet Vent - Method 29 (Multi-Metals)	PNR - Nitric Acid	D	4	7/15/11	2121	180.8	274.2	1L 7/18/11 0440 100mL
BP-WV-D4-M29-Filt	Wet Vent - Method 29 (Multi-Metals)	Filter	D	4			—	—	- 7/18/11 SEM 7/18/11 ~~0440~~ 0440
BP-WV-D4-M29-NPIA	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle A	D	4	EM 7/16/11		418.9	1337.7	7/18/11 0440
BP-WV-D4-M29-NPIB	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle B	D	4			417.3	1328.2	1L
BP-WV-D4-M29-NPIC	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle C	D	4			417.7	1292.8	1L
BP-WV-D4-M29-NPID	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle D	D	4			416.6	1311.9	1L
BP-WV-D4-M29-NPIE	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle E	D	4			417.1	1329.5	1L
BP-WV-D2-M29-PNR-NA	Wet Vent - Method 29 (Multi-Metals)	PNR - Nitric Acid	D	2	7/15/11	2121	178.4	271.3	100 mL
BP-WV-D2-M29-Filt	Wet Vent - Method 29 (Multi-Metals)	Filter	D	2			—	—	-
BP-WV-D2-M29-NPIA	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle A	D	2			414.4	1379.4	1L
BP-WV-D2-M29-NPIB	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle B	D	2			414.7	1366.2	1L

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments	
BP-WV-D2-M29-NPIC	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle C	D	2	7/16/11	2121	414.9	1360.4	1L	
BP-WV-D2-M29-NPID	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle D	D	2			416.0	1369.2	1L	
BP-WV-D2-M29-NPIE	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle E	D	2			407.5	1367.1	1L	
BP-WV-D3-M29-PNR-NA	Wet Vent - Method 29 (Multi-Metals)	PNR - Nitric Acid	D	3	7/16/11	1518	178.6	278.8	100mL	
BP-WV-D3-M29-Filt	Wet Vent - Method 29 (Multi-Metals)	Filter	D	3	7/16/11	1517	—	—	-	
BP-WV-D3-M29-NPIA	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle A	D	3	7/16/11	1518	~~285.2~~	~~456.2~~ SS 7/16/11	Tare=416.2 Gross=1267.1	1L
BP-WV-D3-M29-NPIB	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle B	D	3			418.4	1320.4	1L	
BP-WV-D3-M29-NPIC	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle C	D	3			417.4	1266.5	1L	
BP-WV-D3-M29-NPID	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle D	D	3			416.9	1332.2	1L	
BP-WV-D3-M29-NPIE	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle E	D	3	7/16/11	1518	417.3	1277.6	1L	
BP-WV-DFB-M29-PNR-NA	Wet Vent - Method 29 (Multi-Metals)	PNR - Nitric Acid	D	FB	~~7/18/11~~	~~0333~~	~~180.5~~	~~310.2~~ SS 7/18/11	Field Blank Train 7/26/11 1747 178.9	280.9
BP-WV-DFB-M29-Filt	Wet Vent - Method 29 (Multi-Metals)	Filter	D	FB	~~7/18/11~~	~~0333~~ SS	7/18/11	—	Field Blank Train 100mL " "	
BP-WV-DFB-M29-NPIA	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle A	D	FB	7/26/11	1747	416.1	1296.4	Field Blank Train 1L	
BP-WV-DFB-M29-NPIB	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle B	D	FB					Field Blank Train	
BP-WV-DFB-M29-NPIC	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle C	D	FB					Field Blank Train	
BP-WV-DFB-M29-NPID	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle D	D	FB					Field Blank Train	
BP-WV-DFB-M29-NPIE	Wet Vent - Method 29 (Multi-Metals)	Nitric/Peroxide Impingers - Bottle E	D	FB					Field Blank Train	
BP-WV-TASRB-M29-Filt	Wet Vent - Method 29 (Multi-Metals)	Filter	TAS	RB	7/27/11	1330	—		Reagent Blank	
~~BP-WV-TASRB-M29-Ace~~	~~Wet Vent - Method 29 (Multi-Metals)~~	~~Acetone~~	~~TAS~~	~~RB~~					~~Reagent Blank~~	
BP-WV-TASRB-M29-NA Rns Soln	Wet Vent - Method 29 (Multi-Metals)	Nitric Acid Rinse Solution	TAS	RB	7/27/11	1330	416.1	796.3	Reagent Blank 400mL	
~~BP-WV-TASRB-M29-Perm Soln~~	~~Wet Vent - Method 29 (Multi-Metals)~~	~~Permanganate Solution~~	~~TAS~~	~~RB~~					~~Reagent Blank~~	
~~BP-WV-TASRB-M29-HCl Soln~~	~~Wet Vent - Method 29 (Multi-Metals)~~	~~HCl Rinse Solution~~	~~TAS~~	~~RB~~					~~Reagent Blank~~	
BP-WV-D1-OH-PNR	Wet Vent - Ontario Hydro (Mercury)	Probe and Nozzle Rinse	D	1	7/15/11	0410	178.5	261.7		
BP-WV-D1-OH-Filt	Wet Vent - Ontario Hydro (Mercury)	Filter	D	1			—	—		
BP-WV-D1-OH-KCIA	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impingers - Bottle A	D	1			419.2	1293.4		

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-D1-OH-KCIB	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle B	D	1	7/15/11	0410	418.6	1222.6	
BP-WV-D1-OH-KCIC	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle C	D	1			419.8	1300.4	
BP-WV-D1-OH-KCID	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle D	D	1			418.4	1303.5	
BP-WV-D1-OH-NPI	Wet Vent - Ontario Hydro (Mercury)	Nitric/Peroxide Impingers	D	1			179.5	331.4	
BP-WV-D1-OH-Perm	Wet Vent - Ontario Hydro (Mercury)	Permanganate Impinger	D	1			283.5	762.8	
BP-WV-D2-OH-PNR	Wet Vent - Ontario Hydro (Mercury)	Probe and Nozzle Rinse	D	2	7/15	2125	179.4	266.5	
BP-WV-D2-OH-Filt	Wet Vent - Ontario Hydro (Mercury)	Filter	D	2			—	—	
BP-WV-D2-OH-KCIA	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impingers - Bottle A	D	2			417.3	~~1345.6~~ 1339.0 vmm 7/16/11	
BP-WV-D2-OH-KCIB	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle B	D	2			417.2	1329.2	
BP-WV-D2-OH-KCIC	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle C	D	2			416.1	1311.8	
BP-WV-D2-OH-KCID	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle D	D	2			417.8	1337.7	
BP-WV-D2-OH-NPI	Wet Vent - Ontario Hydro (Mercury)	Nitric/Peroxide Impingers	D	2			~~417.4~~	~~1376.0~~	179.3 / 343.5
BP-WV-D2-OH-Perm	Wet Vent - Ontario Hydro (Mercury)	Permanganate Impinger	D	2			283.4	~~13~~ 807.7	
BP-WV-D~~3~~4-OH-PNR	Wet Vent - Ontario Hydro (Mercury)	Probe and Nozzle Rinse	D	~~3~~ 4 [illegible] 7/18/11	7/18/11	0332	180.8	274.2	
BP-WV-D~~3~~4-OH-Filt	Wet Vent - Ontario Hydro (Mercury)	Filter	D	~~3~~ 4			—	—	
BP-WV-D~~3~~4-OH-KCIA	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impingers - Bottle A	D	~~3~~ 4			415.7	1367.4	
BP-WV-D~~3~~4-OH-KCIB	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle B	D	~~3~~ 4			416.3	1352.2	
BP-WV-D~~3~~4-OH-KCIC	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle C	D	~~3~~ 4			419.3	1347.6	
BP-WV-D~~3~~4-OH-KCID	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle D	D	~~3~~ 4			417.4	1342.5	
BP-WV-D~~3~~4-OH-NPI	Wet Vent - Ontario Hydro (Mercury)	Nitric/Peroxide Impingers	D	~~3~~ 4			182.2	444.3	
BP-WV-D~~3~~4-OH-Perm	Wet Vent - Ontario Hydro (Mercury)	Permanganate Impinger	D	~~3~~ 4	7/18/11	0332	414.6	1271.4	
BP-WV-DFB-OH-PNR	Wet Vent - Ontario Hydro (Mercury)	Probe and Nozzle Rinse	D	FB	7/26/11	1755	179.5	228.2	Field Blank Train
BP-WV-DFB-OH-Filt	Wet Vent - Ontario Hydro (Mercury)	Filter	D	FB			—	—	Field Blank Train
BP-WV-DFB-OH-KCIA	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impingers - Bottle A	D	FB			418.2	1379.0	Field Blank Train
BP-WV-DFB-OH-KCIB	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impinger - Bottle B	D	FB			178.7	419.6	Field Blank Train
~~BP-WV-DFB-OH-KCIC~~	~~Wet Vent - Ontario Hydro (Mercury)~~	~~Potassium Chloride Impinger - Bottle C~~	~~D~~	~~FB~~					~~Field Blank Train~~

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
~~BP-WV-DFB-OH-KCID~~	~~Wet Vent - Ontario Hydro (Mercury)~~	~~Potassium Chloride Impinger - Bottle D~~	~~D~~	~~FB~~	—	—	—	—	~~Field Blank Train~~
BP-WV-DFB-OH-NPI	Wet Vent - Ontario Hydro (Mercury)	Nitric/Peroxide Impingers	D	FB	7/26/11	1735	179.5	4059	Field Blank Train
BP-WV-DFB-OH-Perm	Wet Vent - Ontario Hydro (Mercury)	Permanganate Impinger	D	FB	↓	↓	418.2	1277.3	Field Blank Train
BP-WV-TARB-OH-Filt	Wet Vent - Ontario Hydro (Mercury)	Filter	TA	RB	7/27/11	1600	—	—	Reagent Blank
BP-WV-TARB-OH-KCl	Wet Vent - Ontario Hydro (Mercury)	Potassium Chloride Impingers	TA	RB	7/27/11	1600	179.6	305.1	Reagent Blank
BP-WV-TARB-OH-NPI	Wet Vent - Ontario Hydro (Mercury)	Nitric/Peroxide Impingers	TA	RB	⊥	⊥	178.4	220.0	Reagent Blank
BP-WV-TARB-OH-Perm	Wet Vent - Ontario Hydro (Mercury)	Permanganate Impinger	TA	RB	⊥	⊥	178.7	329.9	Reagent Blank
~~BP-WV-TARB-OH-Water~~	~~Wet Vent - Ontario Hydro (Mercury)~~	~~Water~~	~~TA~~	~~RB~~					~~Reagent Blank~~
BP-WV-TARB-OH-NA Rns Soln	Wet Vent - Ontario Hydro (Mercury)	Nitric Acid Rinse Solution	TA	RB	7/27/11	1600	178.7	307.5	Reagent Blank
BP-WV-TARB-OH-10% NA	Wet Vent - Ontario Hydro (Mercury)	10% Nitric Acid Rinse Solution	TA	RB	⊥	⊥	179.5	299.7	Reagent Blank
BP-WV-C1-M15A-Cond	Wet Vent - M15A (TRS)	Condensate	C	1	7/18	2129	45.4	190.7	see H_2S
BP-WV-C2-M15A-Cond	Wet Vent - M15A (TRS)	Condensate	C	2	7/19/11	1523	45.9	194.3	see H_2S
BP-WV-C3-M15A-Cond	Wet Vent - M15A (TRS)	Condensate	C	3	7/20/11	1127	~~45.4~~	~~126.3~~ 156.9	see H_2S
[redacted]	[redacted]	[redacted]	A	—					
BP-WV-A__-M18b-BagA	Wet Vent - Method 18 (Bag)	Bag Sample A	A	—					
BP-WV-A__-M18b-BagB1	Wet Vent - Method 18 (Bag)	Bag Sample B1	A	—					
BP-WV-A__-M18b-BagB2	Wet Vent - Method 18 (Bag)	Bag Sample B2	A	—					
BP-WV-A__-M18b-BagB3	Wet Vent - Method 18 (Bag)	Bag Sample B3	A	—					
~~BP-WV-A__-M18b-BagB4~~	~~Wet Vent - Method 18 (Bag)~~	~~Bag Sample B4~~	~~A~~						
BP-WV-A1-M18b-BagACond	Wet Vent - Method 18 (Bag)	Bag Sample A - Condens[illegible]	A	1					
~~BP-WV-A1-M18b-BagA~~	~~Wet Vent - Method 18 (Bag)~~	~~Bag Sample A~~ Bag Sa[illegible]e A	~~A~~ A	~~1~~ 1					
~~BP-WV-A1-M18b-BagB1~~	~~Wet Vent - Metho[illegible]ag)~~	~~Bag Sample B1~~	~~A~~	~~1~~					
BP-WV-A1-M18b-BagB2	We[illegible] Method 18 (Bag)	Bag Sample B2	A	1					
BP-WV-A1-M18b-Ba[illegible]	Wet Vent - Method 18 (Bag)	Bag Sample B3	A	1					
~~BP-WV-A[illegible]18b-BagB4~~	~~Wet Vent - Method 18 (Bag)~~	~~Bag Sample B4~~	~~A~~	~~1~~					
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

MOD 7/29/11 ok

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A__-M18b-Methane	Wet Vent - Method 18 (Bag)	Methane Bag Sample	A	2	7/21	2319	—	—	2312 - 2319
BP-WV-A2-M18b-BagACond	Wet Vent - Method 18 (Bag)	Bag Sample A - Condensate	A	2	7/21	2220	—	—	
BP-WV-A2-M18b-BagA	Wet Vent - Method 18 (Bag)	Bag Sample A (dry)	A	2	7/21	2220	—	—	2058-2220
BP-WV-A2-M18b-BagB	Wet Vent - Method 18 (Bag)	Bag Sample B (wet)	A	2	7/21	2240	—	—	2058-2240
BP-WV-A3-M18b-BagACond	Wet Vent - Method 18 (Bag)	Bag Sample A - Condensate	A	3	—	—	—	—	not collected
BP-WV-A3-M18b-BagA	Wet Vent - Method 18 (Bag)	Bag Sample A (dry)	A	3	7/24	2104	—	—	1955 - 2104
BP-WV-A3-M18b-BagB	Wet Vent - Method 18 (Bag)	Bag Sample B (wet)	A	3	7/24	2125	—	—	1955 - 2125
BP-WV-A4-M18b-BagACond	Wet Vent - Method 18 (Bag)	Bag Sample A - Condensate	A	4	—	—	—	—	not collected
BP-WV-A4-M18b-BagA	Wet Vent - Method 18 (Bag)	Bag Sample A (dry)	A	4	7/25	1540	—	—	1440 - 1540
BP-WV-A4-M18b-BagB	Wet Vent - Method 18 (Bag)	Bag Sample B (wet)	A	4	7/25	1540	—	—	1440-1540
BP-WV-C1-M18b-TRSA	Wet Vent - Method 18 (Bag)	TRS Bag Sample A	C	1	7/18	2129	—	—	2029-2129
BP-WV-C1-M18b-H2S	Wet Vent - Method 18 (Bag)	H2S Bag Sample	C	1	7/18	2208			2144:30-2208
BP-WV-C2-M18b-TRSA	Wet Vent - Method 18 (Bag)	TRS Bag Sample A	C	2	~~7/18~~ 7/19	~~2208~~ 1517	—	—	~~2144:30 - 2208~~ 1425 - 1517
BP-WV-C2-M18b-H2S	Wet Vent - Method 18 (Bag)	H2S Bag Sample	C	2	7/19	1543	—	—	1527:40 - 1542:40
BP-WV-C3-M18b-TRSA	Wet Vent - Method 18 (Bag)	TRS Bag Sample A	C	3	7/20	947	—	—	906-947
BP-WV-C3-M18b-H2S	Wet Vent - Method 18 (Bag)	H2S Bag Sample	C	3	7/20	1034	—	—	1019:15-1034:15
BP-WV-A2-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	2	7/21	2208	315	—	
BP-WV-A2-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	2	↓	↓	—	—	3507302025
BP-WV-A2-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	2	↓	↓	—	—	3822202010
BP-WV-A2s-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	2s	7/21	2207	31.6	—	
BP-WV-A2s-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	2s	↓	↓	—	—	3507301494
BP-WV-A2s-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	2s	↓	↓	—	—	3822201875
BP-WV-A3-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	3	7/29	2103	—		
BP-WV-A3-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	3	↓	↓	—	—	3507301593
BP-WV-A3-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	3	↓	↓	—	—	3822201828
BP-WV-A3s-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	3s	7/29	2103	—	—	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trai	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A3s-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	3s	7/24	2103	—	—	3507302069
BP-WV-A3s-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	3s	↓	↓	—	—	3822201925
BP-WV-A4-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	4	7/25	1540	—	—	
BP-WV-A4-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	4	↓	↓	—	—	3507301433
BP-WV-A4-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	4	↓	↓	—	—	3822201783
BP-WV-A4s-M18s-CondA	Wet Vent - Method 18 (sorbent)	Condensate - Bottle A	A	4s	7/25	1540	—	—	
BP-WV-A4s-M18s-Sorbent	Wet Vent - Method 18 (sorbent)	Sorbent	A	4s	↓	↓	—	—	350730 1657
BP-WV-A4s-M18s-Charcoal	Wet Vent - Method 18 (sorbent)	Charcoal	A	4s	↓	↓	—	—	3022201846
BP-WV-D2-M29-NPIF	method 29	NP Imp Bottle F	D	2	7/16	2121	415.5	1316.0	1L
BP-WV-D2-M29-ORG	method 29	acetone back-half	D	2	↓	↓	282.8	306.6	50 mL
BP WV-D2-M29-NPIG	Method 29	NP Imp Bottle G	D	2	↓	↓	417.1	725.4	300 mL
BP-WV-C1-M15A-Cond - H_2S	Method 15A	recovery Study	C	1	7/18	2238	45.4	209.7	
BP-WV-C1-M26A-AcidImp F	M26A	H_2SO_4 Bottle F	C	1	7/18	2236	130.0	1299.2	
BP-WV-C1-M26A-AcidImp G	M26A	H_2SO_4 Bottle G	C	1	↓	↓	130.2	1301.1	
BP-WV-C1-M26A-AlkImpB	M26A	NaOH Bottle B	C	1	↓	↓	130.1	532.8	
BP-									
BP-									
BP-									
BP-									
BP-									
BP-									
BP-									
BP-									
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BP-									
BP-									

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-D2-MS/202-COND E			D	2	7/15	2130	418.4	1368.6	DCW
BP-WV-D2-MS/202-COND F			↓	↓	↓	↓	416.6	1409.9	
BP-WV-D2-MS/202-COND G			↓	↓	↓	↓	415.2	1377.7	
BP-WV-D2-OH-KCl E			D	2	7/15	2125	417.4	1376.0	
BP-WV-D2-OH-KCl F			↓	↓	↓	↓	416.8	1342.5	
BP-WV-D2-OH-KCl G			↓	↓	↓	↓	417.3	1349.6	
BP-WV-D2-OH-KCl H			↓	↓	↓	↓	418.4	1334.4	
BP-WV-D2-OH-KCl I			↓	↓	↓	↓	417.9	944.9	
BP-WV-D1-OH-KCL E			D	1			416,2	1274.8	
BP-WV-D1-OH-KCL F			D	1			416,5	1304,0	
BP-WV-D1-OH-KCl G			D	1			416.7	1236.1	
BP-WV-D1-OH-KCL H			D	1			420,3	1233,9	
BP-WV-D1-OH-KCL I			D	1			419,0	1268.3	
BP-WV-D1-OH-KCL J			D	1			416,7	1273,0	
BP-WV-D3-M29-NPI F			D	3	7/16/11	1518	418,3	~~1396.8~~	SEH 7/17/11 ← 1296,8 1L
BP-WV-D3-M29-NPI G			D	3	↓	↓	419,5	1299,5	1L
BP-WV-D3-M29-NPI H			D	3	↓	↓	416,7	1298.6	1L
BP-WV-D3-M29-NPI I			D	3	↓	↓	418,8	1375.2	1L
BP-WV-D3-M29-~~NPI ACETONE~~ ORG			D	3	7/16/11	1518	285,2	456,2	300mL
BP-WV-D3-MS/202-COND E			D	3	7/16/11	1517	417.8	13[illegible]8,4	
BP-WV-D3-MS/202-COND F			↓	↓	↓	↓	416,5	1225,6	
BP-WV-D3-MS/202-COND G			↓	↓	↓	↓	419,1	1334,7	
BP-WV-D3-MS/202-COND H			↓	↓	↓	↓	420,3	1318,7	
BP-WV-D3-MS/202-COND I			D	3	7/16/11	1517	416,1	1088,8	
BP-WV-D4-M29-NPI ~~E~~F SEH 7/18/11			D	4	7/18/11	0440	418.6	1228,1	1L
BP-WV-D4-M29-NPI G			D	4	7/18	0440	418,5	1313,2	1L

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-D4-M29-	NPI H		D	4	7/18/11	0440	418.2	1362.9	IC
~~BP-WV-D4-OH-~~	~~ANR~~		~~D~~	~~4~~	~~7/18/11~~	~~0332~~	~~180.8~~	~~274.2~~	SSH 7/18/11
~~BP-WV-D4-OH-~~	~~Filt~~		~~D~~	~~4~~	~~7/18/11~~	~~0332~~	~~—~~	~~—~~	SSH 7/18/11
BP-WV-D4-OH-	KCl E		D	4	7/18/11	0332	417.2	1386.6	
BP-WV-D4-OH-	KCl F		D	4	7/18/11	0332	414.1	1363.9	
BP-WV-D4-M5/	202-COND E		D	4	7/18/11	0438	418.6	1326.6	
BP-WV-D4-M5/	202-COND F		D	4	7/18/11	0438	417.4	1319.5	
BP-WV-D4-M5/	202-COND G		D	4	7/18/11	0438	416.1	1328.4	
BP-WV-C1-OTM29-PbA	Imp E		C	1	7/18/11	2145	128.8	1284.2	
BP-WV-C2-WM15A-Cond-H$_2$S			C	3	7/19/11	1013	45.7	2010.2	
BP-WV-C3-WM15A-Cond-H$_2$S			C	3	7/20/11	~~2~~1127	45.7	—	
BP-WV-A1-M0010-	Post Con C		A	1	7/21/11	0355	420.3	1118.8	
BP-WV-A2-M0010	Post Con C		A	2		2231	415.7	1365.4	
BP-WV-A2-M0010	Post Con D						415.1	1382.2	
BP-WV-A2-M0010	Post Con E		↓	↓	↓	↓	418.5	1377.2	
BP-WV-A3-M0010-	Post Cond C		A	3	7/24/11	2125	420.8	1382.7	
BP-WV A3-M0010	Post Cond D						418.0	1368.1	
BP-WV-A3-M0010	Post Cond E		↓	↓	↓	↓	417.3	734.6	
BP-WV-A4-M0010-	PNR Ace		A	4	7/25/11	1543	179.3	243.5	
BP-WV-A4-M0010-	PNR MeCl						179.5 →	280.7	
BP-WV-A4-M0010-	Filt						—	—	
BP-WV-A4-M0010-	Pre Cond A						416.2	1372.9	
BP-WV-A4-M0010-	Pre Cond B						416.5	1375.0	
BP-WV-A4-M0010-	Pre Cond C						417.7	843.7	
BP-WV-A4-M0010-	XAD						—	—	
BP-WV-A4-M0010-	Post Cond A		↓	↓	↓	↓	416.7	1337.6	

Sample Logbook

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Train	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WV-A4-M0010-	PostCondB		A	4	7/25/11	1543	417.6	1369.2	
BP-WV-A4-M0010-	PostCondC		↓	↓	↓	↓	417.3	796.4	
BP-WV-A4-M0010-	CR-Acc		↓	↓	↓	↓	178.5	254.8	
BP-WV-A4-M0010-	CR-MeCl		↓	↓	↓	↓	179.5	325.7	
BP-WV-A4-M0010-	IR-Acc		↓	↓	↓	↓	179.3	207.7	
BP-WV-A4-M0010-	IC-~~AG~~ MeCl		↓	↓	↓	↓	178.3	232.7	
BP-WV-FB-M0010-	IR-MeCl		A	FB	7/26/11	1727	179.3	226.2	Field Blank
BP-WVD5-M29-	PNR-NA		D	5	7/27/11	0339	179.3	249.9	100 mL
BP- ↓ ↓ -	ORG		↓	↓	↓	↓	179.1	219.0	50 mL
BP- ↓ ↓ -	NI A		↓	↓	↓	↓	416.7	1382.4	1L
BP- ↓ ↓ -	NI B		↓	↓	↓	↓	417.3	1375.2	1L
BP- ↓ ↓ -	NI C		↓	↓	↓	↓	417.0	1377.7	1L
BP- ↓ ↓ -	NI D		↓	↓	↓	↓	418.1	1378.7	1L
BP- ↓ ↓ -	NI E		↓	↓	↓	↓	418.3	1380.1	1L
BP- ↓ ↓ -	NI F		↓	↓	↓	↓	417.7	1383.5	1L
BP- ↓ ↓ -	NI G		↓	↓	↓	↓	417.1	1402.3	1L
BP- ↓ ↓ -	NI H		↓	↓	↓	↓	417.2	1369.8	1L
BP- ↓ ↓ -	NI I		↓	↓	↓	↓	417.8	916.9	500 mL
BP- ↓ ↓ -	Filt		↓	↓	↓	↓	—	—	
BP-WVD5-M5/202-	PNR		D	5	7/27/11	0338	179.4	230.1	
BP- ↓ ↓ -	FPM Filt		↓	↓	↓	↓	—	—	
BP- ↓ ↓ -	CPM Filt		↓	↓	↓	↓	—	—	
BP- ↓ ↓ -	CondA		↓	↓	↓	↓	416.3	1365.8	
BP- ↓ ↓ -	CondB		↓	↓	↓	↓	415.6	1378.6	
BP- ↓ ↓ -	Cond C		↓	↓	↓	↓	417.4	1378.5	
BP- ↓ ↓ -	Cond D		↓	↓	↓	↓	416.9	1371.3	

BP-Husky Toledo - DCU3

Project Number 40942317

Sample ID Code	Stream/Sampling Trair	Fraction	Cond	Run	Date	Time	TW	GW	Comments
BP-WVDS-N5J202-	CondE		D	5	7/27/11	0339	417.4	1381.4	
BP-	- CondF						417.2	1380.3	
BP-	- CondG						415.1	1381.8	
BP-	- CondH						417.2	1382.0	
BP-	- BHRnsAce						288.5	408.6	
BP-	- BHRnsHex		↓	↓	↓	↓	288.7	396.3	
BP- ↓ ↓									
BP-WV-DS-OH- PNR			D	5	7/27/11	0251	178.5	260.7	
BP- - Filt							—	—	
BP- - KClA							418.2	1389.0	
BP- - KClB							418.0	1393.2	
BP- - KClC							415.5	1381.2	
BP- - KClD							419.2	1387.4	
BP- - KClE							416.5	1388.5	
BP- - KClF							418.1	1385.4	
BP- - KClG							417.9	1384.9	
BP- - KClH							417.3	852.0	
BP- - NPI							417.1	743.3	
BP- ↓ ↓ - Perm			↓	↓	↓	↓	419.7	1277.5	
BP-WV-EntRB-OTM29-	PbA		Ent ~~7/25/11~~	RB ~~1720~~	7/25/11	1720	45.0	114.8	
BP-WV-TASRB-M29-	Water		TAS	RB	7/27/11	1330	179.5	285.2	100 mL
BP-WV-TASRB-M29-	NP		TAS	RB	⊥	⊥	178.6	292.8	200 mL
BP-WV-TARB-OH-	HA Soln		TA	RB	7/27/11	1600	179.6	190.4	
BP-WV-C3-M15A-	Cond-H2S		C	3	7/20/11	1127	45.7	126.5	
BP-~~D4~~ WV-D4-M29-NP1	M29	NP Imp Bottle 1	D	4	7/18	0440	418.2	—	
BP-WV-D4-M29-ORG	M29	acetone back-half	D	4	↓	↓	282.2	347.7	

Testing Issues and Deviations

FIELD NOTES - TESTING ISSUES AND DEVIATIONS

No.	Method	Deviation	Run	Impact	Comments
1	M1A	Static pressure not recorded at al	D1	High	Static probe plugged with water/cok
2	M29	Final leak test failed, samples not recovere		High	
3	M29	Probe <275F		Low	Equipment limitatio
4	M29	Filter >325F		Low	
5	M29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
6	OH	Probe <275F		Low	Equipment limitatio
7	OH	Filter >325F		Low	
8	OH	Condenser >68F for 15 minutes (0350-0405)		Mid	Operator error
9	OH	Isokinetic <80%		Mid	Samples on hold at analytical laborator
10	OH	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
11	CEMS	Dilution probe and CEMS not operationa		High	Operator error
12	M29	Filter >325F	D2	Low	
13	M29	Final leak test at 22" Hg, highest vacuum 22" H		Low	Sample pump could not pull >22" Hg during leak test, sampling train at 22" Hg only 5 minutes during test ru
14	M29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
15	OH	Probe >325F		Low	
16	OH	Filter >325F		Low	
17	OH	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
18	M5/202	Filter >325F		Low	
19	M5/202	Probe >325F		Low	
20	M5/202	CPM Filter >80F for 25 minutes (1939-2004)		Low	High ambient temperature (120F) and low sample gas flow rate through filter (0.7 Lp
21	M5/202	final leak test at 24" Hg, highest vacuum 24" H		Low	Sample pump could not pull >24" Hg during leak tes
22	M5/202	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
23	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
24	M3A	O2 analyzer failed system calibration error and system drift test		Mid	The O2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
25	M3A	Average DRs calculated with CO2, NOX and SO2 CEMS used to correct O2 result		Mid	The O2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
26	CEMS	Dilution gas pressure not recorded digitally during test ru		Low	Operator error, data recorded on hand-written data shee
27	M1A	Vent gas temp not recorded within 1 minute of beginning of vent cyc	D3	Mid	Equipment malfunctio
28	M1A	Vent gas temp not recorded at least every 5 minutes (1322-1330		Mid	Equipment malfunctio
29	M29	Filter >325F		Low	
30	M29	Condenser >68F for 31 minutes (1432-1437, 1442-1518)		Mid	Operator error
31	M29	Isokinetic >120%		Mid	Samples on hold at analytical laborator
32	M29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
33	OH	Filter >325F		Low	
34	OH	Condenser >68F for 46 minutes (1432-1518)		Mid	Operator error
35	OH	final leak test at 25" Hg, highest vacuum 25" H		Low	Sample pump could not pull >25" Hg during leak tes
36	OH	Isokinetic >120%		Mid	
37	OH	Acidic KMnO4 Impingers clear after test run (reduced		High	Excess H2S reduced acidic KMnO4, Hg capture questionab
38	OH	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
39	M5/202	Filter >325F		Low	
40	M5/202	CPM Filter <60F for 35 minutes (1322-1342, 1452-1457)		Low	Excess ice used around sampling train components to compensate for high ambient temperature (120F) and low sample gas flow rate through filter (0.6 Lp
41	M5/202	Condenser >68F for 40 minutes (1437-1517)		Mid	Operator error
42	M5/202	Isokinetic >120%		Mid	Samples on hold at analytical laborator
43	M5/202	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
44	M1A	Vent gas temp not recorded at least every 5 minutes (0242-0248	D4	Mid	Circuit tripped, power to temperature readout interrupte
45	OH	Probe >325F		Low	
46	OH	Filter >325F		Low	
47	OH	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
48	M29	Probe >325F		Low	
49	M29	Filter >325F		Low	
50	M29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
51	M5/202	CPM Filter >80F for 20 minutes (0220-0240)		Low	High ambient temperature (120F) and low sample gas flow rate through filter (0.6 Lp
52	M5/202	CPM Filter <60F for 5 minutes (0355-0400)		Low	Excess ice used around sampling train components to compensate for high ambient temperature (120F) and low sample gas flow rate through filter (0.6 Lp
53	M5/202	Filter >325F		Low	
54	M5/202	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
55	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
56	M3A	O2 analyzer failed system calibration error and system drift test		Mid	The O2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
57	M3A	Post-test DR used to correct test run O2 and CO2 results and calculate system drif		Mid	DR changed during run, supported by data from CO2, NOX and SO2 CEM
58	M3A	Average DRs calculated with CO2, NOX and SO2 CEMS used to correct O2 result		Mid	The O2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
59	M6C	Post-test DR used to correct test run results and calculate system drif		Mid	DR changed during run, supported by data from CO2, NOX and SO2 CEM
60	M6C	Failed system drift test for zero ga		Mid	Analyzer response drifted during run, possibly due to ambient temperature swings on the DCU
61	M7E	Post-test DR used to correct test run results and calculate system drif		Mid	DR changed during run, supported by data from CO2, NOX and SO2 CEM
62	CEMS	Dilution gas pressure not recorded digitally during some of test ru		Low	Operator error, data recorded on hand-written data shee
63	OH	Probe >325F	D5	Low	
64	OH	Filter >325F		Low	
65	OH	Isokinetic <80%		Mid	
66	OH	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
67	M29	Probe >325F		Low	
68	M29	Filter >325F		Low	
69	M29	Isokinetic <80%		Mid	
70	M29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
71	M5/202	Probe >325F		Low	
72	M5/202	Filter >325F		Low	
73	M5/202	Isokinetic <80%		Mid	
74	M5/202	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
75	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
76	M3A	O2 analyzer failed system calibration error test		Mid	The O2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
77	M3A	CO2 analyzer operating range 2000 x average measured concentratio		Mid	The CO2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi

78	M3A	CO2 analyzer failed system calibration error test		Mid	The CO2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
79	M3A	Average DRs calculated with CO2, NOX and SO2 CEMS used to correct O2 and CO2 result		Mid	The O2 and CO2 analyzers were used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
80	CEMS	Calibration drift tests not performed		High	URS evacuated DCU3 before calibration drift tests could be perform
81	M1A	Static pressure not recorded within 1 minute of the beginning of the vent cyc	C1	Low	Operator error
82	M1A	Static pressure not recorded at least every 5 minutes (2029-2047		Low	Operator error
83	M26A	Probe >325F		Low	
84	M26A	Probe <275F		Low	Equipment limitation
85	M26A	Filter >325F		Low	
86	M26A	Condenser >68F for 10 minutes (2029-2039)		Low	Operator error
87	M26A	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
88	OTM29	Probe >325F		Low	
89	OTM29	Filter >325F		Low	
90	OTM29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
91	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
92	M3A	CO2 analyzer operating range 2000 x average measured concentratio		Mid	The CO2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
93	M1A	Static pressure not recorded at least every 5 minutes (1424-1432	C2	Low	Operator error
94	M1A	Static pressure not recorded within 1 minute of the beginning of the vent cyc		Low	Operator error
95	M26A	Filter >325F		Low	
96	M26A	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
97	OTM29	Probe >325F		Low	
98	OTM29	Filter >325F		Low	
99	OTM29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
100	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
101	M3A	CO2 analyzer operating range 2000 x average measured concentratio		Mid	The CO2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
102	M3A	Post-test DR used to correct test run O2 and CO2 results and calculate system drif		Mid	DR changed during run, supported by data from O2 and CO2 CEM
103	CEMS	Dilution gas pressure and orifice vacuum not recorded digitally during some of test r		Low	Operator error, data recorded on hand-written data shee
104	M1A	deltaP not recorded at least every 5 minutes (0905-0925	C3	High	Operator error
105	M1A	deltaP not recorded within 1 minute of the beginning of the vent cyc		High	Operator error
106	M1A	Static pressure not recorded at least every 5 minutes (0905-0925		Low	Operator error
107	M26A	Probe >325F		Low	
108	M26A	Probe <275F		Mid	Water seen exiting vent pipe throughout test run, highest moisture % of source test recorded (99.73 and 99.75), equipment limitati
109	M26A	Filter >325F		Low	
110	M26A	final leak test at 20" Hg, highest vacuum 20" H		Low	Sample pump could not pull >20" Hg during leak tes
111	M26A	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
112	OTM29	Probe >325F		Low	
113	OTM29	Probe <275F		Low	Water seen exiting vent pipe throughout test run, highest moisture % of source test recorded (99.73 and 99.75), equipment limitati
114	OTM29	Filter >325F		Low	
115	OTM29	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
116	M3A	O2 analyzer operating range 2500 x average measured concentratio		Mid	An O2 analyzer with a ppm-level operating range and non-reactive to hydrocarbons in the sample gas was not commercially availa
117	M3A	CO2 analyzer operating range 2000 x average measured concentratio		Mid	The CO2 analyzer was used at the extreme low-end of its measurement range, difficult to distinguish signal from noi
118	M3A	CO2 failed system calibration error for span gas (4%		Mid	DR instability or analyzer non linearity at extreme low end of measurement range, system drift passed and all test results near ze
119	CEMS	Dilution gas pressure and orifice vacuum not recorded digitally during some of test r		Low	Operator error, data recorded on hand-written data shee
120	M1A	Static pressure not recorded within 1 minute of the beginning of the vent cyc	A1	Low	Operator error
121	M0010	Probe <275F		Low	Equipment limitation
122	M0010	Filter >325F		Low	
123	M0010	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
124	CEMS	Dilution probe and CEMS not operationa		High	Operator error
125	FTIR	Dilution probe and FTIR not operationa		High	Operator error
126	M0010	XAD inlet temperature >68F for 10 minutes (2117-2127	A2	Low	Operator error
127	M0010	Probe >325F		Low	
128	M0010	Filter >325F		Low	
129	M0010	Condenser >68F for 10 minutes (2122-2132)		Low	Operator error
130	M0010	Heated transfer line <223F for 10 minutes (2057-2107		Low	Equipment malfunctio
131	M0010	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
132	M3A	CO2 failed system calibration error for span gas (4%		Mid	DR instability or analyzer non linearity at extreme low end of measurement range, system drift passed and all test results near ze
133	M25A	THC1 failed drift test (-4.3%)		Low	THC2 passed calibration error and drift tests, report THC concentrations from THC2 onl
134	FTIR	CO measured with M320 rather than M1		High	This deviation was performed to simplify the operation of the dilution sampling syste
135	M0010	Probe >325F	A3	Low	
136	M0010	Filter >325F		Low	
137	M0010	Condenser >68F for 10 minutes (1955-2000, 2045-2050)		Low	Operator error
138	M0010	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
139	M3A	CO2 failed system calibration error for span gas (4%		Mid	DR instability or analyzer non linearity at extreme low end of measurement range, system drift passed and all test results near ze
140	M3A	Post-test DR used to correct test run O2 and CO2 results and calculate system drif		Mid	DR changed during run, supported by data from O2, CO2, THC1 and THC2 CEM
141	M25A	Post-test DR used to correct test run THC1 and THC2 results and calculate system dri		Mid	DR changed during run, supported by data from O2, CO2, THC1 and THC2 CEM
142	FTIR	CO measured with M320 rather than M1		High	This deviation was performed to simplify the operation of the dilution sampling syste
143	M1A	Static pressure not recorded within 1 minute of the beginning of the vent cyc	A4	Low	Equipment malfunctio
144	M1A	Static pressure not recorded at least every 5 minutes (1440-1446		Low	Equipment malfunctio
145	M0010	Probe >325F		Low	
146	M0010	Filter >325F		Low	
147	M0010	XAD inlet temperature >68F for 10 minutes (1440-1450		Low	Operator error
148	M0010	Design of impinger train varied from Source Test Pla		Low	This deviation was performed to adapt to a longer vent cycle than expected (more condensat
149	M3A	Post-test DR used to correct test run O2 and CO2 results and calculate system drif		Mid	DR changed during run, supported by data from O2, CO2, THC1 and THC2 CEM
150	M25A	Post-test DR used to correct test run THC1 and THC2 results and calculate system dri		Mid	DR changed during run, supported by data from O2, CO2, THC1 and THC2 CEM
151	FTIR	CO measured with M320 rather than M1		High	This deviation was performed to simplify the operation of the dilution sampling syste

APPENDIX 6 – SAMPLE CALCULATIONS

The goal of the ICU test program was to quantify the mass emission rates of the target compounds released to atmosphere from the DCU3 Vent during the venting cycle. Mass emission rates are expressed using an industry standard of mass per unit time (lbs/hr) by relating the concentration of a target compound to the average volumetric flow rate of a gas stream through an orifice. Calculations not presented in this section were performed as described in the applicable methods.

EQUATION 1: Vent Gas Molecular Weight

The average molecular weight of the dry fraction of the gas released from the DCU3 Vent was calculated per test run according to the following equation, based upon U.S. EPA Equation 3-1:

$$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.16 \times \%CH_4)$$

Where:

M_d = Average dry gas molecular weight, lb/lb-mol;

0.44 = Molecular weight of CO_2, divided by 100, lb/lb-mol;

$\%CO_2$ = Average percent CO_2 by volume, dry basis, per test run;

0.32 = Molecular weight of O_2, divided by 100, lb/lb-mol;

$\%O_2$ = Average percent O_2, dry basis, per test run;

0.16 = Molecular weight of CH_4 (balance), divided by 100, lb/lb-mol; and

$\%CH_4$ = Average percent CH_4 by volume, dry basis, per test run.

The average molecular weight of the wet gas released from the DCU3 Vent was calculated per test run according to the following equation, based upon U.S. EPA Equation 2-6:

$$M_s = (M_d \times [1 - B_{ws}]) + (18.0 \times B_{ws})$$

Where:

M_s = Average wet gas molecular weight, lb/lb-mol;

M_d = Average dry gas molecular weight, lb/lb-mol;

B_{ws} = Average proportion of water vapor, by volume; and

18.0 = Molecular weight of water, lb/lb-mol.

EQUATION 2: Vent Gas Velocity

The average velocity of the gas released from the DCU3 Vent during the venting cycle was calculated according to U.S. EPA Equation 2-7:

$$V_S = 85.49 \times C_P \times \sqrt{\Delta P} \times \sqrt{\frac{T_S}{P_S \times M_W}}$$

Where:

V_S = Average velocity of the vent gas (ft/sec);

85.49 = Conversion constant, per Equation 2-7 of EPA Method 2;

C_p = Type-S pitot correction factor (0.84);

ΔP = Average of the square roots of the differential pressures measured by Type-S pitot tube (inches of water);

T_s = Average vent gas temperature (°R);

P_s = Average absolute pressure (inches of mercury); and

M_w = Average wet gas molecular weight (lb/lb-mole).

EQUATION 3: Vent Gas Volumetric Flow Rate – Standard Conditions

The average volumetric flow rate of the gas released from the DCU3 Vent during the venting cycle, corrected to standard conditions, was calculated according to U.S. EPA Method 2:

$$Q_s = 60 \times V_s \times A \times \left(\frac{528}{T_S}\right) \times \left(\frac{P_S}{29.92}\right)$$

Where:

Q_s = Average volumetric flow rate of the vent gas, corrected to standard conditions (scfm);

60 = Conversion from seconds to minutes;

V_s = Average velocity of the vent gas (ft/sec);

A = Cross-sectional area of the DCU3 Vent (ft^2);

528 = Standard temperature (°R);

T_s = Average vent gas temperature (°R);

29.92 = Standard pressure (inches of mercury); and

P_s = Average absolute vent pressure (inches of mercury).

The total gas volume (scf) released to atmosphere during the venting cycle was calculated by multiplying the average volumetric flow rate (scfm) by the duration of the venting cycle (minutes).

EQUATION 4: Vent Gas Volumetric Flow Rate – Dry Standard Conditions

The average volumetric flow rate of the gas released from the DCU3 Vent, corrected to dry standard conditions, was calculated according to U.S. EPA Method 2. The average venting cycle moisture concentration, developed from moisture concentrations quantified by each individual sampling train operated during a given venting cycle, and the average volumetric flow rate (corrected to standard conditions) was used to calculate average dry gas volumetric flow rates (dscfm) as:

$$Q_{sd} = Q_s \times (1 - B_{ws})$$

Where:

Q_{sd} = Average vent gas dry volumetric flow rate, standard conditions (dscfm);

Q_s = Average vent gas volumetric flow rate, standard conditions (scfm); and

B_{ws} = Average proportion of water vapor, by volume.

The total dry gas volume (dscf) released to atmosphere during the venting cycle was calculated by multiplying the average volumetric flow rate (dscfm) by the duration of the venting cycle (minutes).

EQUATION 5: Dry Gas Meter Sample Volume – Standard Conditions

The volume of dry gas that passed through the isokinetic sampling trains to the dry gas meters was very small (e.g., approximately 1.7 acf) and average dry gas sampling rates was approximately 0.025 acfm. Because of the relatively small dry gas sample volumes acquired, the sampling train leak rates sometimes exceeded 4% of the average dry gas sampling rate (approximately 0.001 acfm) and corrections to the dry gas volume were made according to U.S. EPA Equation 5-1(a), Case I:

$$V'_{ac} = V_{ac} - (\lfloor L_p - L_a \rfloor \times T)$$

Where:

V'_{ac} = Actual dry gas meter sample volume, corrected (acf);

V_{ac} = Actual dry gas meter sample volume, uncorrected (acf);

L_p = Leakage rate observed during the post-test leak check (cfm);

L_a = 4% of the average sampling rate (cfm); and

T = Operating duration of sampling train (min).

The dry gas meter volume at standard conditions was calculated as:

$$V_{sd} = V'_{ac} \times \left(\frac{528}{T_m} \right) \times \left(\frac{BP + \left(\frac{P_m}{13.6} \right)}{29.92} \right)$$

Where:

V_{sd} = Dry gas meter volume at standard conditions (dscf);

V'_{ac} = Actual dry gas meter volume (acf);

528 = Standard temperature (°R);

T_m = Average dry gas meter temperature (°R);

BP = Barometric pressure at the dry gas meter location (inches of mercury);

P_m = Dry gas meter pressure (inches of water);

13.6 = Conversion from inches of water to inches of mercury (inches of water/inches of mercury); and

29.92 = Standard pressure (inches of mercury).

EQUATION 6: Concentrations of Target Compounds in the Vent Gas (Mass Analysis)

The concentration of applicable target compounds measured as mass per sample volume (e.g., U.S. EPA Method 5 and U.S. EPA Method 308) was calculated as:

$$C = \frac{M}{V_{sd}}$$

Where:

C = Concentration of target compound (g/dscm);

M = Mass of target compound collected in the sampling train (g); and

V_{sd} = Dry gas meter volume collected with the sampling train, at standard conditions (dscm).

EQUATION 7: Concentrations of Target Compounds in the Vent Gas (Concentration Analysis)

The concentration of total VOC (as propane) in the DCU3 Vent gas was continuously measured throughout the venting cycle in units of parts per million by volume, on a wet basis (ppmvw). The NMNE VOC concentration was calculated by subtracting the average concentrations of methane and ethane (as determined using U.S. EPA Method 18) from the average concentration of total VOC (as determined using U.S. EPA Method 25A) measured simultaneously. The average concentration of NMNE VOC during the venting cycle was calculated as:

$$C_{VOC} = C_{THC} - \left(\frac{C_M \times RF_M}{3} \right) - \left(\frac{2 \times C_E \times RF_E}{3} \right)$$

Where:

C_{VOC} = Average concentration of NMNE VOC, as propane (ppmvw);

C_{THC} = Average concentration of THC, as propane (ppmvw);

C_M = Average concentration of methane (ppmvw);

RF_M = Average FID response factor for methane, determined directly (unit-less);

C_E = Average concentration of ethane (ppmvw); and

RF_E = Average FID response factor for ethane, determined directly (unit-less).

The conversion of average methane, ethane, NMNE VOC, selected VOC HAP, CO, selected aldehyde, H_2S, COS, CS_2, TRS (as SO_2), NO_X, and SO_2 concentration results from ppmvw to a mole fraction basis was calculated using this equation:

$$MF = \frac{C}{10^6}$$

Where:

MF = Average mole fraction of target compound (unit-less);

C = Average concentration of target compound (ppmvw); and

10^6 = Conversion factor from ppmvw to mol/mol (unit-less).

EQUATION 8: Mass Emission Rates of Target Compounds (Mass Analysis)

The mass emission rates of applicable target compounds measured as mass per sample volume was calculated during the venting cycle using the following equation:

$$MER_M = C \times \left(\frac{Q_{sd}}{453.59} \right) \times 60 \times 0.028317$$

Where:

MER_M = Mass emission rate of target compound, per hour (lbs/hr);
C = Concentration of target compound (g/dscm);
Q_{sd} = Average vent gas volumetric flow rate, at standard conditions (dscfm);
453.59 = Conversion from grams to pounds (g/lb);
60 = Conversion from minutes to hours (min/hr); and
0.028317 = Conversion from cubic meters to cubic feet (cm/cf).

EQUATION 9: Mass Emission Rates of Target Compounds (Concentration Analysis)

The mass emission rates applicable target compounds measured as ppmvw were calculated during the venting cycle using an equation based upon U.S. EPA Equation Y-19 of the GHG Reporting Rule (40 CFR 98.253[i][2]):

$$MER_C = MF \times Q_s \times \left(\frac{MW}{385} \right) \times 60$$

Where:

MER_C = Mass emission rate of target compound, per hour (lbs/hr);
MF = Average mole fraction of target compound (unit-less);
Q_s = Average vent gas volumetric flow rate, at standard conditions (scfm);
MW = Molecular weight of the target compound (lb/lb-mol);
385 = Ideal gas law constant (scf/lb-mol);
60 = Conversion from minutes to hours (min/hr).

APPENDIX 7 – EPA COMMUNICATIONS

E-Mail Correspondence

Subject: Fw: Use of stainless steel nozzles on a DCU during the ICR
From: Chris_Weber@URSCorp.com
Date: Mon, 1 Aug 2011 12:50:46 -0400
To: Gerri Garwood <Garwood.Gerri@epamail.epa.gov>, diane.johnson@bp.com, meggen_delollis@URSCorp.com, dave.ringwald@bp.com
CC: Andrew Bouchard <Bouchard.Andrew@epamail.epa.gov>, Brenda Shine <Shine.Brenda@epamail.epa.gov>, cob@rti.org, Colin Boswell <Boswell.Colin@epamail.epa.gov>, Jason Dewees <Dewees.Jason@epamail.epa.gov>, Kristen Benedict <Benedict.Kristen@epamail.epa.gov>, Peter Westlin <Westlin.Peter@epamail.epa.gov>, Raymond Merrill <Merrill.Raymond@epamail.epa.gov>, Robin Segall <Segall.Robin@epamail.epa.gov>, Steffan Johnson <Johnson.Steffan@epamail.epa.gov>

Hi Gerri,

On July 27 and July 29 URS submitted preliminary data to EPA for the Ontario Hydro, EPA Method 29, EPA Methods 5/202, EPA Method 26A, EPA Other Test Method 29, and SW-846 Method 0010 sampling trains performed during the ICR source test at the BP-Husky Delayed Coking Unit 3. The preliminary data included measured vent gas parameters that impacted isokinetic sampling rates achieved during 10 test runs performed between July 15 and July 27. URS and BP-Husky understand that there are various QA procedures associated with these vent gas samples other than isokinetic sampling rates (e.g., analytical spike recoveries and duplicate analyses) that will impact the overall validity of the samples, and that the results of these QA procedures may not be determined for several weeks. However, we would like to request that EPA confirm, per the July 7 email between URS and EPA quoted below, that the samples we collected outside of 80-120% isokinetic rates will be accepted by EPA, provided that all other QA criteria associated with each sampling train is acceptable for the purposes of the ICR.

- Therefore, we still request that testers strive to sample within a 80-120% isokinetic rate. However, we do understand that it may be impossible to meet this criteria at some sites. If a tester runs into a situation where it is impossible to meet this criteria, we will make case-by-case determinations on whether data outside of this range can be accepted.

Fortunately, and due to a fair amount of luck in our opinion, at least 1 out of 3 test runs for each isokinetic sampling method was sampled within 80-120%, based on our preliminary data. This provides EPA with the opportunity to compare the results from sampling within and outside the 80-120% isokinetic rate criteria and evaluate and quantify possible bias. A fourth test run for the SW-846 Method 0010 sampling train was performed (A4) because the SW-846 Method 0010 sampling train performed during test run A1 was not sampled simultaneously with Speciated VOC HAP, Aldehydes, THC, Methane, Ethane and Carbon Monoxide per the Source Test Plan. While the A4 sampling train was not sampled within 80-120%, the A1, A2 and A3 sampling trains were. URS and BP plan to analyze all four test runs for SW-846 Method 0010.

URS and BP-Husky overcame many significant logistical, technical, and health and safety challenges during the source test of the Delayed Coking Unit 3, and we would appreciate confirmation from EPA that at least on the basis of isokinetic sampling rates, this data is acceptable.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

----- Forwarded by Chris Weber/Austin/URSCorp on 08/01/2011 10:48 AM -----

Chris Weber/Austin/URSCorp

07/27/2011 06:56 AM

To Gerri Garwood <Garwood.Gerri@epamail.epa.gov>, diane.johnson@bp.com, meggen_delollis@urscorp.com, dave.ringwald@bp.com

cc Chris_Weber@URSCorp.com, Meggen_DeLollis@URSCorp.com, Andrew Bouchard <Bouchard.Andrew@epamail.epa.gov>, Brenda Shine <Shine.Brenda@epamail.epa.gov>, cob@rti.org, Colin Boswell <Boswell.Colin@epamail.epa.gov>, Jason Dewees <Dewees.Jason@epamail.epa.gov>, Kristen Benedict <Benedict.Kristen@epamail.epa.gov>, Peter Westlin <Westlin.Peter@epamail.epa.gov>, Raymond Merrill <Merrill.Raymond@epamail.epa.gov>, Robin Segall <Segall.Robin@epamail.epa.gov>, Steffan Johnson <Johnson.Steffan@epamail.epa.gov>

Subject Re: Use of stainless steel nozzles on a DCU during the ICRLink

Hi Gerri,

URS completed the ICR testing at the BP-Husky Toledo DCU late last night and we would like to share some **preliminary** isokinetic sampling data with EPA. Per our discussion of the Source Test Plan during the last few weeks, we attempted to sample between 80-120% isokinetic during each test run. However, as we expected, some isokinetic sampling rates were outside of this target due to the range of moisture concentrations measured in the vent gas.

Test Run	Date	Sampling Train	% Moisture	% Isokinetic
D2	7/15/2011	Ontario Hydro	99.37	81.9

D2	7/15/2011	M29	99.32	86.0
D2	7/15/2011	M5/202	99.21	91.7
D4	7/18/2011	Ontario Hydro	99.12	80.4
D4	7/18/2011	M29	98.75	88.5
D4	7/18/2011	M5/202	98.67	97.3
D5	7/27/2011	Ontario Hydro	99.43	63.9
D5	7/27/2011	M29	99.53	54.0
D5	7/27/2011	M5/202	99.59	56.5
C1	7/18/2011	M26A	99.66	97.9
C1	7/18/2011	OTM29	99.59	98.1
C2	7/19/2011	M26A	98.95	198.8
C2	7/19/2011	OTM29	99.00	148.8
C3	7/20/2011	M26A	99.73	236.3
C3	7/20/2011	OTM29	99.75	166.2
A1	7/21/2011	M0010	99.06	92.3
A2	7/21/2011	M0010	99.19	81.2
A3	7/24/2011	M0010	97.79	104.5
A4	7/25/2011	M0010	99.47	71.64

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

-----Gerri Garwood <Garwood.Gerri@epamail.epa.gov> wrote: -----

To: Chris_Weber@URSCorp.com
From: Gerri Garwood <Garwood.Gerri@epamail.epa.gov>
Date: 07/07/2011 04:06PM
cc: Meggen_DeLollis@URSCorp.com, Andrew Bouchard <Bouchard.Andrew@epamail.epa.gov>, Brenda Shine <Shine.Brenda@epamail.epa.gov>, cob@rti.org, Colin Boswell <Boswell.Colin@epamail.epa.gov>, Jason Dewees <Dewees.Jason@epamail.epa.gov>, Kristen Benedict <Benedict.Kristen@epamail.epa.gov>, Peter Westlin <Westlin.Peter@epamail.epa.gov>, Raymond Merrill <Merrill.Raymond@epamail.epa.gov>, Robin Segall <Segall.Robin@epamail.epa.gov>, Steffan Johnson <Johnson.Steffan@epamail.epa.gov>
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Chris,

We have finished reviewing your requested alternatives. Below is a synopsis of each alternative and our response. The only alternative that is not addressed here is the eductor vent. As this is more of an operational question, I wanted Brenda to look at it. She will get back with you on a response.

As a side note, while I was going through your alternatives, it appears that your ports may not meet Method 1A requirements. You may want to double check that. Also, you mention several different dilution ratios. I just wanted to remind you that the dilution ratio for organics must be kept to less than 20:1.

- Section 3.2.1 - Sampling the east and west coke drums sequentially as one source.

This is approved as detailed on the Refinery ICR FAQ site in the response to Test-011.

- Section 3.2.2 - Sludge injection into coke drums

We could not determine what alternative was requested.

- Section 3.2.4 - Single-point sampling

This is approved as detailed on the Refinery ICR FAQ site in the response to Test-012.

- Section 3.2.5 - Use of Type-S pitot tube with EPA Method 1A.

This is approved as detailed in my 6/13/11 email.

- Section 3.2.6 - Sampling probe and filter temperatures will be at 300±25°F

This alternative is approved.

- Section 3.2.7 - Isokinetic sampling rate </= 110%.

  This is not approved as detailed in my 4/19/11 email. It is critical that we get the best data possible. Therefore, we still request that testers strive to sample within a 80-120% isokinetic rate. However, we do understand that it may be impossible to meet this criteria at some sites. If a tester runs into a situation where it is impossible to meet this criteria, we will make case-by-case determinations on whether data outside of this range can be accepted.
- Section 3.2.8 - Operation of two THC analyzers in overlapping ranges or one THC analyzer in dual-range mode

This alternative is approved.

- Section 3.2.8 - Use of propane in nitrogen rather than propane in air for calibration

This alternative is approved.

- Section 3.2.8 - Use of nitrogen as the dilution gas

This alternative is approved.

- Section 3.2.8 - Custom certified calibration gases (+/- 2% accuracy, traceable to a primary standard) in lieu of US EPA Protocol gases, when US EPA Protocol gases are not available

This alternative is approved.

- Section 3.2.8 - Direct calibration of high-range THC analyzer (without the dilution system)

This alternative is approved.

- Section 3.2.9 - Stainless steel nozzles

  This is approved as detailed in my 6/16/11 email.
- Section 3.2.10 - Addition of H2S scrubbing impingers on the end of the isokinetic trains. The impingers will be weighed but not recovered.

This alternative is approved.

- Section 3.2.11 - Impinger exit gas temperature greater than 68 F

This alternative is approved. However, you must maintain the exit temperature of the condenser below 68 F. You must also make every effort to keep the exit gas temperature of the last impinger below 68 F by employing good operating procedures, such as shading the impingers, maintaining adequate ice in the impinger box, etc.

- Section 3.2.12 - Smaller dry gas sample volumes

  This is approved as detailed on the Refinery ICR FAQ site in the response to Test-017. Testers should make a concerted effort to maximize the sample volume collected during the time of the vent cycle.
- Section 3.2.13 - Dry gas meter calibration

This alternative is approved.

- Section 5.1.2 - No cyclonic flow check

This alternative is approved.

- Section 5.2 - Use of methane to calculate the MW of the dry gas fraction

This alternative is approved.

- Section 5.2.2 - No stratification check

This alternative is approved.

- Section 5.6.1 - Heated stainless steel dilution probe in EPA Method 15A

We do not believe that a heated stainless steel dilution probe is appropriate for EPA Method 15A. We are willing to accept a Silco-lined stainless steel dilution probe in lieu of Teflon.

- Section 5.6.1 - Change dimensions of the combustion tube in EPA Method 15A

This alternative is approved.

- Section 5.6.1 - Removal of SO2 scrubbing impingers from EPA Method 15A

This alternative is approved.

- Section 5.6.1 - Addition of combustion air at known rate in EPA Method 15A

This alternative is approved.

- Section 5.6.2 - Dilution sampling system not flushed with sample gas prior to sampling in EPA Method 15A

We believe that the dilution sampling system should be flushed with stack gas prior to sampling in EPA Method 15A. This stack gas does not need to be the beginning of the vent cycle (so that the highest emissions can be caught by the sampling train); it can occur prior to the beginning of the vent cycle.

- Section 5.6.2 - Pre-test run in lieu of post-test run recovery study in EPA Method 15A

This alternative is conditionally approved. We will allow this as long as the dilution probe used in Runs 2 and 3 have been used in a previous run of this test series (i.e. do not use a new dilution probe on each run).

- Section 5.6.2 - Use of H2S as the recovery gas in EPA Method 15A

This alternative is approved.

- Section 5.6.2 - EPA Method 15A sample recovery study criterion of 70-130%; however, the failure to demonstrate recovery within this criterion will not invalidate test run results.

We do not agree with this alternative. You must meet the sample recovery study criterion of EPA Method 15A.

- Section 5.7.2 - Stainless steel or Teflon sample loops of various sizes may be used to inject target concentrations of calibration gas to the GC/FID and GC/FPD for EPA Method 18

We do not believe that stainless steel loops are appropriate in this application; we believe that Teflon loops should be used. Sample loops used for samples must be qualified during calibration.

- Section 5.7.2 - Dilution sampling system not flushed with sample gas prior to sampling in EPA Method 18

We believe that the dilution sampling system should be flushed with stack gas prior to sampling in EPA Method 18. This stack gas does not need to be the beginning of the vent cycle (so that the highest emissions can be caught by the sampling train); it can occur prior to the beginning of the vent cycle.

- Section 5.7.5 - Dilution sampling system and sorbent sampling per U.S. EPA Method 18

We could not determine what alternative was requested.

- Section 5.9.1 - EPA Method 26A impinger train design

This alternative is approved.

- Section 5.10.1 - EPA Method 29 impinger train design

This alternative is approved.

- Section 5.10.3 - Use of greater than 100 mL 0.1 N HNO3 rinse for Method 29, with no blank corrections

This alternative is approved.

- Section 5.11.1 - Other Test Method 29 impinger train design

This alternative is approved.

- Section 5.11.3 - Other Test Method 29 lead acetate impinger

We disagree with the fact that the lead acetate solution will be discarded without being analyzed, as it may contain hydrogen cyanide. We understand your concern with keeping the sample pH above 12 for the catch from the second and third impingers. We propose that you may recover and analyze the lead acetate solution sample separately in order to solve this problem.

- Section 5.12.1 - EPA Method 5/202 impinger train design

This alternative is approved.

- Section 5.13 - Dilution sampling system with EPA Method 320

We could not determine what alternative was requested.

- Section 5.14.1 - ASTM D6784-02 sampling train impinger design

We could not determine what alternative was requested.

- Section 5.15.1 - ASTM Method D6784-02 impinger train design

This alternative is approved.

- Section 5.15.3 - Post-test pressurized nitrogen condenser and impinger purge for ASTM Method D6784-02

This alternative is approved.

- Section 5.16.3 - Spiking the filter in the Soxhlet instead of the petri dish in SW-846 Method 3542

We do not agree with this alternative. We do not believe that the spiking solution will be effectively and evenly applied to the particulate on the filter if the spiking takes place in the thimble instead of in the petri dish.

- Section 5.16.3 - Laboratory decision on whether to raise or lower pH first in SW-846 Method 3542

This alternative is approved.

- Section 5.16.3 - Concentrating SW-846 Method 3542 extracts to 1 milliliter instead of 5 milliliters

This alternative is approved.

- Appendix B.1.1.1 - SW-846 Method 0011 impinger train design

This alternative is approved.

Please let us know if you have any questions or comments.

Gerri G. Garwood, P.E.

U.S. Environmental Protection Agency
OAR/OAQPS/SPPD
Measurement Policy Group
Ph: 919-541-2406 Fax: 919-541-3207

From: Chris_Weber@URSCorp.com
To: Gerri Garwood/RTP/USEPA/US@EPA
Cc: Chris_Weber@URSCorp.com, Meggen_DeLollis@URSCorp.com, Andrew Bouchard/RTP/USEPA/US@EPA, Brenda Shine/RTP/USEPA/US@EPA, cob@rti.org, Colin Boswell/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA, Kristen Benedict/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA
Date: 06/27/2011 12:33 PM
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Hi Gerri,

Attached is the Source Test Plan for the BP-Husky Delayed Coking Unit. I have summarized our requested modifications in Table ES-1 of the Plan. Please let me know if this format is inconvenient for your review, and I will prepare emails discussing each individual modification.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

-----Garwood.Gerri@epamail.epa.gov wrote: -----

To: Chris_Weber@URSCorp.com
From: Garwood.Gerri@epamail.epa.gov
Date: 06/22/2011 11:03AM

cc: Meggen_DeLollis@URSCorp.com, Bouchard.Andrew@epamail.epa.gov, Shine.Brenda@epamail.epa.gov, cob@rti.org, Boswell.Colin@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Benedict.Kristen@epamail.epa.gov, Westlin.Peter@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov, Johnson.Steffan@epamail.epa.gov
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Chris,

We are not approving test plans as a whole. If there are alternatives that we have not already discussed, you may submit them separately, or if you do submit them in a plan, please highlight them in the plan. The more clearly the alternatives are highlighted, the quicker we will be able to review and approve/disapprove them. We will make decisions on individual points/requests, but we will not approve the sampling scheme as a whole.

Everyone on this email should be included on emails for alternatives.

Sincerely,
Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From: Chris_Weber@URSCorp.com
To: Gerri Garwood/RTP/USEPA/US@EPA
Cc: Meggen_DeLollis@URSCorp.com, Andrew Bouchard/RTP/USEPA/US@EPA, Brenda Shine/RTP/USEPA/US@EPA, cob@rti.org, Colin Boswell/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA, Kristen Benedict/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA
Date: 06/22/2011 11:10 AM
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Thank you for the quick response, Gerri.

URS would like to submit to EPA a Source Test Plan for the Delayed Coking Unit we will be testing in July according to the Refinery ICR requirements. This Plan references some emails we have been exchanging regarding method modifications for use on this type of process unit, and also includes descriptions of many modifications we have not discussed with EPA via email or that have not been included on the FAQ. The site is the BP-Husky Refinery in Toledo, Ohio. Source testing will be performed between July 14 and July 22.

Will you please confirm the appropriate EPA personnel to include on a recipient list for the pdf file of the Plan? Thank you for all of your help.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

-----Garwood.Gerri@epamail.epa.gov wrote: -----

To: Chris_Weber@URSCorp.com
From: Garwood.Gerri@epamail.epa.gov
Date: 06/16/2011 11:25AM
cc: Meggen_DeLollis@URSCorp.com, Bouchard.Andrew@epamail.epa.gov, Shine.Brenda@epamail.epa.gov, cob@rti.org, Boswell.Colin@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Benedict.Kristen@epamail.epa.gov, Westlin.Peter@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov, Johnson.Steffan@epamail.epa.gov
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Chris,

We agree that at the stated moisture content, particulate loading, and velocity use of a stainless steel nozzle is more practical. We agree that use of the SS nozzle only while maintaining the glass/quartz liner will provide minimum contamination in contrast to the problems that could be caused by broken or damaged nozzles.

Sincerely,
Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From: Chris_Weber@URSCorp.com
To: Gerri Garwood/RTP/USEPA/US@EPA
Cc: Meggen_DeLollis@URSCorp.com
Date: 06/14/2011 03:49 PM
Subject: Re: Use of stainless steel nozzles on a DCU during the ICR

Gerri,

This request is for a delayed coking unit vent that depressurizes at 5 psig. We are expecting an initial vent gas velocity of 600 ft/second (400 mph), a vent gas temperature of 220F, a moisture concentration of 99%, and a filterable PM concentration of about a pound per venting cycle. The venting cycle will last about 70 minutes and the delayed coking unit has a 32 hour batch cycle. We are planning to test each of the two coke drums, therefore we will have an opportunity to perform a test run on a venting cycle once every 16 hours.

When URS conducted source testing on delayed coking unit vents at Hovensa, Citgo and Marathon, we used stainless steel nozzles and probe liners with EPA Method 5/202 and SW-846 Method 0010. We observed some damage to the stainless steel nozzles due to the high velocity of the gas stream and the concentration of pet coke PM, and are worried that glass nozzles will be chipped or broken off of the probe during sampling. We are now confident that we can use glass probe liners, and are just asking for approval to use stainless steel nozzles on sampling trains that specifically require glass or quartz.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

Garwood.Gerri@epamail.epa.gov
06/14/2011 08:43 AM

To Chris_Weber@URSCorp.com
cc
Subject Re: Use of stainless steel nozzles on a DCU during the ICR

Chris,

What kind of velocity and temperature are you expecting in the stack? Is this for a particular source or are you asking in general?

thanks,

Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From: Chris_Weber@URSCorp.com
To: Gerri Garwood/RTP/USEPA/US@EPA
Cc: Kristen Benedict/RTP/USEPA/US@EPA, Colin Boswell/RTP/USEPA/US@EPA, Andrew Bouchard/RTP/USEPA/US@EPA, cob@rti.org, Jason Dewees/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Brenda Shine/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA
Date: 06/10/2011 02:21 PM
Subject: Use of stainless steel nozzles on a DCU during the ICR

Hi Gerri,

The high gas stream velocity, high moisture and PM concentrations, and significant pipe vibration associated with DCU Vent sources can easily damage glass or quartz nozzles used with isokinetic sampling trains. A damaged (e.g., chipped or cracked) nozzle can reduce the overall quality of measurement data due to potential sample loss, sample bias, or when a post-test leak check cannot be performed within method tolerance. The potential impact on data quality due to contamination or interference from a relatively small surface area of stainless steel in the sampling train is most likely lower than the impact from an unrecoverable nozzle, which may be damaged inside the DCU3 Vent during the test run. During previous DCU Vent source tests URS has conduced, we have seen damage to even stainless steel nozzles.

May U.S. EPA Methods 26A, 29, Other Test Method 29, ASTM D6784-02, and SW-846 Method 0011 be modified to allow the use stainless steel nozzles on a DCU Vent?

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group

512.419.5369 office
512.983.5158 cell

Garwood.Gerri@epamail.epa.gov
05/18/2011 03:20 PM

To Chris_Weber@URSCorp.com
cc Bouchard.Andrew@epamail.epa.gov, Shine.Brenda@epamail.epa.gov, cob@rti.org, Boswell.Colin@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Benedict.Kristen@epamail.epa.gov, Westlin.Peter@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov, Johnson.Steffan@epamail.epa.gov
Subject Re: Fw: Use of EPA Method 1A on a DCU for the ICR

Chris,

We will allow the use of the centrally-located 10% of the sampling area to suffice for the centroid for the delayed coking unit vents, with the following caveats:
1. This applies only for the purposes of this specific ICR.
2. You must meet the sampling port location criteria of Method 1A. A flow disturbance is created when the sampling equipment (whether one or multiple probes) exceeds 5% of the effective duct area in the sampling plane.
3. In order to perform one-point sampling in lieu of traversing, safety issues must be present.

Sincerely,
Gerri G. Garwood, P.E.

U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From: Chris_Weber@URSCorp.com
To: Steffan Johnson/RTP/USEPA/US@EPA
Cc: Andrew Bouchard/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA, Gerri Garwood/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, US@epamail.epa.gov, Peter Westlin/RTP/USEPA/US@EPA
Date: 05/13/2011 02:48 PM
Subject: Re: Fw: Use of EPA Method 1A on a DCU for the ICR

Steffan,

Thank you again for the quick response. We are attempting to install sampling ports in ICR-compliant locations during the next two weeks. I have attached a drawing of our proposed approach. To summarize the slide, if we are allowed to place isokinetic sampling ports in the centrally-located 10%, we should not have to consider one probe or even two probes a disturbance, based upon a commercially available probe and nozzle design.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

Johnson.Steffan@epamail.epa.gov
05/13/2011 01:28 PM

To Westlin.Peter@epamail.epa.gov, Bouchard.Andrew@epamail.epa.gov, Garwood.Gerri@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov
cc US@epamail.epa.gov, Chris_Weber@URSCorp.com
Subject Re: Fw: Use of EPA Method 1A on a DCU for the ICR

All,

My definition of "centroid" is different than "center 10 percent"; in that it is a single point at the center of the duct and not an area. However, I am familiar with the section of 25a that Chris is referencing and that is a common description of "centroid" in stack tester parlance. I would not presume to know which was in the mind of the responder, so will defer in the direction of "original intent".

>From the ICR page:

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Test-012
Q: If the delayed coking unit vent requires packing glands to
ensure a leak tight sampling port due to hazardous properties
of the gas stream, may the tester conduct single point
sampling at the centroid of the pipe, even if the pipe is
greater than 4 inches in diameter?

A: Where safety is a potential issue, you may conduct single
point sampling in the centroid of the stack with the pitot and
```

sampling location separated per Method 1A.

Would the initial responder please give their response to Chris's question?

Thanks,

Stef

From: Chris_Weber@URSCorp.com
To: Steffan Johnson/RTP/USEPA/US@EPA
Cc: Andrew Bouchard/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA, Gerri Garwood/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA
Date: 05/13/2011 01:53 PM
Subject: Re: Fw: Use of EPA Method 1A on a DCU for the ICR

Thank you for the quick response, Steffan. I also sent the following question yesterday:

On the same project, we are considering installing orthogonal ports and inserting isokinetic probes in each port for simultaneous sampling. Would you consider revising the answer to the ICR FAQ Question Test-012 to be:

A: Where safety is a potential issue, you may conduct single point sampling **from a point within the centrally located 10 percent area of the stack cross-section with the pitot and sampling location separated per Method 1A.**

On an 8" diameter vent pipe, this would allow us to situate two isokinetic probe nozzles within the centrally located 10 percent area of the vent cross-section, on the same plane of measurement, at least an inch apart. The 'centrally located 10 percent' description is from Section 6.1.2 of Method 25A.

Your answer below seems to indicate that we may place two probes in orthogonal ports in the same plane of measurement, with both nozzles situated near the center of the vent pipe (but not the exact center). Can you verify this?

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

Johnson.Steffan@epamail.epa.gov
05/13/2011 05:58 AM

To Chris_Weber@URSCorp.com
cc Bouchard.Andrew@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Garwood.Gerri@epamail.epa.gov, Westlin.Peter@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov
Subject Re: Fw: Use of EPA Method 1A on a DCU for the ICR

HI Chris,

Thank you for your question and the supporting materials; it helps to have a visual perspective.

Yes, as you suspect, the isokinetic probe area needs to be evaluated and considered for potential flow disturbance issues. A flow disturbance would be a probe whose effective area exceeds 5% of the area of the sampling plane, so in an 8" diameter pipe two probes in the same plane (one in each port, for instance) would likely exceed the 5% criteria. Conversely, a probe at any location which takes up less than 5% of the effective duct area is not considered a flow disturbance.

Also keep in mind that Method 1A (11.1.1) specifies isokinetic sampling locations must be 2.5 diameters downstream from a flow disturbance.

I hope this helps answer your question!

Regards,

Stef Johnson

Steffan Johnson
EPA/OAQPS/SPPD
Measurement Policy Group
109 T.W. Alexander Drive D-230
Research Triangle Park, NC 27713
Phone: 919 541 4790
email: johnson.steffan@epa.gov

From: Jason Dewees/RTP/USEPA/US
To: Gerri Garwood/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Andrew Bouchard/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA
Date: 05/12/2011 04:41 PM
Subject: Fw: Use of EPA Method 1A on a DCU for the ICR

---

another one

----- Forwarded by Jason Dewees/RTP/USEPA/US on 05/12/2011 03:41 PM -----

From:	
To:	Peter Westlin/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA
Date:	05/12/2011 02:02 PM
Subject:	Use of EPA Method 1A on a DCU for the ICR

Hi Peter, Robin, and Jason,

URS is planning to conduct the source testing of a DCU for the ICR, and we are providing some guidance to the client for the installation of sampling ports on the atmospheric depressurization vent. My question about EPA Method 1A is:

The vent pipe is 8 inches in diameter, therefore we will use EPA Method 1A and separate the velocity and temperature measurements from the isokinetic sampling trains. We are concerned about potential hydrogen sulfide exposure, therefore we are using gate valves and single-point sampling. We would like to place as many sampling ports as we can on the very limited length of vent pipe that is available due to the design of the process unit, various obstructions, and limited work areas. If multiple isokinetic trains are inserted into a stack or duct for simultaneous sampling and EPA Method 1A is used to separate the continuous velocity and temperature measurements to a separate sampling port, are the isokinetic sampling probes inserted into the vent considered flow disturbances? In other words, are there any minimum distance criteria for the placement of sampling ports for isokinetic trains upstream and downstream from one another, provided that the velocity and temperature sampling location is at least two vent diameters downstream from the last isokinetic sampling location?

I have attached a drawing of the port installations we would prefer. Every inch available on the vent pipe matters to us, due to obstructions we have to work around. Thank you for your help.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

[attachment "DCU Ports.pptx" deleted by Steffan Johnson/RTP/USEPA/US]

[attachment "DCU Ports Cross Section.pptx" deleted by Gerri Garwood/RTP/USEPA/US]

Subject: Fw: Use of stainless steel nozzles on a DCU during the ICR
From: Chris_Weber@URSCorp.com
Date: Wed, 6 Jul 2011 17:18:51 -0400
To: Robert Bivens <bivens@rmb-consulting.com>
CC: Nathan_Reichardt@URSCorp.com, Meggen_DeLollis@URSCorp.com

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

----- Forwarded by Chris Weber/Austin/URSCorp on 07/06/2011 04:18 PM -----

Gerri Garwood <Garwood.Gerri@epamail.epa.gov>

07/05/2011 04:34 PM

To Chris_Weber@URSCorp.com

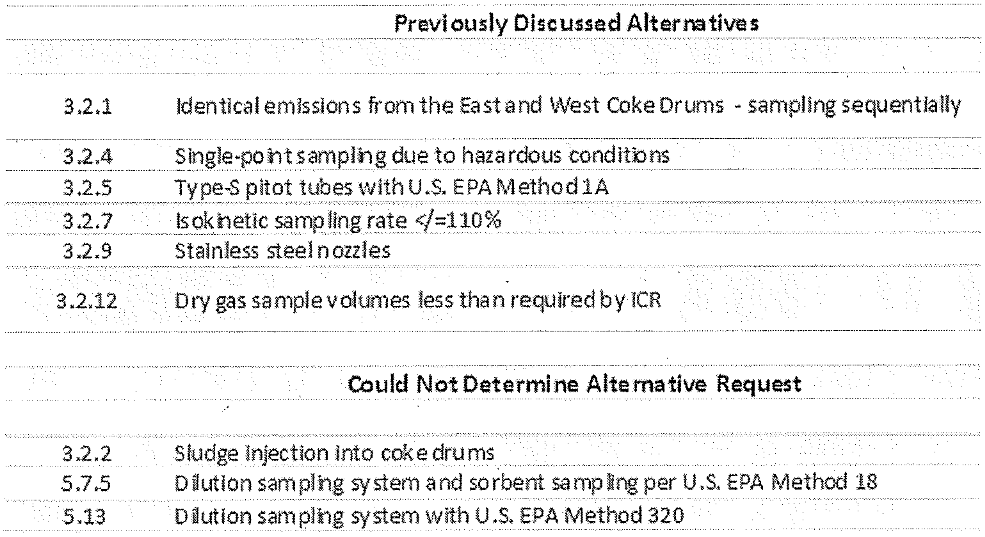
cc Andrew Bouchard <Bouchard.Andrew@epamail.epa.gov>, Brenda Shine <Shine.Brenda@epamail.epa.gov>, cob@rti.org, Colin Boswell <Boswell.Colin@epamail.epa.gov>, Jason Dewees <Dewees.Jason@epamail.epa.gov>, Kristen Benedict <Benedict.Kristen@epamail.epa.gov>, Meggen_DeLollis@URSCorp.com, Peter Westlin <Westlin.Peter@epamail.epa.gov>, Raymond Merrill <Merrill.Raymond@epamail.epa.gov>, Robin Segall <Segall.Robin@epamail.epa.gov>, Steffan Johnson <Johnson.Steffan@epamail.epa.gov>

Subject Re: Fw: Use of stainless steel nozzles on a DCU during the ICR

Chris,

I don't think we are at the point of needing or being ready for a conference call, should we need one. I just finished going through all of the alternatives; the time delay was due to the fact that I had to dig to determine some of the alternatives, as some were vague (e.g. sampling train impinger design).

We will work to try and get this finished by the end of the week so that you can know where it stands prior to mobilization. I am listing below what I pulled out so that you can double check and let us know ASAP if anything is incorrect or (especially important) missing.



Previously Discussed Alternatives

3.2.1	Identical emissions from the East and West Coke Drums - sampling sequentially
3.2.4	Single-point sampling due to hazardous conditions
3.2.5	Type-S pitot tubes with U.S. EPA Method 1A
3.2.7	Isokinetic sampling rate </=110%
3.2.9	Stainless steel nozzles
3.2.12	Dry gas sample volumes less than required by ICR

Could Not Determine Alternative Request

3.2.2	Sludge injection into coke drums
5.7.5	Dilution sampling system and sorbent sampling per U.S. EPA Method 18
5.13	Dilution sampling system with U.S. EPA Method 320

Plan Section	Description of Modification
3.2.3	U.S. EPA maintains that normal operations should be conducted on a regular basis during the Source Test. However, the use of the Eductor Vent (see Section 2.1) would complicate the performance of the Source Test by introducing a separate emissions point during the venting cycle. In addition, the matrix of the Eductor Vent pipe gas stream may vary significantly from the Vent gas stream. Therefore, the normal operations of the DCU3 will be modified and the Eductor Vent will not be used during the venting cycle. The DCU3 coke drum will be depressurized to 0.5 psig through the Vent pipe only. The Eductor Vent will be activated only after the venting cycle is complete and sampling has concluded. Eliminating the use of the Eductor Vent during the venting cycle will increase the typical venting cycle duration of 55 minutes to approximately 70 minutes.
3.2.6	Sampling probe and filter temperatures will be at 300±25°F instead of at 248±25°F.
3.2.8	The concentrations of total hydrocarbon (THC) in the DCU3 Vent gas may vary greatly (i.e., from 0 to over 30% by volume) during the venting cycle. One of the many difficulties associated with the high moisture content of the DCU3 Vent gas stream is that it is not possible to accurately anticipate the dry gas fraction of the gas stream. This, in turn, creates difficulties in attempting to use a proper instrument calibration range. Sample gas will be diluted and routed to two (2) THC analyzers that will be calibrated at overlapping ranges. One (1) THC analyzer may be operated and calibrated in a dual-range mode to obtain the two (2) separate measurement ranges.
3.2.8	Because of limitations associated with the vapor pressure and lower explosive limits of propane, certified calibration gases of highly concentrated (>300,000 ppm) propane in a balance of air are not commercially available. To mitigate these issues, calibration gases will be prepared in a balance of nitrogen rather than air.
3.2.8	The dilution gas will also be nitrogen.
3.2.8	U.S. EPA Protocol calibration gases of propane in a balance of nitrogen at concentrations >15,000 ppm are not commercially available due to the health and safety issues involved with their preparation and NIST-certification (i.e., flammability and risk of explosion). Due to these limitations, some Custom Certified (±2% accuracy) calibration gases (traceable to a primary standard) at concentrations up to 30,000 ppm will be used in lieu of U.S. EPA Protocol gases.
3.2.8	The high-range THC analyzer (10,000 to 100,000 ppm range) will not be calibrated by introducing calibration gas upstream of the dilution sampling probe. Instead, the high-range THC analyzer will be calibrated directly, bypassing the dilution sampling system, while the low range THC analyzer (100 to 10,000 ppm range) will be calibrated with dilution and used to establish the dilution system ratio. Both the high-range and low-range THC analyzers will be interfaced with the same dilution sampling system.
3.2.10	To protect sensitive sampling equipment as well as testing personnel from H2S exhausting out of the isokinetic sampling trains, additional impingers may be used as necessary for the purpose of scrubbing H2S from the sample gas before contact with dry gas meters and sampling pumps and the release to atmosphere through an exhaust orifice. Two impingers with Greenburg-Smith stems, containing 200 ml each of a solution of 10% zinc acetate (ZnOAc), will be inserted before the final silica gel impinger used as a desiccant. A third impinger containing zinc acetate may be added if silica gel discoloration (turns black from formation of cobalt disulfide) indicates H2S breakthrough. An empty knockout impinger will be inserted in the sampling train between the 10% zinc acetate impingers and the silica gel impinger to catch any carryover from solution foaming. URS will ensure that the vast majority of the moisture content is condensed before gas contact with these scrubbing impingers by adding a large glass condenser and an appropriate amount of empty knockout impingers into the sampling trains. All impingers will be weighed before and after the sampling run for the gravimetric determination of the

3.2.11	The impinger exit gas temperature readings measured at the final impinger stem of the sampling trains may exceed 68°F during most of the test run. This is attributed to high ambient temperatures generally found at the sampling train location and the very slow rate of dry gas (0.5 to 5 liters per minute) passing through the final impinger of these multi-component (i.e., 6- to 14-impinger) sampling trains. There is very low gas flow at this thermocouple location so the ambient temperature influences the thermocouple housing and the exit gas temperature reading more than the small amount of sample gas passing through the impinger exit stem. To compensate for this, sample gas temperatures will be measured at the exit of the condenser (upstream of all impingers) used in each isokinetic sampling train. The condenser exit temperature will demonstrate the efficiency of moisture condensation and will meet the RM specification of ?68°F.
3.2.13	The sampling of DCU Vent emissions generally requires dry gas sampling rates between 0.5 and 5 liters per minute. For this reason, dry gas meters for use during the Source Test will be calibrated against a separate set of critical orifices for low-flow rate applications. A 3-point pretest calibration will be performed in triplicate before use in the field, and each Y1 (calibration result) must agree within 4% of the average Y1 at the selected flow rate. Individual Y1 must be between 0.9. and 1.10. A single-point post-test calibration will be performed in triplicate as soon as possible after the Source Test and must agree within 5% of the 3-point calibration at the selected flow rate. The single orifice used during the post-test calibration will be selected to be representative of the average sampling rate obtained during the Source Test.
5.1.2	Due to the high velocity, high moisture concentration, and limited duration of the venting cycle, it is not practicable to check for the presence of cyclonic flow. U.S. EPA Method 2 will be modified such that the extent of cyclonic flow will not be determined as part of this measurement program.
5.2	Except as identified in this Plan, U.S. EPA Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure)," will be performed during each test run and O2 and CO2 concentration data will be used to calculate the MW of the dry fraction of the DCU3 Vent exhaust gas. The remaining balance of the dry gas fraction will be designated as methane, the most concentrated compound in the DCU3 Vent gas after water.
5.2.2	Due to the high velocity, batch process of the DCU3, and limited duration of the venting cycle, it is not practicable to check for the presence of stratification in the DCU3 Vent gas stream. U.S. EPA Method 3A will be modified such that the extent of stratification will not be determined as part of this measurement program. The dilution sampling system will be leak-checked before the test run and placed at a single sampling point within the 10% central area of the DCU3 Vent cross section.
	Method 15A
5.6.1	Modified such that a heated stainless steel dilution probe will be used instead of a heated, non-diluting Teflon probe.
5.6.1	Dimensions of the combustion tube may be modified from method specifications to interface with a commercially available combustion furnace.
5.6.1	The DCU3 coke drum is not considered an oxidizing environment and the concentration of O2 in the actual or diluted DCU3 Vent gas stream is not expected to be >1% O2. Therefore, significant SO2 concentrations are not expected in the sample gas, and SO2 scrubbing impingers will not be included upstream of the combustion
5.6.1	The DCU3 coke drum is not considered an oxidizing environment and the concentration of O2 in the actual or diluted DCU3 Vent gas stream is not expected to be >1% O2. Therefore, significant SO2 concentrations are not expected in the sample gas, combustion air must be added at a known rate upstream of the combustion furnace.
5.6.2	Since target compound concentrations are expected to be highest during the first few minutes of the venting cycle, the dilution sampling system will not be flushed with sample gas prior to beginning collection in the
5.6.2	Modified to allow the use of H2S rather than COS as the recovery gas because H2S is expected to comprise >90% of TRS, while COS is not expected to be measured in the DCU3 Vent gas stream above applicable detection
5.6.2	It is not practicable to perform a post-test run recovery study per method specifications. Method 15A will be modified so that the H2S calibration gas standard will be introduced upstream of the dilution sampling probe for 30 minutes prior to each test run. The recovery study impinger train and the sample impinger train will be analyzed using identical procedures.
5.6.2	Modified so that a sample recovery of 70-130%, rather than 80-120%, will be demonstrated during each recovery study; however, the failure to demonstrate recovery within this criterion will not invalidate test run results. An expanded recovery study criterion is necessary due to the significant potential sample loss in the stainless steel dilution probe, the magnitude of the DR required to sample the DCU3 Vent gas stream, and the impracticality of using alternative, costly, non-reactive and heat-tolerant materials in the dilution sampling

	Method 18
5.7.2	As allowed by U.S. EPA Method 18 and the program-specific guidance from U.S. EPA, U.S. EPA Method 205, "Verification of Gas Dilution Systems for Field Instrument Calibrations," may be used to dilute high-level gas standards for use in instrument calibration. Where U.S. EPA Protocol gases are not commercially available, custom certified (±2% accuracy) calibration standards will be suitable for the mid-level calibration gas required in Section 2.3 of U.S. EPA Method 205 for the laboratory evaluation procedure. As an alternative, stainless steel or Teflon sample loops of various sizes may be used to inject target concentrations of calibration gas to the GC/FID and GC/FPD.
5.7.2	Since target compound concentrations are expected to be highest during the first few minutes of the venting cycle, the dilution sampling system will not be flushed with sample gas prior to beginning collection in the
	Method 26A
5.9.1	• Add glass coiled condenser; one (1) standard glass impinger, with knockout stem, empty; two (2) standard glass impingers, with Greenburg-Smith stems, each containing 200 ml 10% zinc acetate solution, a third (optional) impinger may be added if necessary for H_2S removal; one standard glass impinger, with knockout stem, empty; • Use 200 mL 0.1N H_2SO_4 in the knockout instead of 50 mL;
	Method 29
5.10.1	• Add glass coiled condenser; one (1) standard glass impinger, with knockout stem, empty; two (2) standard glass impingers, with Greenburg-Smith stems, each containing 200 ml 10% zinc acetate solution, a third (optional) impinger may be added if necessary for H_2S removal; and one standard glass impinger, with knockout stem, empty; • Add 200 mL 5% HNO_3/10% H_2O_2 to knockout impinger;
5.10.3	U.S. EPA Method 29 specifies 100-ml volumes of 0.1N HNO_3 to be used to recover the various sampling train fractions to aid in making equitable blank corrections. These rinse volumes will be significantly larger than the method specifications due to the increased volume of the impinger train and the nature of the organic material that is often found in the sampling train. Under these circumstances, comparable, but not exact volumes of rinse solution will be used for each train, and no blank corrections will be applied to the results.
	OTM 29
5.11.1	• Add glass coiled condenser; one large glass impinger (3 L), with modified Greenburg-Smith stem, containing 300 mL 10% lead acetate in acetic acid solution, maintained at a pH <4 during the test run (for removal of H_2S); one standard glass impinger, with knockout stem, empty (prior to first method impinger); and one (1) standard glass impinger, with knockout stem, empty (before silica gel)

	Methods 5 and 202
5.12.1	Modifications: • Remove impinger with 100 mL of water Add: • One (1) standard glass impinger, with knockout stem, empty; two (2) standard glass impingers, with Greenburg-Smith stems, each containing 200 ml 10% zinc acetate solution, a third (optional) impinger may be added if necessary for H2S removal, and one standard glass impinger, with knockout stem, empty
	ASTM D6784-02
5.15.1	• Add glass coiled condenser; one standard glass impinger, with Greenburg-Smith stem, containing 100 mL 1N KCl (with third impinger); one standard glass impinger, with knockout stem, empty (before silica gel); • Use of 200 mL 1N KCl in place of 100 mL in the first and second impingers;
5.15.3	Following the test run, the condenser and impingers will be purged with pressurized nitrogen for 30 minutes at a rate of a least 10 L/min to distribute oxidized and elemental Hg to appropriate absorbing solutions.
	SW-846 Method 3542 (prep for 0010)
5.16.3	Rather than spiking the filter in a Petri-dish on the bench, the filter will be transferred to the soxhlet extraction apparatus, and all spiking material will be added there. Adding surrogate spikes to the filter on the bench exposes the filter to atmosphere for a much greater period of time. During this time, the more volatile compounds can be lost.
5.16.3	For extraction of the probe and nozzle rinse, the laboratory will have the flexibility to select whether to raise or lower the pH first. The choice of whether to raise or lower pH has no direct effect on the extraction efficiency, but allows the laboratory more flexibility to manage foaming or other matrix effects.
5.16.3	The final extracts may be concentrated to one milliliter before analysis, rather than the five milliliters specified in the method. Concentration to a lower volume will improve detection limits. Any potential loss by the increased concentration is documented and mitigated by the recovery of surrogate spiking compounds.
	SW-846 Method 0011
App. B 1.1.1	Modifications to train: • Add glass coiled condenser; • Add one large glass impinger (3 L), with knockout stem, containing 200 mL DNPH solution prior to first impinger; • Add two (2) standard glass impingers, with knockout stems, empty; two (2) standard glass impingers, with Greenburg-Smith stems, each containing 100 ml 10% zinc acetate solution; one standard glass impinger, with knockout stem, empty; and one standard glass impinger, with modified Greenburg-Smith stem, containing 100 ml 1.0N potassium hydroxide solution after DNPH impingers and prior to knockout;

Gerri G. Garwood, P.E.

U.S. Environmental Protection Agency
OAR/OAQPS/SPPD
Measurement Policy Group
Ph: 919-541-2406 Fax: 919-541-3207

From: Chris_Weber@URSCorp.com
To: Gerri Garwood/RTP/USEPA/US@EPA
Cc: Meggen_DeLollis@URSCorp.com, Andrew Bouchard/RTP/USEPA/US@EPA, Brenda Shine/RTP/USEPA/US@EPA, cob@rti.org, Colin Boswell/RTP/USEPA/US@EPA, Jason Dewees/RTP/USEPA/US@EPA, Kristen Benedict/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA
Date: 07/05/2011 12:54 PM
Subject: Fw: Use of stainless steel nozzles on a DCU during the ICR

Hi Gerri,

Subject: [Fwd: Re: EPA Petroleum Refinery ICR FAQ Submittal]
From: Robert Bivens <bivens@rmb-consulting.com>
Date: Mon, 12 Sep 2011 10:44:14 -0400
To: Robert Bivens <bivens@rmb-consulting.com>

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ROBERT J. BIVENS
Senior Engineer II
RMB Consulting & Research, Inc.
5104 Bur Oak Circle
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919-673-9068 Cell
bivens@rmb-consulting.com

Subject: Re: EPA Petroleum Refinery ICR FAQ Submittal
From: Garwood.Gerri@epamail.epa.gov
Date: Thu, 30 Jun 2011 11:54:53 -0400
To: Robert Bivens <bivens@rmb-consulting.com>
CC: Bouchard.Andrew@epamail.epa.gov, Shine.Brenda@epamail.epa.gov, cob@rti.org, Boswell.Colin@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Benedict.Kristen@epamail.epa.gov, Westlin.Peter@epamail.epa.gov, Merrill.Raymond@epamail.epa.gov, Segall.Robin@epamail.epa.gov, Johnson.Steffan@epamail.epa.gov

Robert,

We have discussed your request to add a FAQ to the Refinery ICR website. Your request asked us to reconsider a response we provided to URS on isokinectic sampling with the high moisture content in the DCU vents. We are not changing or adding a FAQ to the website at this time. It is critical that we get the best data possible. Therefore, we still request that testers strive to sample within a 80-120% isokinectic rate. However, based upon the information you provided, we do understand that it may be impossible to meet this criteria at some sites. If a tester runs into a situation where it is impossible to meet this criteria, we will make case-by-case determinations on whether data outside of this range can be accepted.

Sincerely,
Gerri G. Garwood, P.E.

U.S. Environmental Protection Agency
OAR/OAQPS/SPPD
Measurement Policy Group
Ph: 919-541-2406 Fax: 919-541-3207

From:	Robert Bivens <bivens@rmb-consulting.com>
To:	Gerri Garwood/RTP/USEPA/US@EPA
Date:	06/23/2011 11:39 AM
Subject:	Re: EPA Petroleum Refinery ICR FAQ Submittal

Gerri,

The data I have seen show that the DCU vent is always > 95% H2O, with most test runs being between 98-99.5%. In addition, a given 3-run test average could have 3 different moisture contents varying within this range -- for example, if Run 1 is 98% moisture, Runs 2 and 3 could conceivably be anywhere within the 98-99.5% range.

Robert Bivens

Garwood.Gerri@epamail.epa.gov wrote:
Robert,

As a point of information, how much and how frequently does the moisture fluctuate in any given DCU stack?

Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From:	Robert Bivens <bivens@rmb-consulting.com>
To:	Gerri Garwood/RTP/USEPA/US@EPA
Cc:	Robert Bivens <bivens@rmb-consulting.com>
Date:	06/22/2011 03:21 PM
Subject:	EPA Petroleum Refinery ICR FAQ Submittal

Gerri,

This email is in regards to EPA's Petroleum Refinery ICR, which RMB wishes to submit to be considered for an FAQ response.

RMB is currently in the midst of providing consulting services to various facilities to assist them with satisfying the emissions testing and reporting requirements established by EPA's Petroleum Refinery ICR. As part of our consultation efforts, RMB has been made aware of a response previously provided by EPA to URS Corporation, on the subject of the isokinetic sampling criteria for delayed coking unit depressurization vents.

RMB respectfully disagrees with EPA's assertion that *"the 80-120% isokinetic rate approved on the FAQ page is reasonable, achievable, and scientifically sound. We understand that high moisture is a potential issue with the isokinetics, which is why we widened the range,"* and hopes that EPA can reconsider this issue. While RMB certainly agrees that this is the case for the "traditional" sources in which the isokinetic test methods were developed on and intended for, this criteria is simply not practical for "extremely high moisture sources" such as delayed coking depressurization vents.

For example, in 2008 RMB helped to oversee one of the first research projects world-wide on a source of this type and complexity. For this particular project, twenty-five (25) isokinetic test run samples were taken. Over the course of the project, only 12 (i.e., < 50%) of the sample trains met EPA's 80-120% isokinetic sampling criteria. Similar test results have been encountered in subsequent test projects that RMB has been made aware of. To compound matters further, these source types can work on semi-continuous batch process cycles, so if a given sample is shown to be outside of the prescribed isokinetic range, the next subsequent test run (i.e., a repeated test run) may not be able to be performed until 1-2 days later, or even longer.

The source of error here is essentially attributed to the moisture content of the gas stream sampled, coupled with expected low dry gas sample volumes. For "traditional" sources such as a coal-fired boiler, which has a stack moisture content of <15%, any 1% error in the moisture estimate prior to sampling will result in an ~1% error in the isokinetic sample. However, for coking depressurization vents, which can have moisture contents of >98%, any 1% error in the moisture estimate prior to sampling will result in an error of ~50% in the isokinetic sample. In other words, unless the moisture content was guessed absolutely correctly prior to sampling and the subsequent sampling rates were calculated and implemented based upon this correct moisture estimate, the prescribed EPA sampling criteria of 80-120% would most likely not be met. Isokinetic sampling systems that provide real-time moisture concentration data during a sampling period and are suitable for use on a delayed coking vent source are not commercially available. A given sampling console operator will have no method of accurately measuring the moisture concentration (e.g., whether it is 98% or 99%) of the vent gas during the sampling period, and therefore will not be able to make any meaningful adjustment to the sampling train design or operation during the test run to obtain an isokinetic sampling rate between 80-120%.

RMB realizes the importance and significance of this data with respect to how the data will be used to develop emission standards for various refinery sources, and that certain quality control and assurance standards must be met. However, the data gathered must also adhere to achievable QA that is reflective of the source tested. Like URS, RMB would like to request for EPA to consider a revised "middle ground" QA criteria of $\leq$ 110% isokinetic during the source testing of a delayed coking unit depressurization vent. An isokinetic sampling rate of $\leq$ 110% can be ensured by using a nozzle with a large enough diameter such that the velocity of the sample gas through the nozzle orifice will always be less than the velocity of the vent gas stream. RMB would like to stress that there has been a pre-established precedent for this proposed criteria , as it is based upon guidance developed by California's SCAQMD, Rule 1189, Attachment A.

Thank you in advance for EPA's re-consideration of this request.

Robert Bivens
RMB Consulting & Research, Inc.
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ROBERT J. BIVENS

Senior Engineer II

RMB Consulting & Research, Inc.

5104 Bur Oak Circle

Raleigh, North Carolina 27612

919-791-3133 Office

919-673-9068 Cell

Garwood.Gerri@epamail.epa.gov
04/19/2011 03:34 PM

To Chris_Weber@URSCorp.com
cc Merrill.Raymond@epamail.epa.gov, Dewees.Jason@epamail.epa.gov, Segall.Robin@epamail.epa.gov,
bcc
Subject Refinery ICR

History: This message has been forwarded.

Chris,

We have discussed the two requests that you made last week. I have summarized your questions and provided responses:

1. If EPA protocol gases are not commercially available for reduced sulfur compounds, may a mid-level supply gas certified by the manufacturer at 2% accuracy be used in EPA Method 205 to evaluate the gas dilution system for EPA Method 15, 16 or 18 provided that all other quality assurance criteria described in the applicable methods is met?

Where EPA protocol gases are not commercially available, calibration standards for reduced sulfur compounds certified at 2% accuracy by the vendor will be considered adequate for the the Mid-Level supply gas (Method 205 - Section 2.3) for purposes of this data collection request..

2. We suggest that isokinetic sampling train operating parameters such as the sampling nozzle orifice size should be determined during preliminary testing activities to achieve isokinetic sampling percentages ≤110% during source testing.

We appreciate your comment and analysis, but we believe that the 80-120% isokinetic rate approved on the FAQ page is reasonable, achievable, and scientifically sound. We understand that high moisture is a potential issue with the isokinetics, which is why we widened the range.

Please let us know if you have further questions or comments.

Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

Garwood.Gerri@epamail.epa.gov
05/26/2011 08:16 AM

To Chris_Weber@URSCorp.com
cc
bcc
Subject Re: TRS Measurements from a Delayed Coking Unit

Chris,

We are not allowing Silonite coated sample containers or aluminum canisters for the DCU samples. We do not believe that these containers are appropriate for these samples. We also do not anticipate shipping hazards with the DCU samples, which was part of the reason these containers were approved for the fuel gas samples. We are willing to accept ASTM Method D5504 for TRS, which would allow you to sample using a Tedlar bag. If you use ASTM Method D5504, the
TRS must be reported as the sum of the concentration of all of the chromatographic peaks recorded by the method. You must also incorporate Method 18 requirements for spiked target compound recovery standards to validate the analysis procedures. Sampling must be performed using non-reactive containers, such as Tedlar bags with polypropylene fittings or the equivalent. Tedlar bag samples require protection from light and heat. Laboratory equipment must be inert or passivated to ensure reliable results. Additionally, samples should not be held in the Tedlar bags for longer than 24 hours prior to analysis and precautions should be taken to ensure that samples in the bags are well-mixed prior to analysis.

While Method 18 can be used for the speciated compounds, it cannot be used for TRS. We also wanted to add a note about the dilution ratio you mentioned (100:1). We previously stated that the ratio should be limited to 20:1 for organics and that a higher level could be allowed for NOx and SO2 because we did not see an issue with being able to detect those compounds at a higher dilution ratio. If you are increasing the dilution ratio for other compounds, you need to make sure you keep the dilution ratio at a level where you will still be able to detect the compounds for which you are sampling.

Sincerely,
Gerri G. Garwood, P.E.
U.S. Environmental Protection Agency
Measurement Policy Group
OAR/OAQPS/SPPD

From: Chris_Weber@URSCorp.com

To: Gerri Garwood/RTP/USEPA/US@EPA

Cc: Kristen Benedict/RTP/USEPA/US@EPA, Colin Boswell/RTP/USEPA/US@EPA, Andrew Bouchard/RTP/USEPA/US@EPA, cob@rti.org, Jason Dewees/RTP/USEPA/US@EPA, Steffan Johnson/RTP/USEPA/US@EPA, Raymond Merrill/RTP/USEPA/US@EPA, Robin Segall/RTP/USEPA/US@EPA, Brenda Shine/RTP/USEPA/US@EPA, Peter Westlin/RTP/USEPA/US@EPA

Date: 05/19/2011 02:32 PM

Subjec TRS Measurements from a Delayed Coking Unit t:

Hi Gerri,

I am planning to conduct the measurement of TRS on a Delayed Coking Unit, but would like to limit the use of non intrinsically safe equipment on the process unit near the atmospheric depressurization vent. A tube furnace required by Methods 15A, 16A or 16B could create sparks and an explosion hazard. The sampling location on the vent is several hundred feet above the ground. Will EPA allow the use of silonite-coated stainless steel or aluminum gas sample containers, interfaced with our dilution sampling system (operated at a 100:1 ratio), with provisions identical to those specified for the sampling of refinery fuel gas under hazardous conditions? The dilution ratio will be developed through the use of a calibrated O2, CO2, CO2, NOX, SO2 or THC gas analyzer on a per test-run basis.

We are planning to use Method 18 and the dilution sampling system to collect bag samples for the on-site GC/FPD analysis of H2S, COS and CS2.

Best regards,

Chris Weber
URS Corporation
Project Manager
Measurements Group
512.419.5369 office
512.983.5158 cell

Responses to frequently asked questions are provided below.

Please note that in each of the questions below, “I” or “we” refers to an ICR respondent and “you” refers to EPA. In each of the answers below, “we” refers to EPA and “you” refers to an ICR respondent.

General Questions

General-001

Q: What files were updated on April 4, 2011, and why were these files updated?

A: The following files were updated on April 4, 2011 (approximately 11:10 AM).

- The Refinery ICR Component 1 Reporting Tool was updated to allow the forms to fit screen displays with a resolution of 1024 x 768 or higher. If you are having trouble viewing the tool’s forms, please try adjusting your display resolution settings. Additionally, a footnote was added to the “Process Unit” tab in the “General Facility Information” form to indicate process units that should report capacity in units other than bbl/cd (click on “Help” at the top of the form for additional details regarding “throughput capacity” for different types of units). Also, units were specified as million gallons per day for the “daily average WWTS flow rate” in the Wastewater Collection Treatment – Facility-Level Questions form.

- Refinery Wastewater Emissions Tool was updated to include a specific entry for Wastewater Treatment System (WWTS) ID Number. This data is needed for facilities that may have multiple WWTS to ensure the completed spreadsheet tool is assigned to the correct WWTS.

- Instructions and Tips for Using Refinery ICR Component 1 Reporting Tool was updated to provide guidance on how to delete inadvertent answers if there is no blank in the dropdown menu (e.g., for deleting secondary fuel entries when no secondary fuel is used).

General-002

Q: Do I need to register for a username and password on this website?

A: Only those individuals who will be responsible for uploading ICR responses to this website need to register. All files needed to complete the ICR, including background information, will be available without registering. Please note that it is not possible to access ICR data uploaded by other companies from this site; this site is intended for uploading data only.

General-003

Q: Why do I need to enter a Facility ID when I register for a username and password on this website?

A: As noted above, only those individuals who will be responsible for uploading ICR responses to this website need to register. We expect you to enter the Facility ID found in your Section 114 letter when registering. Please note that by entering one Facility ID, you are not limited to only entering information for that one facility; this question is simply a check to confirm that all individuals registering expect to upload data for a facility that received a Section 114 letter.

In addition, we are not limiting registration to one person per facility, as we realize more than one person may need the ability to upload response files. For example, both the environmental manager located at the facility and a consultant retained by the facility to assist in responding to the ICR can register using the same Facility ID.

If you do not provide a valid Facility ID upon registration, the Portal Administrator will contact you to request that information (or any other missing information). Your account may not be activated until that information is provided.

General-004

Q: I still haven’t received a Section 114 letter. I work at a small refinery, and I thought maybe EPA excluded some refineries based on size. If EPA did not exclude any facilities from the mailing list, what should I do about my letter?

A: Section 114 letters for the Petroleum Refinery ICR were sent to every refinery included in the EIA and/or Oil and Gas Journal annual lists. All of the letters were sent via FedEx and required signature upon receipt, and all of them were signed for at the destination address. If you have not seen a Section 114 letter for your facility, contact Brenda Shine as soon as possible and request a PDF copy of your letter. If you indicate that you never received your letter, you will also be provided with the FedEx tracking number and the name of the person who signed for the letter.

General-005

Q: Several refineries have a unit such as a hydrogen plant or coke calciner at a site near the facility but not inside the fenceline, and those sites are often considered separate plants. However, based on the ICR definition of “facility,” information about those units will be reported in the Petroleum Refinery ICR. Will EPA provide separate Facility IDs for those sites so they are recognized as separate plants?

A: No, you should report the unit as part of your Facility ID. However, you can and should provide whatever caveats you associate with this unit (e.g., that you consider this unit to be part of a separate plant, that it has a different physical address) in the “Notes” field of the Component 1 Reporting Tool and any “Comments” fields provided in the other reporting tools and templates as appropriate.

General-006

Q: For Component 1, is May 31 a postmark deadline or a “received by” deadline for mailed information (e.g., CBI info)?

A: All non-CBI files should be uploaded by May 31, 2011. Any CBI package mailings should be postmarked by May 31, 2011.

General-007

Q: We are preparing our Component 1 documents for submittal, and I have a question concerning which documents should be included on the CD that we will submit as CBI. We are anticipating uploading the non-CBI version of the Refinery ICR Component 1 Reporting Tool database and all additional attachments. Do I also include the attachments with the CBI version of the Refinery ICR Component 1 Reporting Tool database, or do I only put the CBI version of the database file on the CD?

A: You do not need to include non-CBI attachments on your CBI CD. You should upload any attachments that do not contain CBI with your non-CBI version of the Refinery ICR Component 1 Reporting Tool database.

If there are attachments that you consider to contain CBI, please do not upload those files. Instead, you should include the files considered to be CBI with the CBI submission of the Refinery ICR Component 1 Reporting Tool database.

General-008

Q: I found an error in our Component 1 submittal and would like to correct it. What should I do?

A: Contact us via the ehe-refineryicr@rti.org email address with a brief description of what you would like to change, including the file name, what type of data you want to change, and method of submittal to EPA. If you uploaded your files, you should include the username and email address for the account on which the files were uploaded. You will then receive a response with instructions; the specific instructions will depend on the nature of your change and the status of your file in the review process.

ICR Content Questions

Content-001

Q: For the question in Component 1 that asks about Annual Revenue, do we have to report calendar year? Our fiscal reporting calendar begins on September 1 every year. Will those numbers be sufficient for costs/revenues throughout the reporting process or will we have to adjust to the calendar year?

A: You do not have to report for the calendar year. Since we would like to match up as close as we can to 2010, you should report the fiscal year that includes most of 2010. In other words, for the example above, report Sept 2009 to Sept 2010. If your fiscal year runs July 1 to June 30, you may choose either one of the fiscal years that includes 2010. You should note the beginning and end of your fiscal year in the “Notes” section of the Component 1 Reporting Tool.

Content-002

Q: In Component 1, Part II, Section 15, one of the questions in the Wastewater Generation section (under Facility-Level Questions) asks for average concentration of organic HAP. Is this total HAP? Also, if I don’t know the exact concentration can I estimate using > symbol (e.g., >100 ppm)?

A: Yes, organic HAP should be the cumulative concentration of all organic HAP. We prefer that you provide your best estimate of this value. An answer of “>100 ppm” could mean that the concentration is near 100 ppm, or it could mean that the concentration is much higher than that. In fact, the Refinery Component 1 Reporting Tool for this section is set up to accept only numerical values (i.e., if you entered “>100” you would get an error). If you feel that any of your answers need explanation or qualification, you should use the “Note” button at the top of the form to provide that information. (The notes are for the entire facility, so be sure to explain where you are in the tool when entering your explanations.)

Content-003

Q: In Component 1, Part II, Section 15, there is a section that asks for Wastewater Vents. I am currently identifying junction boxes with or without controls, but I wanted to ask for clarification. Do you want all drains, such as hub drains and tank water draw sumps? That number is likely to be in the high hundreds for many facilities.

A: No, we do not consider drains to be atmospheric vents (although unsealed drains may act as vents); we were primarily interested in intentional (or “designed”) vents associated with junction boxes, DAFs, and other process and collection systems. As we understand, one may design a vent for the drain system to ensure the water within the drain system flows as intended (or to prevent pressure buildup). This type of drain system vent should be included, but not individual drains.

Content-004

Q: The original instructions for Component 1 and Component 2 were to use the same Unit IDs as in EPA’s 2005 National Scale Air Toxics Assessment (NATA) National Emissions Inventory (NEI) database. Those instructions do not appear in the final versions of Component 1 and Component 2 but I would still like to be consistent with the NEI. Can EPA send me my NEI data?

A: We have posted a zip file on the Component 2 page that contains the 2005 NEI HAP data for petroleum refineries. You may use the data in this file for reference in assigning unit IDs or emissions point IDs if you like, but you are not required to do so.

Content-005

Q: In Component 1, Part II, Section 8, there is a question that asks for the operating pressure of the catalytic reforming unit. I plan to report the highest reactor section pressure versus the product recovery pressure for my catalytic reforming unit. Is my interpretation of this question correct?

A: Yes, this question was intended to collect information on the reactor pressure.

Content-006

Q: We do not have the information requested in Component 1, Part I, Questions 10 (Dun & Bradstreet number) and 11 (annual revenue) readily available for each facility, but we have it for the company. Should we provide the company information instead?

A: Regarding Question 10, the Dun and Bradstreet Number also refers to the D-U-N-S Number, the unique nine digit identification number typically assigned to one physical location of a business (http://fedgov.dnb.com/webform). You should have a Dun and Bradstreet/ D-U-N-S number for each refinery. However, if you do only have one Dun and Bradstreet/ D-U-N-S number for the entire company, you should provide that number rather than leaving the question blank.

Regarding Question 11, the annual revenue, you may report company revenue as long as you are clear what your revenue value covers (e.g., entire company, refining segment). If your revenue is for anything other than the facility, you should specify what your revenue value covers in the “Notes” field (button on the top of the Part I form in the Component 1 Reporting Tool).

Content-007

Q: Component 1 asks for Federal regulations and State, local, and tribal regulations for each process unit, but it does not ask if that unit is subject to a consent decree. Do I need to provide that information, and if so, where?

A: No, you do not need to indicate specifically if your unit is subject to a consent decree. However, some of the questions in Component 1 may ask for information that you gather from your consent decree requirements. For example, suppose you have a process unit that is subject to 40 CFR part 60, subpart GGG as well as a consent decree that requires the valves to be monitored at 500 ppmv. In this case, you would report a leak definition of 500 ppmv for the valves since that is “the monitored concentration above which repairs are required (or routinely performed) for the process unit,” but your answer to the Federal regulation question would just be 40 CFR part 60, subpart GGG.

Content-008

Q: There are pollutants/emission source combinations designated with a filled circle in Table 1 of the Estimation Protocol for Petroleum Refineries for which default emission factors are not provided either in the Protocol or in AP-42. The footnote of Table 1 states that “emission estimates should be developed” for these pollutant/emission source combinations. How are emission estimates for these pollutant/emission source combinations supposed to be developed for the Component 2 emissions inventory when no data exist by which to develop the emission estimates?

A: The filled bullets for pollutant/emission source combinations were used to designate pollutants that are expected (with a reasonably high probability) to be released from a given emissions source. We recognize that there are significant data gaps for certain pollutant/emission source combinations with respect to default emission factors. We intend to fill many of these data gaps through the Component 4 testing program. However, we recognize that these data gaps will not be filled in time for the required submittal of the Component 2 Emissions Inventory. Therefore, we provide the following guidance with respect to Table 1 of the Protocol and the completeness of the inventory for pollutant/emission source combinations for which default emission factors are not available either in the Protocol or in AP-42:

- No new measurement data need to be collected in order to complete the Component 2 Emissions Inventory.
- There may be instances where pollutant measurement data or default emission factors are available for one pollutant or surrogate (e.g., VOC) and process or product knowledge allows you to provide a reasonable estimate of another pollutant’s emissions (e.g., by assuming the emissions of the second pollutant are proportional to the first pollutant’s emission rate and their relative vapor or liquid concentrations). In such cases, a “direct way” is considered to be available for you to provide a reasonable estimate of the second pollutant’s emissions and these estimated emissions are to be reported in the Component 2 Emissions Inventory.
- If no measurement data or default emission factors exist and there is no direct way (see previous bullet) to estimate the emissions for a given pollutant/emission source combination, you are not required to report emissions for that pollutant for that source. The bullets (both filled and open) in Table 1 should be considered a desired reporting list but not a mandatory list.

Content-009

Q: Component 1, Part II, Section 8 asks for “reduction or activation cycle vent disposition/control” (see General (cont.) tab). Can EPA clarify what is meant by the “reduction or activation cycle”? Does it refer to the final purge?

A: The reduction or activation cycle is the final step in getting the catalytic reforming unit ready to go back on-line. Based on EPA’s understanding of the operation of these units, after the coke burn (slow controlled burn with limited O2), operators increase the air to bring up the O2 concentration and spike with chloriding agent (in the Refinery ICR, this is referred to as the oxidation or rejuvenation cycle). Next, operators begin purging the unit with nitrogen to remove all oxygen in the system so the unit can go back on-line (without an explosion). As this step is creating a reducing atmosphere, we termed it the “reduction cycle.” The Refinery ICR reference to the “reduction or activation cycle” means the “final purge,” the step after the oxidation (rejuvenation) step, or getting the unit ready for hydrocarbon service.

We recognize that the regeneration process for some catalytic reforming units may be different based on the design. If this is the case, you should answer the questions to the best of your ability and then supply comments or additional information to help EPA understand the steps in your regeneration process.

Content-010

Q: There are emissions sources at my refinery that I believe have low emissions. Estimates for the emissions from these sources are not required by my State and/or EPA’s TRI either due to their size or emissions characteristics. Examples of these sources include laboratory operations, asbestos removal, and paints and solvents. Do all of these small sources have to be included in the Component 2 emissions inventory, even if they are exempt from another reporting program?

A: Your Component 2 emissions inventory should include all sources and all pollutants for which you can reasonably estimate emissions, regardless of whether or not those sources are exempt from another reporting program. If the emissions are for a one-time event (e.g., building remediation to remove asbestos), then you may note that in the comments for that emissions point. EPA does not plan to provide a reporting threshold for the Component 2 emissions inventory.

Content-011

Q: The Refinery ICR Component 2 Reporting Tool asks for “Emissions allowed by Permit,” and the instructions in Numbers 17 and 18 seem to indicate that I need to provide this information where my permit has “a numerical limit for emissions of this pollutant from this unit,” regardless of whether the emissions limit is actually in tons per year or a concentration-based limit. However, I am not clear on how to handle other types of limits in my permit. For example, some tanks have a throughput and vapor pressure limit in the permit. Do I need to try to estimate maximum emissions under those conditions?

A: We did intend for the instructions in Numbers 17 and 18 of the Component 2 instructions to be interpreted exactly as written. In other words, you are only required to report numerical emissions limits for specific pollutants as described in Numbers 17 and 18. You are not required to try to convert any operating limits (e.g. throughput or vapor pressure limits) to emissions limits.

However, there are some cases where you may want to consider correlating emissions to an operating limit (if possible). For example, if a permit requirement limits production significantly, such as limiting operation to 3 months of the year or half of the unit's capacity, you may want to include that information so that the maximum emissions for that emission point are not significantly overestimated. If you do provide such information, take care to ensure that you do not inadvertently provide CBI. (For example, if your emission factor is on a pounds per production basis and you provide both the permitted production limit and the maximum emissions possible while meeting that production limit, someone could calculate your emission factor and, in turn, your actual production for the year.)

Content-012

Q: I have a question about the information required in Component 1, Part I: General Facility Information, specifically in the Products Produced tab. We pulled the information from our EIA Form-810 report for calendar year 2010, as requested. However, there are categories of materials on this report that are not transported offsite. Rather, they are intermediate streams produced by a particular process unit and then either sent on to another unit for further processing or blended into a finished fuel that is then transported offsite. Should I list these intermediate streams (to keep alignment with the EIA Form-810 report) and simply show them as 100% used onsite and 0% shipped by the various transport methods, or should I not list them in this section at all since they were neither transported offsite nor "used onsite" as a fuel (but rather they were further processed onsite)?

A: If the intermediates are further processed to make other products, then you should list those intermediates and show them as 100 % used onsite (even if they were not used as a fuel). If they are simply blended and then shipped offsite as finished fuels, then you should identify those amounts as shipped offsite.

Content-013

Q: I would like clarification on the questions in Component 1, Part II, Section 3 regarding open-ended lines (OEL) on process units. The Help on this form states: "The information requested for open-ended lines refers to leakage from the open-end of a pipe (e.g., downstream of a secondary valve) or from a cap on the pipe and not to leakage from the associated valve packing or body flanges." Given that statement, I am interpreting the OEL questions as follows:

- **"Number of Pieces of Equipment" means the number of OEL with caps, plugs, etc. missing from the end of a line found during periodic LDAR monitoring.**
- **"Number of Pieces of Equipment Monitored" means the number of OEL as defined in the previous question that after being found, are subsequently monitored via Method 21 to confirm the presence or absence of a leak.**
- **"Monitoring Frequency" means the frequency with which sensory monitoring is conducted (typically done along with the Method 21 monitoring of the process unit).**
- **"Leak Definition" means the leak definition level used if an instrument is used to confirm a suspected leak detected by sensory means.**

Can EPA confirm that my interpretations are correct?

A: We intended for facilities to use the definition of "open-ended line" included in the "Definitions and Abbreviations" document to determine what is and is not an OEL. That definition is: "Any valve, except safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping." Note that the presence or absence of a cap, plug, secondary valve, or blind flange does not define whether or not you have an OEL. The phrase "open to the atmosphere" is only meant to differentiate OEL from valves that have both sides of the valve seat in contact with process fluid. (We agree the definition would be clearer if we rephrased the end to read "…open to the atmosphere (either directly or through open piping) or that would be open to the atmosphere after opening or removing any cap, plug, secondary valve, or blind flange that is downstream of the valve.) An OEL with a cap, plug, secondary valve, or blind flange would be considered a controlled OEL while an OEL without a cap, plug, secondary valve, or blind flange would be considered an uncontrolled OEL. Finally, the "Help" statement that is included in the question above was only meant to indicate that some valves will be reported both as a valve and as an OEL (and the location of the leak, if there is one, determines whether it is a valve leak or an OEL leak).

Given the overall clarification above, see below for clarifications specific to each question:

- "Number of Pieces of Equipment": You should report the total number of OEL (whether they are capped, plugged, equipped with a secondary valve, etc.) as long as the process fluid contains some organic material (e.g., VOC, HAP, methane).
- "Number of Pieces of Equipment Monitored": "Monitoring" includes both Method 21 monitoring and sensory monitoring. Based on the information you provided above, you should report the number of OEL that are checked by sensory methods (this could be the same as the total number of OEL if you conduct sensory monitoring on all of them). The fact that you use Method 21 "to confirm the presence or absence of a leak" is interesting but not information that you are required to provide if you do not conduct Method 21 monitoring on a regular, periodic basis. (If you want to provide that additional information, you can do so in the "Notes").
- "Monitoring Frequency": Your interpretation is fine. At most facilities, we assumed that sensory monitoring would not be conducted on a regular basis and that facilities would answer "No set interval," but if you always conduct sensory monitoring with Method 21 monitoring for other equipment, you can certainly provide that frequency.
- "Leak Definition": Unless you regularly and periodically monitor OEL using Method 21 and fix any leaks found above a certain leak definition, your leak definition should be "Detection by sensory monitoring."

Content-014

Q: Should SRU reactor burners be considered process heaters for purposes of Component 1?

A: For the purposes of this ICR a process heater is an enclosed combustion device used to transfer heat indirectly to process stream materials (liquids, gases, or solids) or to a heat transfer material for use in a process unit, instead of generating steam. If the SRU reactor burners are directly burning the process fluids, and any supplemental fuel needed for the reactor burners is directly burned and mixed in with the process fluids, then these reactor burners would not be "process heaters" for the purposes of this ICR. If your SRU reactor burners do not operate as described in this response, then let us know and we will help you determine whether your burners should be considered process heaters.

Content-015

Q: If an emissions unit was on-site temporarily in 2010, but is no longer used at the site, do we need to report emissions from this source as a part of Component 2?

A: Yes, you should report emissions from this unit in 2010 as part of your emissions inventory in Component 2. However, you may indicate in the comments field associated with this emissions source that the source is no longer used at the site.

Content-016

Q: In the Instructions for Component 2, Numbers 15 and 16 ask for the emissions allowed by NESHAP. Are the NESHAP of concern limited to 40 CFR Part 63, Subpart CC and Subpart UUU?

A: No, the NESHAP of concern are not specifically limited to Subpart CC and Subpart UUU. These are the two NESHAP that will apply in most cases, but if a source is subject to another NESHAP such as the HON or ethylene MACT, we are interested in the emissions allowed based on limits contained in those rules as well.

Content-017

Q: In Component 2, how do we select the throughputs, stack flows, operating hours, or other "activity data" that goes into the calculation of emissions allowed by NESHAP limit and emissions allowed by permit limit? These activity data could be based on design capacities and data in Potential-to-Emit calculations represented in permit applications, or they could be based on actual max data. Which does EPA prefer?

A: We acknowledge that the examples used in Numbers 15 and 16 suggest that you should use actual max data. This is okay particularly for units that do not operate continuously (e.g., a semi-regenerative reformer; we would not want an estimate based on this being a continuous vent). However, for continuously-operated units, we would accept (and prefer to have) the estimates based on design capacity (or data in potential-to-emit calculations). Please note in the comment what basis was used (e.g., design capacities and data in potential-to-emit calculations, actual max data).

Content-018

Q: Are control efficiency limits (for example, 95% control efficiency for a control device on a tank) considered "emission limits" for purposes of estimating emissions allowed by permit or NESHAP in Component 2?

A: In many cases, the answer to this question is no ("N/A"). We are looking for a maximum emission allowed by the NESHAP or the permit. Generally, a 95% control efficiency does not limit the quantity of given pollutant that can be emitted. Even when the control efficiency is specific to a given pollutant (e.g., 97% control for HCl for continuous reformers), it would be difficult to put a ton/yr maximum on the HCl emissions. You should assess whether production capacities can be used to determine a maximum pollutant production rate so that the 95% control efficiency can be used to calculate a maximum limit. However, unless this is a direct correlation, the response will be N/A. In the example of the continuous reformer, a production limit would not really be directly correlated with the quantity of HCl produced, so compliance with the 97% control efficiency may not yield a maximum emission quantity.

Content-019

Q: I have sources with multiple numeric emissions limits in the operating permit. How do I select the correct emissions limit to use to calculate "emissions allowed by permit" for Component 2 in the following cases?

1. The source has both mass and concentration emissions limits (e.g., lb/hr, ppmv) for the same pollutant.

2. The source has both multiple concentration emissions limits for one pollutant but no mass emissions limits.

3. A group of sources has one mass emissions limit that applies to the sum of the emissions from those sources ("bubble" limits.

A: As a general rule of thumb, you want to try to select the most stringent limit to calculate allowed emissions. Answers to each numbered question above are provided below.

1. For emissions allowed by permit, use the most stringent applicable limit. For example, if there is a concentration limit but no limit on gas flow, then the mass limit would be limiting. If

your source is subject to a NESHAP that specifically includes multiple emissions limits, use the same guidance to calculate emissions allowed by NESHAP. If the NESHAP has one emission limit but it is not the same as the more stringent limit in your permit, then use the limit that is in the NESHAP to calculate emissions allowed by NESHAP and the more stringent limit in your permit to calculate emissions allowed by permit. It is okay (and in some cases, expected) that these values may be different.

2. Again, use the most stringent applicable limit. If one of those concentration limits applies for short-term events, use that for the hourly estimates, and use the longer term average for the yearly estimate.

3. EPA wants the emissions reported for individual sources wherever possible, so in the case of "bubble" limits, the individual emission points would not have specific limits (and you would answer "N/A"). Alternatively, you could consider the bubble limit as the limit for each of the sources. Certainly, if any one source exceeds the bubble limit, the group of sources would exceed the limit. However, this would likely yield unreasonable allowable emission estimates for the individual sources.

Content-020

Q: I have a concentration emissions limit with no standard conditions specified for a combustion unit (e.g. 3% excess O_2). How do I calculate the emissions allowed by permit in terms of mass per time without making an assumption about excess oxygen? (Note that this limit applies in an "as found" condition during emissions testing at the combustion unit with no limitation relative to load (i.e., it applies at all loads)).

A: In the example provided, you would use maximum flow or flow at maximum production rate at the typical O_2 operating level.

Content-021

Q: I have a combustion source subject to the NSPS Subpart J concentration limit (i.e., 160 ppmv H_2S in fuel gas). However, this concentration limit does not apply to total sulfur in the gases combusted in the unit. How do I calculate the SO_2 emissions without taking into consideration the other sources of sulfur (e.g., mercaptan, COS, CS_2)? And do I even need to calculate emissions allowed by Subpart J?

A: The H_2S concentration limit is not directly an SO_2 limit. The SO_2 concentration will depend on fuel composition at well as other sulfur compounds. If you would like, you may report "N/A" or report the SO_2 emissions allowed based on typical fuel composition, assuming no other sulfur compounds. You should provide a comment to this effect if you do report SO_2 emissions based on H_2S fuel gas limit. (To answer the second part of the question, the emissions allowed by the subpart J limits would clearly not be reported under "emissions allowed by NESHAP," but if the limits are included in your permit, you may need to consider them as described above for "emissions allowed by permit.").

Component 1 Reporting Tool Questions

Comp-1_Tool-001

Q: Is there a way to review all the data entered into the Component 1 Reporting Tool without having to go back through the tool form by form?

A: Yes, we are currently working on a Tool that will extract and compile the data from the runtime database into an easier format to review, likely MS Excel. We plan to recommend that each refinery review the data entered into their Component 1 Tool using this Extraction Tool prior to uploading their Non-CBI copy of the Component 1 Tool to the website. We will post an announcement to the website when this Extraction Tool is available for download, and we will include instructions on how to use that tool.

Comp-1_Tool-002

Q: When I first open the Component 1 reporting tool, I don't see anything in the drop down to select a facility. When I try to type in my Facility ID, the Tool crashes. How do I fix it?

A: The first step to completing the ICR is to click on the button that reads "PART I – General Facility Information." That should open up a form that will allow you to enter general information about the facility. Click the button near the top left corner that reads "Add Facility" to unlock all the questions on this form. Enter the Facility ID first, followed by the Plant Name, and then all the other facility information.

Once you've entered that information and clicked "Save And Close" at the top right corner of the form, you should see the Facility ID and Facility name that you entered in the drop down for "Selected Facility." (Note: Picking a facility from this drop down only defines the facility for which you want to enter information for Parts II through V. If you go back to Part I, you'll need to select the facility within the Part I form itself to make edits.)

If you did enter your facility under Part I but you still don't see it under the "Selected Facility" drop down, that might be indicative of a larger problem, so you should call the hotline or email EHE-RefineryICR@rti.org

See Instructions and Tips for Using Refinery ICR Component 1 Reporting Tool for other tips on entering data into the Component 1 Reporting Tool.

Comp-1_Tool-003

Q: Why do to I have to keep selecting my facility every time I open and close Part I?

A: We realize that selecting a facility over and over is tedious if you're opening and closing the Part I form often. However, there is a purpose to this – every time you select your facility on the Part 1 form or the Main Switchboard, it ensures that you're entering data for the correct facility and that the Tool is marking CBI for the correct facility.

Comp-1_Tool-004

Q: When entering a second unit right after a first, I see data for the first unit showing up for the second before I enter anything (e.g., when I get to the Federal Regulations tab while I'm adding Process Heater 2, the Federal Regulations chosen for Process Heater 1 appear before I enter anything). I'm also having trouble with the Federal Regulations tab in other places. I wanted to change the applicable regulation for one unit, but the system changed it for another. How do I make sure the system is saving my data correctly?

A: In the first case described above, the Tool was not correctly acknowledging your new unit yet (this is a particular quirk of MS Access). There are two ways to make sure you're editing the right records. One is to click "Save and Close" as soon as you enter the minimum amount of data needed to save the new unit. If you elect not to do that, you should definitely click "Save and Close" as soon as you see existing data in a field that should be blank.* The other is to make sure that the drop down shows your new process unit as soon as possible. (As noted in the instructions, the ID won't always be available right away.) Sometimes if you navigate to another tab, you will then see your new ID in the drop down.

*If you try to change any existing data that you see while you're entering a new unit, you're really changing the information for another unit, and if you don't go back and check that unit, you might not realize it.

Comp-1_Tool-005

Q: Sometimes when I enter a process heater in Part II, Section 2, it doesn't show up in the drop down list, even after I "Save and Close" and then reopen the form. Then when I try to enter that process heater again, the Tool says the Process Heater ID already exists. What happened to my process heater?

A: On the Process Heaters form, General Tab, the question "Unit ID for process unit served by process heater" is set as a required field. Therefore, if you do not answer this one question, even if you enter other data for your process heater, the Component 1 Reporting Tool saves the Process Heater ID in the master list of unit IDs but does not save anything in the Process Heater table. That is why you get the error about the Process Heater ID already existing. Unfortunately, the warning that you must answer this question was inadvertently omitted from the original version of the Component 1 Reporting Tool.

There are two solutions to this issue. On April 12, 2011, a new version of the Component 1 Reporting Tool was posted to the ICR website that does not require you to answer the question "Unit ID for process unit served by process heater" prior to saving the Process Heater ID. If you have not started entering data into the tool you should download the newest version of the Component 1 Reporting Tool. If you have not progressed very far in the Component 1 Reporting Tool, you may elect to download the newest version from the website and start over (data cannot be automatically transferred from one version to another). (Note: If you previously downloaded the Component 1 Reporting Tool, even if you did not enter any data, you must uninstall your current version before you download the new one. You will need to go to Start -> Control Panel -> Add or Remove Programs, and uninstall "Petroleum Refinery ICR – Component 1.")

If you have entered data into the Component 1 Reporting Tool and do not wish to use the newest version of the Component 1 Reporting Tool, be sure that any time you add a Process Heater ID, you answer the question "Unit ID for process unit served by process heater." If you need to qualify your answer to this question (e.g., the process heater is not dedicated to any of the process units you already entered, but you have to pick something so that the record will be saved), use the "Notes" button at the top of the form to provide additional information.

Comp-1_Tool-006

Q: When we are ready to submit our Refinery ICR Component 1 Reporting Tool results, what file will we be submitting?

A: Once you have fully reviewed your Refinery ICR Component 1 Reporting Tool, you will click "Create Non-CBI Copy" on the main form. Review the Non-CBI copy to ensure that all CBI information has been removed (if you claimed any information as CBI). Then click on "View File Path Non-CBI Copy" and make note of the file path shown. It should be something like C:\Documents and Settings\user\Local Settings\Application Data\PetroleumRefineryICR_Component1. You may have to set Windows Explorer to show hidden files and folders to navigate to this folder. The file name for the file that you will upload to the Refinery ICR website upload portal should be something like PetroleumRefineryICR_Component1_NONCBI.accdr. (Note: Detailed instructions for uploading this file will be provided at the time the upload functionality is available.)

In this same directory, you will see a file called "PetroleumRefineryICR_Component1.accdr." If you claimed any data CBI, you should save this file to a disk (CD or DVD) and mail the disk to the address shown in your Section 114 letter for submittal of CBI.

Comp-1_Tool-007

Q: I plan to provide a stack test and CEMS data for a boiler at my refinery. I identified this boiler in Part II, Section 1. Energy Management, Electricity and Steam Generation tab. However, when I try to identify the stack test or CEMS in Part V, the boiler does not show up in the Unit ID(s) tab. How do I identify the test and CEMS data for this unit?

A: This is a bug in the program. The Unit ID(s) tab on the Part V form is programmed to pull only certain units from the master units table (so that, for example, you do not see every storage tank you entered). However, units entered in Part II, Section 1 were inadvertently excluded from that list. Rather than post a new version of the Refinery ICR Component 1 Reporting Tool, we ask that you use the workaround described below:

First, create a Test/Monitoring Data ID for the stack test or monitoring data and answer the questions on the General and APCD Type(s) tabs. Leave the Unit ID(s) tab blank. (Note: If the test covers more than one unit and some of them do appear in the Unit ID(s) tab drop down list, go ahead and enter the units that do appear.)

Enter the Unit ID on the General tab under “OPTIONAL – Process testing notes.” So, for example, if one of your boilers is named “Boiler1,” you would enter “Unit ID: Boiler1” as the answer to the question “OPTIONAL – Process testing notes.” (If the test covers more than one unit and you already entered some units on the Unit ID(s) tab, you should enter “Additional Unit ID: Boiler1”) If you have process testing notes you would like to provide, enter those after the Unit IDs. You may chose to separate the Unit IDs and process testing notes onto different lines by pressing and on the keyboard to go to another line within the same field.

Comp-1_Tool-008

Q: I am entering release data in Part III of the ICR (Non-Routine emissions), and I noticed the list of pollutants in the Component 1 Reporting Tool includes VOC as a criteria pollutant as well as of other pollutants that are either VOC, VOC HAP, or SVOC HAP. If I have VOC data speciated by compound for a particular release, should I also total those compounds for the purpose of entering VOC as a criteria pollutant?

A: You should provide information for each release in as much detail as it is available, but be careful not to enter the same information twice. EPA expects that the sum of the entries in the database for each release will equal the refinery's best estimate of the emissions during that release. If you have speciated, compound-specific emissions estimates, you should provide that information, but if you only have an estimate of total VOC, you may provide that estimate as VOC rather than trying to speciate the VOC estimate. For example, if you enter n-butane, n-pentane, and n-hexane on separate lines and then enter the sum of those three pollutants as VOC, you would be overstating the total estimate of emissions from that release (i.e., you would be "double-counting" some of the emissions).

Note: If you have speciated data for some compounds but not for all of the VOC emissions, then you should provide the speciated data and then enter the combined un-speciated estimates as "VOC." As noted above, the sum of the entries in the database for each release should equal the refinery's best estimate of the emissions during that release, so entering data in this way will indicate that you mean "other VOC." However, if you would like to clarify any of your answers further, you may do so by clicking the "Note" button at the top of the form.

Comp-1_Tool-009

Q: I am entering generation unit data in Component 1, Part II, Section 1, and I do not know the percent steam to blowdown. The “Help” button says to enter “unknown” if I do not know this information and cannot provide a reasonable estimate. However, the Component 1 Reporting Tool will not allow me to enter text in this field. What should I put into this field if the percentage is unknown?

A: The field for the answer to the “Percent Steam to Blowdown” question was inadvertently limited to numerical answers. Therefore, as a workaround, you should use “-99” to indicate “unknown.”

Comp-1_Tool-010

Q: Component 1, Part II, Section 12 asks for the location of the flare (latitude and longitude). Does EPA want these coordinates in decimal degrees or degrees, minutes, and seconds?

A: You should use the same guidance for the coordinate formats as provided in Component 2 for latitude and longitude (this guidance was inadvertently omitted from the “Help” text in the Part II, Section 12 form). Specifically, you should use decimal degrees (North American Datum (NAD) 83) with six digits to the right of the decimal point. If currently available coordinates have five digits to the right of the decimal point instead of six, those coordinates are acceptable.

Comp-1_Tool-011

Q: Component 1, Part II, Section 4 asks for the minimum height of floating roof above the floor at the shell when landed. First, there are no units specified for this question. Can EPA confirm that this value should be provided in feet? Second, I am having trouble entering a height of 6’ 8”. Is there a certain way these heights must be formatted for entry into the Component 1 Reporting Tool?

A: Yes, the “minimum height of floating roof above the floor at the shell when landed” should be provided in feet. The Component 1 Reporting Tool is programmed to accept rational numbers. Therefore, if you have heights of feet and inches, you’ll need to convert those to decimal feet. For example, 6 feet, 8 inches would be 6.667 feet (6 feet + 8in/(12 in/ft)).

Comp-1_Tool-012

Q: How should I enter emissions for a release in Component 1, Part III if the pollutants are not listed in the drop down list for “Pollutants Released” (e.g., cis-2-butane)? Should I group any pollutants that are not listed in the Component 1 Reporting Tool in one entry for VOC?

A: Yes, if your release has emissions of pollutants not listed in Part III of the Component 1 Reporting Tool, you can group those emissions into one entry under “VOC.” If most of the VOC is one particular pollutant, it would be helpful to note that in the “Description of Release Event” field on that form. If possible, avoid “double-reporting” and include only emissions for VOC that you haven’t already included under a specific pollutant name; if you cannot avoid that, include a note in the “Description of Release Event” field on that form.

Comp-1_Tool-013

Q: I’m trying to enter cost data in Part V, and I’m trying to enter information for an “other utility” cost on the “Cost Data for APCD” form, Operating Costs tab. However, I cannot get the Component 1 Reporting Tool to accept different values for the questions “Units/Yr” and “Cost per unit.” Every time I change the number in one of the fields, they both change. What should I do?

A: The field for the question “Other Utility Units/Yr” is inadvertently linked to the field in the underlying data table for the question “Other Utility Cost per Unit.” In other words, both questions are linked to the same value in the table. Since the correctly linked field is for “Cost per unit,” you should use the form to answer that question. Then, to answer the question “Units/Yr,” you should click on the “Note” at the top of the form and enter “Cost Data for APCD,” your APCD ID, “Other Utility Units/Yr,” and then provide the value.

Comp-1_Tool-014

Q: On the Electricity and Steam Generation Information tab on the Part II, Section 1 form, I selected “Other (specify)” as the fuel type for primary fuel for my boiler, but the field for “If Other, Specify” is still locked and shaded gray. How do I specify my primary fuel?

A: The Refinery ICR Component 1 Reporting Tool is a runtime version of a Microsoft Access database, and it is possible for runtime databases to have minor quirks and not display properly. Most of the time, you simply need to force the form to refresh. Try following these steps to get those fields to become active:

1. Select the primary fuel type as “Other (specify).” (If your secondary fuel is also “other,” then select “Other (specify) for that field as well.)

2. Exit the Refinery ICR Component 1 Reporting Tool completely (i.e., hit “Save and Close” at the top of this form, “Close” at the top of the Part II form, and then “Exit ICR” at the bottom right of the main form).

3. Reopen the Refinery ICR Component 1 Reporting Tool and navigate back to the Part II, Section 1 form.

4. Select your Generation Unit ID, and see if the “If Other, Specify” fields become active where you chose “Other (specify)” for the fuel type.

If this does not work for you (i.e., the “If Other, Specify” fields remain gray no matter what you do), then you can provide this information in the “Note” at the top of the form. Provide the name of the form, the Generation Unit ID, whether this is primary or secondary fuel, and what the fuel is (e.g., something like “Part II, Section 1, Electricity and Steam Generation Information; Generation Unit ID = Boiler1; Primary fuel = Other (specify) = gasoline”).

Comp-1_Tool-015

Q: For Component 1, is May 31 a postmark deadline or a “received by” deadline for mailed information (e.g., CBI info)?

A: All non-CBI files should be uploaded by May 31, 2011. Any CBI package mailings should be postmarked by May 31, 2011.

Comp-1_Tool-016

Q: When I run the Refinery ICR Component 1 Extraction Tool on my database, I get error messages, and the exported Excel file is incomplete. How do I get the Component 1 Extraction Tool to show me all the data I have entered in the Refinery ICR Component 1 Reporting Tool?

A: There are a few things you can try, depending on the problems you are experiencing:

- It is possible that Access has saved the links from the last time that you exported data or that it did not link the tables correctly. Go back into the Refinery ICR Component 1 Extraction Tool, select the file, click “Link Tables,” and then go to the bottom of the screen and click “Re-Link Tables” before exporting your data.
- Be sure that your Refinery ICR Component 1 Reporting Tool database and the Refinery ICR Component 1 Extraction Tool are installed and/or saved on the same local computer before you try to extract the data. In other words, make sure that you could unplug your computer from your company’s network and you could still access the files you need. If you moved your Refinery ICR Component 1 Reporting Tool database to a shared network drive, or if you are accessing the computer where these files are saved remotely, you may experience network issues that cause the export to fail. Some users have reported that their Refinery ICR Component 1 Extraction Tool asked them for parameter values and then only exported an Excel file with 10 to 15 tabs. At least one of those users reported that when the files were both located on the local hard drive, the export was

successful.

- Finally, it is possible that the Refinery ICR Component 1 Extraction Tool did not install properly on your computer. You can uninstall the Refinery ICR Component 1 Extraction Tool currently on your computer by clicking Start -> Control Panel -> Add or Remove Programs, then uninstall "Petroleum Refinery ICR – Component 1 – Data Extractor." Then follow the instructions provided on the Component 1 site for installing the Refinery ICR Component 1 Extraction Tool again.

If none of the above solutions help you, please contact us and explain the specific problems you are experiencing.

Component 2 Reporting Tool Questions

Comp-2_Tool-001

Q: Wastewater emissions at my refinery are already estimated using WATER9. The ICR instructions for Component 2 say to complete the RWET spreadsheet tool for wastewater emissions. I have several questions about this requirement:

1. Are we obligated to fill out the RWET spreadsheet? My preference would be to use the WATER9 modeling entirely and forego the spreadsheet.

2. If we are required to complete RWET, how do we report units not included in the spreadsheet? How do we note that in the submittal?

3. The spreadsheet doesn't include all the chemicals that are modeled. Should I expand the chemical tables where needed?

A: As required by the instructions to Component 2, you must complete RWET. The purpose of this requirement is to ensure that all refineries are using the same methodology to calculate wastewater emissions so that we can draw meaningful conclusions when comparing the results.

RWET should already include most units in your wastewater treatment system, but if there are units you want to add, then you should add a worksheet that summarizes the type of unit, flow rate, dimensions, and other key parameters (i.e., include the WATER9 inputs sheet for this unit). In this new sheet, you should also include the emissions you calculated from WATER9.

RWET is set up to allow you to define three chemical compounds not already included in the tool. On the Chemical Properties tab, rows 26 through 28, you will see "Compound A," "Compound B," and "Compound C." You can add properties for three new compounds on those rows (columns A through J) for the chemicals you want to add. (Note that if you change the names in cell B26, the compound will still appear as "Compound A" on the other worksheets.) If you need to add more than three compounds, please contact us.

Comp-2_Tool-002

Q: When we are ready to submit our Refinery ICR Component 2 Reporting Tool results, what file will we be submitting?

A: Once you have fully reviewed your Refinery ICR Component 2 Reporting Tool, you will click "View File Path" and make note of the file path shown. It should be something like C:\Documents and Settings\user\Local Settings\Application Data\PetroleumRefineryICR_Component2. You may have to set Windows Explorer to show hidden files and folders to navigate to this folder. The file name for the file that you will upload to the Refinery ICR website upload portal should be something like PetroleumRefineryICR_Component2.accdr. (Note: Detailed instructions for uploading this file will be provided at the time the upload functionality is available.)

Comp-2_Tool-003

Q: The list of SCC in the Refinery ICR Component 2 Reporting Tool seems to be missing codes for internal floating roof tanks and external floating roof tanks with geodesic domes. What code should I use if I have these types of tanks? Also, for chemical tanks, is it permissible to assign all my emissions to a code for breathing loss?

A: Based on this and other questions about the SCC in the Refinery ICR Component 2 Reporting Tool, we have revised the list of SCC posted on this website.

We have posted a new version of the Component 2 Reporting Tool that includes this revised list of SCC. This new version also includes a rearrangement of the columns in the emissions points table to better match the Component 2 instructions (specifically, the third, fourth, and fifth columns). Finally, this new version provides a "Comments" field at the emissions data (pollutant level). This additional field will allow you to provide comments on things like the estimation method used for one pollutant at the level of that pollutant (instead of having to provide all comments at the emissions point level.)

If you previously installed Component 2 on your computer and entered data that you would like to save, you should follow the steps on the Component 2 page for copying and saving your data, uninstalling the previous version of Component 2, installing the new version of Component 2, re-formatting your data, and re-importing your data.

Comp-2_Tool-004

Q: I am entering emissions data in Component 2 for an emissions point that is not subject to a NESHAP. Instructions 15 and 16 in the "Instructions for Component 2 Emissions Inventory" say to enter "N/A" if the emissions point is not subject to a NESHAP for a particular pollutant. However, the Component 2 Reporting Tool will not allow me to enter text in this field. What should I put into this field if the emissions point is not subject to a NESHAP?

A: The fields for the answers to the "Emissions allowed by NESHAP" and "Emissions allowed by Permit" questions (Instructions 15-18 in the "Instructions for Component 2 Emissions Inventory") were inadvertently limited to numerical answers. Therefore, as a workaround, you should use "-88" to indicate "N/A." (As noted in Frequently Asked Question Comp-1_Tool-009 above, a code of "-99" should be used to indicate "unknown.")

Comp-2_Tool-005

Q: As part of Component 2, we have been asked to complete the Refinery Wastewater Emissions Tool (RWET) for wastewater sources. Are the wastewater emissions data from the RWET also supposed to be entered into the Refinery ICR Component 2 Reporting Tool, or is the Refinery ICR Component 2 Reporting Tool only for non-wastewater units?

A: You should enter the summary (or cumulative) results from RWET into the Refinery ICR Component 2 Reporting Tool to report emissions from wastewater sources.

Comp-2_Tool-006

Q: For most of the emissions sources in Table 1-1 of the *Emission Estimation Protocol for Petroleum Refineries*, VOC is a filled circle (should be reported) while the VOC constituents are hollow (to be reported if information exists). If we have the information available to report some of the speciated VOC emissions, should we still include these speciated compounds in the estimate of VOC emissions or should we treat the VOC emissions as VOC-unclassified and not include the estimates for the speciated compounds?

A: You should provide speciated emissions estimates for each emissions source as requested in the *Emission Estimation Protocol for Petroleum Refineries* in as much detail as it is available. You should then report all your VOC emissions, including the speciated estimates, as "VOC." EPA expects that the speciated VOC emissions will generally sum to slightly less than the total VOC emissions (i.e., that some VOC would not be fully speciated), but the sum of speciated VOC emissions should not exceed the total VOC (criteria pollutant) emissions.

If you would like to clarify any of your answers further, you can do so by providing information in the "Comments" field or column for that pollutant.

(Note: This guidance is intentionally different than the guidance provided for releases in Part III of Component 1 (FAQ Comp-1_Tool-008 and Comp-1_Tool-012).)

Comp-2_Tool-007

Q: In the Component 2 instructions, the guidance says, "You may report emissions by emission point rather than by unit, but you should identify which units are associated with each emissions point." Suppose a Crude unit has two process heaters, one storage tank and equipment leaks, all emitting VOC. Based on the instructions, should the VOC emissions be aggregated for the Crude Unit as one line item (reported by unit), or should the emissions be reported individually for each emission point?

A: The instructions do say that you may provide emissions by process unit or by emissions point. However, in the specific example you provide, you are trying to aggregate too much into a "process unit." The emissions for the crude unit would only be the VOC emitted by the atmospheric crude distillation unit as defined in the "Definitions and Abbreviations" file on the Refinery ICR website, not the definition of "process unit" found in another location such as a NESHAP or NSPS. Since the ICR definition of "atmospheric crude distillation unit" does not include process heaters or storage tanks, the emissions from the process heaters and storage tank would not be considered part of the process unit emissions. (The process heater and storage tank emissions should be estimated and reported, just not as part of the Crude Unit emissions.)

While we don't explicitly state this, it is relatively clear from the Component 2 instructions that we expect equipment leaks to be reported separately. Instruction Number 1 provides instructions for assigning a new ID to the equipment leak emissions that are specific to a process unit. Instruction Number 5 explains that "point releases are the emissions released from a facility unit that is included in the facility inventory through one or more stacks or vents" and "fugitive releases are air pollutants released to the air other than those from stacks or vents, including small releases from leaking plant equipment such as valves, pump seals, flanges, or sampling connections." To be able to answer the questions that are specific to type of release, equipment leaks emissions would have to be entered separately from the point emissions.

Component 3 Questions

Comp-3-001

Q: For the distillation feed sampling required by Component 3, can I sample in May, June, and July?

A: Yes. The Component 3 instructions say, "You will need to collect and analyze samples of the feed to your distillation column(s) three times, each time approximately 30 days from the last. Samples must be collected early enough in the testing period to ensure you can provide results by August 31, 2011." The instructions do not say you must sample in April, May, and June; that is simply provided as an example to illustrate that the sampling should be in 3 different months. You may sample whenever you want, as long as the samples are spaced the way the instructions request (i.e., about 30 days apart) and you meet the submittal deadline of August 31, 2011.

Comp-3-002

Q: We have a question about the timing of the samples for Component 3. One of our columns is going on turnaround the first part of June and is estimated to be down at least 30 days. We are planning to take the first two samples of the feed to this column at the end of April and the end of May, but we will not be able to take the third sample at the end of June. What should we do?

A: Take the third sample as close as you can to 30 days after the second. In the example described above, if the third sample is taken the second or third week of July, that would be acceptable. You should note in Column U of the “Distillation Feed Analysis Template” that the delay in the timing of the third sample is due to the unit’s turnaround. If you have any questions about specific situations, or if your operating schedule is such that you do not believe you will be able to collect samples at three different times spaced sufficiently far apart, please contact Brenda Shine (see “Contact” page on the Refinery ICR website).

Comp-3-003

Q: I plan to use existing sampling systems that are downstream of the desalter and prior to the fractionation column for the sampling required in Component 3. These sampling systems are compliant with Refinery MACT requirements but do not have a delivery tube (i.e., there is not a tube to the bottom of the sample container). The manual sampling method for Tap Sampling (ASTM-D4057-06, Section 13.6) does not require the collection tube, but it does state: “Normally, a sample tap should be equipped with a delivery tube which permits the filling of the sample container from the bottom.” Can I still use this method without a delivery tube on the crude pipe?

A: Yes. If you do not use a delivery tube, you should slant the sample container so the sample pours down the inside of the container to prevent “splashing” of the liquid.

Comp-3-004

Q: Is ASTM Method D2361 acceptable for measuring chlorine in the distillation feed samples?

A: ASTM Method 2361-02 has been withdrawn from the ASTM standards book because the limits of applicability are not well defined. We will not accept this method as an alternative method.

Comp-3-005

Q: Is ASTM Method D4239 acceptable for measuring sulfur in the distillation feed samples?

A: ASTM D4239 assumes a solid fuel will be analyzed for total sulfur. Therefore, this method may be inappropriate for the distillation feed samples. An alternative similar method for distillate hydrocarbons is ASTM D6920, and that method may be more appropriate for this analysis if the sample is in liquid form. Another suggested alternative is ASTM D4294-10, an X-ray Fluorescence method that detects sulfur at 0.0150 to 5.00 mass percent in samples.

Comp-3-006

Q: Is ASTM Method D5453 acceptable for measuring sulfur in the distillation feed samples?

A: We will allow the use of ASTM Method D5453 for total sulfur analysis in the distillation feed samples, as long as the sample meets the limitations of the method and documentation of such is included with the test report. At a minimum:

- The liquid must boil in the approximate range of 25-400°C.
- The viscosity of the liquid must be in the approximate range of 0.2-20 cSt (square mm/S) at room temperature.
- Total sulfur concentration must be between 1.0-8000 mg/kg.

Comp-3-007

Q: Is EPA Method 1638 acceptable for measuring metals other than mercury in the distillation feed samples?

A: SW-846 Method 6020 refers to Method 3052 (Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices) for sample digestion. The sample preparation includes total decomposition of the sample using hydrofluoric acid, which adds complexity to the preparation and analysis but ensures all the carbon and silica are dissolved, thus releasing all of the metals from the feed and not just the acid leachables from the feed. The requested water method uses a nitric acid/hydrochloric acid digestion on a hot plate which may not release all of the metals from solids in the feed. Therefore, we will not accept this method as an alternative method.

Even if SW-846 Method 3052 is used as the preparation method, we have concerns about mixing SW-846 methods with water methods that do not typically use hydrofluoric acid to digest samples. Therefore, we prefer the use of the SW-846 analysis method for use with the SW-846 digestion method.

Component 3 of the Refinery ICR requires preparation of distillation feed samples by SW-846 Method 3020A or any SW-846 method that measures total metals. Laboratories should use a method appropriate for their sample matrix, and in the case of liquid fuels, one that reduces or removes the organic interference. Therefore, SW-846 Method 3052 is acceptable for sample preparation where it is appropriately employed, such as in solid samples or samples that contain suspended solids. Other inorganic digestion methods that do not use hydrofluoric acid may also be acceptable for distillation fuel samples. Please note that elevating temperature to evaporate hydrofluoric acid may lead to a loss of sample for some semi-volatile metals, e.g. antimony, arsenic, and selenium. Laboratories should demonstrate the effectiveness of their digestion and analysis methods through satisfactory recovery performance of matrix spike/matrix spike duplicate fuel samples analyses.

Comp-3-008

Q: Are SW-846 Methods 6010B and 6020A acceptable for measuring mercury in the distillation feed samples?

A: We will allow the use of either SW-846 Method 6010B or 6020A for mercury, if the mercury can be detected at the detection levels achieved by the method. If the mercury cannot be detected by this method, we require reanalysis of the sample by one of the methods listed in Component 3 of the Refinery ICR.

Comp-3-009

Q: Can you clarify the listing of the methods for Total Selected Metals Concentration on the last line of Table 2 in the Instructions for Component 3? Specifically, do I have to use SW-846-7740 to measure selenium and SW-846-7060 or -7060A to measure arsenic in the distillation feed samples, or are the first methods listed (SW-846-6020, -6020A, SW-846-6010B) acceptable for measuring selenium and arsenic?

A: You may use SW-846-6020, -6020A, and SW-846-6010B for measuring the concentration of all the Total Selected Metals, including selenium and arsenic. The other methods listed, SW-846-7740 for selenium and SW-846-7060 or -7060A for arsenic, are additional approved methods for those specific metals.

Comp-3-010

Q: May I use SW-846 Method 7471 instead of Method 7470 to measure mercury in the distillation feed samples?

A: SW-846 Methods 7470 and 7471 are both cold-vapor atomic absorption procedures. Method 7470 should be used for aqueous and ground-water samples; Method 7471 should be used for sludges, soils, bottom deposits, and sediment samples. Laboratories may analyze mercury in the sample by either method, as long as the sample matrix is appropriate to the method selected. As both Methods 7470 and 7471 specify, the samples must be subjected to an appropriate dissolution step prior to analysis.

Comp-3-011

Q: May I use EPA Method 200.7 instead of SW-846 Method 6010B to measure metals in the distillation feed samples?

A: EPA Method 200.7 may be used to analyze metals in distillation feed samples, if the sample matrix is appropriate for analysis by the method. If EPA Method 200.7 is used to analyze metals, the sample digestion must eliminate or greatly reduce the organic material in the distillation feed samples.

Comp-3-012

Q: May I use ASTM Method D808-00 for chlorine analysis of the distillation feed samples?

A: While we believe that this ASTM method uses an appropriate preparation technique, the analysis procedures are antiquated and will not provide results with the sensitivity that can be achieved by other methods. Therefore, we are not approving use of this method for chlorine analysis.

Comp-3-013

Q: May I use UOP Method 938-00 for mercury analysis of the distillation feed samples?

A: You may use UOP Method 938-00 for mercury analysis of the distillation feed samples if you adhere to the quality control procedures for sample preparation, analysis, and acceptance requirements of laboratory control samples in Section 9.4 of SW-846 Method 7473.

Comp-3-014

Q: May I use ASTM Method D7359 for chlorine analysis of the distillation feed samples?

A: Yes, you may use ASTM Method D7359 to analyze chlorine in the distillation feed samples.

Comp-3-015

Q: May I use SW-846 Method 6010C for metals analyses of the distillation feed samples?

A: For the distillation feed samples, you may use SW-846 Method 6010C in place of SW-846 Method 6010B.

Comp-3-016

Q: May I use EPA Method 200.8 to analyze metals in the distillation feed samples?

A: You may use EPA Method 200.8 to analyze metals in distillation feed samples, if the sample matrix is appropriate for analysis by the method. If EPA Method 200.8 is used to analyze metals, the sample digestion must eliminate or greatly reduce the organic material in the distillation feed samples.

Emissions Testing Questions

Test-001

Q: What changes can I make from the ICR for sampling and analysis of the volatile organic compounds on Table 1.3 of Component 4?

A: EPA has determined that the following changes are acceptable. This list is not meant to be exhaustive. You may request other alternatives (e.g. NCASI CI/WP-98.01, ISS-FP-A105.01, etc.) following the process outlined in Component 4. For such requests, please submit as much detail in the request as possible including information on the associated QA/QC, spiking procedures and recovery standards.

- Because Method 18 sampling and analysis techniques are not suitable for measuring trimethylamine and there are no readily available validated method alternatives, we have removed trimethylamine from the target analyte list on Table 1.3.
- Provided you can meet the acceptable recovery levels, ensuring high quality data, you may use Method 0031 and Method 8260(b or c) or you may use SW-846 Method 0030 and Method 8260(b or c) if you use a petroleum-based charcoal in the second trap that is the same mesh size as SKC Lot 104.
- In general, we recommend the bag sampling option in Method 18 for measurement of the more volatile compounds (<99°C boiling point) and the sorbent trap sampling option in Method 18 for measuring the less volatile compounds (>99°C boiling point) . You may use any viable Method 18 option as long as you follow the method and can demonstrate that the recovery is acceptable. Table 1 of this FAQ lists the target compounds from Table 1.3 of Component 4, noting the recommended sampling options.
- You may use a simplified list of representative recovery standards in lieu of the Method 18 requirement to spike all the compounds to be measured. These recovery surrogates are listed in Table 2 of this FAQ. These required surrogates represent different compound classes, different volatility levels, and compounds that are risk drivers. For the sorbent trap sampling option, the surrogate compounds also represent compounds that could be easily lost during analysis. You may choose to spike more compounds, but at a minimum you must use the recovery surrogates listed in Table 2.
- Method 18 spike recoveries for acrolein may be an issue, and we are willing to consider alternate recovery specifications for acrolein. All other compounds must meet the recovery criteria in Method 18.
- We are also willing to entertain alternative method requests for sampling of acrolein such as NCASI 105.01 or a “modified” CARB 430 (Ashland Chemicals dynamic extraction Toluene/DNPH impingers). If requesting to use a modification of CARB Method 430, please include a detailed method write up, which includes paired sampling and spiking. Spiking must be done dynamically using a gaseous standard or a using liquid spike added during the run similar to the requirements in NCASI Method ISS/FP-A105.01.
- You may measure any of the compounds on Table 1 of this FAQ with a boiling point >99°C with the semi-volatile organics train sampling and analysis (SW-846 Methods 0010, 3542, and 8270), but you must spike the XAD sorbent with isotopically-labeled pre-sampling surrogates for, at a minimum, the three analytes with the lowest boiling points from Table 1 that are sampled with the Method 0010 train, in addition to the normal laboratory spikes required by SW-846 Methods 0010, 3542, and 8270. Additionally, if nitrobenzene is sampled with the semi-volatile organics train, you must spike the XAD sorbent with isotopically-labeled pre-sampling surrogates for nitrobenzene. Recovery of the Table 1 spiked compounds must be between 70-130%.

  NOTE: For the coke burn vent cycle on the catalytic reforming units, we are not requiring semi-volatile compound testing. Note that you must test for all of the Table 1.3 compounds during the coke burn vent cycle. You may measure the higher boiling point compounds (> 99°C) on Table 1.3 along with the other volatile compounds using Method 18 or with a semi-volatile sampling train (Methods 0010, 3542, and 8270) during the coke burn vent cycle.
- If you perform Method 18 sorbent trap sampling using a dilution probe, you may use a single dilution probe for a pair of sorbent traps.

FAQ Table 1

FAQ Table 2

Test-002

Q: What are other things to be aware of for sampling and analysis of the volatile organic compounds on Table 1.3 of Component 4?

A: See below for a list of other things you should consider:

- We strongly recommend that sample recovery of any sorbent be conducted using solvent extraction as opposed to thermal desorption. We discourage using Tenax GC or Tenax TA if you plan to recover compounds by solvent extraction.
- We recommend that testers report field and laboratory blanks when performed.
- Method 18 specifies spiking and recovery criteria to determine recovery; sorbent tubes are spiked before sampling and bags are spiked after initial analysis of bag and then reanalyzed.
- If you run Method 18 with a moisture knockout (as in SW-846 Method 0040), then you must analyze the moisture collected in the knockout impinger for all of the target compounds. Knockout traps should be spiked with the same compounds as the bag or sorbent accompanying the knockout trap. If there is minimal moisture at the sampling point, you may want to avoid using the knockout.
- Naphthalene has been moved to Table 1.4 in the final version of Component 4 to be sampled using the semi-volatile organics train (SW-846 Method 0010).
- You must follow the procedure for field spiking in Method 18. You must perform spiking at the levels indicated by the method.

Test-003

Q: What changes can I make from the ICR for sampling and analysis of the compounds on Table 1.6 of Component 4?

A: Table 1.6 of Component 4 of the ICR requires testing for the C1 through C5 Hydrocarbons (HCs). You may still use Method 18 to obtain this information; however, we are aware that some of the standards for these compounds are either unavailable are hard to obtain in a timely fashion. As an alternative, we will accept data collected using the RCRA Risk Burn Guidance procedure for measuring total organics with BP <100 (C1-C7 HCs), referred to as the Field Gas Chromatography (FGC) fraction of Total Organic Emissions or TOE. Information and the procedure can be found at the following links:

- http://www.epa.gov/wastes/hazard/tsd/td/combust/pdfs/burn.pdf - FGC described (Section 5.1.4 ~ p108)
- http://www.epa.gov/wastes/hazard/tsd/td/combust/pdfs/apxb0927.pdf - FGC procedure (Section B-7 ~ p78)

Report the data collected using this procedure as described in the Risk Burn Guidance procedure for FGC analysis.

Test-004

Q: What are some things to be aware of when sampling delayed coker vents?

A: See below for a list of things you should consider:

- Delayed coker unit vents need to be tested only if the venting lasts for 20 or more minutes. If the venting cycle is less than 20 minutes, page 9 of Component 4 of the ICR states you must document the procedures used and the venting duration over the most recent 30 day period and submit that documentation in lieu of test reports.
- Information on determining the lengths of the sampling test runs is provided on page 9 of Component 4 of the ICR.
- Delayed coker unit vents need to be tested only if the venting lasts for 20 or more minutes. If the venting cycle is less than 20 minutes, page 9 of Component 4 of the ICR states you must document the procedures used and the venting duration over the most recent 30 day period and submit that documentation in lieu of test reports.
- If dilution is used to deal with high moisture from these emissions points, then the dilution ratio for organics must be nominally less than 20 to 1. Higher dilution ratios are okay for NOx and SO2 because there should be no detection level issues with these compounds, but the dilution for testing of organics should be kept to less than 20 to 1.

- Due to the extremely high moisture content of these emission points, the specification for isokinetic testing may be loosened to 80 to 120%.
- For ducts smaller than 4 inches in diameter, sampling may be conducted at a single point in the centroid of the duct. Method 1A should be used to determine sampling points for ducts between 4 and 12 inches in diameter.

Test-005

Q: The ICR does not mention PM10. Am I required to report PM10 emissions using the Method 201A/202 train?

A: No. Reporting PM10 is not required.

Test-006

Q: What changes can I make to fuel gas sampling in Table 1.7 of Component 4 of the ICR?

A: In any situation where electrical hazards or other safety concerns exist, please use an alternative to Method 4 to obtain moisture information. Examples of alternative moisture measurement techniques include wet bulb-dry bulb measurement, drying tubes, condensation techniques, and stoichiometric calculations.

If there are safety concerns or issues with the other methods listed, please contact EPA about case-by-case alternative methods.

Test-007

Q: If I do not move any of the compounds from Table 1.3 of Component 4 of the ICR to the semi-volatile sampling train, do I need to have deuterated surrogates for the lowest three boiling point compounds?

A: If you use Method 18 to sample all of the compounds in Table 1.3 of Component 4 of the ICR, you are not required to spike the sorbent with isotopically-labeled pre-sampling surrogates for the three analytes with the lowest boiling points. You must still conform to Method 18 requirements for spiking of compounds, but you may use a simplified list of representative recovery standards in lieu of the Method 18 requirement to spike all the compounds to be measured. These recovery surrogates are listed in FAQ Table 2 (see Test-001). These required surrogates represent different compound classes, different volatility levels, and compounds that are risk drivers.For the sorbent trap sampling option, the surrogate compounds also represent compounds that could be easily lost during analysis. You may choose to spike more compounds, but at a minimum you must use the recovery surrogates listed in FAQ Table 2.

Test-008

Q: With collocated sampling trains for spike and recovery there will be five Method 18 sampling trains required to collect the data for compounds on Table 1.3 of Component 4 of the ICR:

-- bag sample
-- spiked charcoal based adsorbent
-- unspiked charcoal based adsorbent
-- spiked train for methanol
-- unspiked train for methanol

Is it permissible to have one sample probe that is split via manifold to the five sampling trains rather than having five separate probes?

A: We would prefer that the sample probes be combined only within the sample type. For instance, you may use one probe for the pair of sorbent tubes, one for the bag, and one for the pair of trains for the methanol method.

Test-009

Q:If I ensure that the bag is not overfilled, thus eliminating the possibility that changes in atmospheric pressure will cause the bag to rupture, is it permissible for the bag samples from SW-846 Method 0040 to be transported via overnight delivery on an airplane, e.g. FedEx?

A: You may use air transportation to ship the bags as long as the proper precautions are taken. This approval does not grant any relief due to loss of bags in shipping or due to loss of sample in the bags caused by pressure fluctuations. It is your responsibility to determine whether samples can be shipped in conformance with safety and shipping laws and regulations and to determine the proper methods for doing so.

Test-010

Q: May I use direct interface sampling and analysis for the organic compounds listed on Table 1.3 of Component 4 of the ICR?

A: You may use the Method 18 procedure in Section 8.2.2 “Direct Interface Sampling and Analysis” to analyze for the compounds on Table 1.3 of Component 4 of the ICR provided that (1) the moisture content of the gas does not interfere with the analysis procedure, (2) the physical requirements of the equipment can be met at the site, and (3) the source gas concentrations fall within the linear range of the detector. You must adhere to all quality control and safety requirements with this application of Method 18. You must follow the QC procedure in the method that requires through the probe spiking of recovery compounds. You may use the reduced list of recovery compounds provide in FAQ Table 2; however, you are required to add the highest boiling point target compound from Table 1.3 that you choose to measure with the direct interface procedure. You must calibrate the direct interface GC system with all of the compounds you choose to analyze by the procedure. We also recommend using a flame photometric detector to measure carbon disulfide.

Test-011

Q: If a delayed coking unit has more than one drum, and the drums and vent pipes are identical, may I sample the drums sequentially as if they were the same source and in order to conduct all of the testing in a reasonable amount of time?

A: If the drums and vent pipes are identical, and therefore, the emissions are expected to be identical, you may treat the drums as a single source and conduct the sampling sequentially in order to condense the timeframe required for completing the test.

Test-012

Q: If the delayed coking unit vent requires packing glands to ensure a leak tight sampling port due to hazardous properties of the gas stream, may the tester conduct single point sampling at the centroid of the pipe, even if the pipe is greater than 4 inches in diameter?

A: Where safety is a potential issue, you may conduct single point sampling in the centroid of the stack with the pitot and sampling location separated per Method 1A.

Test-013

Q: If a condenser is needed for the Method 18 bag sampling, which spike analytes would be applicable to the collected condensate and at what concentrations?

A: At a minimum, you must spike the required recovery surrogate compounds from FAQ Table 2. We cannot recommend a spiking level, as we do not have information on the concentration levels expected for each source. Survey runs may be necessary to determine the appropriate spiking levels.

Test-014

Q: Since the speciated organic concentrations in the gas stream may be highly variable between runs and there is little information available on this type of source, what analyte spike levels would apply for the sorbent traps used in the sampling trains?

A: We cannot recommend a spiking level, as we do not have information on the concentration levels expected for each source. Survey runs may be necessary to determine the appropriate spiking levels.

Test-015

Q: Based upon the volume of testing required under the ICR for refineries and the limited number of qualified labs available to complete the analyses, is the August 31st deadline realistic and attainable?

A: The ICR deadline dates are consistent with the schedule we are obligated to meet. Further, we believe that the dates are not unreasonable. We expect source owners to act in accordance with the ICR and commit to meeting those deadlines to the best of their abilities. Should a source owner find an impediment to conducting testing or collecting other information required in the ICR by the required deadline, the source owner must contact Brenda Shine, shine.brenda@epa.gov or 919/541-3608, as soon as possible. EPA will review each such case individually to research alternative approaches to collecting the necessary data.

Test-016

Q: What should a facility do if there are concerns about the high moisture concentration in the delayed coking unit vent gas stream causing problems with reduced collection efficiency of the sorbent types used in the isokinetic sampling trains?

A: We understand the concern of high moisture on the collection efficiency on the sorbents used in the isokinetic sampling trains listed in Component 4 of the ICR. We are willing to entertain alternatives for sampling the target analytes for delayed coking unit vents. Additionally, the train can be purged (clean air or nitrogen) post run.

Test-017

Q: For testing of delayed coking unit vents, is it acceptable to collect less than the dry sample gas volume listed in Table 1.2 of Component 4 of the ICR?

A: We are waiving the dry gas volume requirements for delayed coking unit vent testing. The testers should make a concerted effort to maximize the sample volume collected during the time of the vent cycle.

Test-018

Q: Table 1.9 of Component 4 lists both a method for water and a method for stripping air for speciated volatile organic (VO) HAP and speciated semi-volatile organic (semi-VO) HAP. For all the other pollutants, only a method for stripping air is listed. Do we need to follow both methods, or are we expected to use either the water method or the stripping air method for speciated VO HAP and semi-VO HAP? Also, does EPA have any guidance for parameters such as length of sample time and volume of sample to be collected?

A: We intended that both water and air analyses would be conducted for VO HAP and semi-VO HAP. Direct cooling water sample and analysis for VO HAP should be conducted according to Standard Methods 6200; the cross-referenced sampling method indicated 40 mL vials with Teflon-faced silicone septums. Direct cooling water sample and analysis for semi-VO HAP should be conducted according to Standard Methods 6410, which generally specifies 1 liter amber bottles with Teflon-lined caps and minimum of 250 mL (typically fill the jar 50-75% full). Two air samples of the stripping air (one for analysis by TO-15 and one for TO-12) from the El Paso column would be collected in evacuated canisters. The methods generally call for, and we recommend the analysis of, 1-L of sample per canister.

For the cooling towers, only one sample for each cooling tower (or from each return line if there is not a place to sample all returns to the cooling tower) is required. We expect that each refinery would have several cooling towers (and perhaps multiple return lines per cooling tower) to sample. For internal QA purposes, you may elect to take duplicate samples, but you are not required to do multiple “runs” for the cooling tower sampling.

All other test methods (TO-5, TO-12, 18, and 26) are specific to analysis of the stripping air from the El Paso column. It is anticipated that 1-L of sample would be analyzed in each of these methods (unless higher volumes are specifically indicated in the test method).

Test-019

Q: If EPA protocol gases are not commercially available for reduced sulfur compounds, may I use a mid-level supply gas certified by the manufacturer at 2% accuracy in EPA Method 205 to evaluate the gas dilution system for EPA Method 15, 16, or 18, provided that all other quality assurance criteria described in the applicable methods are met?

A: Where EPA protocol gases are not commercially available, calibration standards for reduced sulfur compounds certified at 2% accuracy by the vendor will be considered adequate for the Mid-Level supply gas (Method 205 - Section 2.3) for purposes of this data collection request.

Test-020

Q: In Section 1.1 of Component 4, how does the "normal and representative manner" instruction relate to periodic but routine events such as soot blowing? Specifically, should a facility conduct such operations on a normal schedule, irrespective of whether a stack test captures that activity, or should the operators adjust the schedule? For example, if soot blowing were performed for 30 minutes every six hours, should the schedule for a 2-hour test run be adjusted to ensure that the activity occurs for 10 minutes during the run?

A: Normal activities should be conducted on a regular basis while stack testing. It is not necessary to change facility operations in order to capture all events, especially if doing so would be detrimental to the process or cause undue burden, but likewise, facility operations should not change schedules in order to avoid capturing events. Every effort should be made to schedule testing such that it coincides with all normal operating events.

The Clean Air Act National Stack Testing Guidance (April 27, 2009), specifically addresses the issue of sootblowing: The Agency guidance on this issue states that soot-blowing is a routine operation constituting representative process conditions. Emissions from soot-blowing cannot be discarded as being the result of an upset condition, and it would be erroneous to stop soot-blowing for the purpose of conducting a stack test. Agency guidance outlines the procedures for including soot-blowing while stack testing. The frequency with which facilities perform soot-blowing can vary significantly and the agency guidance addresses this issue by allowing facilities to weight the soot-blowing data in the performance tests based on the frequency of the soot-blowing.

In the specific case of the soot-blowing mentioned here, it is recommended that since soot-blowing occurs every 6 hours and the three test runs will cover that same period of time, the testing could be scheduled such that the sootblowing in its entirety occurs during one of the test runs. This would be most representative of normal conditions.

Test-021

Q: In Component 4, Table 1.2, the requirement for filterable PM measurements is somewhat unclear.

1: If PM is measured with the Method 29 trains, can condensable PM be measured along with the Method 201A train?

2: Can total filterable PM also be determined using a Method 201A train, or must it be determined separately, with an out-of-stack filter temperature of 320F +/- 25F?

A: Condensable PM must be measured alongside the Method 201A train regardless of whether filterable PM is measured using Method 29 or a separate Method 5 or 5F train.

Filterable PM must be determined at a temperature of 320°F +/- 25°F separately from the in-stack Method 201A train.

Test-022

Q: In Component 4, Table 1.2 (page 7), should the entry in the row “Hg” (mercury) and column “Target Reported Units of Measure” read “lb/hr and µg/dscm as oxidized mercury..." rather than "lb/hr and µg/dscm as organic mercury..."?

A: Yes. We have posted a new version of the *Instructions for Component 4 Emissions Source Testing* document with this correction.

Test-023

Q: Is EPA Method 30B acceptable for measurement of mercury in stack gas?

A: We will consider Method 30B as an alternative method only if the requestor provides a detailed methodology and performance based criteria demonstrating how the mercury speciation will be accomplished.

Test-024

Q: The draft version of Component 4 of the ICR had a footnote on acetone, acrolein, and methanol that stated: "Analyte is not applicable to SW-846 Method 0031 sampling procedure. Collection of samples for these compounds is required only for hydrogen plant vent and requires collection in tedlar bags or evacuated canisters." In the final version of Component 4, this footnote is absent. Am I required to sample for acrolein, acetone, and methanol on all points that require VOC sampling?

A: Acetone, acrolein, and methanol should now be included with all VOC sampling. The footnote was removed because the methods that were listed in the draft version of the ICR were revised. Because acetone, acrolein, and methanol cannot be measured with SW-846 Method 0031, we tried to reduce the number of sampling trains by not requiring separate samples on every point for these compounds. However, the ICR now lists VOC sampling by Method 18; these compounds are capable of being measured with Method 18 alongside the other VOC.

Test-025

Q: For ammonia sampling of stack gas, since SCAQMD Method 207.1 and USEPA Method 320 are both non-isokinetic procedures, may I conduct sampling using CTM-027 at a single point and constant rate?

A: SCAQMD 207.1 allows for single point sampling provided that a stratification check of a gaseous pollutant (not diluent) is performed and stratification is not present at the sampling location. If you include this documentation with the test report, we will allow single point sampling by this method.

Upon further review of SCAQMD 207.1, we have determined that non-isokinetic sampling by this method is not acceptable for sampling locations where entrained water droplets are, or may be, present. In locations where entrained water droplets exist, or are expected to exist, we require sampling to be conducted by CTM-027.

CTM-027 requires traversing of the stack and cannot be operated at a single point. CTM-027 must be performed isokinetically, regardless of the saturation condition of the stack gas.

Method 320 is acceptable at all locations, however high moisture environments such as those referenced above may present a different set of concerns for meeting the QA/QC of that method.

Test-026

Q: Can summa canisters, stainless steel bombs, or aluminum bombs be used in lieu of Tedlar bags for the sampling of refinery fuel gas?

A: In general, summa canisters, stainless steel bombs, and aluminum bombs should not be used to collect samples. We do not feel that these containers are appropriate. We are willing to accept samples collected in Tedlar bags, as specified, or in glass sample containers.

However, where there is a safety concern related to high pressure fuel gas sampling, we are extending the sampling containers for refinery fuel gas to include high pressure Silonite coated sampling containers. If the tester uses a Silonite coated steel container, the following extra quality control check is required in order to test for degradation of the reduced sulfur compounds:

- Prepare a field quality control sample by pressurizing an empty sampling container with reduced sulfur compounds from a vendor certified gas cylinder containing a mixture of the target compounds from Table 1.7 of Component 4.
- Prepare one field quality control sample for every 10 field samples collected.

- The concentration of each field quality control sample must be in the range of 10 to 25 ppm.
- The holding time of each field quality control sample must be at least as long as the holding time of the refinery fuel gas samples.
- Acceptance criterion for the analysis of the field quality control sample is between 70 and 130% of the certified cylinder value. Field data for reduced sulfur compounds and TRS should be flagged for samples sets where the associated field quality control fails to meet this criterion.
- Documentation of the certified cylinder value must be submitted with the test report.

We will also allow summa canisters under the following conditions:

- Summa canisters may only be used for refinery fuel gas samples.
- Summa canisters may only be used where safety hazards in sampling or shipping exist.
- Summa canisters may only be used for samples that will be analyzed for the C1-C5 hydrocarbons plus benzene and the compounds on Table 1.8 of Component 4 of the ICR. Any analysis of sulfur compounds will not be accepted from samples taken in summa canisters.

Test-027

Q: For measurement of H_2S, COS, CS_2, and TRS in refinery fuel gas samples, may I:

1. Combine the procedures of Method 15 and 16 to measure the concentrations of H_2S, COS, CS_2, DMS, DMDS and MeSH and report the summation of these six compounds as TRS?

2. Use Method 18?

3. Use ASTM Method D5504?

4. Use SCAQMD Method 307-91?

5. Use a CMS to measure and report TRS?

6. Combine the procedures of Methods 15 and 16 to measure TRS if I quantify all measured peaks?

A: Answers to each numbered question above are provided below.

1. We are not approving summation of these compounds as TRS, as there may be other sulfur compounds in the fuel gas. In lieu of Methods 15A and 16A, we have approved the use of ASTM D5504 and SCAQMD 307-91, as qualified below.

2. You may use Method 18 to measure H_2S, COS, and CS_2, as long as you follow all of the Method 18 requirements for quality assurance and quality control, including spiking. You may not use Method 18 to measure TRS.

3. Yes, ASTM Method D5504 may be used on fuel gas samples in this information collection request for speciated sulfur compounds and TRS, provided that TRS is reported as the sum of the concentration of all of the chromatographic peaks recorded by the method. However, the use of this method must incorporate Method 18 requirements for spiked target compound recovery standards to validate the analysis procedures. Sampling must be performed using non-reactive containers, such as Tedlar bags with polypropylene fittings or the equivalent. Tedlar bag samples require protection from light and heat. Laboratory equipment must be inert or passivated to ensure reliable results. Additionally, samples should not be held in the Tedlar bags for longer than 24 hours prior to analysis and precautions should be taken to ensure that samples in the bags are well-mixed prior to analysis.

4. Yes, SCAQMD Method 307-91 is an acceptable alternative for fuel gas sulfur measurements for this ICR under the following conditions:

- For Section 4.3 of the method, the sample concentrations must lie within the calibration range for samples at or above 1 ppm.
- Sulfur compounds not listed in Table 1.7 of Component 4 of the ICR or in SCAQMD Method 307-91 for which a standard is not available may be quantified and reported as part of the reduced sulfur value using the methyl mercaptan response factor as specified in Section 4.9 of the method.
- TRS must be reported as the sum of the concentration of all of the chromatographic peaks recorded by the method.
- You must incorporate Method 18 requirements for spiked target compound recovery standards to validate the analysis procedures.
- Sampling must be performed using non-reactive containers, such as Tedlar bags with polypropylene fittings or the equivalent. Tedlar bag samples require protection from light and heat. Laboratory equipment must be inert or passivated to ensure reliable results.
- Samples should not be held in the Tedlar bags for longer than 24 hours prior to analysis and precautions should be taken to ensure that samples in the bags are well-mixed prior to analysis.

5. You may not substitute measurement of H_2S from a CMS for TRS. If you have a certified CMS (per 40 CFR 60 Appendix A Performance Specification 5) that measures TRS and the accuracy of the CMS has been verified as no more than plus or minus 20% then you may use the TRS CMS data in lieu of testing the fuel gas for TRS. The data reporting requirements for a TRS CMS are the same as those for H_2S in footnote 3 to Table 1.7 of Component 4 of the ICR.

6. For TRS, you may analyze the individual reduced sulfur compounds listed in Method 15 and Method 16 and quantitate all other unidentified chromatographic peaks using the response factor for methyl mercaptan. The sum of the individual species plus the sum of the unknowns will be considered TRS.

Test-028

Q: May I use data from a refinery's on-line GC in lieu of performance testing or collecting data from a CMS?

A: We are willing to entertain reporting of on-line GC data in lieu of testing. The decision to accept such data will be made on a case-by-case basis. In order for us to make a determination, each facility must submit specific information about the instrumentation, such as a sampling schematic, instrumentation used, initial verification procedures, and continuing QA/QC procedures with acceptability ranges.

Test-029

Q: May I use the Method 18 Midget Impinger Method described in the link below to sample the compounds listed in Table 1.3 of Component 4 of the ICR?

A: You may use the Method 18 Midget Impinger Method described in the link below to sample the compounds in Table 1.3 under the following conditions:

- You must use an appropriate quantity of the methanol sorbent in the analysis procedure such that a low end target analysis of 0.1 ppm in the gas stream is achieved.
- You may not measure methanol using this procedure.
- You must follow the Method 18 requirements for spiking "sorbent trains" as specified in the method. At a minimum, you must spike the recovery standards listed in FAQ Table 2 on the Refinery ICR website to demonstrate the quality of the measurement data. Omission of a specific recovery spike compound listed on FAQ Table 2 precludes the use of this sampling and analysis method for that target analyte. You may either:
  - spike isotopically labeled recovery standards in the trains used to collect emission samples or
  - use a paired train setup and spike unlabeled (native) compounds in one of the trains. The unspiked train is used to collect emissions samples, and the native spiked train is used to collect emission gas and determine recovery similar to the approach in Method 18.
- You must meet Method 18 recovery standards requirements for sorbent sampling when you use this chilled methanol impinger alternative sampling method.
- We recommend heated purge as found in SW-846 Methods 5030C/8260B for all analyses in order to improve the recovery of acrylonitrile, methyl t-butyl ether (MBTE) and acrolein.

  Method 18 Midget Impinger Method

Test-030

Q: I have been asked to conduct cooling water sampling as part of Component 4. If the stripping air from the El Paso column does not indicate appreciable volatile hydrocarbons based on a general FID detector in the stripping air, additional speciated air and water analyses will generally result only in non-detect readings. Is there a minimum threshold for the El Paso total FID readings below which I don't have to do those additional analyses?

A: We intended that you would conduct a direct Modified El Paso Method for every cooling water system return line and determine the total hydrocarbon (THC) concentration in the stripped air (ppmv dry basis, as methane) using an FID detector following the Modified El Paso Method. We also intended that the speciated samples would only be taken at one or a few selected cooling water system return lines, based on the THC levels present, but these additional instructions were inadvertently omitted from Section 1.3 of Component 4. We have revised the Component 4 instructions to include these additional instructions.

The following guidance is provided to focus the cooling water sampling requirements per our original intent. First, you should do the full suite of sampling for all cooling water systems for which the stripping air THC concentration measured by FID exceeds 62 ppmv (dry basis, as methane). If you do not have any cooling water systems that exceed 62 ppmv THC (dry basis, as methane) but you have some systems that exceed 3 ppmv THC (dry basis, as methane), you must conduct the full suite of sampling only at the cooling water systems that had the highest THC concentration. If you have no cooling water systems that exceed 3 ppmv THC, you may select any one cooling water system and collect samples for only HCl and Cl2 analysis at that cooling water system. You must submit the results of each El Paso sampling test (i.e., the THC concentration for the overall FID analysis of stripping air) regardless of whether additional sampling was conducted for that cooling water system.

Test-031

Q: The "hydrogen production unit" is an emission source for which testing is required under Component 4. However, there can be multiple vents within a hydrogen production unit, and it is not clear which vent is required to be tested. The exemption in the definition of miscellaneous process vent in 40 CFR 63.641 identifies two types of vents in hydrogen production plants: "Hydrogen production plant vents through which carbon dioxide is removed from process streams or through which steam condensate produced or treated within the hydrogen plant is degassed or deaerated." Are these vents (i.e., the CO_2 removal and deaerator vents) the vents required to be tested (if they discharge to atmosphere)?

A: Yes, these are the vents that should be tested.

Test-032

Q: We are preparing to conduct stack testing and we have a question about Table 1.1 in the Component 4 instructions when an adequate number of sampling ports are not available to do all tests at the same time. We understand that all tests with the same number and letter must be performed simultaneously (e.g., all "a2" testing must be performed simultaneously), but do the numbers and letters assigned to the test signify anything about EPA's preferred order for the testing? In other words, can you tell us whether any/all of the following three scenarios are acceptable?

- **Scenario 1: Perform the test sets in the following order: Group a1, followed by Group a3, followed by Group a2, all performed on the same day. The letters are performed together; the numbers are performed together but out of numerical order.**
- **Scenario 2: Group d1, d2, d3, and d4 performed on the same day but BEFORE all Group a testing. The letters are performed together but out of alphabetic order.**
- **Scenario 3: Group d1, followed by Group a1, followed by Group d2, followed by Group a2. All letter/number matches are performed together but letters are staggered.**

A: Any of the 3 scenarios above are acceptable if you do not have enough ports to do all of the testing marked with the same letter. The letter and number designations were done only to show preference for simultaneous sampling. That is, if you have multiple ports, you must do the same letter groups together (e.g., all Group a testing, including "a1" and "a2"); you should not group testing by number (e.g., Group a1 testing simultaneous with Group d1). However, if you do not have enough ports to conduct all testing with the same letter together, you will conduct sequential testing, and the order is not a strong factor. It may be a preference that all of the tests of a given letter designation be performed sequentially (near the same day or two), but that is not required.

Test-033

Q: For the delayed coking unit vent, may we sample in the centrally-located 10 percent area of the stack's cross-section in lieu of the stack's centroid?

A: We will allow the use of the centrally-located 10% of the stack's cross-section to suffice for the centroid of the stack for the delayed coking unit vents, with the following caveats:

- This applies only for the purposes of this specific ICR.
- You must meet the sampling port location criteria of Method 1A. A flow disturbance is created when the sampling equipment (whether one or multiple probes) exceeds 5% of the effective duct area in the sampling plane.
- In order to perform one-point sampling in lieu of traversing, safety issues must be present or the stack must be smaller than four inches in diameter.

Test-034

Q: What type of detection limit must I achieve for the volatile compounds? Is 1 ppm an acceptable detection limit?

A: We have not defined or specified an expected detection level for any of the testing for this ICR. Instead, we have 1) specified minimum sample volumes or other criteria that we believe will define procedures that correspond to the expected emissions levels reducing the number of nondetect data and 2) required that testers report the method detection levels for each test run and whether the measured values are below the method detection levels. We will assess the data in the emissions analyses in accordance with that reported data quality information.

Test-035

Q: May Method 308 be accepted to fulfill the methanol test requirement in Table 1.2 of Component 4 of the Refinery ICR?

A: We will allow the use of Method 308 for methanol, if the methanol levels are high enough to be detected by the method. If the methanol cannot be detected by this method, we require sampling and analysis by another approved method.

Test-036

Q: SW-846 Method 0061 has only been evaluated at temperatures less than 300°F. Am I required to use SW-846 Method 0061 if the temperature of the stack is above 300°F, and if so, do you recommend the use of a water-cooled sampling probe?

A: We do require the use of SW-846 Method 0061 for hexavalent chromium, even if the stack temperature is above 300°F. We recognize that there may be issues with the Teflon at elevated temperatures. If you determine that the temperature is hot enough to cause a problem with the Teflon in the sampling train, an air or water cooled probe may be necessary. Be aware that depending on your water cooled probe design, there may be a safety issue with creating steam in the probe. Also you may need to use a glass or quartz liner. If you use a glass or quartz liner, you must keep the liner very clean to reduce the active sites for chromium conversion. We recommend getting the solution as cold as possible before injecting it and running the injection rate at the top end of the pumping ability. In order to minimize the possibility of cracking the probe liner, we recommend traversing the stack by starting out and going in; slowly remove it from the stack at the end of sampling on the traverse. If you must start on the farthest traverse point, don't immediately push the probe through. Allow the system time to slowly acclimate to the stack temperature.

Test-037

Q: We anticipate that maintaining the pH of the first impinger above 8.5 on the SW-846 Method 0061 sampling train may be a problem on some stacks. What are some methods we may employ to keep the pH above 8.5?

A: We suggest the following tips for maintaining the pH of the first impinger above 8.5:

- Increase the strength of the caustic solution in the impingers.
- Increase the volume of caustic in the first impinger.
- Monitor the pH as frequently as possible.
- Add more caustic to the first impinger during the run (but make sure you maintain a record of how much caustic you are adding).

Test-038

Q: On Table 1.2 of Component 4 of the Refinery ICR, the "Target Reported Units of Measure" column in the "PM/$PM_{2.5}$ (filterable plus condensable) from stacks without entrained water droplets" row states lb/hr and gr/dscf (if use Method 5F, report both total filterable catch and non-sulfate PM). Is Method 5F required for some or all of the sources in the refinery ICR or is it presented as an option to Method 5 or 5B?

A: The note about Method 5F is not clearly presented in Table 1.2. Method 5F is not an option for sampling $PM_{2.5}$. Method 5F is an alternative option for total filterable particulate in lieu of conducting that measurement with the Method 29 train for stacks that do not have entrained water droplets. However, in that case, the Method 5F train would be run to determine total filterable particulate, and a separate Method 201A/202 train would be used to measure $PM_{2.5}$.

We have posted an updated version of Table 1.2 in the Instructions for Component 4 to reflect this clarification.

Test-039

Q: Table 1.2 of Component 4 of the Refinery ICR requires testers to use EPA Method 201A to test PM/$PM_{2.5}$ (filterable) when no water droplets are entrained in the gas stream. Is analysis for total filterable particulate (PM) required with this method?

A: For stacks without entrained water droplets, you must determine filterable PM emissions with EPA Method 29 using a filter temperature of 320°F ± 25°F, as noted in the row for metals in Table 1.2 of Component 4 of the Refinery ICR. Alternatively, you may opt to conduct a separate EPA Method 5 or 5F test with a filter temperature of 320°F ± 25°F in lieu of measuring PM with the Method 29 train.

Test-040

Q: For test locations where the minimum stack diameter for the Method 201A filterable particulate cyclone configurations cannot be met and the flue gas does not contain entrained water droplets, may I use Method 5 with a 320°F+/-25°F filter temperature for the filterable $PM_{2.5}$ determination?

A: For stacks with a diameter less than 26.5 inches, $PM_{2.5}$ particulate measurements may be possible using only a $PM_{2.5}$ cyclone, pitot tube, and in-stack filter. If the blockage exceeds three percent but is less than six percent, you must follow the procedures outlined in Method 1A to conduct tests. If the diameter of the duct is so small that the blockage is greater than six percent, you may measure $PM_{2.5}$ with Methods 5 and 202, with the filter temperature at 320°F +/- 25°F.

If the unit has a wet scrubber, you should analyze the wet scrubber recirculation liquid for TSS/TDS.

We have posted an updated version of Table 1.2 in the Instructions for Component 4 to reflect this clarification.

Test-041

Q: Will using Method TO-15 by canister, per the requirement for the cooling water systems in Table 1.9 of Component 4 of the Refinery ICR, provide information on all of the volatile compounds in Table 1.3 to EPA's satisfaction?

A: Method TO-15 is applicable to all of the compounds on Table 1.3 of Component 4 of the Refinery ICR as long as the tester validates the recovery of the target compounds with humid air calibration standards, per the method.

Test-042

Q: In regards to the use of Method TO-13A for measuring semi-volatile organic HAP in cooling tower water, as specified in Table 1.9 of Component 4 of the Refinery ICR:

1. Will Method TO-13A provide information on all of the semi-volatile compounds in Table 1.4 to EPA's satisfaction?

2. What is the required sample rate/run time or minimum air volume?

3. Method TO-13A employs a high-volume air sampler with a recommended sampling rate of 225 liters per minute over 24 hours, for a total nominal sample volume of approximately 300 m^3. The El Paso Air Stripping Method only has 2.5 liters per minute of air passing through it, with a recommended sampling time of at least 10 minutes. How can we resolve this sampling rate issue?

A: Answers to each numbered question above are provided below.

1. Use of Method TO-13A will provide satisfactory data for the purposes of this ICR. As an alternative to Method TO-13A, testers may sample the semi-volatile compounds from the El Paso Air Stripping equipment using an SW-846 Method 0010 XAD resin cartridge, per the response to part 3 of this question.

2. Method TO-13A calls for 300 cubic meters of sample. We understand that the sampling rate in TO-13A may conflict with the amount of sample that is generated by the El Paso Air Stripping Method. As an alternative to Method TO-13A, testers may sample the semi-volatile compounds from the El Paso Air Stripping equipment using an SW-846 Method 0010 XAD resin cartridge, per the response to part 3 of this question.

3. We agree that the sampling rate in Method TO-13A conflicts with the amount of sample that is generated by the El Paso Air Stripping Method. As an alternative to Method TO-13A, we suggest that testers sample the semi-volatile compounds from the El Paso Air Stripping equipment using an SW-846 Method 0010 XAD resin cartridge. You do not need to include the filter prior to the cartridge, and the cartridge should be kept at ambient temperature. You must mount the cartridge in a vertical position to allow any condensed moisture to pass through the cartridge. You should collect the sample at a rate of approximately 2 liters per minute for at least two hours. You may use single point proportional sampling in lieu of the isokinetic traverse sampling required by SW-846 Method 0010. You should analyze the XAD cartridge for the target semi-volatile compounds using SW-846 Method 8270D. During sampling, you may need a knockout impinger after the cartridge to protect the sampling equipment. If a significant amount of water collects in the knockout impinger (>20 mL), you must analyze the water for the semi-volatile compounds on Table 1.4 of Component 4 of the Refinery ICR. The knockout impinger sample must be prepared in accordance with an appropriate SW-846 Method (e.g., Method 3510C or Method 3520C) and analyzed in accordance with SW-846 Method 8270D.

Test-043

Q: Table 1.9 of Component 4 of the Refinery ICR lists Method TO-11A as an acceptable alternative method for formaldehyde. Typical sampling rates for Method TO-11A are between 1 and 2 liters per minute. Similarly, for HCl and Cl_2 the specified methods recommend 1-hour sampling runs at a nominal sampling rate of 2 liters per minute. Is there a recommended sample volume to obtain the desired data quality objectives which may allow reducing the sampling time from 1 hour to the El Paso Method nominal sampling time of 10 minutes?

A: We do not believe that it is possible to sample for less than an hour and achieve the quantification levels necessary for this project. Additionally, please note that Method TO-11A requires the gas to be heated to prevent condensation of water or organic compounds.

Test-044

Q: What is the required sample rate/run time or minimum air volume for Method TO-11A? The method allows a wide range of sampling rates from 100-2000 cc/min.

A: We believe that an hour long sample at a flowrate in the range of 100-2000 cc/min that is also compatible with the flowrate in the El Paso method would be appropriate.

Test-045

Q: Table 1.9 of Component 4 of the Refinery ICR specifies Method TO-12 for THC, yet Method TO-12 is for Non-Methane Organic Compounds (NMOC), not total hydrocarbons. Further, methane is to be measured separately using Method 18. May we determine both methane and non-methane concentrations from the SUMMA canister samples used for Method TO-15 by measuring the methane and non-methane total hydrocarbons by GC-FID following a modified Method TO-3?

A: Methods TO-3 and TO-15 are not acceptable for measuring methane. The SUMMA canister used for Method TO-15 may be used for all three analyses (methane, NMOC, and VOC) by using the following procedures:

1. You must be able to collect enough sample in the canister to perform all of the analyses.
2. You must fill the sample canister to no more than half of the capacity.
3. Upon receipt, the laboratory must measure the pressure in the canister and then pressurize the canister with dry, ultra high purity nitrogen to a known pressure that is sufficient to perform the subsequent analyses.
4. You must first analyze the sample for methane using Method 18.
5. You must analyze the sample for NMOC using Method TO-12 after the Method 18 analysis.
6. The sample must then be vented to atmospheric pressure and allowed to equilibrate for 24 hours.
7. Finally, you must analyze the sample for speciated pollutants using Method TO-15.

Test-046

Q: What does the "as measured" mean for the air concentrations in Table 1.9 of Component 4 of the Refinery ICR?

A: In Table 1.9 of Component 4 of the Refinery ICR, the ppmvd should be ppmv. Please report the concentrations as measured and indicate whether the concentrations were measured on a wet basis or dry basis. We have posted an updated version of Table 1.9 in the Instructions for Component 4 to reflect this clarification.

Test-047

Q: Is only one run required for the cooling water samples in Table 1.9 of Component 4 of the Refinery ICR?

A: Only one run is required for the cooling water samples unless specified otherwise in the ICR or test method.

Test-048

Q: Will EPA allow the use of silonite-coated stainless steel or aluminum gas sample containers on the delayed coking unit vents?

A: We are not allowing Silonite coated sample containers or aluminum canisters for the delayed coking unit samples. We do not believe that these containers are appropriate for these samples. We also do not anticipate shipping hazards with these samples, which was part of the reason these containers were approved for the refinery fuel gas samples. We are willing to accept ASTM Method D5504 for TRS, which would allow samples to be taken in a Tedlar bag. If you use ASTM Method D5504, the TRS must be reported as the sum of the concentration of all of the chromatographic peaks recorded by the method. You must also incorporate Method 18 requirements for spiked target compound recovery standards to validate the analysis procedures. Sampling must be performed using non-reactive containers, such as Tedlar bags with polypropylene fittings or the equivalent. Tedlar bag samples require protection from light and heat. Laboratory equipment must be inert or passivated to ensure reliable results. Additionally, samples should not be held in the Tedlar bags for longer than 24 hours prior to analysis and precautions should be taken to ensure that samples in the bags are well-mixed prior to analysis.

Test-049

Q: May I use a GC-SCD (sulfur chemiluminescence detector) in lieu of a GC-FPD (flame photometric detector) for the Method 15 direct interface sampling following Method 15 procedures? Similarly, may I analyze TRS following ASTM D5504 with a GC-SCD using direct interface instead of using tedlar bags?

A: You may use a GC-SCD in both of these situations, as long as you continue to perform the quality control requirements in the methods.

Test-050

Q: May I use Method 29 to measure mercury if I perform an Ontario Hydro finish on the sample?

A: We are not approving the use of Method 29 to measure mercury for the Refinery ICR project. Due to the various risk factors for the different species of mercury, we need the Ontario Hydro Method train for mercury speciation testing.

Test-051

Q: May I combine the Method 23 sampling train for dioxins/furans with the Method 0010 sampling train for semi-volatile organics?

A: In general, the SW-846 Method 0010 and EPA Method 23 trains use completely different solvents in recovery of the sampling trains. In some instances, it is acceptable to use the Method 23 solvents to recover semi-volatile compounds. However, we do not feel it is appropriate to combine the SW-846 Method 0010 and EPA Method 23 sampling trains for this ICR project, due to extensive and varied lists of semi-volatile compounds that are required to be collected.

Test-052

Q: May I use Method 320 (FTIR) to analyze CO and moisture in my stack?

A: We will allow measurement of CO and moisture by Method 320 if there are no entrained water droplets in the stack. Also, you must perform the Section 13.0 validation requirements for all compounds that will be measured using Method 320. The validation must be performed at your source or at a similar source with the same matrix.

Emissions Test, CEMS, and CMS Reporting Questions

TestReporting-001

Q: The CEMS data collection template header asks for the "1-day average emission value for pollutant (as measured by the CEMS)." Am I correct in interpreting this to mean the raw measured CEMS data and not the data this is later corrected to some concentration at 0% O_2 in the data acquisition system?

A: Yes, that interpretation is correct. The template asks for the data as provided by the monitor as well as moisture content and O_2 content so that EPA can convert the data to a different %O_2 and evaluate both the uncorrected and corrected data. If you wish to provide the corrected values, there are optional columns on the right side of the template that can accommodate those values.

TestReporting-002

Q: Page 21 of Component 4 states to calculate the in-stack emission rate for any analytical measurement below the detection level using the relevant detection level as the reported value. Then, page 22 for instrumental methods says to use the actual and negative reported values to calculate the emission rates, and use Above Detection Limit (ADL). Since the values are negative and often represent some interference and disturbance of the compound within the capability of that analyzer, BDL would seem most appropriate as EPA has defined as: BDL (below detection level) all analytical values used to calculate and report an in-stack emissions value are less than the laboratory's reported detection level(s).

A: EPA feels that it is more appropriate to mark these values as ADL. Negative instrumental analyzer values are generally caused by system/analyzer bias or calibration error and the sensitivity of the system, not because the pollutant was lower than what the instrument is capable of detecting.

TestReporting-003

Q: Regarding Component 1, Part V, can EPA clarify how I should report daily averages from my CEMS if the some of the hourly averages are not "Qualified CEMS data"? Specifically, if I have 22 hours of qualified CEMS data but 2 hours are not qualified, should I report "ND" or should I average the 22 hours of qualified data that I do have?

A: You should report the daily average based on the hours of qualified data you do have (e.g., in the example above, you would average the 22 hours of qualified data and report that as your daily average.) The "ND" notation should only be used when there are no qualified CEMS data for any of the 24 hours in a given day (in other words, when you do not have qualified data for even one hour of that day).

TestReporting-004

Q: The methods for analysis of cooling water systems are not supported by the ERT, and cooling water systems are not included in the Refinery Testing Supplement. Where should I report the results of cooling water systems testing?

A: The Cooling Water System reporting tab was inadvertently left out of the original Refinery Testing Supplement. A new version of the Refinery Testing Supplement has been posted to the Component 4 page that includes the Cooling Water Systems template. The new version of the Refinery Testing Supplement also includes other clarifications on all tabs, such as providing locations for specific types of comments. In addition, we significantly revised the Wastewater reporting tab to be consistent with the requested testing.

If your Section 114 letter directs you to conduct wastewater or cooling water system sampling, you will need to use newer version of the Refinery Testing Supplement to report your results. If your Section 114 letter directs you to conduct stack tests or fuel gas sampling, we recommend using this newer version of the Refinery Testing Supplement, but you are not required to do so.

TestReporting-005

Q: I have a CMS for H_2S on a fuel gas line that provides fuel gas to multiple combustion sources. Should I complete and submit one CMS Daily Template for this monitor, or do I need to complete a CMS Daily Template for each combustion source with the same CMS data? If the answer to the first question is one CMS Daily Template for each monitor, which parameter should be included under the "Daily production/throughput rate" column of the spreadsheet (since the production/throughput rate of each combustion source is different)?

A: You should complete and submit one CMS Daily Template for each monitor. The throughput basis for a fuel gas line would be the same as the throughput basis for fuel gas treatment units. Specifically, for this CMS, you would enter in the "Daily production/throughput rate" column the system flow rate at the location of the monitor in units of scf/hr using 60°F (15.56°C) and 1 atmosphere as "standard conditions." You do not need to provide the downstream flow to individual combustion sources.

If your monitor is located downstream of the point at which the fuel gas line splits to provide fuel to different combustion sources, you should still provide the flow rate of the fuel gas at the location of the monitor in the "Daily production/throughput rate" column. However, if available, you should also provide the total flow rate of the fuel gas leaving the mix drum so that EPA can assess the total flow represented by the monitored concentration.

TestReporting-006

Q: For a CEMS on a boiler, what should I put in the "Daily production/throughput rate" column of the CEMS Daily Template: the amount of steam produced by the boiler each day or the amount of fuel combusted each day?

A: The preferred parameter for the "Daily production/throughput rate" is the amount of fuel combusted each day. If you wish to also provide amount of steam produced each day, you could do that in the additional columns in the spreadsheet (e.g., starting on column N).

Laboratory Correspondence

ENTHALPY
analytical, inc.

ACCREDITED IN ACCORDANCE WITH nelac
••• TCEQ #T104704421-08-TX •••
NJDEP #NC008 ••• LADEQ #04010

August 29, 2011

Mr. Chris Weber
URS Corporation
9400 Amberglen Blvd
Austin, Texas 78729

Subject: Refinery ICR Project Status Update, URS# 40942317, EA# 0711-08, 0711-09, 0811-09
BP Husky Refinery, Toledo, OH

Dear Mr. Weber,

Between July 23 and August 01, 2011 Enthalpy Analytical received Method 18 (VOHAP), Method 308 (Methanol), Method 5/202 (PM/CPM), Method 26A (HCl/Cl/HF), and Other Test Method 29 (HCN) samples for your *BP Husky – Toledo, OH Refinery ICR project*. As you know we have been inundated by this Clean Air Act Section 114 request, and are prioritizing projects based 100% on day of receipt.

The Bag and tube samples, as well as the Method 26A samples have been analyzed, but the reports are not yet fully compiled for review. The Method 5 and 202 samples are finishing in the next day or two – as discussed previously, the large amount of water required extended drying time. The OTM-29 samples were affected by instrumentation issues that caused significant delays in performing the instrumental analysis. There were a number of projects received for OTM-29 before this one that were also affected, but the remaining list is almost cleared now. This being said we do not expect to have your project reported to you before the August 31st reporting deadline. We expect the Method 5, 202, 26A, and OTM-29 portions to be reported to you before September 9th and the remainder of the project reported on or before September 16th. These are conservative estimates which include additional time in the event that samples require additional analysis. We fully expect to be done well before these dates.

We apologize for putting you and your client in this difficult situation, and please understand we are doing absolutely everything to expedite the reporting and QA review of this sample set. At this time we must urge you and your client to petition EPA for a reporting extension to ensure that all reported data is thorough and complete, and the best possible information is provided to EPA in response to this request.

If you have any questions please feel free to contact me via phone or email. We do not take your continued support and trust lightly; please understand absolutely everything has been done to expedite these analyses.

Sincerely,

Jordan Laster
Enthalpy Analytical – Sales / Engineer

Ph: (919) 850-4392 / Fax: (919) 850-9012 / Jordan.laster@enthalpy.com
2202 Ellis Road, Suite A Durham, NC 27703 - 5518

APPENDIX 8 – EQUIPMENT QA/QC INFORMATION

Reference Method Calibration Gas Certificates of Analysis

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

11426 FAIRMONT PKWY, LA PORTE, TX 77571 Phone: 800-248-1427 Fax: 281-474-8419

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A32011
AIR LIQUIDE AMERICA SPECIALTY GASES LLC
11426 FAIRMONT PKWY
LA PORTE, TX 77571

P.O. No.: 697824OP
Document # : 41631766-001

Customer
URS CORPORATION

9400 AMBERGLEN BLVD
AUSTIN TX 78729
US

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: AAL8192 **Certification Date:** 25May2011 **Exp. Date:** 25May2013
Cylinder Pressure*:** 2005 PSIG **Batch No:** LAP0040936

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
NITRIC OXIDE	4,950	PPM	+/- 2%	NIST and VSL
CARBON MONOXIDE	4,980	PPM	+/- 2%	NIST and VSL
SULFUR DIOXIDE *	5,060	PPM	+/- 2%	NIST and VSL
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	4,950.	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION		COMPONENT
NTRM 2631	15Mar2013	KAL003289	2937.	PPM	NITRIC OXIDE
NTRM 2637	01Aug2013	ALM012050	2505.	PPM	CARBON MONOXIDE
NTRM 1664	02Oct2011	ALM043304	2402.	PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
MKS FTIR/2030/MG-09-149	05May2011	FTIR
MKS FTIR/2030/MG-09-149	28Apr2011	FTIR
MKS FTIR/2030/MG-09-149	12May2011	FTIR

Special Notes: 660 CGA DEW POINT 40 F

APPROVED BY:
RAMIEN JR

AIR LIQUIDE
Air Liquide America
Specialty Gases LLC
Scott™

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A52011

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
8832 DICE ROAD
SANTA FE SPRINGS, CA 90670-2516

P.O. No.: 6978240P
Document # : 41642622-001

Customer
URS CORPORATION

9400 AMBERGLEN BLVD
AUSTIN TX 78729
US

ANALYTICAL INFORMATION Gas Type : SNC

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC69815
Cylinder Pressure*:** 1400 PSIG
Certification Date: 16May2011
Exp. Date: 15May2013
Batch No: SB00037523

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
NITRIC OXIDE	9,910	PPM	+/- 2%	NIST and VSL
CARBON MONOXIDE	9,960	PPM	+/- 2%	NIST and VSL
SULFUR DIOXIDE *	9,980	PPM	+/- 2%	NIST and VSL
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	9,910.	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION		COMPONENT
NTRM 3600	02Oct2012	ALM066655	3553.	PPM	NITRIC OXIDE
NTRM 2637	08Aug2013	ALM051378	2505.	PPM	CARBON MONOXIDE
NTRM 1696	02Oct2012	ALM053746	3100.	PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
MKS-FTIR/2030/001785245	11May2011	FTIR
MKS-FTIR/2030/001785245	20Apr2011	FTIR
MKS-FTIR/2030/001785245	27Apr2011	FTIR

APPROVED BY: Thuantran
THUAN TRAN

AIR LIQUIDE Air Liquide America Specialty Gases LLC SCOTT™

RATA CLASS

Dual-Analyzed Calibration Standard

11426 FAIRMONT PKWY, LA PORTE, TX 77571 Phone: 800-248-1427 Fax: 281-474-8419

CERTIFICATE™ OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas

Assay Laboratory

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
11426 FAIRMONT PKWY
LA PORTE, TX 77571

P.O. No.: URS
Project No.: 04-85384-001

Customer

URS CORPORATION
ITEM# URS019

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC87102 **Certification Date:** 17Jun2010 **Exp. Date:** 17Jun2013
Cylinder Pressure*:** 1900 PSIG **Batch No:** LAP0019016

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	9.48 %	+/- 1%	Direct NIST and VSL
OXYGEN	11.4 %	+/- 1%	Direct NIST and VSL
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1675	02Oct2012	K002502	13.93 %	CARBON DIOXIDE
NTRM 2350	01May2013	K026427	23.50 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//000929060	10Jun2010	FTIR
BIG SERVOMEX/1101-4605C/4605C	14Jun2010	PARAMAGNETIC

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis **Second Triad Analysis** **Calibration Curve**

CARBON DIOXIDE

Date: 16Jun2010 Response Unit: %
Z1=-0.00013 R1=13.90778 T1=9.45060
R2=13.90962 Z2=0.01081 T2=9.46875
Z3=0.01214 T3=9.48051 R3=13.92003
Avg. Concentration: 9.476 %

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99995E-1
Constants: A=0.00000E+0
B=6.38151E-1 C=5.05400E-3
D=0.00000E+0 E=0.00000E+0

OXYGEN

Date: 17Jun2010 Response Unit: VOLTS
Z1=0.00000 R1=0.88180 T1=0.42730
R2=0.88180 Z2=0.00000 T2=0.42800
Z3=0.00000 T3=0.42800 R3=0.88130
Avg. Concentration: 11.37 %

Concentration=A+Bx+Cx2+Dx3+Ex4
r=0.9999985
Constants: A=-0.00696867
B=26.56762301 C=
D= E=

Special Notes: CERTS & TAGS DOC#37470449 URS CORPORATION
ITEM# URS019

APPROVED BY:
DAVID KELLY

Scott Specialty Gases **AIR LIQUIDE**

CERTIFICATION OF ANALYSIS

Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

Cylinder S/N: CC99294

Customer: URS CORPORATION
Location: MANOR, TX

P.O. Number: URS
Item Number: URS020

Assay Date: 9-Dec-2009

Expiration Date: 9-Dec-2012

Shipping Order Number: 35575097
Transfer Number: 35575097
Lot Number: SFS67738101
Valve: CGA 296
Cylinder Pressure*: 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Components	Requested Concentration	Assay Concentration
Nitrogen	**Balance**	**Balance**
Carbon Dioxide	**19.5 %**	**19.5 % ± 1% NIST TRACEABLE**
Oxygen	**23.5 %**	**23.5 % ± 1% NIST TRACEABLE**

Reference Standard(s) Employed For Analysis

Certified Concentration and Uncertainty	Component	Balance	Cyl. No.	SRM/PRM/Mix No.	Exp. Date	Sample No.	Type
17.87 ± 0.11 %	Carbon Dioxide	Nitrogen	K021824	1800	1-Mar-2013	100104	NTRM
23.48 ± 0.12 %	Oxygen	Nitrogen	K027039	2350	1-May-2013	062804	NTRM

Analytical Data

Component:	Carbon Dioxide		FIRST TRIAD ANALYSIS 9-Dec-2009				
Analyzer Information				Trial 1	Trial 2	Trial 3	Units
Analyzer Type:	Gas Chromatograph		Zero	0.0000	0.0000	0.0000	Area
Manufacturer:	Varian		Reference	10378000	10371000	10345000	Area
Model Number:	3400B		Candidate	11328000	11318000	11309000	Area
Serial Number:	2806		Result	19.50	19.50	19.53	%
MPR Last Calibrated:	18-Nov-2009		Evaluation	Valid	Valid	Valid	
Analytical Principle:	FID & TCD				Mean Analytical Result:	19.51	%

Component:	Oxygen		FIRST TRIAD ANALYSIS 9-Dec-2009				
Analyzer Information				Trial 1	Trial 2	Trial 3	Units
Analyzer Type:	Gas Chromatograph		Zero	0.0000	0.0000	0.0000	Area
Manufacturer:	Varian		Reference	11455000	11442000	11406000	Area
Model Number:	3400B		Candidate	11461000	11404000	11397000	Area
Serial Number:	2806		Result	23.49	23.40	23.46	%
MPR Last Calibrated:	18-Nov-2009		Evaluation	Valid	Valid	Valid	
Analytical Principle:	FID & TCD				Mean Analytical Result:	23.45	%

Analyst: ______________________ David Connolly

Approved by: ______________________ Thuan Tran

RATA CLASS

Dual-Analyzed Calibration Standard

AIR LIQUIDE

Scott Specialty Gases

8832 DICE ROAD, SANTA FE SPRINGS, CA 90670-2516 Phone: 800-323-2212 Fax: 562-464-5262

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory		Customer
AIR LIQUIDE AMERICA SPECIALTY GASES LLC 8832 DICE ROAD SANTA FE SPRINGS, CA 90670-2516	P.O. No.: CORIS DOC. 35708958 Project No.: 02-67811-001	ALA AUSTIN/MANOR 12700 BELTEX DR MANOR TX 78653

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC16718

Certification Date: 23Dec2009

Exp. Date: 22Dec2012

Batch No: SBO0009003

Cylinder Pressure*:** 2000 PSIG

COMPONENT	**CERTIFIED CONCENTRATION (Moles)**		**ANALYTICAL ACCURACY****	**TRACEABILITY**
PROPANE	3,020	PPM	+/- 1%	Direct NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2647	01May2011	ALM028037	2499. PPM	PROPANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN A/3400/2805	22Dec2009	FID & TCD

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

PROPANE

Date: 23Dec2009 Response Unit: AREA

Z1=0.00000	R1=5527334.	T1=6688092.
R2=5517430.	Z2=0.00000	T2=6659487.
Z3=0.00000	T3=6672339.	R3=5522107.

Avg. Concentration: 3020. PPM

Concentration=A+Bx+Cx2+Dx3+Ex4

r=0.999999 2647

Constants: A=-1.00626223

B=0.000448155 C=0

D=0 E=0

APPROVED BY: Dlu

DC

AIR LIQUIDE™

CERTIFICATION OF ANALYSIS

Interference Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section 2.2, Procedure G-1

Cylinder S/N: CC62892

Customer: ALA-CSL-LAPORTE
Location: LA PORTE, TX

P.O. Number: 40942073

Shipping Order Number: 29541783
Transfer Number: 29541783
Lot Number: SFS120643
Valve: CGA 350
Cylinder Pressure*: 2000 PSIG
*Cylinder should not be used when gas pressure is below 150 psig

Assay Date: 14-May-2008

Expiration Date: 14-May-2011

Components	Requested Concentration	Assay Concentration
Nitrogen	Balance	Balance
Propane	5000 ppm	5010 ± 60 ppm

Reference Standard(s) Employed For Analysis

Certified Concentration and Uncertainty	Component	Balance	Cyl. No.	SRM/PRM/Mix No.	Exp. Date	Sample No.	Type
4927 ± 26 ppm	Propane	Nitrogen	XF000255B	2648a	25-Apr-2012	105-C-13	SRM

Analytical Data

Component:	Propane		FIRST TRIAD ANALYSIS	14-May-2008		
Analyzer Information			Trial 1	Trial 2	Trial 3	Units
Analyzer Type:	Gas Chromatograph	Zero	0.0000	0.0000	0.0000	ppm
Manufacturer:	Varian	Reference	4329.1	4327.4	4337.1	ppm
Model Number:	3400B	Candidate	4401.6	4404.7	4419.3	ppm
Serial Number:	2806	Result	5010	5015	5020	ppm
MPR Last Calibrated:	23-Apr-2008	Evaluation	Valid	Valid	Valid	
Analytical Principle:	FID & TCD			Mean Analytical Result:	5015	ppm

Analyst: Aidan Ifland

Approved by: Thuan Tran

AIR LIQUIDE AMERICA, L.P. 8832 Dice Road, Santa Fe Springs, CA 90670-2516
Phone: (562) 945-1383 • Fax: (562) 693-1156

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - **PGVP Vendor ID: A22011**

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: 697824OP
Document # : 41633673-001

Customer
URS CORPORATION

9400 AMBERGLEN BLVD
AUSTIN TX 78729
US

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: CC352385 **Certification Date:** 13May2011 **Exp. Date:** 12May2014

Cylinder Pressure*:** 1950 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
PROPANE	8,000	PPM	+/- 2%	NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1669	02Oct2012	K011507	499.3 PPM	PROPANE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
VARIAN/3400/7506	05May2011	TCD/FID

Special Notes: EPA COMPLIANCE SEAL

APPROVED BY: ROBERT LESNIAK

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Customer : A L Austin Manor
P.O. Number : 40942073
Document # : 29311855-1a
Mix/Lot # : SFS120437
Item Number : SFS120437
Valid Until : 4 May, 2013

Specification : PRIMARY STANDARD
Phase : GAS
Cyl. Size : 30AL
Valve : CGA 350
Pressure : 2000
Volume : 144 SCF

Cylinder Number: **CC261608**

Component	Requested Concentrations MOLE	Actual Concentration MOLE	% Analytical Uncertainty	Equipment Used		
				Scale	Analyt. Inst.	Calibration Standard
NITROGEN	Balance	Balance		8		
PROPANE	15000 PPM	15000 PPM	1	8	0154	AS
7001-30al						

This mixture was certified by analysis using one or more calibration standards prepared with scales certified against weights traceable to N.I.S.T.

Comments:

Dewpoint calculated to 40° F, unless otherwise stated. Improper storage or use may affect the accuracy of this standard.
Reported impurities are approximate and should not be used for calibration purposes.

Prepared by ______________________ Date: 5-May-2008

8832 Dice Road -- Santa Fe Springs, CA 90670
Phone (562) 945-1383 **Fax** (562) 693-1156
ISO: 9001-2000

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Customer : A L Austin Manor
P.O. Number : 40942073
Document # : 29311926-1b
Mix/Lot # : SFS120435
Item Number : SFS120435
Valid Until : 4 May, 2013

Specification : PRIMARY STANDARD
Phase : GAS
Cyl. Size : 30AL
Valve: CGA 350
Pressure : 2000
Volume : 144 SCF

Cylinder Number: **CC261620**

Component	Requested Concentrations MOLE	Actual Concentration MOLE	% Analytical Uncertainty	Equipment Used		
				Scale	Analyt. Inst.	Calibration Standard
NITROGEN	Balance	Balance		8		
PROPANE	30000 PPM	29900 PPM	1	8	0154	AS
7001-30al						

This mixture was certified by analysis using one or more calibration standards prepared with scales certified against weights traceable to N.I.S.T.

Comments:

Dewpoint calculated to 40° F, unless otherwise stated. Improper storage or use may affect the accuracy of this standard. Reported impurities are approximate and should not be used for calibration purposes.

Prepared by ____________________ Date: 5-May-2008

8832 Dice Road -- Santa Fe Springs, CA 90670
Phone (562) 945-1383 **Fax** (562) 693-1156
ISO: 9001-2000

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Customer : Urs Austin
P.O. Number :
Doc. # : 35708744-1A
Mix/Lot # : LPX260022
Item Number :
Valid Until : 29 December, 2014

Specification : Custom Certified
Phase : GAS
Cyl. Size : 30AL Valve : CGA 350
Pressure : 2000 Psia
Volume : 144 SCF

Cylinder Number: **ALM053410**

Requested Concentrations Mole	Component	Actual Concentration Mole	Analytical Uncertainty	Equipment Used Scale	Equipment Used Analyt. Inst.	Equipment Used Calibration Standard
Balance	NITROGEN	Balance		1391		
8000 PPM	METHANE	7990. PPM	+/-2%	0903		

This mixture was prepared and certified by weight using one or more scales certified against weights traceable to N.I.S.T.

Comments:

Dewpoint calculated to 40 F, unless otherwise stated. Improper storage or use may affect the accuracy of this standard.

Certified by Date: 30-Dec-2009
Jeff Bickers

11426 Fairmont Pkwy -- LaPorte, TX 77571
Phone (281) 474-8400 **Fax** (281) 474-8419 **USA** (800) 248-1427
ISO: 9001-2000

AIR LIQUIDE™

CERTIFICATE OF ANALYSIS

Customer	: A L A La Porte		
P.O. Number	: 40942073	Specification	: PRIMARY STANDARD
Document #	: 29543176-1aR	Phase	: GAS
Mix/Lot #	: SFS120857	Cyl. Size	: 30AL Valve: CGA 350
Item Number	: SFS120457	Pressure	: 2000
Valid Until	: 6 May, 2013	Volume	: 144 SCF

Cylinder Number: **CC133942**

Component	Requested Concentrations MOLE	Actual Concentration MOLE	% Analytical Uncertainty	Equipment Used Scale	Equipment Used Analyt. Inst.	Equipment Used Calibration Standard
NITROGEN	Balance	Balance		8		
ETHANE	8000 PPM	8010 PPM	1	8	2806	295
7001-30al						

This mixture was certified by analysis using one or more calibration standards prepared with scales certified against weights traceable to N.I.S.T.

Comments:

Dewpoint calculated to 40° F, unless otherwise stated. Improper storage or use may affect the accuracy of this standard.
Reported impurities are approximate and should not be used for calibration purposes.

Prepared by ____________________ Date: 7-May-2008

8832 Dice Road -- Santa Fe Springs, CA 90670
Phone (562) 945-1383 **Fax** (562) 693-1156
ISO: 9001-2000

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

CUSTOM CLASS

6141 EASTON ROAD, BLDG 1, PLUMSTEADVILLE, PA 18949-0310 Phone: 800-331-4953 Fax: 215-766-7226

CERTIFICATE OF ACCURACY: Custom Class Calibration Standard

Product Information
Document # : 41645831-001
Item No.: MP300058-Z-30AL
P.O. No.: 697824OP

Cylinder Number: ALM018043
Cylinder Size: 30AL
Certification Date: 02Jun2011
Expiration Date: 01Jun2012

Customer

URS CORPORATION
9400 AMBERGLEN BLVD
AUSTIN, TX 78729
US

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
PROPANAL	100.	PPM	2
SULFUR HEXAFLUORIDE	16.0	PPM	5
NITROGEN		BALANCE	

TRACEABILITY

Description	Traceability Type	Traceable To
BLEND PROCESS TRACEABILITY	WEIGHT	NIST
ANALYTICAL TRACEABILITY	GAS STANDARDS	

APPROVED BY: WALTER SABITUS

DATE: 6/3/11

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

6141 EASTON ROAD, BLDG 1, PLUMSTEADVILLE, PA 18949-0310 Phone: 800-331-4953 Fax: 215-766-7226

CERTIFIED MASTER CLASS

Single-Certified Calibration Standard

CERTIFICATE OF ACCURACY: Certified Master Class Calibration Standard

Product Information
Document # : 41643001-001
Item No.: MC600021-P-30AL
P.O. No.: 697824OP

Cylinder Number: ALM035763
Cylinder Size: 30AL
Certification Date: 01Jun2011
Expiration Date: 31May2012

Customer

URS CORPORATION
9400 AMBERGLEN BLVD
AUSTIN, TX 78729
US

CERTIFIED CONCENTRATION

Component Name	Concentration (Moles)		Accuracy (+/-%)
HYDROGEN SULFIDE	25.9	PPM	2
CARBONYL SULFIDE	25.1	PPM	2
CARBON DISULFIDE	25.2	PPM	2
METHYL MERCAPTAN	24.6	PPM	2
DIMETHYL SULFIDE	24.9	PPM	2
NITROGEN		BALANCE	

TRACEABILITY

Traceable To

Scott Reference Standard

APPROVED BY: James L. McHale
JAMES L. MCHALE

DATE: 6/1/11

AIR LIQUIDE Air Liquide America Specialty Gases LLC Scott™

COMPLIANCE CLASS

Dual-Analyzed Calibration Standard

11426 FAIRMONT PKWY, LA PORTE, TX 77571 Phone: 800-248-1427 Fax: 281-474-8419

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A32011
AIR LIQUIDE AMERICA SPECIALTY GASES LLC
11426 FAIRMONT PKWY
LA PORTE, TX 77571

P.O. No.: 697824OP
Document # : 41617323-001

Customer
URS CORPORATION

9400 AMBERGLEN BLVD
AUSTIN TX 78729
US

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number:	CC233567	**Certification Date:**	17May2011	**Exp. Date:**	17May2012
Cylinder Pressure*:**	2000 PSIG			**Batch No:**	LAP0040941

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
HYDROGEN SULFIDE	2,014	PPM	+/- 2%	NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol procedures , September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 0100 1	02Oct2011	AAL069590	102.7 PPM	HYDROGEN SULFIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
INTERSCAN HI/RM-17/710837	25Apr2011	ELECTROCHEMICAL

Special Notes: URS AUSTIN PI # 52422 cga-330; dew pt. 40 deg.f

APPROVED BY: ______________________
DAVID KELLY

NO_x Converter Efficiency Results

NO-NO_x Converter Efficiency Checkout (Bag Method)

Date: **7/26/2011**
Project: **BP-Husky DCU3 Vent Test**
Analyzer: **Thermo**
Model: **42C**
S/N: **211109**

Location: **DCU3 West Vent**
Technician: **KMM**
Operating Range: **100 ppm (diluted)**
Bag Leak Check: **Yes**

Cylinder Number	Cal Gas Concentration	Span Value (ppm)	Time (Start - End)	Peak Analyzer Response (ppm)	Final Analyzer Response (ppm)	Difference (Peak - Final) (ppm)
CC69815	9910	100	23:32-01:02	75.83	75.07	0.76

Converter Loss = (Peak-Final / Peak) x 100

Converter Loss = **1.0** (Must be less than 2.0 percent of highest Peak value)

Procedures

1. Zero Analyzer
2. Leak check a clean Tedlar Bag
3. Add gas from the mid-level NO in N_2 calibration gas cylinder to a clean, evacuated, leak-tight Tedlar bag.
4. Dilute this gas approximately 1:1 with purified air.
5. Immediately attach the bag outlet directly to the analyzer inlet port.
6. Operate the analyzer in "NOx" mode and record the NOx response for at least 30 minutes.
7. Calculate efficiency.

PDS-07BS NOx Converter Check
Per EM SOP-037
Revision Date: June 2011

Response Time Checks

Response Time Determination – EPA Method 7E

Applicable to Performance of EPA Methods 3A, 6C, 7E and 10

Project Name: BP-Husky DCU Vent Test
Project Number: 40942317
Location: West ~~East~~ Vent - DCU3
Source: West ~~East~~ Vent - DCU3
Date: 7/18/11
Time 0010 - 0015

Parameter	O_2		CO_2			
Analyzer Make and Model	Servomex 1440		TECO 51C			
Analyzer Name	Dylan		410005371			
Analyzer Range	0-5*		0-2000 ppm			
From	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**
To	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**
Start Time (hh:mm)	0010:15	0013:00	0010:15	0013:00		
15 sec	-0.03	0.07	-3.10	883		
30 sec	-0.037	0.07	1.10	887		
45 sec	0.05	-0.03	158.2	805		
60 sec	0.06	-0.03	591.4	321.3		
75 sec	0.07	-0.03	819.9	79.08		
90 sec	0.07	—	875.7	12.94		
105 sec	0.07	—	881.6	5.09		
120 sec			879.6	1.02		
135 sec			885.7	1.02		
150 sec			885.7	1.02		
165 sec						
180 sec						
195 sec						
Response Time [1]	75	75	90	90		
Analyzer Response Time [2]	75		90			

---

[1] Time in seconds to reach 95% of final stable value.
[2] Greater of upscale and downscale response time

	Cylinder Number	**Actual Value**
Upscale	CC99294	19.5/23.5
Upscale		
Upscale		
Zero	ALM044655	0

Response Time Determination – EPA Method 7E

Applicable to Performance of EPA Methods 3A, 6C, 7E and 10

Project Name: BP-Husky DCU Vent Test
Project Number: 40942317
Location: BP-Husky Toledo

Source: Coker 3 West - DCU3
Date: 7-19-11
Time 1122

Parameter	CO2					
Analyzer Make and Model	Servomex 1440					
Analyzer Name	Dylan					
Analyzer Range	0-20%					
From	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**
To	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**
Start Time (hh:mm)	1126	1128				
15 sec	0.0053	1.1006				
30 sec	0.9987	0.1122				
45 sec	1.0883	0.0183				
60 sec	1.0941	0.0122				
75 sec	1.0994	0.0099				
90 sec						
105 sec						
120 sec						
135 sec						
150 sec						
165 sec						
180 sec						
195 sec						
Response Time [1]	45	45				
Analyzer Response Time [2]	45					

[1] Time in seconds to reach 95% of final stable value.
[2] Greater of upscale and downscale response time

	Cylinder Number	Actual Value
Upscale	CC99294	1.095 @ 17.8:1 (19.5%)
Upscale		
Upscale		
Zero	ALM044655	0

Response Time Determination – EPA Method 7E

Applicable to Performance of EPA Methods 3A, 6C, 7E and 10

Project Name: BP-Husky DCU Vent Test
Project Number: 40942317
Location: Oregon, OH
Source: East Vent - DCU3
Date: 7/18/11
Time 0016- 0025

Parameter	NOx		SO2		SO2 cont.	
Analyzer Make and Model	TECO 42C		Ametek 921M			
Analyzer Name	201109		Holiday			
Analyzer Range	100		100			
From	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**
To	**Upscale**	**Zero**	**Upscale**	**Zero**	**Upscale**	**Zero**
Start Time (hh:mm)	0016	0021	0016	0021		
15 sec	-0.22	46.78	1.98	53.3	205 52.76	332.56
30 sec	-0.17	46.7	2.13	53.3	220 52.86	2.37
45 sec	20.51	46.6	36.9	26.4	235 52.93	2.43
60 sec	41.85	6.36	45.2	10.19	53.02	2.30
75 sec	43.45	3.45	49.93	5.16	53.15	–
90 sec	46.22	0.48	50.76	4.09	53.18	–
105 sec	46.57	0.38	51.65	3.60		
120 sec	46.50	0.04	51.77	3.35		
135 sec	46.57	-0.07	52.14	3.12		
150 sec	–	-0.07	52.30	2.96		
165 sec			52.48	2.78		
180 sec			52.66	2.70		
195 sec			52.69	–		
Response Time [1]	90	90			90	205
Analyzer Response Time [2]	90				205	

---

[1] Time in seconds to reach 95% of final stable value.
[2] Greater of upscale and downscale response time

	Cylinder Number	**Actual Value**
Upscale	AAL 8192	4950 / 5060
Upscale		
Upscale		
Zero	ALM 044655	0

Response Time Determination

Project Name: BP-Husky DCU Vent Test
Project Number: 40942317
Location: Oregon, OH
Source: West Vent DCU3
Date: 7/25/11

Parameter: THC
Monitor Make/Model: TECO
Monitor Name: Buddy
Operator: KWM
Span: 0-10000 (diluted)
Time: 1140-1150

From	To	System Response													Response Time [1]	
		15 sec	30 sec	45 sec	60 sec	75 sec	90 sec	105 sec	120 sec	135 sec	150 sec	165 sec	180 sec	195 sec	Upscale	Downscale
Zero	High	1.19	555	598	602	602									30	
High	Zero	556	5.5	-0.76	-1.14	-1.14										30
Zero	High	1373	598	601	602	602									30	
High	Zero	602	1.91	-1.14	-1.14	-										30
Zero	High	-1.14	598	602	602	-									30	
High	Zero	598	1.91	-1.14	-1.14	-										30
Average															30	30
System Response Time [2]															30	

[1] Time in seconds to reach 95% of final stable value.
[2] Select greater of upscale and downscale response time.

	Cylinder Number	Actual Value
High	CC261608	15,000 ppm
Zero	N2 n/a	0

FDS-05: CEM Response Time
Revision Date: October 2009
Reviewed: September 2010

Response Time Determination

Project Name: BP-Husky DCU3 Vent Test

Project Number: 40942317

Location: Oregon, OH

Source: DCU3 West Vent

Date: 7/25/11

Parameter: THC

Monitor Make/Model: JUM 3-300A

Monitor Name: 207 745

Operator: KMM

Span: 2,277 ppm (diluted)

Time: 1140-1150

From	To	System Response													Response Time [1]	
		15 sec	30 sec	45 sec	60 sec	75 sec	90 sec	105 sec	120 sec	135 sec	150 sec	165 sec	180 sec	195 sec	Upscale	Downscale
Zero	High	14.6	609	610	613	614									30	
High	Zero	598	7.63	2.0	2.0	-										30
Zero	High	90.3	610	614	611	614									30	
High	Zero	595	4.3	2.0	2.0	-										30
Zero	High	429	610	613	613	-									30	
High	Zero	598	4.3	2.0	2.0	-										30
Average															30	30
System Response Time [2]															30	

[1] Time in seconds to reach 95% of final stable value.

[2] Select greater of upscale and downscale response time.

	Cylinder Number	Actual Value
High	CC261608	15,000 ppm
Zero	N_2 n/a	0

FDS-05: CEM Response Time
Revision Date: October 2009
Reviewed: September 2010

Meter Box Calibrations

Run	Sampling Train	DGM ID	Avg. Flow Rate (Lpm)	DGMCF
D1	OH	A161398	0.488	1.034
D2	OH	A161398	0.572	1.034
D2	M29	A161361	0.584	1.013
D2	M5/202	A167041	0.728	1.023
D3	M29	A161361	0.433	1.013
D3	M5/202	A167041	0.562	1.023
D4	OH	A161398	0.846	1.034
D4	M29	A161361	1.011	1.014
D4	M5/202	A167041	1.176	0.988
D5	OH	A167041	0.642	1.023
D5	M29	A161361	0.419	1.013
D5	M5/202	A167398	0.446	1.034
C1	M26A	A167041	0.385	1.023
C1	OTM29	A161361	0.430	1.013
C1	M15A Sample	80-10204-1	2.101	1.014
C1	M15A Air	80-011309-2	0.515	0.987
C2	M26A	A167041	1.109	0.988
C2	OTM29	A161361	1.092	1.014
C2	M15A Sample	80-10204-1	2.004	1.014
C2	M15A Air	80-011309-2	0.533	0.987
C3	M26A	A167041	0.700	1.023
C3	OTM29	A161361	0.560	1.013
C3	M15A Sample	80-10204-1	1.935	1.014
C3	M15A Air	80-011309-2	0.545	0.987
A1	M0010	A167041	1.061	0.988
A2	M0010	A167041	1.002	0.988
A2	M18	80-011309-2	0.489	0.987
A2	M18 Spiked	80-10204-1	0.649	1.005
A2	M308	80-111701-1	0.729	1.005
A3	M0010	A167041	2.273	1.030
A3	M18	80-011309-2	0.612	0.987
A3	M18 Spiked	80-10204-1	0.564	1.005
A3	M308	80-111701-1	0.537	1.005
A4	M0010	A167041	0.569	1.023
A4	M18	80-011309-2	0.649	0.987
A4	M18 Spiked	80-10204-1	0.580	1.005
A4	M308	80-111701-1	0.513	1.005

DGM ID	Range of Flow Rates (Lpm)	Post-Cal @ (Lpm)
A161398	0.446-0.846	0.5
A161361	0.419-1.092	0.5 and 1.0
A167041	0.385-2.273	0.5 and 2.0
80-10204-1	0.564-2.004	0.5 and 2.0
80-011309-2	0.489-0.649	0.5
80-111701-1	0.513-0.729	0.5

Pre/Post Test Console Calibration Check

Console ID		A161361
Calibrated by	Initials	RVW
	Date	7/4/11
Reviewed by	Initials	DC
	Date	7/5/11

Orifice ID:	N-2		N-3		N-4	
Orifice K':	0.3598		0.5180		0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	649.000	654.659	660.365	667.155	673.991	681.943
Final Reading, (ft^3)	654.659	660.365	667.155	673.991	681.943	689.923
Difference, (ft^3)	5.659	5.706	6.790	6.836	7.952	7.980
Initial Meter Inlet Temp., (°F)	71	73	75	77	80	82
Initial Meter Outlet Temp., (°F)	69	70	71	73	74	75
Final Meter Inlet Temp., (°F)	73	75	77	80	82	84
Final Meter Outlet Temp., (°F)	70	71	73	74	75	76
Average Meter Temp., (°F)	70.8	72.3	74.0	76.0	77.8	79.3
Test Time (min.)	12	12	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.61	0.61	1.3	1.3	1.7	1.7
Barometric Pressure, ("Hg)	29.15	29.15	29.15	29.15	29.15	29.15
Ambient Temperature, (°F)	70	70	70	70	70	70
Pump Vacuum, ("Hg)	25	25	24	24	23	23
Standard Volume of the Meter, (Vmstd)	5.491	5.521	6.560	6.580	7.636	7.642
Standard Volume of Critical Orifice, (Vcrstd)	5.467	5.467	6.559	6.559	7.690	7.690
DGM Calibration Factor, (Y)	0.996	0.990	1.000	0.997	1.007	1.006
Difference from Average	-0.004	-0.009	0.001	-0.002	0.008	0.007
Delta H@	1.607	1.603	1.648	1.642	1.560	1.556

Average Y =	0.999
Reference Yd =	0.998
Percent Difference =	0.106
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.603

CDS-0451 DGM 3 point cal check against orifice
Revision Date: January 2011

Pre/Post Test Console Calibration Check

Console ID		A161361
Calibrated by	Initials	RVW
	Date	8/13/11
Reviewed by	Initials	EDF
	Date	8-15-11

Orifice ID: Orifice K':	N-2 0.3598		N-3 0.5180		N-4 0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	746.000	751.652	757.315	764.095	770.885	779.598
Final Reading, (ft^3)	751.652	757.315	764.095	770.885	779.598	788.311
Difference, (ft^3)	5.652	5.663	6.780	6.790	8.713	8.713
Initial Meter Inlet Temp., (°F)	76	76	76	78	79	81
Initial Meter Outlet Temp., (°F)	75	74	75	75	76	76
Final Meter Inlet Temp., (°F)	77	77	79	80	81	82
Final Meter Outlet Temp., (°F)	75	76	76	76	76	76
Average Meter Temp., (°F)	75.8	75.8	76.5	77.3	78.0	78.8
Test Time (min.)	12	12	10	10	11	11
Orifice Manometer Reading, ("H_2O)	0.62	0.62	1.3	1.3	1.7	1.7
Barometric Pressure, ("Hg)	29.20	29.20	29.20	29.20	29.20	29.20
Ambient Temperature, (°F)	70	70	70	70	70	70
Pump Vacuum, ("Hg)	26	26	25	25	24	24
Standard Volume of the Meter, (Vmstd)	5.443	5.453	6.531	6.531	8.378	8.366
Standard Volume of Critical Orifice, (Vcrstd)	5.476	5.476	6.570	6.570	8.473	8.473
DGM Calibration Factor, (Y)	1.006	1.004	1.006	1.006	1.011	1.013
Difference from Average	-0.002	-0.004	-0.002	-0.002	0.004	0.005
Delta H@	1.62	1.62	1.64	1.64	1.56	1.55

Average Y =	1.008
Reference Yd =	0.998
Percent Difference =	1.0
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.603

CDS-0452 DGM 3 point cal check against orifice
Revision Date: January 2011

Pre/Post Test Console Calibration Check

Console ID		A161398
Calibrated by	Initials	RF
	Date	7/6/11
Reviewed by	Initials	Rvw
	Date	07-06-11

Orifice ID:	N-2		N-3		N-4	
Orifice K':	0.3598		0.5180		0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	969.563	975.194	980.838	987.594	994.359	1002.249
Final Reading, (ft^3)	975.194	980.838	987.594	994.359	1002.249	1010.177
Difference, (ft^3)	5.631	5.644	6.756	6.765	7.890	7.928
Initial Meter Inlet Temp., (°F)	72	73	75	77	78	80
Initial Meter Outlet Temp., (°F)	72	72	73	74	75	76
Final Meter Inlet Temp., (°F)	73	75	77	78	80	81
Final Meter Outlet Temp., (°F)	72	73	74	75	76	77
Average Meter Temp., (°F)	72.3	73.3	74.8	76.0	77.3	78.5
Test Time (min.)	12	12	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.68	0.69	1.5	1.5	2.1	2.1
Barometric Pressure, ("Hg)	29.20	29.20	29.20	29.20	29.20	29.20
Ambient Temperature, (°F)	68	68	68	68	68	68
Pump Vacuum, ("Hg)	24	24	22.5	22.5	21.5	21.5
Standard Volume of the Meter, (Vmstd)	5.459	5.461	6.532	6.526	7.605	7.623
Standard Volume of Critical Orifice, (Vcrstd)	5.487	5.487	6.583	6.583	7.717	7.717
DGM Calibration Factor, (Y)	1.005	1.005	1.008	1.009	1.015	1.012
Difference from Average	-0.004	-0.004	-0.001	0.000	0.006	0.003
Delta H@	1.78	1.80	1.89	1.89	1.92	1.92

Average Y =	1.009
Reference Yd =	1.011
Percent Difference =	-0.2
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.866

CDS-0452 DGM 3 point cal check against orifice
Per EM SOP-002
Revision Date: May 2012

Pre/Post Test Console Calibration Check

Console ID		A161398
Calibrated by	Initials	RVW
	Date	8/10/11
Reviewed by	Initials	EDF
	Date	8/11/11

Orifice ID: Orifice K':	N-2 0.3598		N-3 0.5180		N-4 0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	50.000	56.102	62.215	68.948	75.693	83.567
Final Reading, (ft^3)	56.102	62.215	68.948	75.693	83.567	91.453
Difference, (ft^3)	6.102	6.113	6.733	6.745	7.874	7.886
Initial Meter Inlet Temp., (°F)	69	71	73	74	75	77
Initial Meter Outlet Temp., (°F)	68	69	71	71	73	73
Final Meter Inlet Temp., (°F)	71	73	74	75	77	78
Final Meter Outlet Temp., (°F)	69	71	71	73	73	74
Average Meter Temp., (°F)	69.3	71.0	72.3	73.3	74.5	75.5
Test Time (min.)	13	13	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.69	0.69	1.5	1.5	2.1	2.1
Barometric Pressure, ("Hg)	29.00	29.00	29.00	29.00	29.00	29.00
Ambient Temperature, (°F)	69	69	69	69	69	69
Pump Vacuum, ("Hg)	25	25	23	23	21	21
Standard Volume of the Meter, (Vmstd)	5.908	5.900	6.496	6.495	7.576	7.574
Standard Volume of Critical Orifice, (Vcrstd)	5.898	5.898	6.531	6.531	7.657	7.657
DGM Calibration Factor, (Y)	0.998	1.000	1.005	1.006	1.011	1.011
Difference from Average	-0.007	-0.005	0.000	0.000	0.006	0.006
Delta H@	1.830	1.824	1.916	1.913	1.949	1.946

Average Y =	1.005
Reference Yd =	1.011
Percent Difference =	-0.6
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.896

CDS-0454 DGM 3 point cal check against orifice
Per EM SOP-002

Pre/Post Test Console Calibration Check

Console ID	A167041	
Calibrated by	Initials	RF
	Date	7/6/11
Reviewed by	Initials	RvW
	Date	07-06-1

Orifice ID: Orifice K':	N-2 0.3598		N-3 0.5180		N-4 0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	370.262	375.977	381.699	388.476	395.264	403.176
Final Reading, (ft^3)	375.977	381.699	388.476	395.264	403.176	411.086
Difference, (ft^3)	5.715	5.722	6.777	6.788	7.912	7.910
Initial Meter Inlet Temp., (°F)	76	74	74	75	76	78
Initial Meter Outlet Temp., (°F)	75	73	71	73	72	73
Final Meter Inlet Temp., (°F)	74	74	75	76	78	79
Final Meter Outlet Temp., (°F)	73	71	73	72	73	74
Average Meter Temp., (°F)	74.5	73.0	73.3	74.0	74.8	76.0
Test Time (min.)	12	12	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.73	0.72	1.6	1.6	2.1	2.1
Barometric Pressure, ("Hg)	29.15	29.15	29.15	29.15	29.15	29.15
Ambient Temperature, (°F)	68	68	68	68	68	68
Pump Vacuum, ("Hg)	23	23	22	22	21	21
Standard Volume of the Meter, (Vmstd)	5.508	5.530	6.561	6.563	7.648	7.629
Standard Volume of Critical Orifice, (Vcrstd)	5.477	5.477	6.571	6.571	7.704	7.704
DGM Calibration Factor, (Y)	0.994	0.990	1.002	1.001	1.007	1.010
Difference from Average	-0.006	-0.010	0.001	0.000	0.006	0.009
Delta H@	1.90	1.88	2.03	2.02	1.93	1.93

Average Y =	1.001
Reference Yd =	0.990
Percent Difference =	1.1
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.950

CDS-0451 DGM 3 point cal check against orifice
Revision Date: January 2011

Pre/Post Test Console Calibration Check

Console ID		A167041
Calibrated by	Initials	RVW
	Date	8/12/11
Reviewed by	Initials	EDF
	Date	8-12-11

Orifice ID: Orifice K':	N-2 0.3598		N-3 0.5180		N-4 0.6073	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b
Initial Reading, (ft^3)	515.000	520.712	526.427	533.236	541.387	549.299
Final Reading, (ft^3)	520.712	526.427	533.236	541.387	549.299	557.237
Difference, (ft^3)	5.712	5.715	6.809	8.151	7.912	7.938
Initial Meter Inlet Temp., (°F)	71	72	72	71	73	76
Initial Meter Outlet Temp., (°F)	70	70	71	70	72	73
Final Meter Inlet Temp., (°F)	72	73	72	74	76	78
Final Meter Outlet Temp., (°F)	70	71	71	72	73	74
Average Meter Temp., (°F)	70.8	71.5	71.5	71.8	73.5	75.3
Test Time (min.)	12	12	10	12	10	10
Orifice Manometer Reading, ("H_2O)	0.73	0.73	1.6	1.6	2.1	2.1
Barometric Pressure, ("Hg)	29.17	29.17	29.17	29.17	29.17	29.17
Ambient Temperature, (°F)	70	70	70	70	70	70
Pump Vacuum, ("Hg)	24	24	22	22	21	21
Standard Volume of the Meter, (Vmstd)	5.548	5.543	6.619	7.919	7.671	7.672
Standard Volume of Critical Orifice, (Vcrstd)	5.471	5.471	6.563	7.876	7.695	7.695
DGM Calibration Factor, (Y)	0.986	0.987	0.992	0.995	1.003	1.003
Difference from Average	-0.008	-0.007	-0.003	0.000	0.009	0.009
Delta H@	1.923	1.921	2.040	2.039	1.945	1.939

Average Y =	0.994
Reference Yd =	0.990
Percent Difference =	0.4
Is Measured Y within 5% of Reference Yd?	TRUE
Average Delta H@ =	1.968

CDS-0452 DGM 3 point cal check against orifice
Revision Date: January 2011

Meter Box Full Test Calibration

Meter Box No: 0028-041410-1

Date of Calibration: 6/6/2010

Calibration Conducted by: Oleg Lavrov

Signature:

Meter Box Y_d: 1.0006

Meter Box ΔH@: 1.8790

Barometric Pressure: 29.28

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)			Time (min.)	Calibration Results	
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds} Net	Initial	Final	V_d Net	T_{is} In	T_{os} Out	T_{ds} Avg.	T_i In	T_o Out	T_d Avg.	Θ	Y_d	ΔH@
0.927	3.00	-1.80	1.0000	0.000	10.000	10.000	243.599	253.610	10.011	78.0	78.0	78.00	90.0	80.0	85.00	10.36	0.9998	1.8803
0.922	3.00	-1.80	1.0000	0.000	10.000	10.000	253.610	263.617	10.007	78.0	78.0	78.00	91.0	81.0	86.00	10.41	1.0020	1.8950
0.376	0.50	-1.20	1.0000	0.000	5.000	5.000	268.710	273.748	5.038	78.0	78.0	78.00	86.0	82.0	84.00	12.75	0.9992	1.8916
0.375	0.50	-1.20	1.0000	0.000	5.000	5.000	273.748	278.774	5.026	78.0	78.0	78.00	86.0	82.0	84.00	12.79	1.0016	1.9035
0.659	1.50	-1.50	1.0000	0.000	10.000	10.000	287.483	297.582	10.099	77.5	77.5	77.50	91.0	83.0	87.00	14.59	1.0001	1.8509
0.658	1.50	-1.50	1.0000	0.000	10.000	10.000	297.582	307.693	10.111	77.5	77.5	77.50	92.0	84.0	88.00	14.61	1.0008	1.8525
																Averages	1.00060	1.87898

Nomenclature

P_b	Barometric Pressure (in. Hg)
Q	Flow Rate (cfm)
ΔH	Orifice Pressure differential (in. H_2O)
ΔP	Inlet Pressure Differential (in. H_2O)
V_d	Gas Meter Volume - Dry (ft^3)
V_{ds}	Standard Meter Volume - Dry (ft^3)
T_d	Average Meter Box Temperature (°F)
T_o	Outlet Meter Box Temperature (°F)
T_{ds}	Average Standard Meter Temperature (°F)
Y_d	Meter Correction Factor (unitless), $Y_i \leq Y_{avg} \pm 0.02$
Y_{ds}	Standard Meter Correction Factor (unitless)
ΔH@	Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_2O) $\Delta H@_i \leq \Delta H@_{avg} \pm 0.2$
Θ	Duration of Run (minutes)

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + \Delta P/13.6}{P_b + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{(0.0319)(\Delta H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64(V_{ds})(P_b)}{(T_{ds} + 460)(\Theta)}$$

Vacuum Gauge

Standard (in.Hg)	Gauge (in.Hg)
4.9	5.0
9.8	10.0
14.4	15.0
19.2	20.0
24.1	25.0

CDS005C-Meter Full, April 2004a

CleanAir ENGINEERING

5 Point Console Dry Gas Meter Calibration

Console ID A161361

Calibrated by	Initials	DC
	Date	5/16/11
Reviewed by	Initials	EDF
	Date	5-23-11

Orifice ID:	N-1		N-2		N-3		N-4		N-5	
Orifice K':	0.2639		0.3598		0.5180		0.6073		0.7245	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b	Run #4a	Run #4b	Run #5a	Run #5b
Initial Reading, (ft^3)	122.907	128.133	169.645	175.392	106.600	114.756	133.693	141.651	149.630	160.110
Final Reading, (ft^3)	128.133	133.693	175.392	181.140	114.756	122.907	141.651	149.630	160.110	169.645
Difference, (ft^3)	5.226	5.560	5.747	5.748	8.156	8.151	7.958	7.979	10.480	9.535
Initial Meter Inlet Temp., (°F)	75	74	82	78	73	74	74	76	78	81
Initial Meter Outlet Temp., (°F)	72	72	74	75	71	71	73	73	74	74
Final Meter Inlet Temp., (°F)	74	74	78	77	74	76	76	78	81	82
Final Meter Outlet Temp., (°F)	72	72	75	75	71	72	73	74	74	74
Average Meter Temp., (°F)	73.3	73.0	77.3	76.3	72.3	73.3	74.0	75.3	76.8	77.8
Test Time (min.)	15	16	12	12	12	12	10	10	11	10
Orifice Manometer Reading, ("H_2O)	0.35	0.35	0.63	0.63	1.25	1.25	1.70	1.70	2.40	2.40
Barometric Pressure, ("Hg)	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
Ambient Temperature, (°F)	68	68	68	68	68	68	68	68	68	68
Pump Vacuum, ("Hg)	26	26	25	25	24	24	23	23	22	22
Standard Volume of the Meter, (V_{mstd})	5.061	5.387	5.528	5.539	7.931	7.912	7.722	7.724	10.135	9.204
Standard Volume of Critical Orifice, (V_{crstd})	5.039	5.375	5.496	5.496	7.913	7.913	7.731	7.731	10.145	9.222
Flow Rate (cfm)	0.337	0.337	0.461	0.462	0.661	0.659	0.772	0.772	0.921	0.920
DGM Calibration Factor, (Y)	0.996	0.998	0.994	0.992	0.998	1.000	1.001	1.001	1.001	1.002
Average DGM Calibration Factor (Y)	0.997		0.993		0.999		1.001		1.001	
Delta H@	1.692	1.692	1.628	1.631	1.578	1.575	1.560	1.556	1.545	1.542

Current Average Y =	0.998
Average Delta H@ =	1.600
All Individual Values within 2% of mean?	TRUE

Five-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161361

Calibrated by	Initials	DC	Reviewed by	Initials	EDF	Leak Check	(+)	OK
	Date	5-16-11		Date	5-23-11		(-)	OK

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B
Critical Orifice	Identification Number		N-1		N-2		N-3		N-4		N-5	
	K Factor		0.2639		0.3598		0.5180		0.6073		0.7245	
Subject DGM	DGM Initial Reading (ft^3)		122.907	128.133	169.645	175.392	106.600	114.756	133.693	141.651	149.630	160.110
	DGM Final Reading (ft^3)		128.133	133.693	175.392	181.140	114.756	122.907	141.651	149.630	160.110	169.645
	Temperature (°F)	Inlet Initial	75	74	82	78	73	74	74	76	78	81
		Outlet Initial	72	72	74	75	71	71	73	73	74	74
		Inlet Final	74	74	78	77	74	76	76	78	81	82
		Outlet Final	72	72	75	75	71	72	73	74	74	74
Test Time (minutes)			15	16	12	12	12	12	10	10	11	10
Orifice Manometer, ΔH (" H_2O)			0.35	0.35	0.63	0.63	1.25	1.25	1.7	1.7	2.4	2.4
Barometric Pressure (" Hg)			29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25	29.25
Ambient Temperature (°F)			68	68	68	68	68	68	68	68	68	68
Pump Vacuum (" Hg)			26	26	25	25	24	24	23	23	22	22

Notes:

5 Point Console Dry Gas Meter Calibration

Console ID A161398

Calibrated by	Initials	RF
	Date	6/9/11
Reviewed by	Initials	RJW
	Date	06-14-11

Expiration Date 8-Dec-11

Orifice ID:	N-1		N-2		N-3		N-4		N-5	
Orifice K':	0.2639		0.3598		0.5180		0.6073		0.7245	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b	Run #4a	Run #4b	Run #5a	Run #5b
Initial Reading, (ft^3)	641.957	647.078	652.214	657.839	628.575	635.250	663.482	671.264	679.067	688.351
Final Reading, (ft^3)	647.078	652.214	657.839	663.482	635.250	641.957	671.264	679.067	688.351	697.694
Difference, (ft^3)	5.121	5.136	5.625	5.643	6.675	6.707	7.782	7.803	9.284	9.343
Initial Meter Inlet Temp., (°F)	72	73	73	74	70	71	67	69	72	76
Initial Meter Outlet Temp., (°F)	71	71	72	72	70	70	67	68	69	71
Final Meter Inlet Temp., (°F)	73	73	74	75	71	73	69	72	76	78
Final Meter Outlet Temp., (°F)	71	72	72	73	70	71	68	69	71	72
Average Meter Temp., (°F)	71.8	72.3	72.8	73.5	70.3	71.3	67.8	69.5	72.0	74.3
Test Time (min.)	15	15	12	12	10	10	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.35	0.35	0.69	0.69	1.5	1.5	2.1	2.1	2.9	2.9
Barometric Pressure, ("Hg)	29.08	29.08	29.08	29.08	29.08	29.08	29.10	29.10	29.10	29.10
Ambient Temperature, (°F)	68	68	68	68	68	68	68	68	68	68
Pump Vacuum, ("Hg)	25	25	24	24	22	22	21	21	20	20
Standard Volume of the Meter, (V_{mstd})	4.945	4.954	5.426	5.435	6.482	6.501	7.609	7.605	9.024	9.043
Standard Volume of Critical Orifice, (V_{crstd})	5.010	5.010	5.464	5.464	6.556	6.556	7.691	7.691	9.175	9.175
Flow Rate (cfm)	0.330	0.330	0.452	0.453	0.648	0.650	0.761	0.760	0.902	0.904
DGM Calibration Factor, (Y)	1.013	1.011	1.007	1.005	1.011	1.008	1.011	1.011	1.017	1.015
Average DGM Calibration Factor (Y)	1.012		1.006		1.010		1.011		1.016	
Delta H@	1.706	1.705	1.809	1.807	1.915	1.911	1.964	1.957	1.898	1.890

Current Average Y =	1.011
Average Delta H@ =	1.856
All Individual Values within 2% of mean?	TRUE

CDS-04S DGM 5 point against orifice
Per EM SOP-002
Revision Date: May 2012

Five-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161398

Thermometer ID T3117

Calibrated by	Initials	DF	Reviewed by	Initials	KVW	Leak Check	(+)	ok
	Date	6/9/11		Date	06-14-11		(-)	ok

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B
Critical Orifice	Identification Number		N-1		N-2		N-3		N-4		N-5	
	K Factor		0.2639		0.3598		0.5180		0.6073		0.7245	
Subject DGM	DGM Initial Reading (ft³)		641.957	647.078	652.214	657.839	628.575	635.250	663.482	671.264	679.067	688.351
	DGM Final Reading (ft³)		647.078	652.214	657.839	663.482	635.250	641.957	671.264	679.067	688.351	697.694
	Temperature (°F)	Inlet Initial	72	73	73	74	70	71	67	69	72	76
		Outlet Initial	71	71	72	72	70	70	67	68	69	71
		Inlet Final	73	73	74	75	71	73	69	72	76	78
		Outlet Final	71	72	72	73	70	71	68	69	71	72
Test Time (minutes)			15	15	12	12	10	10	10	10	10	10
Orifice Manometer, ΔH (" H₂O)			0.35	0.35	0.69	0.69	1.5	1.5	2.1	2.1	2.9	2.9
Barometric Pressure (" Hg)			29.08	29.08	29.08	29.08	29.08	29.08	29.10	29.10	29.10	29.10
Ambient Temperature (°F)			68	68	68	68	68	68	68	68	68	68
Pump Vacuum (" Hg)			25	25	24	24	22	22	21	21	20	20

Notes:

5 Point Console Dry Gas Meter Calibration

Console ID A167041

Calibrated by	Initials	DC
	Date	5/18/11
Reviewed by	Initials	EDF
	Date	5-20-11

Orifice ID:	N-1		N-2		N-3		N-4		N-5	
Orifice K':	0.2639		0.3598		0.5180		0.6073		0.7245	
Dry Gas Meter	Run #1a	Run #1b	Run #2a	Run #2b	Run #3a	Run #3b	Run #4a	Run #4b	Run #5a	Run #5b
Initial Reading, (ft^3)	925.700	930.878	936.087	941.800	912.100	918.890	947.505	955.450	963.357	972.807
Final Reading, (ft^3)	930.878	936.087	941.800	947.505	918.890	925.700	955.450	963.357	972.807	982.253
Difference, (ft^3)	5.178	5.209	5.713	5.705	6.790	6.810	7.945	7.907	9.450	9.446
Initial Meter Inlet Temp., (°F)	69	69	69	70	68	68	67	66	69	72
Initial Meter Outlet Temp., (°F)	66	67	67	66	66	65	68	65	66	67
Final Meter Inlet Temp., (°F)	69	69	70	70	68	69	66	69	72	75
Final Meter Outlet Temp., (°F)	67	67	66	68	65	66	65	66	66	68
Average Meter Temp., (°F)	67.8	68.0	68.0	68.5	66.8	67.0	66.5	66.5	68.3	70.5
Test Time (min.)	15	15	12	12	10	10	10	10	10	10
Orifice Manometer Reading, ("H_2O)	0.37	0.37	0.72	0.72	1.55	1.55	2.10	2.10	3.00	3.00
Barometric Pressure, ("Hg)	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
Ambient Temperature, (°F)	67	67	67	67	67	67	67	67	67	67
Pump Vacuum, ("Hg)	24	24	23	23	21	21	20	20	19	19
Standard Volume of the Meter, (V_{mstd})	5.015	5.043	5.536	5.523	6.609	6.625	7.747	7.710	9.205	9.162
Standard Volume of Critical Orifice, (V_{crstd})	4.992	4.992	5.445	5.445	6.532	6.532	7.659	7.659	9.137	9.137
Flow Rate (cfm)	0.334	0.336	0.461	0.460	0.661	0.663	0.775	0.771	0.921	0.916
DGM Calibration Factor, (Y)	0.995	0.990	0.984	0.986	0.988	0.986	0.989	0.993	0.993	0.997
Average DGM Calibration Factor (Y)	0.993		0.985		0.987		0.991		0.995	
Delta H@	1.822	1.822	1.910	1.909	1.997	1.996	1.975	1.975	1.985	1.977

Current Average Y =	0.990
Average Delta H@ =	1.937
All Individual Values within 2% of mean?	TRUE

CDS-045 DGM 5 point against orifice
Revision Date: January 2011

Five-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A167041

Calibrated by	Initials	DC	Reviewed by	Initials	EDF	Leak Check (+)	ok
	Date	05-18-11		Date	5-20-11	(-)	ok

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B
Critical Orifice	Identification Number		N-1		N-2		N-3		N-4		N-5	
	K Factor		0.2639		0.3598		0.5180		0.6093		0.7245	
Subject DGM	DGM Initial Reading (ft³)		925.700	930.878	936.087	941.800	912.100	918.890	947.505	955.450	963.357	972.807
	DGM Final Reading (ft³)		930.878	936.087	941.800	947.505	918.890	925.700	955.450	963.357	972.807	982.253
	Temperature (°F)	Inlet Initial	69	69	69	70	68	68	67	66	69	72
		Outlet Initial	66	67	67	66	66	65	68	65	66	67
		Inlet Final	69	69	70	70	68	69	66	69	72	75
		Outlet Final	67	67	66	68	65	66	65	66	66	68
Test Time (minutes)			15	15	12	12	10	10	10	10	10	10
Orifice Manometer, ΔH (" H₂O)			0.37	0.37	0.72	0.72	1.55	1.55	2.1	2.1	3.0	3.0
Barometric Pressure (" Hg)			28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
Ambient Temperature (°F)			67	67	67	67	67	67	67	67	67	67
Pump Vacuum (" Hg)			24	24	23	23	21	21	20	20	19	19

Notes:

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Console ID A161361

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	RWO
	Date	7/8/2011		Date	07-12-11

			Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1			L-2			L-4		
	K Factor		0.3834			0.8001			1.5109		
	Nominal Flow Rate (l/min)		0.5			1.0			2.0		
DGM being Calibrated	Volume (ft^3)	Initial	693.147	693.508	693.860	690.012	690.375	690.739	691.106	691.777	692.473
		Final	693.508	693.860	694.202	690.375	690.739	691.106	691.777	692.473	693.147
	T_{meter} (°F)	Inlet Initial	73	73	73	69	70	72	72	72	73
		Outlet Initial	73	73	73	69	70	72	72	72	73
		Inlet Final	73	73	73	70	71	72	72	72	73
		Outlet Final	73	73	73	70	71	72	72	72	73
	Meter Pressure (H_2O)		0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Test Conditions	Pump Vacuum ("Hg)		28	28	28	27.5	27.5	27.5	27.5	27.5	27
	P_{bar} ("Hg)		29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10
	$T_{ambient}$ (°F)		68	68	68	68	68	68	68	68	68
	Test Duration (minutes)		20	20	20	10	10	10	10	10	10
Calculated Values	Meter Volume (DGM) (ft^3)		0.361	0.352	0.342	0.363	0.364	0.367	0.671	0.696	0.674
	Average DGM Temp (°F)		73.00	73.00	73.00	69.50	70.50	72.00	72.00	72.00	73.00
	Std Volume (DGM) (dsL)		9.85	9.60	9.33	9.97	9.97	10.03	18.33	19.02	18.38
	Std Volume (orifice) (dsL)		9.71	9.71	9.71	10.13	10.13	10.13	19.13	19.13	19.13
	Flow rate (cf/min)		0.018	0.018	0.017	0.036	0.036	0.037	0.067	0.070	0.067
	Flow rate (l/min)		0.511	0.498	0.484	1.027	1.030	1.039	1.899	1.970	1.907
	DGMCF, Y		0.986	1.012	1.041	1.017	1.016	1.010	1.044	1.006	1.041
	Average DGMCF, Y_d		1.013			1.014			1.030		
			Acceptable			Acceptable			Acceptable		

Acceptance Criteria:

1: Each individual Y value must be within 4% of the average Y value

2: Average Y value must be between 0.90 and 1.1

CDS-24sa DGM - Low Flow
per EM SOP-005
Revision Date June 2011

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Per EM SOP-005

Console ID	Calibrated by		Reviewed by	
A161361		Initials RF Date 7/8/11		Initials RW Date 07-12-11

				Run 1A	Run 1B	Run 1C	Run 2A	Run 2B	Run 2C	Run 3A	Run 3B	Run 3C
DGM Calibration	Critical Orifice		Identification Number	L-1	L-1	L-1	L-2	L-2	L-2	L-4	L-4	L-4
			K Factor	0.3834	0.3834	0.3834	0.8001	0.8001	0.8001	1.5109	1.5109	1.5109
	Subject DGM		DGM Initial Reading (ft³)	693.147	693.508	693.860	690.012	690.375	690.739	691.106	691.777	692.473
			DGM Final Reading (ft³)	693.508	693.860	694.202	690.375	690.739	691.106	691.777	692.473	693.147
		Temperature (°F)	Inlet Initial	73	73	73	69	70	72	72	72	73
			Outlet Initial	73	73	73	69	70	72	72	72	73
			Inlet Final	73	73	73	70	71	72	72	72	73
			Outlet Final	73	73	73	70	71	72	72	72	73
	Test Time (minutes)			20	20	20	10	10	10	10	10	10
	Orifice Manometer, ΔH (" H₂O)			0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	Barometric Pressure (" Hg)			29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10
	Ambient Temperature (°F)			68	68	68	68	68	68	68	68	68
	Pump Vacuum (" Hg)			28	28	28	27.5	27.5	27.5	27.5	27.5	27

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	1
3	165	165	0
7	341	342	1
15	692	693	1

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161361

Calibrated by	Initials	RvW	Reviewed by	Initials	DC	Leak Check	(+)	OK
	Date	07-04-11		Date	7/5/11		(-)	OK

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice	Identification Number		N-2		N-3		N-4	
		K Factor		0.3598		0.518		0.6073	
	Subject DGM	DGM Initial Reading (ft^3)		649.000	654.659	660.365	667.155	673.991	681.943
		DGM Final Reading (ft^3)		654.659	660.365	667.155	673.991	681.943	689.923
		Temperature (°F)	Inlet Initial	71	73	75	77	80	82
			Outlet Initial	69	70	71	73	74	75
			Inlet Final	73	75	77	80	82	84
			Outlet Final	70	71	73	74	75	76
	Test Time (minutes)			12	12	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.61	0.61	1.3	1.3	1.7	1.7
	Barometric Pressure (" Hg)			29.15	29.15	29.15	29.15	29.15	29.15
	Ambient Temperature (°F)			70	70	70	70	70	70
	Pump Vacuum (" Hg)			25	25	24	24	23	23

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	342	1
15	692	693	1

CDS-05 DGM Calibration, 3 point vs orifices
Per EM SOP-003
Revision Date: May 2011

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161361

Calibrated by	Initials	RW	Reviewed by	Initials	EDF	Leak Check	(+) OK
	Date	08-13-11		Date	8-15-11		(-) OK

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice	Identification Number		N-2		N-3		N-4	
		K Factor		0.3598		0.518		0.6073	
	Subject DGM	DGM Initial Reading (ft^3)		746.000	751.652	757.315	764.095	770.885	779.598
		DGM Final Reading (ft^3)		751.652	757.315	764.095	770.885	779.598	788.311
		Temperature (°F)	Inlet Initial	76	76	76	78	79	81
			Outlet Initial	75	74	75	75	76	76
			Inlet Final	77	77	79	80	81	82
			Outlet Final	75	76	76	76	76	76
	Test Time (minutes)			12	12	10	10	11	11
	Orifice Manometer, ΔH (" H_2O)			0.62	0.62	1.3	1.3	1.7	1.7
	Barometric Pressure (" Hg)			29.20	29.20	29.20	29.20	29.20	29.20
	Ambient Temperature (°F)			70	70	70	70	70	70
	Pump Vacuum (" Hg)			26	26	25	25	24	24

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550 Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	164	-1
7	341	341	0
15	692	694	2

CDS-05 DGM Calibration, 3 point vs orifices
Per EM SOP-003
Revision Date: May 2011

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Per EM SOP-005

Console ID A161398	Calibrated by	Initials RF Date 7/7/11	Reviewed by	Initials Rw Date 07-17-11

				Run 1A	Run 1B	Run 1C	Run 2A	Run 2B	Run 2C	Run 3A	Run 3B	Run 3C
DGM Calibration	Critical Orifice	Identification Number		L-1	L-1	L-1	L2	L-2	L-2	L-4	L-4	L-4
		K Factor		0.3834	0.3834	0.3834	0.8001	0.8001	0.8001	1.5109 ~~[illegible]~~ [illegible]	1.5109	1.5109
	Subject DGM	DGM Initial Reading (ft³)		013.297	013.635	013.978	010.184	010.544	010.898	011.256	011.944	012.607
		DGM Final Reading (ft³)		013.634	013.978	014.336	010.544	010.898	011.256	011.944	012.607	013.297
		Temperature (°F)	Inlet Initial	75	76	76	70	71	72	73	74	75
			Outlet Initial	75	75	75	70	71	72	73	73	74
			Inlet Final	76	76	76	71	72	73	74	75	75
			Outlet Final	75	75	75	71	72	73	73	74	75
	Test Time (minutes)			20	20	20	10	10	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	Barometric Pressure (" Hg)			29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18
	Ambient Temperature (°F)			68	68	68	68	68	68	68	68	68
	Pump Vacuum (" Hg)			26.5	26.5	26.5	26.5	26.5	26.5	26	26	26

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID 53117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178560

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	342	1
15	692	695	3

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Console ID A161398

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	Rvw
	Date	7/7/2011		Date	07-12-11

			Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1			L-2			L-4		
	K Factor		0.3834			0.8001			1.5109		
	Nominal Flow Rate (l/min)		0.5			1.0			2.0		
DGM being Calibrated	Volume (ft^3)	Initial	13.297	13.635	13.978	10.184	10.544	10.898	11.256	11.944	12.607
		Final	13.634	13.978	14.336	10.544	10.898	11.256	11.944	12.607	13.297
	T_{meter} (°F)	Inlet Initial	75	76	76	70	71	72	73	74	75
		Outlet Initial	75	75	75	70	71	72	73	73	74
		Inlet Final	76	76	76	71	72	73	74	75	75
		Outlet Final	75	75	75	71	72	73	73	74	75
	Meter Pressure (H_2O)		0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Test Conditions	Pump Vacuum ("Hg)		26.5	26.5	26.5	26.5	26.5	26.5	26	26	26
	P_{bar} ("Hg)		29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18
	$T_{ambient}$ (°F)		68	68	68	68	68	68	68	68	68
	Test Duration (minutes)		20	20	20	10	10	10	10	10	10
Calculated Values	Meter Volume (DGM) (ft^3)		0.337	0.343	0.358	0.36	0.354	0.358	0.688	0.663	0.69
	Average DGM Temp (°F)		75.25	75.50	75.50	70.50	71.50	72.50	73.25	74.00	74.75
	Std Volume (DGM) (dsL)		9.18	9.34	9.74	9.89	9.71	9.80	18.81	18.10	18.81
	Std Volume (orifice) (dsL)		9.74	9.74	9.74	10.16	10.16	10.16	19.19	19.19	19.19
	Flow rate (cf/min)		0.017	0.017	0.018	0.036	0.035	0.036	0.069	0.066	0.069
	Flow rate (l/min)		0.477	0.485	0.507	1.019	1.002	1.013	1.947	1.876	1.953
	DGMCF, Y		1.061	1.043	0.999	1.027	1.047	1.037	1.020	1.060	1.020
	Average DGMCF, Y_d		1.034			1.037			1.034		
			Acceptable			Acceptable			Acceptable		

Acceptance Criteria:

1: Each individual Y value must be within 4% of the average Y value

2: Average Y value must be between 0.90 and 1.1

CDS-24sa DGM - Low Flow
per EM SOP-005
Revision Date June 2011

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161 348

Calibrated by	Initials	BF	Reviewed by	Initials	RVW	Leak Check	(+)	ok
	Date	7/6/11		Date	07-06-11		(-)	ok

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice		Identification Number	N-2		N-3		N-4	
			K Factor	0.3598		0.5180		0.6073	
	Subject DGM		DGM Initial Reading (ft³)	969.563	975.194	980.838	987.594	994.359	1002.249
			DGM Final Reading (ft³)	975.194	980.838	987.594	994.359	1002.249	1010.177
		Temperature (°F)	Inlet Initial	72	73	75	77	78	80
			Outlet Initial	72	72	73	74	75	76
			Inlet Final	73	75	77	78	80	81
			Outlet Final	72	73	74	75	76	77
	Test Time (minutes)			12	12	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.68	0.69	1.5	1.5	2.1	2.1
	Barometric Pressure (" Hg)			29.20	29.20	29.20	29.20	29.20	29.20
	Ambient Temperature (°F)			68	68	68	68	68	68
	Pump Vacuum (" Hg)			24	24	22.5	22.5	21.5	21.5

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J3117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	342	1
15	692	695	3

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A161398

Calibrated by	Initials	RWW	Reviewed by	Initials	EDF	Leak Check	(+)	OK
	Date	08-10-11		Date	8/11/11		(-)	OK

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice		Identification Number	N-2		N-3		N-4	
			K Factor	0.3598		0.518		0.6073	
	Subject DGM		DGM Initial Reading (ft^3)	50.000	56.102	62.215	68.948	75.693	83.567
			DGM Final Reading (ft^3)	56.102	62.215	68.948	75.693	83.567	91.453
		Temperature (°F)	Inlet Initial	69	71	73	74	75	77
			Outlet Initial	68	69	71	71	73	73
			Inlet Final	71	73	74	75	77	78
			Outlet Final	69	71	71	73	73	74
	Test Time (minutes)			13	13	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.69	0.69	1.5	1.5	2.1	2.1
	Barometric Pressure (" Hg)			29.00	29.00	29.00	29.00	29.00	29.00
	Ambient Temperature (°F)			69	69	69	69	69	69
	Pump Vacuum (" Hg)			25	25	23	23	21	21

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	77	0
3	165	165	0
7	341	342	1
15	692	694	2

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Console ID A167041

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	Rvw
	Date	7/7/2011		Date	07-12-11

			Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1			L-2			L-4		
	K Factor		0.3834			0.8001			1.5109		
	Nominal Flow Rate (l/min)		0.5			1.0			2.0		
DGM being Calibrated	Volume (ft^3)	Initial	414.234	414.585	414.935	411.093	411.426	411.832	412.198	412.866	413.559
		Final	414.585	414.935	415.275	411.462	411.812	412.198	412.866	413.559	414.234
	T_{meter} (°F)	Inlet Initial	71	71	72	69	70	70	71	71	72
		Outlet Initial	71	71	71	69	69	69	70	70	71
		Inlet Final	71	72	72	70	70	71	71	72	72
		Outlet Final	71	71	71	69	69	70	70	71	71
	Meter Pressure (H_2O)		0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Test Conditions	Pump Vacuum ("Hg)		25	25	25	24.5	24.5	24.5	24	24.5	24
	P_{bar} ("Hg)		29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18
	$T_{ambient}$ (°F)		68	68	68	68	68	68	68	68	68
	Test Duration (minutes)		20	20	20	10	10	10	10	10	10
Calculated Values	Meter Volume (DGM) (ft^3)		0.351	0.35	0.34	0.369	0.386	0.366	0.668	0.693	0.675
	Average DGM Temp (°F)		71.00	71.25	71.50	69.25	69.50	70.00	70.50	71.00	71.50
	Std Volume (DGM) (dsL)		9.64	9.60	9.32	10.16	10.63	10.07	18.35	19.02	18.51
	Std Volume (orifice) (dsL)		9.74	9.74	9.74	10.16	10.16	10.16	19.19	19.19	19.19
	Flow rate (cf/min)		0.018	0.018	0.017	0.037	0.039	0.037	0.067	0.069	0.067
	Flow rate (l/min)		0.497	0.495	0.481	1.044	1.092	1.036	1.890	1.961	1.910
	DGMCF, Y		1.011	1.014	1.044	1.000	0.956	1.009	1.045	1.009	1.036
	Average DGMCF, Y_d		1.023			0.988			1.030		
			Acceptable			Acceptable			Acceptable		

Acceptance Criteria:

1: Each individual Y value must be within 4% of the average Y value

2: Average Y value must be between 0.90 and 1.1

CDS-24sa DGM - Low Flow
per EM SOP-005
Revision Date June 2011

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A167091

Calibrated by	Initials	FF	Reviewed by	Initials	RVW	Leak Check	(+) ok
	Date	7/6/11		Date	07-06-11		(-) ok

DGM Calibration				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
	Critical Orifice	Identification Number		N-2		N-3		N-4	
		K Factor		0.3598		0.5180		0.6073	
	Subject DGM	DGM Initial Reading (ft³)		370.262	375.977	381.699	388.476	395.264	403.176
		DGM Final Reading (ft³)		375.977	381.699	388.476	395.264	403.176	411.086
		Temperature (°F)	Inlet Initial	76	74	74	75	76	78
			Outlet Initial	75	73	71	73	72	73
			Inlet Final	74	74	75	76	78	79
			Outlet Final	73	71	73	72	73	74
	Test Time (minutes)			12	12	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.73	0.72	1.6	1.6	2.1	2.1
	Barometric Pressure (" Hg)			29.15	29.15	29.15	29.15	29.15	29.15
	Ambient Temperature (°F)			68	68	68	68	68	68
	Pump Vacuum (" Hg)			23	23	22	22	21	21

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J3117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	164	-1
7	341	341	0
15	692	694	2

Three-Point Dry Gas Meter Calibration for Low-Flow Applications Using Critical Orifices

Per EM SOP-005

Console ID A167041	Calibrated by	Initials RF Date 7/7/11	Reviewed by	Initials RVW Date 07-12-11	

				Run 1A	Run 1B	Run 1C	Run 2A	Run 2B	Run 2C	Run 3A	Run 3B	Run 3C
DGM Calibration	Critical Orifice		Identification Number	L-1	L-1	L-1	L-2	L-2	L-2	L-4	L-4	L-4
			K Factor	0.3834	0.3834	0.3834	0.8001	0.8001	0.8001	1.5109	1.5109	1.5109
	Subject DGM		DGM Initial Reading (ft³)	414.234	414.585	414.935	411.093	411.426	411.832	412.198	412.866	413.559
			DGM Final Reading (ft³)	414.585	414.935	415.275	411.462	RF 7/7/11 ~~411.8[illegible]2~~ 411.832	412.198	412.866	413.554	414.234
		Temperature (°F)	Inlet Initial	71	71	72	69	70	70	71	71	72
			Outlet Initial	71	71	71	69	69	69	70	70	71
			Inlet Final	71	72	72	70	70	71	71	72	72
			Outlet Final	71	71	71	69	69	70	70	71	71
	Test Time (minutes)			20	20	20	10	10	10	10	10	10
	Orifice Manometer, ΔH (" H_2O)			0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	Barometric Pressure (" Hg)			29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18	29.18
	Ambient Temperature (°F)			68	68	68	RF 7/7 ~~29.1~~ 68	68	68	68	68	68
	Pump Vacuum (" Hg)			25	25	25	24.5	24.5	24.5	24	24.5	24

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID 33117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	164	-1
7	341	341	0
15	692	694	2

Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID A167041

Calibrated by	Initials	RVW	Reviewed by	Initials	EDF
	Date	08-11-11		Date	8-12-11

Leak Check	(+)	OK
	(-)	OK

				Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	Critical Orifice		Identification Number	N-2		N-3		N-4	
			K Factor	0.3598		0.518		0.6073	
	Subject DGM		DGM Initial Reading (ft³)	515.000	520.712	526.427	533.236	541.387	549.299
			DGM Final Reading (ft³)	520.712	526.427	533.236	541.387	549.299	557.237
		Temperature (°F)	Inlet Initial	71	72	72	71	73	76
			Outlet Initial	70	70	71	70	72	73
			Inlet Final	72	73	72	74	76	78
			Outlet Final	70	71	71	72	73	74
			Test Time (minutes)	12	12	10	12	10	
			Orifice Manometer, ΔH (" H₂O)	0.73	0.73	1.6	1.6	2.1	2.1
			Barometric Pressure (" Hg)	29.17	29.17	29.17	29.17	29.17	29.17
			Ambient Temperature (°F)	70	70	70	70	70	70
			Pump Vacuum (" Hg)	24	24	22	22	21	21

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F)	32
Readout Reading (°F)	32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	343	2
15	692	694	2

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A161361

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	FDF
	Date	8/12/2011		Date	8-12-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-1		
		K Factor	0.3834		
		Nominal Flow Rate (l/min)	0.5		
DGM being Calibrated	Volume (ft^3)	Initial	741.500	741.848	742.185
		Final	741.848	742.185	742.532
	T_{meter} (°F)	Inlet Initial	74	75	75
		Outlet Initial	73	74	74
		Inlet Final	75	75	76
		Outlet Final	74	74	74
		Orifice Manometer ("H$_2$O)	0.01	0.01	0.01
Test Conditions		Pump Vacuum ("Hg)	28	28	28
		Barometric Pressure ("Hg)	29.10	29.10	29.10
		Ambient Temperature (°F)	70	70	70
		Test Duration (minutes)	20	20	20
Calculated Values		Meter Volume (DGM) (ft^3)	0.348	0.337	0.347
		Average DGM Temp (°F)	74	74.5	74.75
		Std Volume (DGM) (dsL)	9.47	9.16	9.43
		Std Volume (orifice) (dsL)	9.69	9.69	9.69
		DGMCF, Y	1.023	1.058	1.028
		Average DGMCF, Y_d	1.036		
		Previous DGMCF, Y_{ref}	1.013		
		Average DGMCF/Previous DGMCF	1.023		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

CDS-24sb DGM Low-Flow Post Cal
per EM SOP-005
Revision Date: June 2011

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A161361

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	EOF
	Date	8/13/2011		Date	8-15-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-2		
		K Factor	0.8001		
		Nominal Flow Rate (l/min)	1.0		
DGM being Calibrated	Volume (ft^3)	Initial	743.400	744.142	744.886
		Final	744.142	744.886	745.625
	T_{meter} (°F)	Inlet Initial	72	74	75
		Outlet Initial	71	73	74
		Inlet Final	74	75	76
		Outlet Final	73	74	75
		Orifice Manometer ("H_2O)	0.01	0.01	0.01
Test Conditions		Pump Vacuum ("Hg)	28	28	28
		Barometric Pressure ("Hg)	29.21	29.21	29.21
		Ambient Temperature (°F)	70	70	70
		Test Duration (minutes)	20	20	20
Calculated Values		Meter Volume (DGM) (ft^3)	0.742	0.744	0.739
		Average DGM Temp (°F)	72.5	74	75
		Std Volume (DGM) (dsL)	20.33	20.33	20.15
		Std Volume (orifice) (dsL)	20.30	20.30	20.30
		DGMCF, Y	0.999	0.999	1.007
		Average DGMCF, Y_d	1.002		
		Previous DGMCF, Y_{ref}	1.014		
		Average DGMCF/Previous DGMCF	0.988		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

CDS-24sb DGM Low-Flow Post Cal
per EM SOP-005
Revision Date: June 2011

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A161361	Calibrated by	Initials RW Date 08-12-11	Reviewed by	Initials EOF Date 8-12-11	

				Run 1A	Run 1B	Run 1C
DGM Calibration	Critical Orifice		Identification Number	L-1	L-1	L-1
			K Factor	0.3834	0.3834	0.3834
	Subject DGM		DGM Initial Reading (ft³)	741.500	741.848	742.185
			DGM Final Reading (ft³)	741.848	742.185	~~742.832~~ 742.532 RW 08-12-11
		Temperature (°F)	Inlet Initial	74	75	75
			Outlet Initial	73	74	74
			Inlet Final	75	75	76
			Outlet Final	74	74	74
	Orifice Manometer, ΔH (" H₂O)			0.01	0.01	0.01
	Pump Vacuum (" Hg)			28	28	28
	Barometric Pressure (" Hg)			29.10	29.10	29.10
	Ambient Temperature (°F)			70	70	70
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	77	0
3	165	165	0
7	341	342	1
15	692	695	3

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A161361	Calibrated by	Initials RvD Date 08-13-11	Reviewed by	Initials EDF Date 8-15-11

				Run 1A	Run 1B	Run 1C
DGM Calibration	Critical Orifice		Identification Number	L-2	L-2	L-2
			K Factor	0.8001	0.8001	0.8001
	Subject DGM		DGM Initial Reading (ft³)	743.400	744.142	744.886
			DGM Final Reading (ft³)	744.147	744.886	745.625
		Temperature (°F)	Inlet Initial	72	74	75
			Outlet Initial	71	73	74
			Inlet Final	74	75	76
			Outlet Final	73	74	75
	Orifice Manometer, ΔH (" H₂O)			0.01	0.01	0.01
	Pump Vacuum (" Hg)			28	28	28
	Barometric Pressure (" Hg)			29.21	29.21	29.21
	Ambient Temperature (°F)			70	70	70
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID IT31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	342	1
15	692	694	2

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A161398

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	EDF
	Date	8/10/2011		Date	8/11/11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-1		
		K Factor	0.3834		
		Nominal Flow Rate (l/min)	0.5		
DGM being Calibrated	Volume (ft^3)	Initial	45.000	45.350	45.708
		Final	45.350	45.708	46.053
	T_{meter} (°F)	Inlet Initial	73	73	73
		Outlet Initial	72	72	72
		Inlet Final	73	73	74
		Outlet Final	72	72	72
		Orifice Manometer ("H_2O)	0.01	0.01	0.01
Test Conditions		Pump Vacuum ("Hg)	27	27	27
		Barometric Pressure ("Hg)	29.05	29.05	29.05
		Ambient Temperature (°F)	69	69	69
		Test Duration (minutes)	20	20	20
Calculated Values		Meter Volume (DGM) (ft^3)	0.35	0.358	0.345
		Average DGM Temp (°F)	72.5	72.5	72.75
		Std Volume (DGM) (dsL)	9.54	9.76	9.40
		Std Volume (orifice) (dsL)	9.69	9.69	9.69
		DGMCF, Y	1.015	0.993	1.031
		Average DGMCF, Y_d	1.013		
		Previous DGMCF, Y_{ref}	1.034		
		Average DGMCF/Previous DGMCF	0.980		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

CDS-24sb DGM Low-Flow Post Cal
per EM SOP-005
Revision Date: June 2011

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A161398	Calibrated by	Initials RwD Date 08-10-11	Reviewed by	Initials EDF Date 8/11/11

DGM Calibration				Run 1A	Run 1B	Run 1C
	Critical Orifice	Identification Number		L-1	L-1	L-1
		K Factor		0.3834	0.3834	0.3834
	Subject DGM	DGM Initial Reading (ft³)		45.000	45.350	45.708
		DGM Final Reading (ft³)		45.350	45.708	46.053
		Temperature (°F)	Inlet Initial	73	73	73
			Outlet Initial	72	72	72
			Inlet Final	73	73	74
			Outlet Final	72	72	72
	Orifice Manometer, ΔH (" H₂O)			0.01	0.01	0.01
	Pump Vacuum (" Hg)			27	27	27
	Barometric Pressure (" Hg)			29.05	29.05	29.05
	Ambient Temperature (°F)			69	69	69
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	342	1
15	692	695	3

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A167041

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	FQF
	Date	8/11/2011		Date	8-11-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
	Nominal Flow Rate (l/min)		0.5		
DGM being Calibrated	Volume (ft^3)	Initial	500.000	500.347	500.705
		Final	500.347	500.705	501.052
	T_{meter} (°F)	Inlet Initial	73	74	74
		Outlet Initial	69	69	69
		Inlet Final	74	74	75
		Outlet Final	69	69	70
	Orifice Manometer ('H$_2$O)		0.01	0.01	0.01
Test Conditions	Pump Vacuum ("Hg)		26	26	26
	Barometric Pressure ("Hg)		29.08	29.08	29.08
	Ambient Temperature (°F)		70	70	70
	Test Duration (minutes)		20	20	20
Calculated Values	Meter Volume (DGM) (ft^3)		0.347	0.358	0.347
	Average DGM Temp (°F)		71.25	71.5	72
	Std Volume (DGM) (dsL)		9.49	9.78	9.47
	Std Volume (orifice) (dsL)		9.69	9.69	9.69
	DGMCF, Y		1.021	0.990	1.022
	Average DGMCF, Y_d		1.011		
	Previous DGMCF, Y_{ref}		1.023		
	Average DGMCF/Previous DGMCF		0.988		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

CDS-24sb DGM Low-Flow Post Cal
per EM SOP-005
Revision Date: June 2011

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A167041

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	EOF
	Date	8/11/2011		Date	8-11-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-2		
	K Factor		0.8001		
	Nominal Flow Rate (l/min)		1.0		
DGM being Calibrated	Volume (ft^3)	Initial	501.052	501.790	502.533
		Final	501.790	502.533	503.272
	T_{meter} (°F)	Inlet Initial	74	75	75
		Outlet Initial	70	72	72
		Inlet Final	75	75	75
		Outlet Final	72	72	72
	Orifice Manometer ('H_2O)		0.02	0.02	0.02
Test Conditions	Pump Vacuum ("Hg)		26	26	26
	Barometric Pressure ("Hg)		29.05	29.05	29.05
	Ambient Temperature (°F)		70	70	70
	Test Duration (minutes)		20	20	20
Calculated Values	Meter Volume (DGM) (ft^3)		0.738	0.743	0.739
	Average DGM Temp (°F)		72.75	73.5	73.5
	Std Volume (DGM) (dsL)		20.10	20.21	20.10
	Std Volume (orifice) (dsL)		20.19	20.19	20.19
	DGMCF, Y		1.004	0.999	1.005
	Average DGMCF, Y_d		1.003		
	Previous DGMCF, Y_{ref}		0.988		
	Average DGMCF/Previous DGMCF		1.015		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

CDS-24sb DGM Low-Flow Post Cal
per EM SOP-005
Revision Date: June 2011

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Console ID A167041

Thermometer ID J31117

DGM Calibration

Calibrated By	Initials	RVW	Reviewed By	Initials	EDF
	Date	8/15/2011		Date	8-15-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-4		
		K Factor	1.5109		
		Nominal Flow Rate (l/min)	2.0		
DGM being Calibrated	Volume (ft^3)	Initial	558.500	559.875	561.255
		Final	559.875	561.255	562.639
	T_{meter} (°F)	Inlet Initial	73	76	78
		Outlet Initial	69	73	73
		Inlet Final	76	78	79
		Outlet Final	73	73	74
		Orifice Manometer ('H$_2$O)	0.02	0.02	0.02
Test Conditions		Pump Vacuum ("Hg)	26	26	26
		Barometric Pressure ("Hg)	29.15	29.15	29.15
		Ambient Temperature (°F)	70	70	70
		Test Duration (minutes)	20	20	20
Calculated Values		Meter Volume (DGM) (ft^3)	1.375	1.38	1.384
		Average DGM Temp (°F)	72.75	75	76
		Std Volume (DGM) (dsL)	37.58	37.56	37.60
		Std Volume (orifice) (dsL)	38.26	38.26	38.26
		DGMCF, Y	1.018	1.019	1.018
		Average DGMCF, Y_d	1.018		
		Previous DGMCF, Y_{ref}	1.030		
		Average DGMCF/Previous DGMCF	0.988		
			Acceptable		

Acceptance Criteria: 1: Average Y value (Y_d) must be within 5% of the pre-test average Y value (Y_{ref})

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A167041	Calibrated by	Initials RW Date 08-11-11	Reviewed by	Initials EDF Date 8-11-11

				Run 1A	Run 1B	Run 1C
DGM Calibration	Critical Orifice	Identification Number		L-1	L-1	L-1
		K Factor		0.3834	0.3834	0.3834
	Subject DGM	DGM Initial Reading (ft³)		500.000	500.347	500.705
		DGM Final Reading (ft³)		500.347	500.705	501.052
		Temperature (°F)	Inlet Initial	73	74	74
			Outlet Initial	69	69	69
			Inlet Final	74	74	75
			Outlet Final	69	69	70
	Orifice Manometer, ΔH (" H_2O)			0.01	0.01	0.01
	Pump Vacuum (" Hg)			26	26	26
	Barometric Pressure (" Hg)			29.08	29.08	29.08
	Ambient Temperature (°F)			70	70	70
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	343	2
15	692	696	4

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A167041	Calibrated by	Initials RVD Date 08-11-11	Reviewed by	Initials EOF Date 8-11-11

				Run 1A	Run 1B	Run 1C
DGM Calibration	Critical Orifice		Identification Number	L-2	L-2	L-2
			K Factor	0.8001	0.8001	0.8001
	Subject DGM		DGM Initial Reading (ft^3)	501.052	501.790	502.533
			DGM Final Reading (ft^3)	501.790	502.533	503.272
		Temperature (°F)	Inlet Initial	74	75	75
			Outlet Initial	70	72	72
			Inlet Final	75	75	75
			Outlet Final	72	72	72
	Orifice Manometer, ΔH (" H_2O)			0.02	0.02	0.02
	Pump Vacuum (" Hg)			26	26	26
	Barometric Pressure (" Hg)			29.05	29.05	29.05
	Ambient Temperature (°F)			70	70	70
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	76	-1
3	165	165	0
7	341	343	2
15	692	696	4

Dry Gas Meter Calibration Check for Low-Flow Applications Using a Critical Orifice

Per EM SOP-005

Console ID A167041	Calibrated by	Initials Rvw Date 08-15-11	Reviewed by	Initials EDF Date 8-15-11

				Run 1A	Run 1B	Run 1C
DGM Calibration	Critical Orifice	Identification Number		L-4	L-4	L-4
		K Factor		1.5109	1.5109	1.5109
	Subject DGM	DGM Initial Reading (ft³)		558.500	559.875	561.255
		DGM Final Reading (ft³)		559.875	561.255	562.639
		Temperature (°F)	Inlet Initial	73	76	78
			Outlet Initial	69	73	73
			Inlet Final	76	78	79
			Outlet Final	73	73	74
	Orifice Manometer, ΔH (" H_2O)			0.02	0.02	0.02
	Pump Vacuum (" Hg)			26	26	26
	Barometric Pressure (" Hg)			29.15	29.15	29.15
	Ambient Temperature (°F)			70	70	70
	Test Duration (minutes)			20	20	20

Temperature Readout Calibration

Check the readout against a NIST Thermometer

NIST Thermometer ID J31117

Thermometer Reading (°F) 32

Readout Reading (°F) 32

Check the readout linearity (one channel only)

Voltage Supply ID A178550

Channel No 1

Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32	32	0
1	77	77	0
3	165	165	0
7	341	342	1
15	692	694	2

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Certificate of Calibration

Calibrated For: CleanAir Engineering
500 West Wood Street
Palatine, IL 60067

Test Result: PASS
Calibration Date: October 19, 2009
*Due Date: October 19, 2010

Wet Test Meter Serial Number: 11AH6
Satisfactory Leak Check: Yes
Ambient Temperature of Equilbrated Liquid in Wet Test Meter and Reservoir: 70°F

Range of Wet Test Meter Flow Rate: 0-120 CFH
Volume of Test Flask Ví: 28316(ml.)

	A			B		C
Test Number	Manometer Reading " of H_2O	Inicial Volume (V_i) ml.	Final Volume (V_f) ml.	Total Volume (V_m) ml.	Flask Volume (V_s) ml.	Percent Error
1	.20	0	28412.20	28412.20	28316.00	0.3397
2	.20	0	28415.50	28415.50	28316.00	0.3514
3	.20	0	28465.10	28465.10	28316.00	0.5266

A: Must be less than .40 inches of water
B: $Vm = Vf - V_i$
C: % Error (±1%) = 100 * (V_m - V_s / V_s)

Calibration Performed By

Calibration Reviewed By

Standards Used

Serial #	Description	Cal Date	Due Date
T-225950	Calibrator/Thermometer	10/7/2009	10/7/2010
CAE TL07-1	Ohaus Balance		

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Critical Orifice Calibrations

POST TEST CALIBRATION USING A CRITICAL ORIFICE
CALIBRATED BY CLEAN AIR ENGINEERING

1. Install the orifice that is most suitable by:
   a. closest test ΔH to orifice ΔH.
   b. closest test cfm to orifice cfm.
2. Level meter and zero monometer.
3. Perform positive and negative leakcheck with orifice installed.
4. Set the meter to maximum flow (highest vacuum). note: the vacuum must be >60% of barometric.
5. Allow 15 of running for meter to warm up.
7. Record the time and the meter volume on the fly.
8. Each run must be at least 5 min in length.
9. Record data on data sheet.
10. Repeat procudure for 3 runs with a volume of 5cf.
11. Calculate the Yi for each run.
12. Average the Yi from the three runs.
13. Determine % variation, ΔY, must be ≤ ±2%.
14. Determine the cal error of average Yi, ≤ ±5%.

Orifice Set Number SERIES L
Calibration Date 8/9/2010

Critical Orifice Number	ΔH (in H_2O)	Approx CFM	K'
L-1	1.00	0.500	0.3834
L-2	1.2	1.045	0.8001
L-3	1.4	1.371	1.0518
L-4	1.8	1.968	1.5109

Never disassemble the orifice. Keep them in their case when not in use.

The URS QMP and associated SOPs specify calibration every two years. This instrument is acceptable for use until 8/9/12.

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: L-1

Calibration Date: 8/9/2010

Calibrated By: Martin Vaquero

Dry Gas Meter I.D.: 80-080610-1

DGM Yd 1.0093

DGM Full Cal. Date: 8/6/2010

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	6140.16	6142.66	6145.17
Final DGM meter reading	ft^3	6142.66	6145.17	6147.66
Net Meter Volume (Vm)	ft^3	2.50	2.51	2.49
Average Inlet/Outlet Temperatures				
Initial	°F	78.5	78.5	78.5
Final	°F	78.5	78.5	78.5
Avg. Temperature (t_m)	°F	78.5	78.5	78.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.00	1.00	1.00
Barometric pressure, P_{bar}	in. Hg	29.11	29.11	29.11
Ambient temperature (t_{amb})	°F	75	75	75
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.383	0.385	0.382
K' value deviation from average (%diff)	≤0.5%	0.000	0.400	0.400
Average K' value		**0.3834**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature:

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CriticalOrifice_K-cal.xls February, 2004

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: L-2
Calibration Date: 8/9/2010
Calibrated By: Martin Vaquero

Dry Gas Meter I.D.: 80-080610-1
DGM Yd 1.0093
DGM Full Cal. Date: 8/6/2010

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	6167.57	6172.78	6178.01
Final DGM meter reading	ft^3	6172.78	6178.01	6183.24
Net Meter Volume (Vm)	ft^3	5.21	5.23	5.23
Average Inlet/Outlet Temperatures				
Initial	°F	79.5	79.5	79.5
Final	°F	79.5	79.5	79.5
Avg. Temperature (t_m)	°F	79.5	79.5	79.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.20	1.20	1.20
Barometric pressure, P_{bar}	in. Hg	29.11	29.11	29.11
Ambient temperature (t_{amb})	°F	75	75	75
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.798	0.801	0.801
K' value deviation from average (%diff)	≤0.5%	0.255	0.128	0.128
Average K' value		**0.8001**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m = (t_m + 460)$
$T_{amb} = (t_{amb} + 460)$
$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature: Martin Vaquero

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CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: L-3

Calibration Date: 8/9/2010

Calibrated By: Martin Vaquero

Dry Gas Meter I.D.: 80-080610-1

DGM Yd 1.0093

DGM Full Cal. Date: 8/6/2010

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft³	6407.30	6414.13	6421.02
Final DGM meter reading	ft³	6414.13	6421.02	6427.87
Net Meter Volume (Vm)	ft³	6.83	6.89	6.85
Average Inlet/Outlet Temperatures				
Initial	°F	79.5	79.5	79.5
Final	°F	79.5	79.5	79.5
Avg. Temperature (t_m)	°F	79.5	79.5	79.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.40	1.40	1.40
Barometric pressure, P_{bar}	in. Hg	29.11	29.11	29.11
Ambient temperature (t_{amb})	°F	76	76	76
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		1.048	1.057	1.051
K' value deviation from average (%diff)	≤0.5%	0.389	0.486	0.097
Average K' value		**1.0518**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar} T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature: Martin Vaquero

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CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.:	L-4	Dry Gas Meter I.D.:	80-080610-1
Calibration Date:	8/9/2010	DGM Yd	1.0093
Calibrated By:	Martin Vaquero	DGM Full Cal. Date:	8/6/2010

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	6309.58	6319.43	6329.26
Final DGM meter reading	ft^3	6319.43	6329.26	6339.10
Net Meter Volume (Vm)	ft^3	9.85	9.83	9.84
Average Inlet/Outlet Temperatures				
Initial	°F	79.5	79.5	79.5
Final	°F	79.5	79.5	79.5
Avg. Temperature (t_m)	°F	79.5	79.5	79.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.80	1.80	1.80
Barometric pressure, P_{bar}	in. Hg	29.11	29.11	29.11
Ambient temperature (t_{amb})	°F	76	76	76
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		1.512	1.509	1.511
K' value deviation from average (%diff)	≤0.5%	0.102	0.102	0.000
Average K' value		**1.5109**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature: Martin Vaquero

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POST TEST CALIBRATION USING A CRITICAL ORIFICE CALIBRATED BY CLEAN AIR ENGINEERING

1. Install the orifice that is most suitable by:
   a. closest test ΔH to orifice ΔH.
   b. closest test cfm to orifice cfm.
2. Level meter and zero monometer.
3. Perform positive and negative leakcheck with orifice installed.
4. Set the meter to maximum flow (highest vacuum). note: the vacuum must be >60% of barometric.
5. Allow 15 of running for meter to warm up.
7. Record the time and the meter volume on the fly.
8. Each run must be at least 5 min in length.
9. Record data on data sheet.
10. Repeat procudure for 3 runs with a volume of 5cf.
11. Calculate the Yi for each run.
12. Average the Yi from the three runs.
13. Determine % variation, ΔY, must be < ±2%.
14. Determine the cal error of average Yi, < ±5%.

Orifice Set Number N
Calibration Date 8/4/10

Critical Orifice Number	ΔH (in H_2O)	Approx CFM	K'
N-1	0.380	0.347	0.2639
N-2	0.700	0.476	0.3598
N-3	1.400	0.689	0.5180
N-4	1.900	0.808	0.6073
N-5	2.800	0.964	0.7245
N-6	3.000	1.000	0.7507

Never disassemble the orifice. Keep them in their case when not in use.

The URS QMP and associated SOPs specify calibration every two years. This instrument is acceptable for use until 08/04/12.

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.:	N-1	Dry Gas Meter I.D.:	0028-041410-1
Calibration Date:	8/4/10	DGM Yd	1.0006
Calibrated By:	R. Redel	DGM Full Cal. Date:	6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	319.50	321.24	322.97
Final DGM meter reading	ft^3	321.24	322.97	324.71
Net Meter Volume (Vm)	ft^3	1.74	1.74	1.74
Average Inlet/Outlet Temperatures				
Initial	°F	79.0	79.0	80.0
Final	°F	79.0	80.0	80.0
Avg. Temperature (t_m)	°F	79.0	79.5	80.0
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	0.38	0.38	0.38
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	78	78	78
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.264	0.264	0.264
K' value deviation from average (%diff)	≤0.5%	0.003	0.096	0.099
Average K' value		**0.2639**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar} T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature

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CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: N-2

Calibration Date: 8/4/10

Calibrated By: R. Redel

Dry Gas Meter I.D.: 0028-041410-1

DGM Yd 1.0006

DGM Full Cal. Date: 6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft³	336.00	338.39	340.77
Final DGM meter reading	ft³	338.39	340.77	343.15
Net Meter Volume (Vm)	ft³	2.38	2.38	2.38
Average Inlet/Outlet Temperatures	▨	▨	▨	▨
Initial	°F	82.5	83.5	83.5
Final	°F	83.5	83.5	84.5
Avg. Temperature (t_m)	°F	83.0	83.5	84.0
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	0.70	0.70	0.70
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	78	79	79
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.360	0.360	0.359
K' value deviation from average (%diff)	≤0.5%	0.170	0.171	0.341
Average K' value		**0.3598**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar} T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64$°R/in.Hg

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature Ryan Redel

CleanAir
ENGINEERING

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: N-3

Calibration Date: 8/4/10

Calibrated By: R. Redel

Dry Gas Meter I.D.: 0028-041410-1

DGM Yd 1.0006

DGM Full Cal. Date: 6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	350.00	353.45	356.89
Final DGM meter reading	ft^3	353.45	356.89	360.33
Net Meter Volume (Vm)	ft^3	3.45	3.44	3.44
Average Inlet/Outlet Temperatures				
Initial	°F	86.0	87.0	87.0
Final	°F	87.0	87.0	87.5
Avg. Temperature (t_m)	°F	86.5	87.0	87.3
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.40	1.40	1.40
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	79	79	79
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.519	0.517	0.518
K' value deviation from average (%diff)	≤0.5%	0.270	0.257	0.013
Average K' value		**0.5180**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature

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CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.:	N-4	Dry Gas Meter I.D.:	0028-041410-1
Calibration Date:	8/4/10	DGM Yd	1.0006
Calibrated By:	R. Redel	DGM Full Cal. Date:	6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	383.00	387.05	391.09
Final DGM meter reading	ft^3	387.05	391.09	395.13
Net Meter Volume (Vm)	ft^3	4.05	4.04	4.04
Average Inlet/Outlet Temperatures				
Initial	°F	88.0	88.5	88.5
Final	°F	88.5	88.5	88.5
Avg. Temperature (t_m)	°F	88.3	88.5	88.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	1.90	1.90	1.90
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	79	79	80
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.609	0.607	0.607
K' value deviation from average (%diff)	≤0.5%	0.206	0.087	0.118
Average K' value		**0.6073**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature

CleanAir
ENGINEERING

CriticalOrifice_K-cal.xls February, 2004

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.:	N-5	Dry Gas Meter I.D.:	0028-041410-1
Calibration Date:	8/4/10	DGM Yd	1.0006
Calibrated By:	R. Redel	DGM Full Cal. Date:	6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft^3	408.00	412.83	417.64
Final DGM meter reading	ft^3	412.83	417.64	422.46
Net Meter Volume (Vm)	ft^3	4.82	4.82	4.82
Average Inlet/Outlet Temperatures				
Initial	°F	89.5	89.5	90.0
Final	°F	89.5	90.0	90.0
Avg. Temperature (t_m)	°F	89.5	89.8	90.0
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	2.80	2.80	2.80
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	80	80	80
Pump vacuum	in. Hg	18.0	18.0	18.0
K' - Critical orifice coefficient value		0.726	0.724	0.724
K' value deviation from average (%diff)	≤0.5%	0.149	0.104	0.046
Average K' value		**0.7245**		

$$K' = \frac{K_1 V_m Y_d (P_{bar} + \Delta H/13.6)\sqrt{T_{amb}}}{P_{bar} T_m \theta}$$

$T_m = (t_m + 460)$

$T_{amb} = (t_{amb} + 460)$

$K_1 = 17.64$ °R/in.Hg

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature

CleanAir
ENGINEERING

CriticalOrifice_K-cal.xls February, 2004

CRITICAL ORIFICE K' CALIBRATION

Critical Orifice I.D.: N-6

Calibration Date: 8/4/10

Calibrated By: R. Redel

Dry Gas Meter I.D.: 0028-041410-1

DGM Yd 1.0006

DGM Full Cal. Date: 6/6/10

Parameter	Units	Run 1	Run 2	Run 3
Initial DGM meter reading	ft³	433.10	438.11	443.11
Final DGM meter reading	ft³	438.11	443.11	448.11
Net Meter Volume (Vm)	ft³	5.01	5.00	5.00
Average Inlet/Outlet Temperatures				
Initial	°F	90.5	90.5	90.5
Final	°F	90.5	90.5	90.5
Avg. Temperature (t_m)	°F	90.5	90.5	90.5
Time (θ) *5 minute minimum*	minutes	5.00	5.00	5.00
Orifice manometer reading (ΔH)	in. H_2O	3.00	3.00	3.00
Barometric pressure, P_{bar}	in. Hg	29.12	29.12	29.12
Ambient temperature (t_{amb})	°F	79	79	80
Pump vacuum	in. Hg	17.5	17.5	17.5
K' - Critical orifice coefficient value		0.751	0.750	0.751
K' value deviation from average (%diff)	≤0.5%	0.036	0.064	0.029
Average K' value		**0.7507**		

$$K' = \frac{K_1 V_m Y_d (P_{bar}+\Delta H/13.6)\sqrt{T_{amb}}}{P_{bar}\, T_m \theta}$$

$T_m=(t_m+460)$

$T_{amb}=(t_{amb}+460)$

$K_1 = 17.64°R/in.Hg$

All test runs must be of the same time length.

Allow meter to warm up for 15 minutes with orifice before calibration.

Signature

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Barometer Calibrations

Portable Barometer Calibration

Portable Barometer Identification BP-1

Reference Barometer Identification ____________

Calibrated by	Initials	NR
	Date	5/25/11
Reviewed by	Initials	RW
	Date	06-02-11

Laboratory barometer reading (reference) (in Hg)	29,00
Portable barometer reading after correction (in Hg)	29.00
Difference between reference and portable after correction (in Hg)	0.0
Is the difference ≤±0.1 in Hg (yes/no)	Yes

Notes:

CDS-20 Portable Barometer
Revision Date: January 2008
Reviewed: December 2011

Appendix K Barometer Calibration

Console ID BP-2

Reference Barometer ID NIST 7485

Calibrated by	Initials	KC
	Date	7/8/11
Reviewed by	Initials	RVW
	Date	07.08.1

Reference barometer reading (reference) (in. Hg)	29.00
Appendix K barometer reading (in Hg)	29.00
Difference between reference barometer and Appendix K barometer (in Hg)	—
Is the difference ≤±0.39 in Hg (yes/no)	yes

Notes:
KC 7/8/11

CDS-10 Appendix K Barometer
Revision Date: March 2008
Reviewed: December 2011

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Balance Calibrations

Balance Calibration

Balance ID TE4101A

Calibrated by	Initials	RVW	**Reviewed by**	Initials	K
	Date	07-12-10		Date	07/12/10

	Calibration Weight	
Initial Calibration	ID #	Mass
	11308	2KG

	Calibration Weight		Balance Reading (g)	Acceptable Range (g)
	ID #	**Mass (g)**		
Linearity Check	27946	50	50.0	49.9 – 50.1
	20101	100	100.0	99.9 - 100.1
	94-059828	200	200.0	199.8 - 200.2
	↓	500	500.0	499.5 - 500.5
		1000	1000.0	999 - 1001

	Calibration Weight[1] (g)	**Balance Reading (g)**
Calibration of Student Weights **Student Weight Set ID** 700224	20.A	20.0
	20B	20.0
	50	50.0
	100	100.0
	200A	200.0
	200B	200.0
	500	500.0
	1000	1000.0
	RVW	
	07-12-10	

---

[1] Use only calibration weights greater than 20 g.

Field Balance Calibration Check

Balance ID TE 4101A

Calibration Checked by	Initials	WDD
	Date	7/28/11

	Student Calibration Weight[a,b] (g)	Actual Mass (from Annual Calibration) (g)	Balance Reading (g)	Difference (g)	Percent Difference[c]
Calibration Check of Balance Using Student Weights **Student Weight Set ID** 700224	20A	20.0	20.0	0	0
	50	50.0	50.0	0	0
	100	100.0	100.1	0.1	0.1
	200A	200.0	200.1	0.1	0.05
	500	500.0	500.~~1~~4	0.4	0.08
	1000	1000.0	1001.0	1.0	0.1
	* 3000	3000.0	3000.8	0.8	0.03
	** 4000	3997.9	4001.7	3.8	0.1

WDD 7/28/11

[a] Use only calibration weights greater than 20 g.

[b] If the balance is used to weigh amounts greater than 1000g, combine the 1000 and 500 gram weights for a calibration check.

[c] The acceptance criteria for percent difference is ±0.5%. This is calculated using this equation:

$$\text{Percent Difference} = \frac{\text{balance reading} - \text{actual mass}}{\text{actual mass}} \times 100$$

*Require the use of student weights 700225 as well.

1000g
+ 500g
+ 200g (200A) } 700224
+ 200g (200B)
+ 100g
+ 1000g — 700225
3000 g

** used Student weights set 700225

1000g
+ 500g
+ 200g (200A) } 700224
+ 200g (200B)
+ 100g
+ 1000g
+ 500g
+ 200g (200A) } 700225
+ 200g (200B
+ 100g
4000 g

CDS-08B: Field Balance Calibration
Per EM SOP-010
Revision Date: April 2011

Balance Calibration

Balance ID PE 6000

Calibrated by	Initials	RVW	**Reviewed by**	Initials	CSG
	Date	07-12-11		Date	7/12/11

	Calibration Weight	
Initial Calibration	ID #	Mass
	20100	5 Kg

Per EM SOP-010, this balance calibration is good for one year.
Expiration Date: 07-12-12

	Calibration Weight		**Balance Reading (g)**	**Acceptable Range (g)**
	ID #	**Mass (g)**		
Linearity Check	27946	50	50.0	49.9 – 50.1
	20101	100	100.0	99.9 - 100.1
	94-059828	200	200.0	199.8 - 200.2
	↓	500	500.0	499.5 - 500.5
		1000	1000.0	999 - 1001
	20100	5000	5,000.5	4995-5005

	Calibration Weight[1] (g)	**Balance Reading (g)**
Calibration of Student Weights **Student Weight Set ID** 700225	20	20.0
	50	50.0
	100	100.0
	200A	200.0
	200B	200.0
	500	497.9
	1000	1000.0
		RVW
		07-12-11

[1] Use only calibration weights greater than 20 g.

Field Balance Calibration Check

Balance ID PE 6000

Calibration Checked by	Initials	WDD	
	Date	4/28/11	

	Student Calibration Weight[a,b] (g)	Actual Mass (from Annual Calibration) (g)	Balance Reading (g)	Difference (g)	Percent Difference[c]
Calibration Check of Balance Using Student Weights **Student Weight Set ID** 700225	20 A	20.0	20.0	0.0	0
	50	50.0	50.0	0.0	0
	100	100.0	100.1	0.1	0.1
	200 A	200.0	200.2	0.2	0.1
	500	497.9	498.4	0.5	0.1
	1000	1000.0	1001.1	1.1	0.11
	*3000	2997.9	3001.1	3.2	0.11
	**4000	3997.9	4002.2	4.3	0.11

[a] Use only calibration weights greater than 20 g.

[b] If the balance is used to weigh amounts greater than 1000g, combine the 1000 and 500 gram weights for a calibration check.

[c] The acceptance criteria for percent difference is ±0.5%. This is calculated using this equation:

$$\text{Percent Difference} = \frac{\text{balance reading} - \text{actual mass}}{\text{actual mass}} \times 100$$

* Require the use of student weights 700224 as well.

Student Weight 700225:

1000g
+ 500g
+ 200g (200A)
+ 200g (200B)
+ 100g
+ 1000g (Student weight 700224)

3000 g

CDS-08B: Field Balance Calibration
Per EM SOP-010
Revision Date: April 2011

** Student weight 700225:

1000g
+ 500g
+ 200g (200A)
+ 200g (200B)
+ 100g
+ 1000g (Student weight 700224)
+ 500g
+ 200g (200A)
+ 200g (200B)
+ 100g

4000g

55152601000080202

TEXAS DEPARTMENT OF AGRICULTURE

TODD STAPLES, COMMISSIONER
P. O. BOX 12847 AUSTIN, TX 78711-2847
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www.tda.state.tx.us

WEIGHTS AND MEASURES SERVICE COMPANY LICENSE

This is to certify that the person listed below is licensed to engage in business as a licensed service company in accordance with Texas Agriculture Code Chapter 13.

BASTROP SCALE CO INC
192 HARMON RD
BASTROP TX 78602

Client Name: BASTROP SCALE CO INC
TDA Client No: 00104273

LICENSE NO: 0245519
Effective Date: October 31, 2010

LICENSE TYPE: LICENSED SERVICE COMPANY
Expiration Date: October 31, 2011

MUST BE POSTED IN A CONSPICUOUS LOCATION

THIS LICENSE IS NON-TRANSFERABLE

LICENSED TO SERVICE/INSPECT THE FOLLOWING:

Equipment Class Description

CLASS 1: SCALES 0 TO 300 LBS
CLASS 2: SCALES 301 TO 3000 LBS
CLASS 3: SCALES 3001 TO 40000 LBS
CLASS 4: SCALES MORE THAN 40000 LBS

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Pitot Calibrations

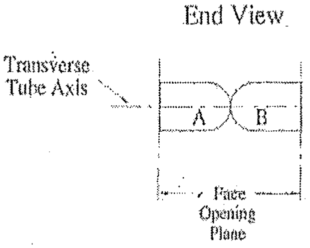
S-Type Pitot Tube Inspection and Probe Thermocouple Calibration Check

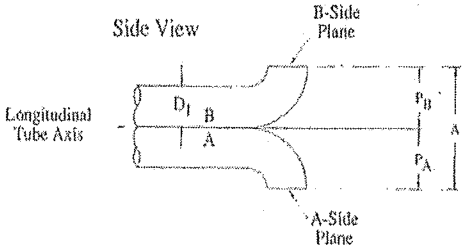
Pitot ID: 0.75-01

Caliper ID: 700839

Calibrated by	Initials	RVW	Reviewed by	Initials	RF
	Date	06-17-11		Date	6/22/11

General Pitot Tube Alignment





A = 0.582

D_t = 0.240

$0.188'' \le D_t \le 0.375''$? Y (y/n)

$1.05 \le A/2D_t \le 1.50$? Y (y/n)

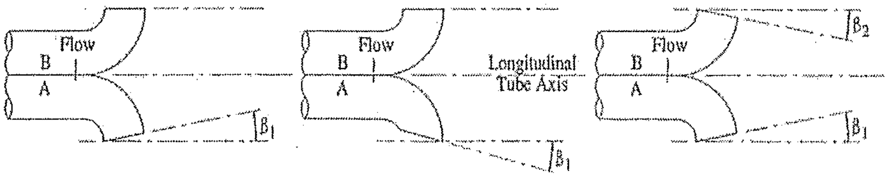
Misalignment

α_1 = 2°

α_2 = 2°

$\alpha_1 \le 10°$? Y (y/n)

$\alpha_2 \le 10°$? Y (y/n)

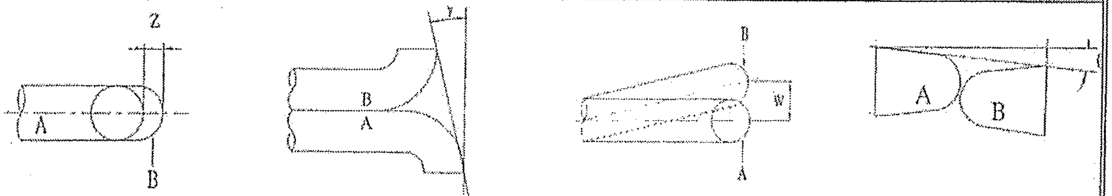


β_1 = 1°

β_2 = 2°

$\beta_1 \le 5°$? Y (y/n)

$\beta_2 \le 5°$? Y (y/n)



γ = 1° Z = A tan(γ) = 0.0102

θ = 0 W = A tan(θ) = 0

Z ≤ 0.125"? Y (y/n)

W ≤ 0.031"? Y (y/n)

Acceptability for Use (Circle Selection)	[✓ If all answers are "Y", this pitot tube is available for use, and may be assigned a correction factor of 0.84]	If all answers except the first (D_t) are "Y", this pitot tube is available for use, but needs to be calibrated using a wind tunnel.	Any other situation, the pitot tube must be removed from service.

Probe ID: 0.75-01

Calibrated by	Initials	RVW	Reviewed by	Initials	RF
	Date	06-17-11		Date	6/22/11

Stack Thermocouple Calibration [1]	Reference Thermometer ID No. [2]	Thermocouple Readout ID No.	Compare thermocouple to reference thermometer	Calculate applicability range for thermocouple.	
	J31117	A161402	$T_{abs,TC}/T_{abs,RT}$ = 0.993	$Min_{abs} = 0.9 \times T_{abs,TC}$ 550°R	$Min_F = Min_{abs} - 460$ 90°F
	T_F 155°F $T_{abs,RT}$ 615°R	T_F 151°F $T_{abs,TC}$ 611°R	Is this between 0.985 and 1.015? Y (y/n)	$Max_{abs} = 1.1 \times T_{abs,TC}$ 672°R	$Max_F = Max_{abs} - 460$ 212°F

---

[1] Per SOP 032, this calibration is generally performed at 160°F.

[2] T_{abs}: (°R) = T_F (°F) + 460

Thermometer Calibrations

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number A161361
Calibrated by: DC
Reference Thermometer ID Number J31117
Date 5-16-11
Voltage Generator ID Number A178550
Reviewed by EDF
Date 5-20-11

Temperature Readout Calibration	
Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	32

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (°F)			Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference [1,2]			Theoretical	Observed	Difference
1 [3]	0.0	32	32	0	4	-1.0	-10	-12	-2
	1.0	77	76	-1		0.0	32	31	-1
	3.0	165	164	-1		1.0	77	75	-2
	5.0	251	253	+2		2.0	121	120	-1
	7.0	341	341	0		3.0	165	164	-1
	10.0	475	473	-2	5	-1.0	-10	-11	-1
	15.0	692	692	0		0.0	32	32	0
	20.0	905	907	-2		1.0	77	76	-1
	30.0	1329	1326	-3		2.0	121	120	-1
	40.0	1772	1774	+2		3.0	165	165	0
2	0.0	32	32	0	6	-1.0	-10	-11	-1
	3.0	165	164	-1		0.0	32	32	0
	4.0	208	208	0		1.0	77	76	-1
	5.0	251	252	+1		2.0	121	121	0
	7.0	341	341	0		3.0	165	165	0
3	0.0	32	31	-1	7	-1.0	-10	-11	-1
	3.0	165	164	-1		0.0	32	32	0
	4.0	208	208	0		1.0	77	76	-1
	5.0	251	252	+1		2.0	121	120	-1
	7.0	341	341	0		3.0	165	164	-1

---

[1] Difference is calculated as follows:

Difference = Measured – Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number A161398 Calibrated by: RF
Reference Thermometer ID Number J3117 Date 6/9/11
Voltage Generator ID Number A178550 Reviewed by RWD
Date 06-14-11

Temperature Readout Calibration

Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	32

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference[1,2]
1[3] RF 6/9	0.0	32	32	0
	1.0	77	76	-1
	3.0	165	164	-1
	5.0	251	253	2
	7.0	341	~~340~~ 341	0
	10.0	475	473	-2
	15.0	692	693	1
	20.0	905	906	1
	30.0	1329	1330	1
	40.0	1772	1774	2
2	0.0	32	32	0
	3.0	165	165	0
	4.0	208	209	1
	5.0	251	254	3
	7.0	341	342	1
3	0.0	32	32	0
	3.0	165	165	0
	4.0	208	210	2
	5.0	251	254	3
	7.0	341	343	2

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference
4	-1.0	-10	-11	1
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0
5	-1.0	-10	-11	0
	0.0	32	32	0
	1.0	77	RF 6/9 76	-1
	2.0	121	120	-1
	3.0	165	165	0
6	-1.0	-10	-11	-1
	0.0	32	32	0
	1.0	77	76	-1
	2.0	121	121	0
	3.0	165	165	0
7	-1.0	-10	-11	-1
	0.0	32	32	0
	1.0	77	76	-1
	2.0	121	120	-1
	3.0	165	165	0

---

[1] Difference is calculated as follows:

Difference = Measured – Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number A167041
Reference Thermometer ID Number J31117
Voltage Generator ID Number A178550

Calibrated by: DC
Date 05-18-11
Reviewed by EDF
Date 5-20-11

Temperature Readout Calibration

Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	32

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (°F)			Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference [1,2]			Theoretical	Observed	Difference
1[3]	0.0	32	32	0	4	-1.0	-10	-12	-2
	1.0	77	76	-1		0.0	32	32	0
	3.0	165	165	0		1.0	77	76	-1
	5.0	251	253	+2		2.0	121	120	-1
	7.0	341	342	+1		3.0	165	165	0
	10.0	475	474	-1	5	-1.0	-10	-12	-2
	15.0	692	695	+3		0.0	32	32	0
	20.0	905	907	+2		1.0	77	76	-1
	30.0	1329	1330	+1		2.0	121	121	0
	40.0	1772	1774	+2		3.0	165	165	0.
2	0.0	32	32	0	6	-1.0	-10	-11	-1
	3.0	165	165	0		0.0	32	32	0
	4.0	208	209	+1		1.0	77	77	0
	5.0	251	254	+3		2.0	121	121	0
	7.0	341	342	+1		3.0	165	165	0
3	0.0	32	32	0	7	-1.0	-10	-11	-1
	3.0	165	165	0		0.0	32	32	0
	4.0	208	209	+1		1.0	77	77	0
	5.0	251	253	+2		2.0	121	121	0
	7.0	341	342	+1		3.0	165	165	0

---

[1] Difference is calculated as follows:

Difference = Measured − Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number	80-011309-2	Calibrated by:	RF
Reference Thermometer ID Number	J31117	Date	5/10/11
Voltage Generator ID Number	A178550	Reviewed by	RWD
		Date	05-13-11

Temperature Readout Calibration

Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	33

Temperature Readout Calibration Check

5/10/11

Channel	Voltage (mV)	Temperature (°F)			Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference[1,2]			Theoretical	Observed	Difference
1[3]	0.0	32	~~32~~	~~0~~	AUX-1 4	-1.0	-10	-15	-5
	1.0	77	~~77~~	~~0~~		0.0	32	32	0
	3.0	165	~~165~~	~~0~~		1.0	77	77	0
	5.0	251	~~252~~	~~1~~		2.0	121	121	0
	7.0	341	~~341~~	~~0~~		3.0	165	165	0
	10.0	475			AUX-2 5	-1.0	-10	-15	-5
	15.0	692	RWD			0.0	32	32	0
	20.0	905	05-13-11			1.0	77	77	0
	30.0	1329				2.0	121	121	0
	40.0	1772				3.0	165	164	-1
Probe 2	0.0	32	32	0	DGM IN 6	-1.0	-10	-15	-5
	3.0	165	165	0		0.0	32	32	0
	4.0	208	208	0		1.0	77	77	0
	5.0	251	252	1		2.0	121	121	0
	7.0	341	341	0		3.0	165	165	0
Filter 3	0.0	32	32	0	DGM OUT 7	-1.0	-10	-15	-5
	3.0	165	164	-1		0.0	32	32	0
	4.0	208	208	0		1.0	77	78	1
	5.0	251	251	0		2.0	121	121	0
	7.0	341	340	-1		3.0	165	165	0

---

[1] Difference is calculated as follows:

Difference = Measured – Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number 80-10204-1 Calibrated by: RF

Reference Thermometer ID Number J31117 Date 5/10/11

Voltage Generator ID Number A178550 Reviewed by Rvw

Date 05-12-11

Temperature Readout Calibration	
Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	32

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference [1,2]
1 [3]	0.0	32	~~3~~ RF 5/10	
	1.0	77		
	3.0	165		
	5.0	251	Rvw	
	7.0	341	05-12-11	
	10.0	475		
	15.0	692		
	20.0	905		
	30.0	1329		
	40.0	1772		
Probe 2	0.0	32	32	0
	3.0	165	165	0
	4.0	208	208	0
	5.0	251	251	0
	7.0	341	340	-1
Filter 3	0.0	32	32	0
	3.0	165	165	0
	4.0	208	209	1
	5.0	251	253	2
	7.0	341	342	1

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference
Aux-1 4	-1.0	-10	-15	-5
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	122	1
	3.0	165	165	0
Aux-2 5	-1.0	-10	-15	-5
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0
DGM IN 6	-1.0	-10	-15	~~0~~ -5 RF 5/10
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0
DGM OUT 7	-1.0	-10	-14	-4
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0

---

[1] Difference is calculated as follows:

Difference = Measured – Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number 80-111701-1
Reference Thermometer ID Number J31117
Voltage Generator ID Number A179550
Calibrated by: DC
Date 6-2-11
Reviewed by RVW
Date 06-02-11

Temperature Readout Calibration	
Reference Thermometer (°F)	Temperature Readout (°F) (after adjustment)
32	32

Temperature Readout Calibration Check

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference[1,2]
1[3]	0.0	32		
	1.0	77		
	3.0	165		
	5.0	251	RVW	
	7.0	341	06-02-11	
	10.0	475		
	15.0	692		
	20.0	905		
	30.0	1329		
	40.0	1772		
probe ~~2~~	0.0	32	32	0
	3.0	165	164	-1
	4.0	208	207	-1
	5.0	251	251	0
	7.0	341	340	-1
Filter ~~3~~	0.0	32	32	0
	3.0	165	164	-1
	4.0	208	208	0
	5.0	251	251	0
	7.0	341	340	-1

Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference
DGM Inlet ~~4~~	-1.0	-10	-12	-2
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	164	-1
DGM outlet ~~5~~	-1.0	-10	-13	-3
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0
Aux-1 ~~6~~	-1.0	-10	-13	-3
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	164	-1
Aux-2 ~~7~~	-1.0	-10	-12	-2
	0.0	32	32	0
	1.0	77	77	0
	2.0	121	121	0
	3.0	165	165	0

---

[1] Difference is calculated as follows:

Difference = Measured – Theoretical

[2] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

[3] Select at least 5 of the voltage/temperature combinations.

QUALITY CONTROL SERVICES
LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
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Established 1974

ACCREDITED
Calibration Services
Certificate Number: 1550.01
Laboratory code: 115953

Report of Calibration

Firm: URS
Address: 9400 Amberglen Blvd
City/State/Zip: Austin, TX 78729

Test Completed: 10/19/09
Submitted By: Robert Woytek
Traceable Certificate: 20091646

Test Item: Liquid-in-Glass Thermometer
Serial No.: J 31117
Range: +20 to +500 °F
Type: 76mm Immersion

Manufacturer: HB USA
Model: Enviro-Safe
Graduation Size: 2 °F

The URS QMP and associated SOPs specify calibration every two years. This instrument is acceptable for use until 10/19/11.

Procedure Used:
Tested with Reference Standards Traceable to the National Institute of Standards and Technology using Quality Control Services SOP 017, which is based on ASTM E77-98 (2003) and NIST Special Publications 250-23 and 819.

Results of Calibration:

Standard °F	HB USA °F	Correction °F	Rounded °F	Uncertainty °F
32.113	32.0	0.113	0.1	0.07
100.274	100.0	0.274	0.3	0.07
199.982	200.0	-0.018	0.0	0.07
299.979	300.0	-0.021	0.0	0.07

The standard is corrected to 3 decimal places. Corrections are rounded to the readability of the customer instrument.

Comments: Thermometer is new from the manufacturer. Readings were magnified using a 0x power lens. The indications on a liquid-in-glass thermometer cannot be adjusted. Table values should be considered to be "As Found" and "As Left".

Tolerance: The manufacturers published accuracy specification for this thermometer is +/- 2 °F from 0 to 221 °F and +/-3 °F >221 to 392 °F and +/- 4°F >392°F. This thermometer was within tolerance As Found.

Measurement Uncertainty:
The uncertainty is calculated according to NIST Technical Note 1297. The reported uncertainty of the standard is combined with the uncertainty of the measurement process in a root sum square formula using a K factor of 2 for an approximate 95% level of confidence.

Quality Control Services, Inc
Metrology Laboratory
E-mail: lab@qc-services.com
FAX (503) 235-2535

Date: 10/19/09
Signature James E. Ross
Title Metrology Manager

Established 1974

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ACCREDITED
Calibration Services
Certificate Number: 1550.01
Laboratory code: 115953

Report of Calibration

Firm: URS
Address: 9400 Amberglen Blvd
City/State/Zip: Austin, TX 78729

Test Completed: 10/19/09
Submitted By: Robert Woytek
Traceable Certificate: 20091646

Test Item: Liquid-in-Glass Thermometer
Serial No.: J 31117
Range: +20 to +500 °F
Type: 76mm Immersion

Manufacturer: HB USA
Model: Enviro-Safe
Graduation Size: 2 °F

Laboratory Environment: Temperature is maintained from +20 to +23 °C. Relative Humidity is maintained from +30 to +60%RH.

Traceability Information:
This calibration is traceable to NIST through an unbroken chain of comparisons each having stated uncertainties.

Primary Standard:
Hart Scientific PRT QCS158
Primary Standard QCS 158 was calibrated: 06/22/09 Due: 06/22/11

Temperature Source: Ertco/Hart Baths QCS 120, 121

Tested By: J. Ross

ITS-90: All temperatures listed in this report are those defined by the International Temperature Scale of 1990. The International Temperature Scale of 1990 was adopted by the International Committee of Weights and Measures at its meeting in 1989. This scale supersedes the International Practical Temperature Scale of 1968 (amended edition of 1975) and the 1976 Provisional 0.5 K to 30 K Temperature Scale.

Accredited by the American Association for Laboratory Accreditation (A2LA) under Calibration Laboratory Code 115953 and Certificate Number 1550.01. This laboratory meets the requirements of ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories.* This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration.

Quality Control Services, Inc
Metrology Laboratory
E-mail: lab@qc-services.com
FAX (503) 235-2535

Date: 10/19/09
Signature James E. Ross
Title Metrology Manager

Form number T01 Revision Date 07/10/06

VOST Box Calibrations

Vost Meter Full Test Calibration

DATE: August 6, 2010

Operator: Martin Vaquero

Meter Box No: 80-080610-1										Meter Box Y_d: 1.0093					Barometric Pressure: 29.22			
				Standard Meter Gas Volume			Meter Box Gas Volume (ft_3)			Std. Meter Temperature (°F)			Meter Box Temperature (°F)					
Q	ΔH	ΔP	Y_{ds}	Initial	Final	V_{ds}	Initial	Final	V_d	Inlet	Outlet	T_{ds}	Inlet	T_o	T_d	Time	Y_d	
0.035	1.10	-0.80	1.0000	0.0	1.000	1.000	5814.38	5842.57	0.9956	77.0	77.0	77.0	83.0	83.0	83.0	27.77	1.0108	
0.035	1.10	-0.80	1.0000	0.0	1.000	1.000	5887.24	5915.50	0.9980	77.0	77.0	77.0	83.0	83.0	83.0	27.70	1.0083	
0.035	1.10	-0.80	1.0000	0.0	1.000	1.000	5915.50	5943.75	0.9977	77.0	77.0	77.0	83.0	83.0	83.0	27.69	1.0087	
															AVERAGE		1.0093	

Signature Martin Vaquero

Nomenclature

P_b	Barometric Pressure (in. Hg)
Q	Flow Rate (cfm)
^2H	Orifice Pressure Differential (in. H_20)
^2P	Inlet Pressure Differential (in. H_20)
V_d	Gas Meter Volume - Dry (ft^3)
V_{ds}	Standard Meter Volume - Dry (ft^3)
T_d	Average Meter Box Temperature (°F)
T_o	Outlet Meter Box Temperature (°F)
T_{ds}	Average Standard Meter Temperature (°F)
Y_d	Meter Correction Factor (unitless)
Y_{ds}	Standard Meter Correction Factor (unitless)
$^2H@$	Orifice Pressure Differential giving 0.75 cfm of air at 68°F and 29.92 in. Hg (in. H_20)

Vacuum Gauge

Standard (in. Hg)	Vacuum Gauge
5.0	5.0
9.8	10.0
15.1	15.0
15.1	20.0
20.6	25.0
24.5	24.0

Thermometers

Standard (°F)	Inlet	Outlet

Equations

$$Y_d = (Y_{ds})\left[\frac{V_{ds}}{V_d}\right]\left[\frac{T_d + 460}{T_{ds} + 460}\right]\left[\frac{P_b + {}^2P/13.6}{P_b + {}^2H/13.6}\right]$$

$$^2H@ = \frac{0.0319({}^2H)}{P_b(T_o + 460)}\left[\frac{(T_{ds} + 460)\Theta}{(V_{ds})(Y_{ds})}\right]^2$$

$$Q = \frac{17.64\ (V_{ds})\ (P_b)}{(T_{ds} + 460)\ (\Theta)}$$

CleanAir
ENGINEERING

VOST Console DGM Calibration

Console ID 80-011309-2
Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	KvW
	Date	7/8/11		Date	07-13-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-1		
		K Factor	0.3834		
DGM being Calibrated	Vol (L)	Initial	124.867	130.006	135.109
		Final	130.005	135.109	140.306
	T meter (°F)	Inlet Initial	74	77	79
		Outlet Initial	73	76	78
		Inlet Final	75	79	80
		Outlet Final	74	78	79
		Meter Pressure (H_2O)	0.08	0.08	0.08
Test Conditions		Pump Vacuum ("Hg)	23	23	23
		Pbar ("Hg)	29.05	29.05	29.05
		T ambient (°F)	68	68	68
		Test Duration (minutes)	10	10	10
Calculated Values		DGMCF, Y	0.983	0.996	0.981
		Average DGMCF, Yd	0.987		

Acceptance Criteria:
1: Each individual Y value must be within 2% of the average Y value
2: Average Y value must be between 0.95 and 1.05

VOST Console DGM Calibration

Console ID 80-011309-2

Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	dc	Reviewed By	Initials	EDF
	Date	8/4/11		Date	8-16-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	0.000	5.583	10.730
		Final	5.583	10.730	15.861
	T meter (°F)	Inlet Initial	80	82	82
		Outlet Initial	80	81	81
		Inlet Final	82	82	83
		Outlet Final	81	81	82
	Meter Pressure (H_2O)		1.5	1.5	1.5
Test Conditions	Pump Vacuum ("Hg)		23.00	23.00	23.00
	Pbar ("Hg)		29.15	29.15	29.15
	T ambient (°F)		70	70	70
	Test Duration (minutes)		11	10	10
Calculated Values	DGMCF, Y		1.002	0.990	0.994
	Average DGMCF, Yd		0.995		
	Previous DGMCF, Y_{ref}		0.987	Error:	0.9%

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value

2: Average Y value must be between 0.95 and 1.05

3: Average Y value must be within 5% of the pre-test average Y value

CDS-03sb VOST Console
Revision Date November 2008
Reviewed: January 2010

VOST Console DGM & Thermocouple Calibration

Console ID 80-011309-2 Nominal Orifice Flow Rate .5 std/min

DGM Calibration

Calibrated by	Initials	RF	Reviewed by	Initials	KVW	Leak Check	(-)	ok
	Date	7/8/11		Date	07-13-11			

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	124.867	130.006	135.109
		Final	130.005	135.109	140.306
	T_{meter} (°F)	Inlet Initial	74	77	79
		Outlet Initial	73	76	78
		Inlet Final	75	79	80
		Outlet Final	74	78	79
	Meter Pressure (" H2O))		RF 7/12 ~~1.0~~ .08	.08	.08
Test Conditions	Pump Vacuum (" Hg)		23	23	23
	P_{bar} (" Hg)		29.05	29.05	29.05
	$T_{ambient}$ (°F)		68	68	68
	Test Duration (min)		10	10	10

Thermocouple Calibration

Thermometer ID 37117 Voltage Supply ID A128550

Temperature Readout Accuracy		
Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	Aux-1	33

Temperature Readout Linearity			
Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
Aux-1	0	32	32
	1	77	77
	3	165	164
	7	341	340
↓	15	692	691

VOST Console DGM & Thermocouple Calibration

Console ID 80-011309-2 Nominal Orifice Flow Rate 0.500

DGM Calibration

Calibrated by	Initials	PC	Reviewed by	Initials	RWD	Leak Check	(-)	OK
	Date	8-4-11		Date	08-05-11			

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	0.000	5.583	10.730
		Final	5.583	10.730	15.861
	T_{meter} (°F)	Inlet Initial	~~77~~ 80	82	82
		Outlet Initial	~~77~~ 80	81	81
		Inlet Final	82	82	83
		Outlet Final	81	81	82
	Meter Pressure (" H2O))		1.5	1.5	1.5
Test Conditions	Pump Vacuum (" Hg)		23	23	23
	P_{bar} (" Hg)		29.15	29.15	29.15
	$T_{ambient}$ (°F)		70	70	70
	Test Duration (min)		11	10	10

Thermocouple Calibration

Thermometer ID J31117 Voltage Supply ID A178550

Temperature Readout Accuracy			Temperature Readout Linearity			
Thermometer Reading (°F)	Temperature Readout		Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
	Channel No.	Temperature (°F)				
32	Aux-1	33	Aux-1	0	32	32
				1	77	78
				3	165	165
				7	341	341
				15	692	692

VOST Console DGM Calibration

Console ID 80-10204-1

Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	K(w)
	Date	7/8/11		Date	07-13-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-1		
		K Factor	0.3834		
DGM being Calibrated	Vol (L)	Initial	3909.97	3914.97	3920.93
		Final	3914.97	3919.85	3926.06
	T meter (°F)	Inlet Initial	69	72	75
		Outlet Initial	69	72	74
		Inlet Final	72	75	77
		Outlet Final	72	74	76
		Meter Pressure (H_2O)	1.2	1.2	1.2
Test Conditions		Pump Vacuum ("Hg)	24	24	24
		Pbar ("Hg)	29.05	29.05	29.05
		T ambient (°F)	68	68	68
		Test Duration (minutes)	10	10	10
Calculated Values		DGMCF, Y	1.001	1.030	0.984
		Average DGMCF, Yd	1.005		

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value

2: Average Y value must be between 0.95 and 1.05

VOST Console DGM Calibration

Console ID 80-10204-1

Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	dc	Reviewed By	Initials	EDF
	Date	8/4/11		Date	8-16-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	4782.630	4788.000	4793.420
		Final	4788.000	4793.420	4798.960
	T meter (°F)	Inlet Initial	70	72	74
		Outlet Initial	69	71	73
		Inlet Final	72	74	77
		Outlet Final	71	73	76
	Meter Pressure (H_2O)		1.3	1.3	1.3
Test Conditions	Pump Vacuum ("Hg)		24.00	24.00	24.00
	Pbar ("Hg)		29.15	29.15	29.15
	T ambient (°F)		70	70	70
	Test Duration (minutes)		11	11	11
Calculated Values	DGMCF, Y		1.023	1.017	1.000
	Average DGMCF, Yd		1.013		
	Previous DGMCF, Y_{ref}		1.005	Error:	0.8%

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value

2: Average Y value must be between 0.95 and 1.05

3: Average Y value must be within 5% of the pre-test average Y value

CDS-03sb VOST Console
Revision Date November 2008
Reviewed: January 2010

VOST Console DGM Calibration

Console ID 80-10204-1

Nominal Orifice Flow Rate (l/min) 2.0

DGM Calibration

Calibrated By	Initials	mlb	Reviewed By	Initials	RWW
	Date	8/17/11		Date	08-19-11

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-4		
		K Factor	1.5109		
DGM being Calibrated	Vol (L)	Initial	5369.63	5389.19	5408.72
		Final	5389.19	5408.72	5428.32
	T meter (°F)	Inlet Initial	75	76	76
		Outlet Initial	75	76	76
		Inlet Final	76	76	76
		Outlet Final	76	76	76
		Meter Pressure (H_2O)	2.0	2.0	2.0
Test Conditions		Pump Vacuum ("Hg)	17.5	17.5	17.5
		Pbar ("Hg)	29.23	29.23	29.23
		T ambient (°F)	70	70	70
		Test Duration (minutes)	10	10	10
Calculated Values		DGMCF, Y	1.013	1.016	1.012
		Average DGMCF, Yd	1.014		

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value

2: Average Y value must be between 0.95 and 1.05

CDS-03sa VOST Console
Revision Date November 2008
Reviewed: January 2010

VOST Console DGM & Thermocouple Calibration

Console ID 80-10204-1 Nominal Orifice Flow Rate 0.500 L/min

DGM Calibration

Calibrated by	Initials	RE	Reviewed by	Initials	RRW	Leak Check	(-)	ok
	Date	7/8/11		Date	07-13-11			

				Run 1	Run 2	Run 3
Orifice Information	ID Number			L-1		
	K Factor			0.3834		
DGM being Calibrated	Vol (L)	Initial		3909.97	3914.97	3920.93
		Final		3914.97	3919.85	3926.06
	T_{meter} (°F)	Inlet Initial		69	72	75
		Outlet Initial		69	72	74
		Inlet Final		72	75	77
		Outlet Final		72	74	76
	Meter Pressure (" H2O))			1.2	1.2	1.2
Test Conditions	Pump Vacuum (" Hg)			24	24	24
	P_{bar} (" Hg)			29.05	29.05	29.05
	$T_{ambient}$ (°F)			68	68	68
	Test Duration (min)			10	10	10

Thermocouple Calibration

Thermometer ID J3117 Voltage Supply ID A178550

Temperature Readout Accuracy		
Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	AUX-1	31

Temperature Readout Linearity			
Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
AUX-1	0	32	32
	1	77	77
	3	165	164
	7	341	340
	15	692	691

VOST Console DGM & Thermocouple Calibration

Console ID 80-10204-1

Nominal Orifice Flow Rate 0.500 LPM

DGM Calibration

Calibrated by	Initials	DL	Reviewed by	Initials	RW	Leak Check	(-)	OK
	Date	8-4-11		Date	08-05-11			

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	4782.63	4788.00	4793.42
		Final	4788.00	4793.42	4798.96
	T_{meter} (°F)	Inlet Initial	70	72	74
		Outlet Initial	69	71	73
		Inlet Final	72	74	77
		Outlet Final	71	73	76
	Meter Pressure (" H2O))		1.3	1.3	1.3
Test Conditions	Pump Vacuum (" Hg)		24	24	24
	P_{bar} (" Hg)		29.15	29.15	29.15
	$T_{ambient}$ (°F)		70	70	70
	Test Duration (min)		11	11	11

Thermocouple Calibration

Thermometer ID J31117

Voltage Supply ID A178550

Temperature Readout Accuracy		
Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	Aux-1	32

Temperature Readout Linearity			
Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
Aux-1	0	32	32
	1	77	77
	3	165	165
	7	341	342
	15	692	693

VOST Console DGM & Thermocouple Calibration

Console ID 80-10204-1 Nominal Orifice Flow Rate 2.0LPM

DGM Calibration

Calibrated by	Initials	mlb	Reviewed by	Initials	RVW	Leak Check	(-)	OK
	Date	08-17-11		Date	08-19-11			

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-4		
	K Factor		1.5109		
DGM being Calibrated	Vol (L)	Initial	5369.63	5389.19	5408.72
		Final	5389.19	5408.72	5428.32
	T_{meter} (°F)	Inlet Initial	75	76	76
		Outlet Initial	75	76	76
		Inlet Final	76	76	76
		Outlet Final	76	76	76
	Meter Pressure (" H2O))		2.0	2.0	2.0
Test Conditions	Pump Vacuum (" Hg)		17.5	17.5	17.5
	P_{bar} (" Hg)		29.23	29.23	29.23
	$T_{ambient}$ (°F)		70	70	70
	Test Duration (min)		10	10	10

Thermocouple Calibration

Thermometer ID J3117 Voltage Supply ID A178550

Temperature Readout Accuracy		
Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	Aux-1	32

Temperature Readout Linearity			
Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
Aux-1	0	32	32
↓	1	77	77
	3	165	165
	7	341	341
	15	692	692

VOST Console DGM Calibration

Console ID 80-111701-1

Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	RF	Reviewed By	Initials	Rlw
	Date	7/8/11		Date	07-13-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	1328.77	1333.78	1338.82
		Final	1333.78	1338.82	1343.86
	T meter (°F)	Inlet Initial	74	75	77
		Outlet Initial	74	74	76
		Inlet Final	75	77	79
		Outlet Final	74	76	77
	Meter Pressure (H_2O)		1.0	1.0	1.0
Test Conditions	Pump Vacuum ("Hg)		21.5	21.5	21.5
	Pbar ("Hg)		29.05	29.05	29.05
	T ambient (°F)		68	68	68
	Test Duration (minutes)		10	10	10
Calculated Values	DGMCF, Y		1.006	1.002	1.006
	Average DGMCF, Yd		1.005		

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value

2: Average Y value must be between 0.95 and 1.05

VOST Console DGM Calibration

Console ID 80-111701-1

Nominal Orifice Flow Rate (l/min) 0.5

DGM Calibration

Calibrated By	Initials	dc	Reviewed By	Initials	EDF
	Date	8/4/11		Date	8-16-11

			Run 1	Run 2	Run 3
Orifice Information	ID Number			L-1	
	K Factor			0.3834	
DGM being Calibrated	Vol (L)	Initial	1481.510	1486.490	1492.040
		Final	1486.490	1492.040	1497.050
	T meter (°F)	Inlet Initial	73	76	76
		Outlet Initial	73	74	75
		Inlet Final	76	76	77
		Outlet Final	74	75	76
	Meter Pressure (H_2O)		1	1	1
Test Conditions	Pump Vacuum ("Hg)		21.00	21.00	21.00
	Pbar ("Hg)		29.15	29.15	29.15
	T ambient (°F)		70	70	70
	Test Duration (minutes)		10	11	10
Calculated Values	DGMCF, Y		1.010	0.999	1.008
	Average DGMCF, Yd			1.005	
	Previous DGMCF, Y_{ref}		1.005	Error:	0.1%

Acceptance Criteria:

1: Each individual Y value must be within 2% of the average Y value
2: Average Y value must be between 0.95 and 1.05
3: Average Y value must be within 5% of the pre-test average Y value

CDS-03sb VOST Console
Revision Date November 2008
Reviewed: January 2010

VOST Console DGM & Thermocouple Calibration

Console ID 80-111701-1

Nominal Orifice Flow Rate 0.500L/min

DGM Calibration

Calibrated by	Initials	RF	Reviewed by	Initials	RW	Leak Check	(-)	ok
	Date	7/8/11		Date	07-13-11			

			Run 1	Run 2	Run 3
Orifice Information	ID Number		L-1		
	K Factor		0.3834		
DGM being Calibrated	Vol (L)	Initial	1328.77	1333.78	1338.82
		Final	1333.78	1338.82	1343.86
	T_{meter} (°F)	Inlet Initial	74	75	77
		Outlet Initial	74	74	76
		Inlet Final	75	77	79
		Outlet Final	74	76	77
	Meter Pressure (" H2O))		1.0	1.0	1.0
Test Conditions	Pump Vacuum (" Hg)		21.5	21.5	21.5
	P_{bar} (" Hg)		29.05	29.05	29.05
	$T_{ambient}$ (°F)		68	68	68
	Test Duration (min)		10	10	10

Thermocouple Calibration

Thermometer ID 53117

Voltage Supply ID A178550

Temperature Readout Accuracy

Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	Aux-1	32

Temperature Readout Linearity

Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
Aux-1	0	32	32
	1	77	77
	3	165	165
	7	341	341
	15	692	692

VOST Console DGM & Thermocouple Calibration

Console ID 80-111701-1

Nominal Orifice Flow Rate 0.500 LPM

DGM Calibration

Calibrated by	Initials	DC	Reviewed by	Initials	RW	Leak Check	(-) OK
	Date	8-4-11		Date	08-05-11		

			Run 1	Run 2	Run 3
Orifice Information		ID Number	L-1		
		K Factor	0.3834		
DGM being Calibrated	Vol (L)	Initial	1481.51	1486.49	1492.04
		Final	1486.49	1492.04	1497.05
	T_{meter} (°F)	Inlet Initial	73	76	76
		Outlet Initial	73	74	75
		Inlet Final	76	76	77
		Outlet Final	74	75	76
	Meter Pressure (" H2O))		1.0	1.0	1.0
Test Conditions	Pump Vacuum (" Hg)		21	21	21
	P_{bar} (" Hg)		29.15	29.15	29.15
	$T_{ambient}$ (°F)		70	70	70
	Test Duration (min)		10	11	10

Thermocouple Calibration

Thermometer ID J31117

Voltage Supply ID A178550

Temperature Readout Accuracy

Thermometer Reading (°F)	Temperature Readout	
	Channel No.	Temperature (°F)
32	Aux-1	33

Temperature Readout Linearity

Channel No.	Voltage	Theoretical Temp (°F)	Observed Temp (°F)
Aux-1	0	32	32
	1	77	77
	3	165	165
	7	341	341
	15	692	691

Miscellaneous

Calibration Data Sheet - Calipers

Caliper ID Number 700904

Calibrated by	Initials	RVW
	Date	01-19-10
Reviewed by	Initials	JP
	Date	1/21/10

	Ring Gauge		Caliper	
	ID No.	Diameter (in)	Measurement (in)	Error
1	030042	0.34999	0.349	-0.28
2	↓	↓	0.349	-0.28
3	↓	↓	0.349	-0.28

$$\text{Error} = \frac{\text{Measured} - \text{Standard}}{\text{Standard}} \times 100\%$$

Error for each of the three determinations must be within ±2%

CDS-18 Calipers
Revision Date: March 2008
Reviewed: March 2009

Calibration Data Sheet - Calipers

Caliper ID Number 700904

Calibrated by	Initials	Rvw
	Date	01-19-10
Reviewed by	Initials	JP
	Date	1/21/10

	Ring Gauge		Caliper	
	ID No.	Diameter (in)	Measurement (in)	Error
1	020035	0.23984	0.238	-0.77
2	|	|	0.238	-0.77
3	↓	↓	0.238	-0.77

$$\text{Error} = \frac{\text{Measured} - \text{Standard}}{\text{Standard}} \times 100\%$$

Error for each of the three determinations must be within ±2%

Meter Box - Pyrometer Calibration Sheet

Meter Box No: 0028-041410-1

Calibrated by: Oleg Lavrov

Date: 6/6/10

Temperature Scale Used: Fahrenheit

Office: ________

Client: ________

Job No: ________

Type of Calibration: Full-Test

Calibration Reference Settings (°F)	Pyrometer Reading for each Channel (°F)						
	1 Stack	2 Probe	3 Filter	4 Imp Out	5 Aux	6 DGM In	7 DGM Out
50	52	52	51				
100	102	102	102				
150	152	152	152				
200	202	202	202	▨	▨	▨	▨
250	252	252	251	▨	▨	▨	▨
300	302	302	301	▨	▨	▨	▨
350	352	352	351	▨	▨	▨	▨
400	402	402	402	▨	▨	▨	▨
450	452	452	452	▨	▨	▨	▨
500	502	502	502	▨	▨	▨	▨
550	552	552	552	▨	▨	▨	▨
600	602	601	601	▨	▨	▨	▨

Tolerance = ±2°F difference from reference setting.

Calibration Reference Information

Reference Used: Omega CL23A

Serial No: T-225950

Calibrated By: JH Metrology

Exp. Date: 10/7/2010

Calibration Report No: R044791

CleanAir
ENGINEERING

Pyrometer Calibration Test Report

Pyrometer No.:	80-080610-1	Office:	Palatine, Il
Calibrated By:	Martin Vaquero	Client:	
Date:	8/6/2010	Job Number:	

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading
50 °F	50 °F
100 °F	100 °F
150 °F	150 °F
200 °F	200 °F
250 °F	250 °F
300 °F	300 °F
350 °F	350 °F
400 °F	400 °F
450 °F	450 °F
500 °F	500 °F
550 °F	550 °F
600 °F	600 °F

Calibration Reference Information

Reference Used:	Omega CL23A	Serial No:	T-225950
Calibrated By:	JH METROLOGY CO.INC	Exp. Date:	10/7/2010
Report No:	R044791		

CleanAir
ENGINEERING

SIMCO electronics
11110 METRIC BLVD SUITE B
AUSTIN, TX 78758

Certificate No. 4872939

CERTIFICATE OF CALIBRATION
FOR
URS

9400 AMBERGLEN
AUSTIN, TX 78729

Description: DATEL, DVC8500, VOLTAGE CALIBRATOR

Serial No: 12560879
Asset No: A178550
Simco ID: 17414-1

Dept: NONE
PO No: ROBERT WOYTEK CC

Calibration Date: 08/12/10	Calibration Interval: 12 Months	Recall Date: 08/12/11
Arrival Condition: MEETS MANUFACTURER'S SPEC'S.	Service: CALIBRATED & CLEANED	

Procedure: 648-0013 REV 0
Temperature: 74°F
Relative Humidity: 48%

Standards Used:

Type	Simco ID	Due Date	Intvl Mos	Acc/Unc	Trace No.
DMM	16151*322	05/19/11	13	DCV +/-2 ppm	817/276744-08

The URS QMP and associated SOPs specify calibration every three years. This instrument is acceptable for use until 08/12/13.

Work performed by:
J. Robert Quiroz
Electronic Technician C (17121)

Reviewed by:

SIMCO Electronics' quality management system conforms to ISO 9001:2008, ISO/IEC 17025:2005, and ANSI/NCSL Z540-1-1994. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test uncertainty ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control.

Dated: 08/12/10

APPENDIX 9 – SOURCE TEST PLAN