VERTEX®

Vertex Environmental Insurance Services, Inc.
Vertex Environmental Services, Inc.
Vertex Construction Services, Inc.
Vertex International Services
Vertex Air Quality Services, LLC
Vertex Ingenieros Consultores, S. de R.L. de C.V.

Corporate Headquarters
400 Libbey Parkway
Weymouth, MA 02189
www.vertexeng.com
p: 781.952.6000
f: 781.335.3543

April 7, 2011

U.S. Environmental Protection Agency
5 Post Office Square, Suite 100
Mail Code OEP06-4
Boston, MA 02109-3912
ATTN: Remediation General Permit NOI Processing

**Re: NPDES Remediation General Permit (RGP) Notice of Intent**

To Whom It May Concern:

VERTEX Environmental Insurance Service, Inc. has been retained by Mr. Fred Kreuzinger to prepare this National Pollutant Discharge Elimination System (NPDES) Remediation General Permit (RGP) Notice of Intent (NOI) and application.

A release of fuel oil from an aboveground storage tank (AST) was identified at the residential property at 64 Country Club Drive in Northbridge, Massachusetts (Site) on March 12, 2011 and is currently being managed under the Massachusetts Contingency Plan (MCP) under release tracking number (RTN) 2-18136. In order to remediate the release, VERTEX has requested authorization from the Massachusetts Department of Environmental Protection (MADEP) to perform Immediate Response Action (IRA) activities including the treatment of fuel oil impacted dewatered groundwater with granular activated carbon (GAC) and discharge to the local storm water system.

VERTEX is seeking approval from the EPA for this proposed action, as described in the attached RGP application. The completed application details the identified concentrations of petroleum compounds in Site groundwater, a description of the proposed treatment system, an outline of proposed discharge limits and analytical tests, and information regarding the receiving waters.

A copy of this NOI is being provided to the Town of Northbridge, where the proposed discharge point will be located. Separate compliance with the Massachusetts state permit process is not necessary as the discharge is already subject to state regulation under the MCP.

If you have any questions or require additional information to process the above request, please do not hesitate to contact us at 781-952-6000.

Sincerely,

**VERTEX Environmental Insurance Services, Inc.**

Catherine Pierce
Senior Project Manager

Jonathan M. Noris, L.S.P, P.E
Project Manager

**Cc: Town of Northbridge, Board of Selectman**

## B. Suggested Form for Notice of Intent (NOI) for the Remediation General Permit

**1. General facility/site information.** Please provide the following information about the site:

| | | | | |
|---|---|---|---|---|
| a) Name of **facility/site**: Kreuzinger Residence | | **Facility/site** mailing address: | | |
| Location of **facility/site**:<br>longitude: 42.099444<br>latitude: 71.656389 | Facility SIC code(s): N/A | Street: 64 Country Club Drive | | |
| b) Name of **facility/site owner:** | | Town: Northbridge | | |
| Email address of facility/site owner: N/A | | State: MA | Zip: 01588 | County: Worcester |
| Telephone no. of facility/site **owner**: 508-234-7103 | | | | |
| Fax no. of facility/site **owner**: | | **Owner** is (check one): 1. Federal ○ 2. State/Tribal ○ 3. Private ⊙ 4. Other ○ if so, describe: | | |
| Address of **owner** (if different from site): | | | | |
| Street: | | | | |
| Town: | State: | Zip: | County: | |
| c) Legal name of **operator**: | **Operator** telephone no: 781-952-6000 | | | |
| VERTEX Environmental Insurance Services, Inc. | **Operator** fax no.: 781-952-6080 | **Operator** email: jnoris@vertexeng.com | | |
| **Operator** contact name and title: Jonathan Noris, PE, LSP Senior Project Manager | | | | |
| Address of **operator** (if different from owner): | Street: 400 Libbey Industrial Parkway | | | |
| Town: Weymouth | State: MA | Zip: 02189 | County: Norfolk | |

d) Check Y for "yes" or N for "no" for the following:
1. Has a prior NPDES permit exclusion been granted for the discharge? Y ○ N ◉, if Y, number:
2. Has a prior NPDES application (Form 1 & 2C) ever been filed for the discharge?
Y ○ N ◉, if Y, date and tracking #:
3. Is the discharge a "new discharge" as defined by 40 CFR 122.2? Y ◉ N ○
4. For sites in Massachusetts, is the discharge covered under the Massachusetts Contingency Plan (MCP) and exempt from state permitting? Y ◉ N ○

e) Is site/facility subject to any State permitting, license, or other action which is causing the generation of discharge? Y ○ N ◉
If Y, please list:
1. site identification # assigned by the state of NH or MA:
2. permit or license # assigned:
3. state agency contact information: name, location, and telephone number:

f) Is the site/facility covered by any other EPA permit, including:
1. Multi-Sector General Permit? Y ○ N ◉,
if Y, number:
2. Final Dewatering General Permit? Y ○ N ◉,
if Y, number:
3. EPA Construction General Permit? Y ○ N ◉,
if Y, number:
4. Individual NPDES permit? Y ○ N ◉,
if Y, number:
5. any other water quality related individual or general permit? Y ○ N ◉, if Y, number:

g) Is the site/facility located within or does it discharge to an Area of Critical Environmental Concern (ACEC)? Y ○ N ◉

h) Based on the facility/site information and any historical sampling data, identify the sub-category into which the potential discharge falls.

| **Activity Category** | **Activity Sub-Category** |
|---|---|
| I - Petroleum Related Site Remediation | A. Gasoline Only Sites ☐<br>B. Fuel Oils and Other Oil Sites (including Residential Non-Business Remediation Discharges) ☒<br>C. Petroleum Sites with Additional Contamination ☐ |
| II - Non Petroleum Site Remediation | A. Volatile Organic Compound (VOC) Only Sites ☐<br>B. VOC Sites with Additional Contamination ☐<br>C. Primarily Heavy Metal Sites ☐ |
| III - Contaminated Construction Dewatering | A. General Urban Fill Sites ☐<br>B. Known Contaminated Sites ☐ |

| | |
|---|---|
| IV - Miscellaneous Related Discharges | A. Aquifer Pump Testing to Evaluate Formerly Contaminated Sites ☐<br>B. Well Development/Rehabilitation at Contaminated/Formerly Contaminated Sites ☐<br>C. Hydrostatic Testing of Pipelines and Tanks ☐<br>D. Long-Term Remediation of Contaminated Sumps and Dikes ☐<br>E. Short-term Contaminated Dredging Drain Back Waters (if not covered by 401/404 permit) ☐ |

**2. Discharge information.** Please provide information about the discharge, (attaching additional sheets as necessary) including:

a) Describe the discharge activities for which the owner/applicant is seeking coverage:

b) Provide the following information about each discharge:

1) Number of discharge points: 1

2) What is the **maximum** and **average flow rate** of discharge (in cubic feet per second, $ft^3/s$)?
Max. flow .1114 Is maximum flow a **design value**? Y ◉ N ○
Average flow (include units) .0557 Is average flow a design value or estimate? Estimate

3) Latitude and longitude of each discharge within 100 feet:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| pt.1: lat | 42°06'02" | long | 71°39'09" | pt.2: lat. | | long. | ; |
| pt.3: lat | | long | | pt.4: lat. | | long. | ; |
| pt.5: lat | | long | | pt.6: lat. | | long. | ; |
| pt.7: lat | | long | | pt.8: lat. | | long. | ; etc. |

4) If hydrostatic testing, total volume of the discharge (gals):

5) Is the discharge intermittent ◉ or seasonal ○ ?
Is discharge ongoing? Y ○ N ◉

c) Expected dates of discharge (mm/dd/yy): start Apr 27, 2011 end May 25, 2011

d) Please attach a line drawing or flow schematic showing water flow through the facility including:
1. sources of intake water, 2. contributing flow from the operation, 3. treatment units, and 4. discharge points and receiving waters(s).

| Parameter * | CAS Number | Believed Absent | Believed Present | # of Samples | Sample Type (e.g., grab) | Analytical Method Used (method #) | Minimum Level (ML) of Test Method | Maximum daily value | | Average daily value | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | concentration (ug/l) | mass (kg) | concentration (ug/l) | mass (kg) |
| 13. tert-Amyl Methyl Ether (TAME) | 9940508 | ☒ | ☐ | | | | | | | | |
| 14. Naphthalene | 91203 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| 15. Carbon Tetrachloride | 56235 | ☒ | ☐ | | | | | | | | |
| 16. 1,2 Dichlorobenzene (o-DCB) | 95501 | ☒ | ☐ | | | | | | | | |
| 17. 1,3 Dichlorobenzene (m-DCB) | 541731 | ☒ | ☐ | | | | | | | | |
| 18. 1,4 Dichlorobenzene (p-DCB) | 106467 | ☒ | ☐ | | | | | | | | |
| 18a. Total dichlorobenzene | | ☒ | ☐ | | | | | | | | |
| 19. 1,1 Dichloroethane (DCA) | 75343 | ☒ | ☐ | | | | | | | | |
| 20. 1,2 Dichloroethane (DCA) | 107062 | ☒ | ☐ | | | | | | | | |
| 21. 1,1 Dichloroethene (DCE) | 75354 | ☒ | ☐ | | | | | | | | |
| 22. cis-1,2 Dichloroethene (DCE) | 156592 | ☒ | ☐ | | | | | | | | |
| 23. Methylene Chloride | 75092 | ☒ | ☐ | | | | | | | | |
| 24. Tetrachloroethene (PCE) | 127184 | ☒ | ☐ | | | | | | | | |
| 25. 1,1,1 Trichloro-ethane (TCA) | 71556 | ☒ | ☐ | | | | | | | | |
| 26. 1,1,2 Trichloro-ethane (TCA) | 79005 | ☒ | ☐ | | | | | | | | |
| 27. Trichloroethene (TCE) | 79016 | ☒ | ☐ | | | | | | | | |

| Parameter * | CAS Number | Believed Absent | Believed Present | # of Samples | Sample Type (e.g., grab) | Analytical Method Used (method #) | Minimum Level (ML) of Test Method | Maximum daily value | | Average daily value | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | concentration (ug/l) | mass (kg) | concentration (ug/l) | mass (kg) |
| 28. Vinyl Chloride (Chloroethene) | 75014 | ☒ | ☐ | | | | | | | | |
| 29. Acetone | 67641 | ☒ | ☐ | 1 | Grab | 8260 | 10 | | | | |
| 30. 1,4 Dioxane | 123911 | ☒ | ☐ | | | | | | | | |
| 31. Total Phenols | 108952 | ☒ | ☐ | | | | | | | | |
| 32. Pentachlorophenol (PCP) | 87865 | ☒ | ☐ | | | | | | | | |
| 33. Total Phthalates (Phthalate esters) [4] | | ☒ | ☐ | | | | | | | | |
| 34. Bis (2-Ethylhexyl) Phthalate [Di-(ethylhexyl) Phthalate] | 117817 | ☒ | ☐ | | | | | | | | |
| 35. Total Group I Polycyclic Aromatic Hydrocarbons (PAH) | | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| a. Benzo(a) Anthracene | 56553 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| b. Benzo(a) Pyrene | 50328 | ☒ | ☐ | 1 | Grab | MADEP EPH | 0.2 | | | | |
| c. Benzo(b)Fluoranthene | 205992 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| d. Benzo(k)Fluoranthene | 207089 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| e. Chrysene | 21801 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| f. Dibenzo(a,h)anthracene | 53703 | ☒ | ☐ | 1 | Grab | MADEP EPH | 0.5 | | | | |
| g. Indeno(1,2,3-cd) Pyrene | 193395 | ☒ | ☐ | 1 | Grab | MADEP EPH | 0.5 | | | | |
| 36. Total Group II Polycyclic Aromatic Hydrocarbons (PAH) | | ☐ | ☒ | 1 | Grab | MADEP EPH | 1.0 | | | | |

[4] The sum of individual phthalate compounds.

| Parameter * | CAS Number | Believed Absent | Believed Present | # of Samples | Sample Type (e.g., grab) | Analytical Method Used (method #) | Minimum Level (ML) of Test Method | Maximum daily value | | Average daily value | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | concentration (ug/l) | mass (kg) | concentration (ug/l) | mass (kg) |
| h. Acenaphthene | 83329 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| i. Acenaphthylene | 208968 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| j. Anthracene | 120127 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| k. Benzo(ghi) Perylene | 191242 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| l. Fluoranthene | 206440 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| m. Fluorene | 86737 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| n. Naphthalene | 91203 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| o. Phenanthrene | 85018 | ☐ | ☒ | 1 | Grab | MADEP EPH | 1.0 | 1.41 | .0004 | 1.41 | .0002 |
| p. Pyrene | 129000 | ☒ | ☐ | 1 | Grab | MADEP EPH | 1.0 | | | | |
| 37. Total Polychlorinated Biphenyls (PCBs) | 85687; 84742; 117840; 84662; 131113; 117817. | ☒ | ☐ | | | | | | | | |
| 38. Chloride | 16887006 | ☒ | ☐ | | | | | | | | |
| 39. Antimony | 7440360 | ☒ | ☐ | | | | | | | | |
| 40. Arsenic | 7440382 | ☒ | ☐ | | | | | | | | |
| 41. Cadmium | 7440439 | ☒ | ☐ | | | | | | | | |
| 42. Chromium III (trivalent) | 16065831 | ☒ | ☐ | 1 | Grab | 6010C | 5 | | | | |
| 43. Chromium VI (hexavalent) | 18540299 | ☒ | ☐ | 1 | Grab | 3500C | 5 | | | | |
| 44. Copper | 7440508 | ☒ | ☐ | | | | | | | | |
| 45. Lead | 7439921 | ☒ | ☐ | | | | | | | | |
| 46. Mercury | 7439976 | ☒ | ☐ | | | | | | | | |
| 47. Nickel | 7440020 | ☒ | ☐ | 1 | Grab | 6010C | 5 | | | | |
| 48. Selenium | 7782492 | ☒ | ☐ | | | | | | | | |
| 49. Silver | 7440224 | ☒ | ☐ | | | | | | | | |
| 50. Zinc | 7440666 | ☐ | ☒ | 1 | Grab | 6010C | 5 | 13.2 | .004 | 13.2 | .002 |
| 51. Iron | 7439896 | ☐ | ☒ | 1 | Grab | 6010C | 15 | 544 | .15 | 544 | .07 |
| Other (describe): | | ☒ | ☐ | | | | | | | | |

| Parameter * | CAS Number | Believed Absent | Believed Present | # of Samples | Sample Type (e.g., grab) | Analytical Method Used (method #) | Minimum Level (ML) of Test Method | Maximum daily value | | Average daily value | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | concentration (ug/l) | mass (kg) | concentration (ug/l) | mass (kg) |
| | | ☐ | ☐ | | | | | | | | |
| | | ☐ | ☐ | | | | | | | | |

b) For discharges where **metals** are believed present, please fill out the following (attach results of any calculations):

| | |
|---|---|
| *Step 1:* Do any of the metals in the influent exceed the effluent limits in Appendix III (i.e., the limits set at zero dilution)? Y ○ N ◉ | If yes, which metals? |
| *Step 2:* For any metals which exceed the **Appendix III** limits, calculate the **dilution factor (DF)** using the formula in Part I.A.3.c (step 2) of the NOI instructions or as determined by the State prior to the submission of this NOI. What is the dilution factor for applicable metals?<br>Metal: DF:<br>Metal: DF:<br>Metal: DF:<br>Metal: DF:<br>Etc. | Look up the limit calculated at the corresponding dilution factor in **Appendix IV.** Do any of the metals in the **influent** have the potential to exceed the corresponding **effluent** limits in Appendix IV (i.e., is the influent concentration above the limit set at the calculated dilution factor)?<br>Y ○ N ○ If Y, list which metals: |

**4. Treatment system information.** Please describe the treatment system using separate sheets as necessary, including:

a) A description of the treatment system, including a schematic of the proposed or existing treatment system:

5,000 gallon poly-settling/equalization tank with a submersible pump control, two 5-micron single bag filter housings (100gpm capacity each), two non-Code carbon adsorbers each 1,000 lbs reactivated carbon (50 gpm capacity), one flow meter totalizing 8 t0 160 gpm range.

| | | | | | | |
|---|---|---|---|---|---|---|
| b) Identify each applicable treatment unit (check all that apply): | Frac. tank ☐ | Air stripper ☐ | Oil/water separator ☐ | Equalization tanks ☒ | Bag filter ☒ | GAC filter ☒ |
| | Chlorination ☐ | De-chlorination ☐ | Other (please describe): | | | |

c) Proposed **average** and **maximum flow rates** (gallons per minute) for the discharge and the **design flow rate**(s) (gallons per minute) of the treatment system:
Average flow rate of discharge 25 gpm Maximum flow rate of treatment system 50 gpm
Design flow rate of treatment system 50 gpm

d) A description of chemical additives being used or planned to be used (attach MSDS sheets):

**5. Receiving surface water(s).** Please provide information about the receiving water(s), using separate sheets as necessary:

| a) Identify the discharge pathway: | Direct to receiving water ☐ | Within facility (sewer) ☐ | Storm drain ☒ | Wetlands ☐ | Other (describe): |
|---|---|---|---|---|---|

b) Provide a narrative description of the discharge pathway, including the name(s) of the receiving waters:
Discharge to catchbasin on Country Club Drive with outfall at Linwood Pond.

c) Attach a detailed map(s) indicating the site location and location of the outfall to the receiving water:
1. For multiple discharges, number the discharges sequentially.
2. For indirect dischargers, indicate the location of the discharge to the indirect conveyance and the discharge to surface water
The map should also include the location and distance to the nearest sanitary sewer as well as the locus of nearby sensitive receptors (based on USGS topographical mapping), such as surface waters, drinking water supplies, and wetland areas.

d) Provide the state water quality classification of the receiving water B

e) Provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water NA (Pond) cfs
Please attach any calculation sheets used to support stream flow and dilution calculations.

f) Is the receiving water a listed 303(d) water quality impaired or limited water? Y ○ N ⊙ If yes, for which pollutant(s)?

Is there a final TMDL? Y ○ N ⊙ If yes, for which pollutant(s)?

**6. ESA and NHPA Eligibility.**

Please provide the following information according to requirements of Permit Parts I.A.4 and I.A.5 Appendices II and VII.

a) Using the instructions in Appendix VII and information on Appendix II, under which criterion listed in Part I.C are you eligible for coverage under this general permit?

A ◉ B ○ C ○ D ○ E ○ F ○

b) If you selected Criterion D or F, has consultation with the federal services been completed? Y ○ N ○ Underway ○

c) If consultation with U.S. Fish and Wildlife Service and/or NOAA Fisheries Service was completed, was a written concurrence finding that the discharge is "not likely to adversely affect" listed species or critical habitat received? Y ○ N ○

d) Attach documentation of ESA eligibility as described in the NOI instructions and required by Appendix VII, Part I.C, Step 4.

e) Using the instructions in Appendix VII, under which criterion listed in Part II.C are you eligible for coverage under this general permit?

1 ◉ 2 ○ 3 ○

f) If Criterion 3 was selected, attach all written correspondence with the State or Tribal historic preservation officers, including any terms and conditions that outline measures the applicant must follow to mitigate or prevent adverse effects due to activities regulated by the RGP.

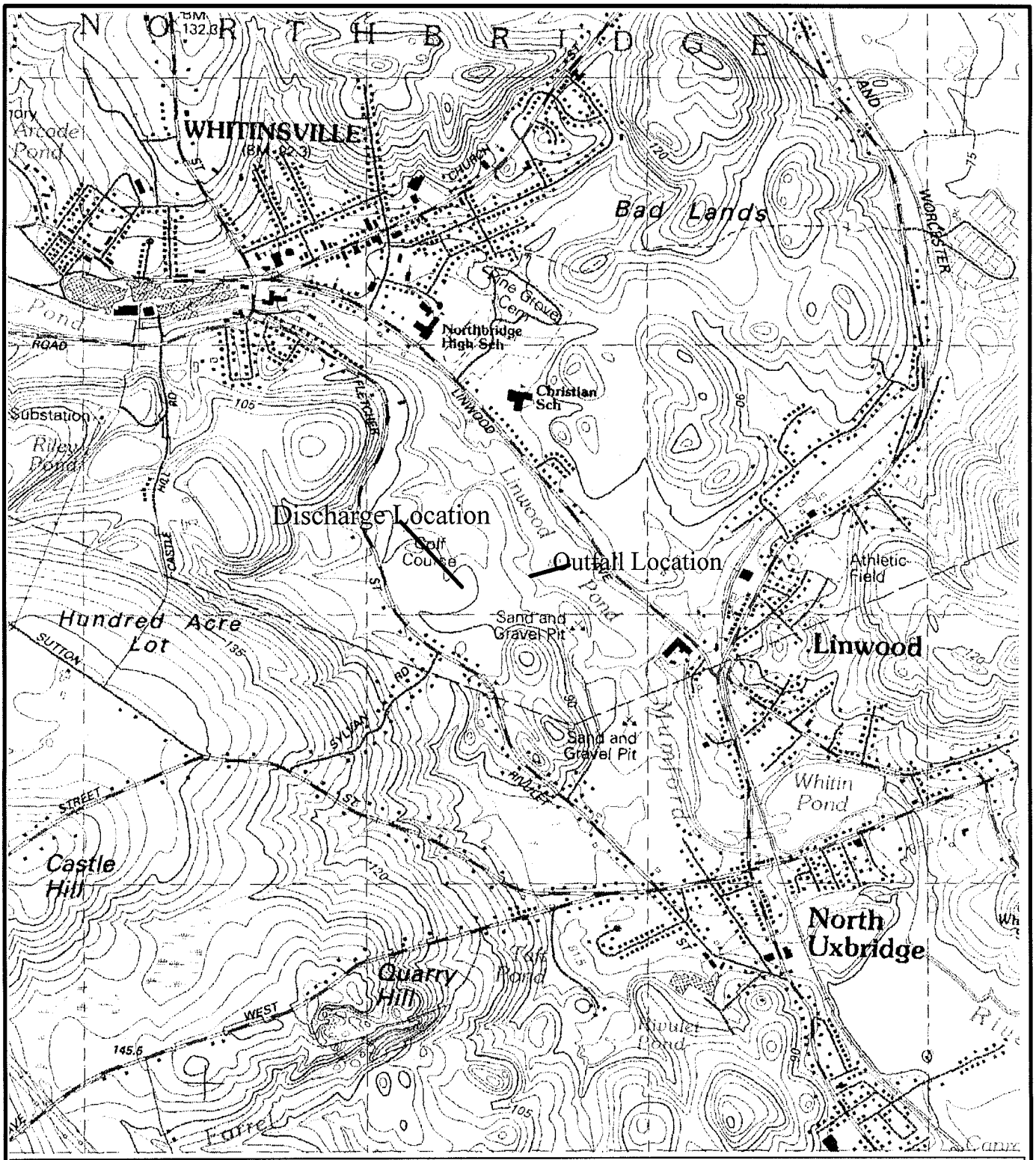
**7. Supplemental information.**

Please provide any supplemental information. Attach any analytical data used to support the application. Attach any certification(s) required by the general permit.

**8. Signature Requirements:** The Notice of Intent must be signed by the operator in accordance with the signatory requirements of 40 CFR Section 122.22, including the following certification:

*I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I certify that I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.*

| | |
|---|---|
| Facility/Site Name: | Kreuzinger Residence, 64 Country Club Drive, Northbridge, Massachusetts |
| Operator signature: | Jonathan Noris |
| Printed Name &Title: | Jonathan Noris, PE, LSP Senior Project Manager |
| Date: | April 6, 2011 |




USGS Topographic Map, 2009
Uxbridge, MA Quadrangle

| | | |
|---|---|---|
| **DISCHARGE AND OUTFALL LOCATIONS**<br>Kreuzinger Residence<br>64 Country Club Drive<br>Northbridge, MA | Scale: As Shown<br>April 2011<br>Project No. 18473 | **VERTEX**<br>**Environmental Services, Inc.**<br>**Figure 1** |

# MassDEP - Bureau of Waste Site Cleanup

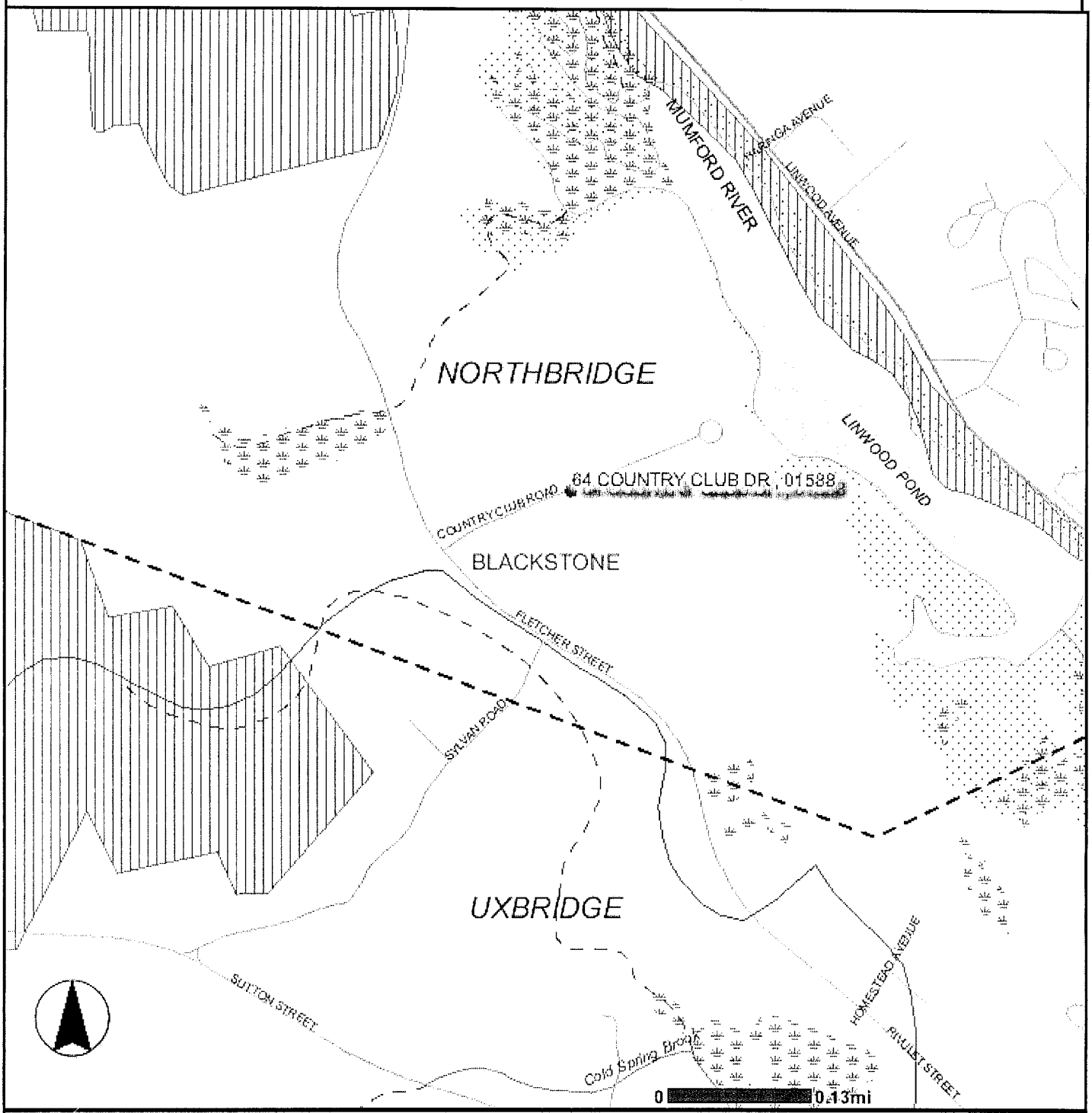
## MCP Numerical Ranking System Map: 500 feet & 0.5 Mile Radii

Site Name:
Whitinsville Site
64 Country Club Drive
Northbridge, MA
RTN:
NAD83 MA Coordinates:
0mE, 0mN

March 15, 2011

The information shown on this map is the best available at the date of printing. For more information please refer to www.mass.gov/mgis/massgis.htm

MassDEP
Department of Environmental Protection




Roads: Limited Access, Divided, Other Hwy, Major Road, Minor Road, Track, Trail

Boundaries: Town, County, DEP Region; Train; Powerline; Pipeline; Aqueduct

Basins: Major, Sub; Streams: Perennial, Intermittent, Man Made Shore, Dam

Aquifers: Medium Yield, High Yield, EPA Sole Source

Non Potential Drinking Water Source Area: Medium, High (Yield)

PWS Protection Areas: Zone II, IWPA, Zone A

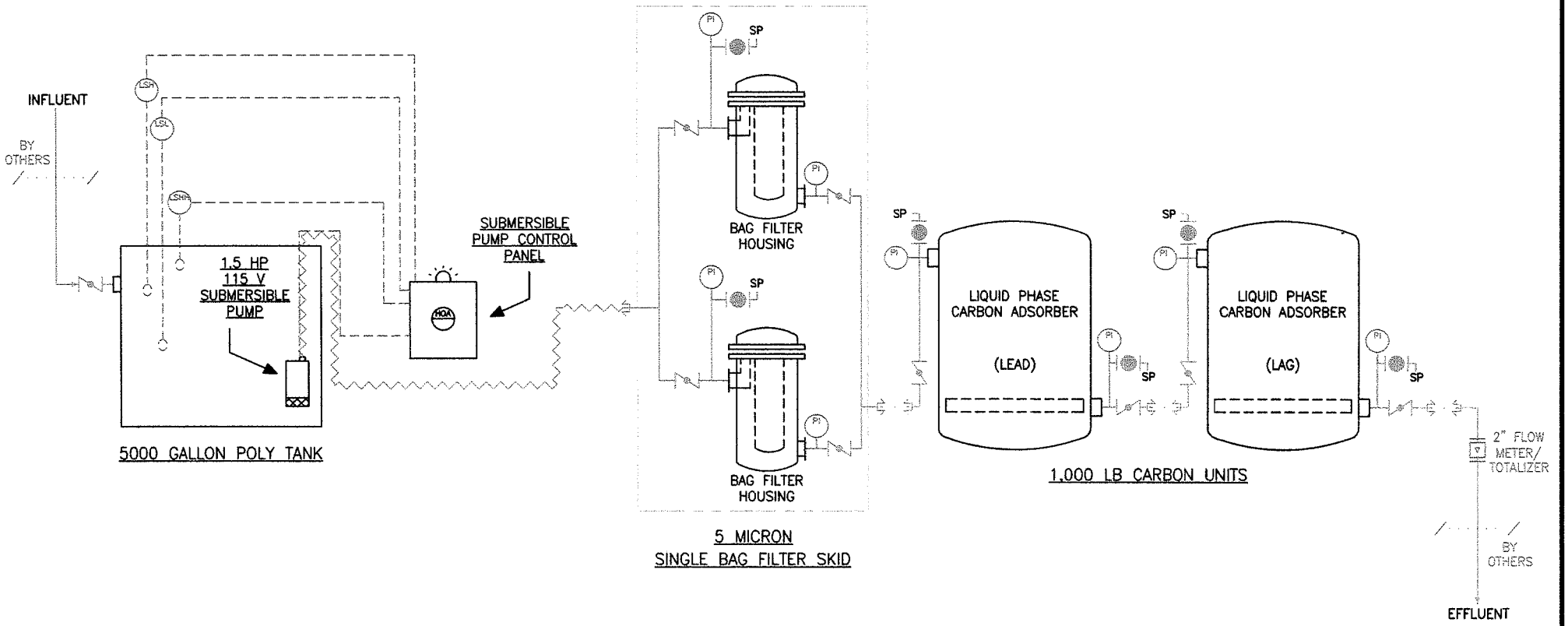
Hydrography: Open Water, PWS Reservoir, Tidal Flat

Wetlands: Freshwater, Saltwater, Cranberry Bog

FEMA 100yr Floodplain; Protected Open Space; ACEC

NHESP: Est Rare Weland Habitat, Certified Vernal Pool

DEP Permitted Solid Waste Landfill




**LEGEND**

- PROCESS PIPING
- FLEXIBLE HOSE
- FLOW DIRECTION
- PIPE CROSS OVER
- BALL VALVE (NORMALLY CLOSE)
- BUTTERFLY VALVE
- CHECK VALVE
- GATE VALVE (OPEN)
- SP SAMPLE PORT
- CAM LOCK COUPLING
- PI PRESSURE GAGE
- LEVEL FLOAT SWITCH
- M MOTOR
- FLOW METER
- LAHH LEVEL ALARM HIGH HIGH
- LSH LEVEL SWITCH HIGH
- LSHH LEVEL SWITCH HIGH HIGH
- LSL LEVEL SWITCH LOW
- HOA HAND/OFF/AUTO SWITCH



NOTES:
1) MAXIMUM FLOWRATE = 50 GPM
2) SYSTEM FOOTPRINT APPROX. 10' X 30'
3) NOT ALL VALVES, INSTRUMENTATION AND PIPING, ETC. SHOWN FOR CLARITY.
4) POWER REQUIREMENTS (BY OTHERS) – 460V, 3 PHASE, 20 AMPS.

| NO. | REVISIONS | DATE |
|---|---|---|
| B | MODIFIED FOR SUMP AND POLY TANK | 03/30/11 |
| A | TYPICAL | 06/29/10 |

# STANDARD PROCESS & INSTRUMENTATION DIAGRAM

## PROPOSED 50 GPM TEMPORARY TREATMENT SYSTEM – 64 COUNTRY CLUB RD. WHITINSVILLE, MA

| SCALE: NTS | APPROVED BY: JB | DRAWN BY: DP |
|---|---|---|
| DATE: 03/30/11 | | |

GROUND/WATER TREATMENT & TECHNOLOGY
P.O. BOX 1174
DENVILLE, NJ 07834

| DWG SIZE: A | SHEET: 1 OF 1 | DRAWING NUMBER: LYT-WHITINSVILLE | B |
|---|---|---|---|

Report Date:
04-Apr-11 15:05

☑ Final Report
☐ Re-Issued Report
☐ Revised Report

**SPECTRUM ANALYTICAL, INC.**
*Featuring*
**HANIBAL TECHNOLOGY**

## *Laboratory Report*

Vertex Engineering Services, Inc.
400 Libbey Parkway
Weymouth, MA 02189
Attn: Catherine Pierce

Project: Whitinsville, MA
Project #: 18285

| Laboratory ID | Client Sample ID | Matrix | Date Sampled | Date Received |
|---|---|---|---|---|
| SB26357-01 | Sump | Ground Water | 29-Mar-11 17:30 | 30-Mar-11 17:58 |

I attest that the information contained within the report has been reviewed for accuracy and checked against the quality control requirements for each method. These results relate only to the sample(s) as received.
All applicable NELAC requirements have been met.

Massachusetts # M-MA138/MA1110
Connecticut # PH-0777
Florida # E87600/E87936
Maine # MA138
New Hampshire # 2538
New Jersey # MA011/MA012
New York # 11393/11840
Pennsylvania # 68-04426/68-02924
Rhode Island # 98
USDA # S-51435
Vermont # VT-11393

Authorized by:

Nicole Leja
Laboratory Director

Spectrum Analytical holds certification in the State of Massachusetts for the analytes as indicated with an X in the "Cert." column within this report. Please note that the State of Massachusetts does not offer certification for all analytes.
Please note that this report contains 19 pages of analytical data plus Chain of Custody document(s). When the Laboratory Report is indicated as revised, this report supersedes any previously dated reports for the laboratory ID(s) referenced above. Where this report identifies subcontracted analyses, copies of the subcontractor's test report are available upon request. This report may not be reproduced, except in full, without written approval from Spectrum Analytical, Inc.

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*Please contact the Laboratory or Technical Director at 800-789-9115 with any questions regarding the data contained in this laboratory report.*

**CASE NARRATIVE:**

The sample temperature upon receipt by Spectrum Analytical courier was recorded as 5.2 degrees Celsius. The condition of these samples was further noted as received on ice. The samples were transported on ice to the laboratory facility and the temperature was recorded at 1.6 degrees Celsius upon receipt at the laboratory. Please refer to the Chain of Custody for details specific to sample receipt times.

An infrared thermometer with a tolerance of +/- 2.0 degrees Celsius was used immediately upon receipt of the samples.

If a Matrix Spike (MS), Matrix Spike Duplicate (MSD) or Duplicate (DUP) was not requested on the Chain of Custody, method criteria may have been fulfilled with a source sample not of this Sample Delivery Group.

MADEP has published a list of analytical methods (CAM) which provides a series of recommended protocols for the acquisition, analysis and reporting of analytical data in support of MCP decisions. "Presumptive Certainty" can be established only for those methods published by the MADEP in the MCP CAM. The compounds and/or elements reported were specifically requested by the client on the Chain of Custody and in some cases may not include the full analyte list as defined in the method. Regulatory limits may not be achieved if specific method and/or technique was not requested on the Chain of Custody.

According to WSC-CAM 5/2009 Rev.1, Table 11 A-1, recovery for some VOC analytes have been deemed potentially difficult. Although they may still be within the recommended recovery range, a range has been set based on historical control limits.

Some target analytes which are not listed as exceptions in the Summary of CAM Reporting Limits may exceed the recommended RL based on sample initial volume or weight provided, % moisture content, or responsiveness of a particular analyte to purge and trap instrumentation.

**See below for any non-conformances and issues relating to quality control samples and/or sample analysis/matrix.**

**SW846 7196A/SM3500CrD**

**Samples:**

SB26357-01 *Sump*

This sample was received outside the EPA recommended holding time for the analysis specified.

Hexavalent Chromium

**SW846 8260C**

**Calibration:**

S101868-ICV1

Analyte percent recovery is outside individual acceptance criteria (70-130).

1,1-Dichloroethane (152%)
Naphthalene (131%)

This affected the following samples:

1105650-BLK1
1105650-BS1
1105650-BSD1
S102495-CCV1

**Laboratory Control Samples:**

1105650 BS/BSD

Acetone percent recoveries (111/131) are outside individual acceptance criteria (70-130), but within overall method allowances. All reported results of the following samples are considered to have a potentially high bias:

Sump

1105650-BSD1

SW846 8260C

**Laboratory Control Samples:**

1105650-BSD1

The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data.

Acrylonitrile

**Samples:**

S102495-CCV1

Analyte percent difference is outside individual acceptance criteria (20), but within overall method allowances.

Naphthalene (25.5%)

Analyte percent drift is outside individual acceptance criteria (20), but within overall method allowances.

Acetone (31.1%)
Acrylonitrile (24.8%)
Vinyl chloride (28.2%)

This affected the following samples:

1105650-BLK1
1105650-BS1
1105650-BSD1
Sump

| Sample Identification | Client Project # | Matrix | Collection Date/Time | Received |
|---|---|---|---|---|
| **Sump** SB26357-01 | 18285 | Ground Water | 29-Mar-11 17:30 | 30-Mar-11 |

| CAS No. | Analyte(s) | Result | Flag | Units | *RDL | Dilution | Method Ref. | Prepared | Analyzed | Analyst | Batch | Cert. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Volatile Organic Compounds** | | | | | | | | | | | | |
| Volatile Organic Compounds<br>Prepared by method SW846 5030 Water MS | | | | | | | | | | | | |
| 67-64-1 | Acetone | BRL | | µg/l | 10.0 | 1 | SW846 8260C | 31-Mar-11 | 31-Mar-11 | JLG | 1105650 | |
| 71-43-2 | Benzene | BRL | | µg/l | 1.0 | 1 | " | " | " | " | " | |
| 100-41-4 | Ethylbenzene | BRL | | µg/l | 1.0 | 1 | " | " | " | " | " | |
| 1634-04-4 | Methyl tert-butyl ether | BRL | | µg/l | 1.0 | 1 | " | " | " | " | " | |
| 108-88-3 | Toluene | BRL | | µg/l | 1.0 | 1 | " | " | " | " | " | |
| 179601-23-1 | m,p-Xylene | BRL | | µg/l | 2.0 | 1 | " | " | " | " | " | |
| 95-47-6 | o-Xylene | 2.8 | | µg/l | 1.0 | 1 | " | " | " | " | " | |
| *Surrogate recoveries:* | | | | | | | | | | | | |
| *460-00-4* | *4-Bromofluorobenzene* | *97* | | | *70-130 %* | | " | " | " | " | " | |
| *2037-26-5* | *Toluene-d8* | *102* | | | *70-130 %* | | " | " | " | " | " | |
| *17060-07-0* | *1,2-Dichloroethane-d4* | *123* | | | *70-130 %* | | " | " | " | " | " | |
| *1868-53-7* | *Dibromofluoromethane* | *108* | | | *70-130 %* | | " | " | " | " | " | |
| **Extractable Petroleum Hydrocarbons** | | | | | | | | | | | | |
| EPH Aliphatic/Aromatic Ranges<br>Prepared by method SW846 3510C | | | | | | | | | | | | |
| | C9-C18 Aliphatic Hydrocarbons | 0.6 | | mg/l | 0.1 | 1 | +MADEP EPH 5/2004 R | 31-Mar-11 | 01-Apr-11 | MM | 1105621 | |
| | C19-C36 Aliphatic Hydrocarbons | BRL | | mg/l | 0.1 | 1 | " | " | " | " | " | |
| | C11-C22 Aromatic Hydrocarbons | 0.5 | | mg/l | 0.1 | 1 | " | " | " | " | " | |
| | Unadjusted C11-C22 Aromatic Hydrocarbons | 0.5 | | mg/l | 0.1 | 1 | " | " | " | " | " | |
| | Total Petroleum Hydrocarbons | 1.2 | | mg/l | 0.1 | 1 | " | " | " | " | " | |
| | Unadjusted Total Petroleum Hydrocarbons | 1.2 | | mg/l | 0.1 | 1 | " | " | " | " | " | |
| EPH Target PAH Analytes<br>Prepared by method SW846 3510C | | | | | | | | | | | | |
| 91-20-3 | Naphthalene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 91-57-6 | 2-Methylnaphthalene | 2.00 | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 208-96-8 | Acenaphthylene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 83-32-9 | Acenaphthene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 86-73-7 | Fluorene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 85-01-8 | Phenanthrene | 1.41 | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 120-12-7 | Anthracene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 206-44-0 | Fluoranthene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 129-00-0 | Pyrene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 56-55-3 | Benzo (a) anthracene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 218-01-9 | Chrysene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 205-99-2 | Benzo (b) fluoranthene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 207-08-9 | Benzo (k) fluoranthene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| 50-32-8 | Benzo (a) pyrene | BRL | | µg/l | 0.200 | 1 | " | " | " | " | " | |
| 193-39-5 | Indeno (1,2,3-cd) pyrene | BRL | | µg/l | 0.500 | 1 | " | " | " | " | " | |
| 53-70-3 | Dibenzo (a,h) anthracene | BRL | | µg/l | 0.500 | 1 | " | " | " | " | " | |
| 191-24-2 | Benzo (g,h,i) perylene | BRL | | µg/l | 1.00 | 1 | " | " | " | " | " | |
| *Surrogate recoveries:* | | | | | | | | | | | | |
| *3386-33-2* | *1-Chlorooctadecane* | *54* | | | *40-140 %* | | " | " | " | " | " | |
| *84-15-1* | *Ortho-Terphenyl* | *57* | | | *40-140 %* | | " | " | " | " | " | |

*This laboratory report is not valid without an authorized signature on the cover page.*

* Reportable Detection Limit BRL = Below Reporting Limit

| Sample Identification | Client Project # | Matrix | Collection Date/Time | Received |
|---|---|---|---|---|
| **Sump** | 18285 | Ground Water | 29-Mar-11 17:30 | 30-Mar-11 |
| SB26357-01 | | | | |

| *CAS No.* | *Analyte(s)* | *Result* | *Flag* | *Units* | **RDL* | *Dilution* | *Method Ref.* | *Prepared* | *Analyzed* | *Analyst* | *Batch* | *Cert.* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Extractable Petroleum Hydrocarbons** | | | | | | | | | | | | |
| EPH Target PAH Analytes<br>Prepared by method SW846 3510C | | | | | | | | | | | | |
| *321-60-8* | *2-Fluorobiphenyl* | *69* | | | *40-140 %* | | +MADEP EPH 5/2004 R | 31-Mar-11 | 01-Apr-11 | MM | 1105621 | |
| **Total Metals by EPA 200/6000 Series Methods** | | | | | | | | | | | | |
| | Preservation | Field Preservec | | N/A | | 1 | EPA 200/6000 methods | 30-Mar-11 | 30-Mar-11 | LA | 1105561 | |
| **Total Metals by EPA 6000/7000 Series Methods** | | | | | | | | | | | | |
| 7440-47-3 | Chromium | BRL | | mg/l | 0.0050 | 1 | SW846 6010C | 31-Mar-11 | 31-Mar-11 | ARF | 1105702 | |
| 7439-89-6 | Iron | 0.544 | | mg/l | 0.0150 | 1 | " | " | " | " | " | |
| 7440-02-0 | Nickel | BRL | | mg/l | 0.0050 | 1 | " | " | " | " | " | |
| 7440-66-6 | Zinc | 0.0132 | | mg/l | 0.0050 | 1 | " | " | 01-Apr-11 | " | " | |
| **General Chemistry Parameters** | | | | | | | | | | | | |
| 16065-83-1 | Trivalent Chromium | BRL | | mg/l | 0.0050 | 1 | Calculation | 31-Mar-11 | 01-Apr-11 | JLC | 1105702 | |
| 18540-29-9 | Hexavalent Chromium | BRL | HT2 | mg/l | 0.005 | 1 | SW846 7196A/SM3500C rD | 31-Mar-11 13:44 | 31-Mar-11 16:51 | TDD | 1105682 | |
| | Total Suspended Solids | 39.0 | | mg/l | 5.00 | 1 | SM2540D | 01-Apr-11 | 01-Apr-11 | SJL | 1105829 | X |

## Volatile Organic Compounds - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105650 - SW846 5030 Water MS** | | | | | | | | | | |
| Blank (1105650-BLK1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | BRL | | µg/l | 1.0 | | | | | | |
| Acetone | BRL | | µg/l | 10.0 | | | | | | |
| Acrylonitrile | BRL | | µg/l | 0.5 | | | | | | |
| Benzene | BRL | | µg/l | 1.0 | | | | | | |
| Bromobenzene | BRL | | µg/l | 1.0 | | | | | | |
| Bromochloromethane | BRL | | µg/l | 1.0 | | | | | | |
| Bromodichloromethane | BRL | | µg/l | 0.5 | | | | | | |
| Bromoform | BRL | | µg/l | 1.0 | | | | | | |
| Bromomethane | BRL | | µg/l | 2.0 | | | | | | |
| 2-Butanone (MEK) | BRL | | µg/l | 10.0 | | | | | | |
| n-Butylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| sec-Butylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| tert-Butylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| Carbon disulfide | BRL | | µg/l | 2.0 | | | | | | |
| Carbon tetrachloride | BRL | | µg/l | 1.0 | | | | | | |
| Chlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| Chloroethane | BRL | | µg/l | 2.0 | | | | | | |
| Chloroform | BRL | | µg/l | 1.0 | | | | | | |
| Chloromethane | BRL | | µg/l | 2.0 | | | | | | |
| 2-Chlorotoluene | BRL | | µg/l | 1.0 | | | | | | |
| 4-Chlorotoluene | BRL | | µg/l | 1.0 | | | | | | |
| 1,2-Dibromo-3-chloropropane | BRL | | µg/l | 2.0 | | | | | | |
| Dibromochloromethane | BRL | | µg/l | 0.5 | | | | | | |
| 1,2-Dibromoethane (EDB) | BRL | | µg/l | 0.5 | | | | | | |
| Dibromomethane | BRL | | µg/l | 1.0 | | | | | | |
| 1,2-Dichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,3-Dichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,4-Dichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| Dichlorodifluoromethane (Freon12) | BRL | | µg/l | 2.0 | | | | | | |
| 1,1-Dichloroethane | BRL | | µg/l | 1.0 | | | | | | |
| 1,2-Dichloroethane | BRL | | µg/l | 1.0 | | | | | | |
| 1,1-Dichloroethene | BRL | | µg/l | 1.0 | | | | | | |
| cis-1,2-Dichloroethene | BRL | | µg/l | 1.0 | | | | | | |
| trans-1,2-Dichloroethene | BRL | | µg/l | 1.0 | | | | | | |
| 1,2-Dichloropropane | BRL | | µg/l | 1.0 | | | | | | |
| 1,3-Dichloropropane | BRL | | µg/l | 1.0 | | | | | | |
| 2,2-Dichloropropane | BRL | | µg/l | 1.0 | | | | | | |
| 1,1-Dichloropropene | BRL | | µg/l | 1.0 | | | | | | |
| cis-1,3-Dichloropropene | BRL | | µg/l | 0.5 | | | | | | |
| trans-1,3-Dichloropropene | BRL | | µg/l | 0.5 | | | | | | |
| Ethylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| Hexachlorobutadiene | BRL | | µg/l | 0.5 | | | | | | |
| 2-Hexanone (MBK) | BRL | | µg/l | 10.0 | | | | | | |
| Isopropylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| 4-Isopropyltoluene | BRL | | µg/l | 1.0 | | | | | | |
| Methyl tert-butyl ether | BRL | | µg/l | 1.0 | | | | | | |
| 4-Methyl-2-pentanone (MIBK) | BRL | | µg/l | 10.0 | | | | | | |
| Methylene chloride | BRL | | µg/l | 2.0 | | | | | | |
| Naphthalene | BRL | | µg/l | 1.0 | | | | | | |
| n-Propylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| Styrene | BRL | | µg/l | 1.0 | | | | | | |
| 1,1,1,2-Tetrachloroethane | BRL | | µg/l | 1.0 | | | | | | |

## Volatile Organic Compounds - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105650 - SW846 5030 Water MS** | | | | | | | | | | |
| Blank (1105650-BLK1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| 1,1,2,2-Tetrachloroethane | BRL | | µg/l | 0.5 | | | | | | |
| Tetrachloroethene | BRL | | µg/l | 1.0 | | | | | | |
| Toluene | BRL | | µg/l | 1.0 | | | | | | |
| 1,2,3-Trichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,2,4-Trichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,3,5-Trichlorobenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,1,1-Trichloroethane | BRL | | µg/l | 1.0 | | | | | | |
| 1,1,2-Trichloroethane | BRL | | µg/l | 1.0 | | | | | | |
| Trichloroethene | BRL | | µg/l | 1.0 | | | | | | |
| Trichlorofluoromethane (Freon 11) | BRL | | µg/l | 1.0 | | | | | | |
| 1,2,3-Trichloropropane | BRL | | µg/l | 1.0 | | | | | | |
| 1,2,4-Trimethylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| 1,3,5-Trimethylbenzene | BRL | | µg/l | 1.0 | | | | | | |
| Vinyl chloride | BRL | | µg/l | 1.0 | | | | | | |
| m,p-Xylene | BRL | | µg/l | 2.0 | | | | | | |
| o-Xylene | BRL | | µg/l | 1.0 | | | | | | |
| Tetrahydrofuran | BRL | | µg/l | 2.0 | | | | | | |
| Ethyl ether | BRL | | µg/l | 1.0 | | | | | | |
| Tert-amyl methyl ether | BRL | | µg/l | 1.0 | | | | | | |
| Ethyl tert-butyl ether | BRL | | µg/l | 1.0 | | | | | | |
| Di-isopropyl ether | BRL | | µg/l | 1.0 | | | | | | |
| Tert-Butanol / butyl alcohol | BRL | | µg/l | 10.0 | | | | | | |
| 1,4-Dioxane | BRL | | µg/l | 20.0 | | | | | | |
| trans-1,4-Dichloro-2-butene | BRL | | µg/l | 5.0 | | | | | | |
| Ethanol | BRL | | µg/l | 400 | | | | | | |
| *Surrogate: 4-Bromofluorobenzene* | *45.2* | | µg/l | | *50.0* | | *90* | *70-130* | | |
| *Surrogate: Toluene-d8* | *51.1* | | µg/l | | *50.0* | | *102* | *70-130* | | |
| *Surrogate: 1,2-Dichloroethane-d4* | *60.0* | | µg/l | | *50.0* | | *120* | *70-130* | | |
| *Surrogate: Dibromofluoromethane* | *54.5* | | µg/l | | *50.0* | | *109* | *70-130* | | |
| LCS (1105650-BS1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 18.7 | | µg/l | | 20.0 | | 94 | 70-130 | | |
| Acetone | 22.2 | | µg/l | | 20.0 | | 111 | 70-130 | | |
| Acrylonitrile | 18.9 | | µg/l | | 20.0 | | 95 | 70-130 | | |
| Benzene | 17.6 | | µg/l | | 20.0 | | 88 | 70-130 | | |
| Bromobenzene | 19.9 | | µg/l | | 20.0 | | 100 | 70-130 | | |
| Bromochloromethane | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| Bromodichloromethane | 20.0 | | µg/l | | 20.0 | | 100 | 70-130 | | |
| Bromoform | 23.0 | | µg/l | | 20.0 | | 115 | 70-130 | | |
| Bromomethane | 21.4 | | µg/l | | 20.0 | | 107 | 70-130 | | |
| 2-Butanone (MEK) | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| n-Butylbenzene | 18.5 | | µg/l | | 20.0 | | 93 | 70-130 | | |
| sec-Butylbenzene | 21.1 | | µg/l | | 20.0 | | 106 | 70-130 | | |
| tert-Butylbenzene | 21.6 | | µg/l | | 20.0 | | 108 | 70-130 | | |
| Carbon disulfide | 19.9 | | µg/l | | 20.0 | | 100 | 70-130 | | |
| Carbon tetrachloride | 21.1 | | µg/l | | 20.0 | | 106 | 70-130 | | |
| Chlorobenzene | 18.1 | | µg/l | | 20.0 | | 91 | 70-130 | | |
| Chloroethane | 18.9 | | µg/l | | 20.0 | | 95 | 70-130 | | |
| Chloroform | 18.9 | | µg/l | | 20.0 | | 95 | 70-130 | | |
| Chloromethane | 23.0 | | µg/l | | 20.0 | | 115 | 70-130 | | |
| 2-Chlorotoluene | 21.0 | | µg/l | | 20.0 | | 105 | 70-130 | | |
| 4-Chlorotoluene | 20.4 | | µg/l | | 20.0 | | 102 | 70-130 | | |

## Volatile Organic Compounds - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105650 - SW846 5030 Water MS** | | | | | | | | | | |
| LCS (1105650-BS1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| 1,2-Dibromo-3-chloropropane | 17.4 | | µg/l | | 20.0 | | 87 | 70-130 | | |
| Dibromochloromethane | 22.2 | | µg/l | | 20.0 | | 111 | 70-130 | | |
| 1,2-Dibromoethane (EDB) | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| Dibromomethane | 18.3 | | µg/l | | 20.0 | | 92 | 70-130 | | |
| 1,2-Dichlorobenzene | 18.8 | | µg/l | | 20.0 | | 94 | 70-130 | | |
| 1,3-Dichlorobenzene | 19.7 | | µg/l | | 20.0 | | 99 | 70-130 | | |
| 1,4-Dichlorobenzene | 17.5 | | µg/l | | 20.0 | | 87 | 70-130 | | |
| Dichlorodifluoromethane (Freon12) | 19.5 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| 1,1-Dichloroethane | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | | |
| 1,2-Dichloroethane | 19.7 | | µg/l | | 20.0 | | 98 | 70-130 | | |
| 1,1-Dichloroethene | 18.4 | | µg/l | | 20.0 | | 92 | 70-130 | | |
| cis-1,2-Dichloroethene | 18.7 | | µg/l | | 20.0 | | 94 | 70-130 | | |
| trans-1,2-Dichloroethene | 17.8 | | µg/l | | 20.0 | | 89 | 70-130 | | |
| 1,2-Dichloropropane | 16.2 | | µg/l | | 20.0 | | 81 | 70-130 | | |
| 1,3-Dichloropropane | 18.0 | | µg/l | | 20.0 | | 90 | 70-130 | | |
| 2,2-Dichloropropane | 19.1 | | µg/l | | 20.0 | | 96 | 70-130 | | |
| 1,1-Dichloropropene | 17.7 | | µg/l | | 20.0 | | 89 | 70-130 | | |
| cis-1,3-Dichloropropene | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | | |
| trans-1,3-Dichloropropene | 19.9 | | µg/l | | 20.0 | | 100 | 70-130 | | |
| Ethylbenzene | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| Hexachlorobutadiene | 18.6 | | µg/l | | 20.0 | | 93 | 70-130 | | |
| 2-Hexanone (MBK) | 17.7 | | µg/l | | 20.0 | | 89 | 70-130 | | |
| Isopropylbenzene | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| 4-Isopropyltoluene | 18.8 | | µg/l | | 20.0 | | 94 | 70-130 | | |
| Methyl tert-butyl ether | 16.7 | | µg/l | | 20.0 | | 84 | 70-130 | | |
| 4-Methyl-2-pentanone (MIBK) | 18.1 | | µg/l | | 20.0 | | 90 | 70-130 | | |
| Methylene chloride | 21.7 | | µg/l | | 20.0 | | 108 | 70-130 | | |
| Naphthalene | 22.7 | | µg/l | | 20.0 | | 113 | 70-130 | | |
| n-Propylbenzene | 20.2 | | µg/l | | 20.0 | | 101 | 70-130 | | |
| Styrene | 21.0 | | µg/l | | 20.0 | | 105 | 70-130 | | |
| 1,1,1,2-Tetrachloroethane | 20.9 | | µg/l | | 20.0 | | 104 | 70-130 | | |
| 1,1,2,2-Tetrachloroethane | 17.0 | | µg/l | | 20.0 | | 85 | 70-130 | | |
| Tetrachloroethene | 18.8 | | µg/l | | 20.0 | | 94 | 70-130 | | |
| Toluene | 17.2 | | µg/l | | 20.0 | | 86 | 70-130 | | |
| 1,2,3-Trichlorobenzene | 21.4 | | µg/l | | 20.0 | | 107 | 70-130 | | |
| 1,2,4-Trichlorobenzene | 20.6 | | µg/l | | 20.0 | | 103 | 70-130 | | |
| 1,3,5-Trichlorobenzene | 18.0 | | µg/l | | 20.0 | | 90 | 70-130 | | |
| 1,1,1-Trichloroethane | 19.9 | | µg/l | | 20.0 | | 99 | 70-130 | | |
| 1,1,2-Trichloroethane | 18.3 | | µg/l | | 20.0 | | 92 | 70-130 | | |
| Trichloroethene | 18.2 | | µg/l | | 20.0 | | 91 | 70-130 | | |
| Trichlorofluoromethane (Freon 11) | 20.9 | | µg/l | | 20.0 | | 104 | 70-130 | | |
| 1,2,3-Trichloropropane | 17.7 | | µg/l | | 20.0 | | 89 | 70-130 | | |
| 1,2,4-Trimethylbenzene | 21.8 | | µg/l | | 20.0 | | 109 | 70-130 | | |
| 1,3,5-Trimethylbenzene | 21.4 | | µg/l | | 20.0 | | 107 | 70-130 | | |
| Vinyl chloride | 27.9 | QM9 | µg/l | | 20.0 | | 140 | 70-130 | | |
| m,p-Xylene | 40.0 | | µg/l | | 40.0 | | 100 | 70-130 | | |
| o-Xylene | 20.7 | | µg/l | | 20.0 | | 104 | 70-130 | | |
| Tetrahydrofuran | 17.6 | | µg/l | | 20.0 | | 88 | 70-130 | | |
| Ethyl ether | 20.4 | | µg/l | | 20.0 | | 102 | 70-130 | | |
| Tert-amyl methyl ether | 20.9 | | µg/l | | 20.0 | | 104 | 70-130 | | |
| Ethyl tert-butyl ether | 19.4 | | µg/l | | 20.0 | | 97 | 70-130 | | |
| Di-isopropyl ether | 17.2 | | µg/l | | 20.0 | | 86 | 70-130 | | |

## Volatile Organic Compounds - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105650 - SW846 5030 Water MS** | | | | | | | | | | |
| LCS (1105650-BS1) | | | | | | Prepared & Analyzed: 31-Mar-11 | | | | |
| Tert-Butanol / butyl alcohol | 184 | | µg/l | | 200 | | 92 | 70-130 | | |
| 1,4-Dioxane | 179 | | µg/l | | 200 | | 89 | 70-130 | | |
| trans-1,4-Dichloro-2-butene | 16.4 | | µg/l | | 20.0 | | 82 | 70-130 | | |
| Ethanol | 397 | | µg/l | | 400 | | 99 | 70-130 | | |
| *Surrogate: 4-Bromofluorobenzene* | *51.6* | | µg/l | | *50.0* | | *103* | *70-130* | | |
| *Surrogate: Toluene-d8* | *50.7* | | µg/l | | *50.0* | | *101* | *70-130* | | |
| *Surrogate: 1,2-Dichloroethane-d4* | *53.5* | | µg/l | | *50.0* | | *107* | *70-130* | | |
| *Surrogate: Dibromofluoromethane* | *50.8* | | µg/l | | *50.0* | | *102* | *70-130* | | |
| LCS Dup (1105650-BSD1) | | | | | | Prepared & Analyzed: 31-Mar-11 | | | | |
| 1,1,2-Trichlorotrifluoroethane (Freon 113) | 18.6 | | µg/l | | 20.0 | | 93 | 70-130 | 0.3 | 25 |
| Acetone | 26.2 | | µg/l | | 20.0 | | 131 | 70-130 | 17 | 50 |
| Acrylonitrile | 25.0 | QR2 | µg/l | | 20.0 | | 125 | 70-130 | 27 | 25 |
| Benzene | 17.1 | | µg/l | | 20.0 | | 85 | 70-130 | 3 | 25 |
| Bromobenzene | 18.0 | | µg/l | | 20.0 | | 90 | 70-130 | 10 | 25 |
| Bromochloromethane | 19.3 | | µg/l | | 20.0 | | 96 | 70-130 | 0.4 | 25 |
| Bromodichloromethane | 19.8 | | µg/l | | 20.0 | | 99 | 70-130 | 1 | 25 |
| Bromoform | 22.2 | | µg/l | | 20.0 | | 111 | 70-130 | 3 | 25 |
| Bromomethane | 21.5 | | µg/l | | 20.0 | | 108 | 70-130 | 0.8 | 50 |
| 2-Butanone (MEK) | 22.5 | | µg/l | | 20.0 | | 112 | 70-130 | 14 | 50 |
| n-Butylbenzene | 18.1 | | µg/l | | 20.0 | | 90 | 70-130 | 2 | 25 |
| sec-Butylbenzene | 19.3 | | µg/l | | 20.0 | | 97 | 70-130 | 9 | 25 |
| tert-Butylbenzene | 19.6 | | µg/l | | 20.0 | | 98 | 70-130 | 9 | 25 |
| Carbon disulfide | 20.4 | | µg/l | | 20.0 | | 102 | 70-130 | 3 | 25 |
| Carbon tetrachloride | 19.5 | | µg/l | | 20.0 | | 98 | 70-130 | 8 | 25 |
| Chlorobenzene | 17.3 | | µg/l | | 20.0 | | 86 | 70-130 | 5 | 25 |
| Chloroethane | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | 1 | 50 |
| Chloroform | 18.4 | | µg/l | | 20.0 | | 92 | 70-130 | 3 | 25 |
| Chloromethane | 20.5 | | µg/l | | 20.0 | | 103 | 70-130 | 11 | 25 |
| 2-Chlorotoluene | 19.9 | | µg/l | | 20.0 | | 99 | 70-130 | 5 | 25 |
| 4-Chlorotoluene | 18.7 | | µg/l | | 20.0 | | 94 | 70-130 | 8 | 25 |
| 1,2-Dibromo-3-chloropropane | 21.9 | | µg/l | | 20.0 | | 110 | 70-130 | 23 | 25 |
| Dibromochloromethane | 20.8 | | µg/l | | 20.0 | | 104 | 70-130 | 6 | 50 |
| 1,2-Dibromoethane (EDB) | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | 0.6 | 25 |
| Dibromomethane | 17.9 | | µg/l | | 20.0 | | 90 | 70-130 | 2 | 25 |
| 1,2-Dichlorobenzene | 17.6 | | µg/l | | 20.0 | | 88 | 70-130 | 7 | 25 |
| 1,3-Dichlorobenzene | 18.2 | | µg/l | | 20.0 | | 91 | 70-130 | 8 | 25 |
| 1,4-Dichlorobenzene | 16.6 | | µg/l | | 20.0 | | 83 | 70-130 | 5 | 25 |
| Dichlorodifluoromethane (Freon12) | 18.1 | | µg/l | | 20.0 | | 90 | 70-130 | 7 | 50 |
| 1,1-Dichloroethane | 18.4 | | µg/l | | 20.0 | | 92 | 70-130 | 4 | 25 |
| 1,2-Dichloroethane | 20.2 | | µg/l | | 20.0 | | 101 | 70-130 | 3 | 25 |
| 1,1-Dichloroethene | 18.1 | | µg/l | | 20.0 | | 91 | 70-130 | 2 | 25 |
| cis-1,2-Dichloroethene | 18.1 | | µg/l | | 20.0 | | 90 | 70-130 | 4 | 25 |
| trans-1,2-Dichloroethene | 17.6 | | µg/l | | 20.0 | | 88 | 70-130 | 1 | 25 |
| 1,2-Dichloropropane | 16.1 | | µg/l | | 20.0 | | 80 | 70-130 | 0.7 | 25 |
| 1,3-Dichloropropane | 18.0 | | µg/l | | 20.0 | | 90 | 70-130 | 0.06 | 25 |
| 2,2-Dichloropropane | 17.8 | | µg/l | | 20.0 | | 89 | 70-130 | 7 | 25 |
| 1,1-Dichloropropene | 16.8 | | µg/l | | 20.0 | | 84 | 70-130 | 5 | 25 |
| cis-1,3-Dichloropropene | 18.8 | | µg/l | | 20.0 | | 94 | 70-130 | 2 | 25 |
| trans-1,3-Dichloropropene | 20.2 | | µg/l | | 20.0 | | 101 | 70-130 | 1 | 25 |
| Ethylbenzene | 18.3 | | µg/l | | 20.0 | | 92 | 70-130 | 5 | 25 |
| Hexachlorobutadiene | 16.7 | | µg/l | | 20.0 | | 83 | 70-130 | 11 | 50 |

## Volatile Organic Compounds - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105650 - SW846 5030 Water MS** | | | | | | | | | | |
| LCS Dup (1105650-BSD1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| 2-Hexanone (MBK) | 20.2 | | µg/l | | 20.0 | | 101 | 70-130 | 13 | 25 |
| Isopropylbenzene | 17.9 | | µg/l | | 20.0 | | 90 | 70-130 | 8 | 25 |
| 4-Isopropyltoluene | 17.9 | | µg/l | | 20.0 | | 90 | 70-130 | 5 | 25 |
| Methyl tert-butyl ether | 17.5 | | µg/l | | 20.0 | | 88 | 70-130 | 5 | 25 |
| 4-Methyl-2-pentanone (MIBK) | 21.4 | | µg/l | | 20.0 | | 107 | 70-130 | 17 | 50 |
| Methylene chloride | 22.7 | | µg/l | | 20.0 | | 114 | 70-130 | 5 | 25 |
| Naphthalene | 25.1 | | µg/l | | 20.0 | | 126 | 70-130 | 10 | 25 |
| n-Propylbenzene | 18.9 | | µg/l | | 20.0 | | 94 | 70-130 | 7 | 25 |
| Styrene | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | 9 | 25 |
| 1,1,1,2-Tetrachloroethane | 19.3 | | µg/l | | 20.0 | | 96 | 70-130 | 8 | 25 |
| 1,1,2,2-Tetrachloroethane | 18.1 | | µg/l | | 20.0 | | 90 | 70-130 | 6 | 25 |
| Tetrachloroethene | 16.7 | | µg/l | | 20.0 | | 84 | 70-130 | 12 | 25 |
| Toluene | 16.1 | | µg/l | | 20.0 | | 81 | 70-130 | 6 | 25 |
| 1,2,3-Trichlorobenzene | 20.8 | | µg/l | | 20.0 | | 104 | 70-130 | 3 | 25 |
| 1,2,4-Trichlorobenzene | 19.0 | | µg/l | | 20.0 | | 95 | 70-130 | 8 | 25 |
| 1,3,5-Trichlorobenzene | 17.4 | | µg/l | | 20.0 | | 87 | 70-130 | 4 | 25 |
| 1,1,1-Trichloroethane | 18.9 | | µg/l | | 20.0 | | 94 | 70-130 | 5 | 25 |
| 1,1,2-Trichloroethane | 18.5 | | µg/l | | 20.0 | | 93 | 70-130 | 1 | 25 |
| Trichloroethene | 17.6 | | µg/l | | 20.0 | | 88 | 70-130 | 4 | 25 |
| Trichlorofluoromethane (Freon 11) | 20.0 | | µg/l | | 20.0 | | 100 | 70-130 | 4 | 50 |
| 1,2,3-Trichloropropane | 20.0 | | µg/l | | 20.0 | | 100 | 70-130 | 12 | 25 |
| 1,2,4-Trimethylbenzene | 20.9 | | µg/l | | 20.0 | | 104 | 70-130 | 4 | 25 |
| 1,3,5-Trimethylbenzene | 19.7 | | µg/l | | 20.0 | | 98 | 70-130 | 8 | 25 |
| Vinyl chloride | 25.6 | | µg/l | | 20.0 | | 128 | 70-130 | 9 | 25 |
| m,p-Xylene | 37.0 | | µg/l | | 40.0 | | 92 | 70-130 | 8 | 25 |
| o-Xylene | 19.2 | | µg/l | | 20.0 | | 96 | 70-130 | 8 | 25 |
| Tetrahydrofuran | 22.0 | | µg/l | | 20.0 | | 110 | 70-130 | 22 | 25 |
| Ethyl ether | 20.9 | | µg/l | | 20.0 | | 105 | 70-130 | 3 | 50 |
| Tert-amyl methyl ether | 22.1 | | µg/l | | 20.0 | | 110 | 70-130 | 5 | 25 |
| Ethyl tert-butyl ether | 20.0 | | µg/l | | 20.0 | | 100 | 70-130 | 3 | 25 |
| Di-isopropyl ether | 18.5 | | µg/l | | 20.0 | | 93 | 70-130 | 7 | 25 |
| Tert-Butanol / butyl alcohol | 232 | | µg/l | | 200 | | 116 | 70-130 | 23 | 25 |
| 1,4-Dioxane | 214 | | µg/l | | 200 | | 107 | 70-130 | 18 | 25 |
| trans-1,4-Dichloro-2-butene | 18.5 | | µg/l | | 20.0 | | 92 | 70-130 | 12 | 25 |
| Ethanol | 467 | | µg/l | | 400 | | 117 | 70-130 | 16 | 30 |
| *Surrogate: 4-Bromofluorobenzene* | *51.1* | | µg/l | | *50.0* | | *102* | *70-130* | | |
| *Surrogate: Toluene-d8* | *49.6* | | µg/l | | *50.0* | | *99* | *70-130* | | |
| *Surrogate: 1,2-Dichloroethane-d4* | *56.0* | | µg/l | | *50.0* | | *112* | *70-130* | | |
| *Surrogate: Dibromofluoromethane* | *52.6* | | µg/l | | *50.0* | | *105* | *70-130* | | |

## Extractable Petroleum Hydrocarbons - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105621 - SW846 3510C** | | | | | | | | | | |
| Blank (1105621-BLK1) | | | | | | Prepared & Analyzed: 31-Mar-11 | | | | |
| C9-C18 Aliphatic Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| C19-C36 Aliphatic Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| C11-C22 Aromatic Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| Unadjusted C11-C22 Aromatic Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| Total Petroleum Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| Unadjusted Total Petroleum Hydrocarbons | BRL | | mg/l | 0.05 | | | | | | |
| Naphthalene | BRL | | µg/l | 1.00 | | | | | | |
| 2-Methylnaphthalene | BRL | | µg/l | 1.00 | | | | | | |
| Acenaphthylene | BRL | | µg/l | 1.00 | | | | | | |
| Acenaphthene | BRL | | µg/l | 1.00 | | | | | | |
| Fluorene | BRL | | µg/l | 1.00 | | | | | | |
| Phenanthrene | BRL | | µg/l | 1.00 | | | | | | |
| Anthracene | BRL | | µg/l | 1.00 | | | | | | |
| Fluoranthene | BRL | | µg/l | 1.00 | | | | | | |
| Pyrene | BRL | | µg/l | 1.00 | | | | | | |
| Benzo (a) anthracene | BRL | | µg/l | 1.00 | | | | | | |
| Chrysene | BRL | | µg/l | 1.00 | | | | | | |
| Benzo (b) fluoranthene | BRL | | µg/l | 1.00 | | | | | | |
| Benzo (k) fluoranthene | BRL | | µg/l | 1.00 | | | | | | |
| Benzo (a) pyrene | BRL | | µg/l | 0.200 | | | | | | |
| Indeno (1,2,3-cd) pyrene | BRL | | µg/l | 0.500 | | | | | | |
| Dibenzo (a,h) anthracene | BRL | | µg/l | 0.500 | | | | | | |
| Benzo (g,h,i) perylene | BRL | | µg/l | 1.00 | | | | | | |
| Naphthalene (aliphatic fraction) | 0.00 | | µg/l | | | | | | | |
| 2-Methylnaphthalene (aliphatic fraction) | 0.00 | | µg/l | | | | | | | |
| *Surrogate: 1-Chlorooctadecane* | *40.6* | | µg/l | | *50.0* | | *81* | *40-140* | | |
| *Surrogate: Ortho-Terphenyl* | *32.4* | | µg/l | | *50.0* | | *65* | *40-140* | | |
| *Surrogate: 2-Fluorobiphenyl* | *26.6* | | µg/l | | *40.0* | | *66* | *40-140* | | |
| LCS (1105621-BS1) | | | | | | Prepared & Analyzed: 31-Mar-11 | | | | |
| C9-C18 Aliphatic Hydrocarbons | 0.366 | | mg/l | 0.05 | 0.600 | | 61 | 40-140 | | |
| C19-C36 Aliphatic Hydrocarbons | 0.576 | | mg/l | 0.05 | 0.800 | | 72 | 40-140 | | |
| C11-C22 Aromatic Hydrocarbons | 0.940 | | mg/l | 0.05 | 1.70 | | 55 | 40-140 | | |
| Naphthalene | 40.2 | | µg/l | 1.00 | 100 | | 40 | 40-140 | | |
| 2-Methylnaphthalene | 43.3 | | µg/l | 1.00 | 100 | | 43 | 40-140 | | |
| Acenaphthylene | 51.9 | | µg/l | 1.00 | 100 | | 52 | 40-140 | | |
| Acenaphthene | 50.3 | | µg/l | 1.00 | 100 | | 50 | 40-140 | | |
| Fluorene | 54.4 | | µg/l | 1.00 | 100 | | 54 | 40-140 | | |
| Phenanthrene | 62.2 | | µg/l | 1.00 | 100 | | 62 | 40-140 | | |
| Anthracene | 61.0 | | µg/l | 1.00 | 100 | | 61 | 40-140 | | |
| Fluoranthene | 65.7 | | µg/l | 1.00 | 100 | | 66 | 40-140 | | |
| Pyrene | 66.0 | | µg/l | 1.00 | 100 | | 66 | 40-140 | | |
| Benzo (a) anthracene | 71.4 | | µg/l | 1.00 | 100 | | 71 | 40-140 | | |
| Chrysene | 73.6 | | µg/l | 1.00 | 100 | | 74 | 40-140 | | |
| Benzo (b) fluoranthene | 83.0 | | µg/l | 1.00 | 100 | | 83 | 40-140 | | |
| Benzo (k) fluoranthene | 80.8 | | µg/l | 1.00 | 100 | | 81 | 40-140 | | |
| Benzo (a) pyrene | 72.3 | | µg/l | 0.200 | 100 | | 72 | 40-140 | | |
| Indeno (1,2,3-cd) pyrene | 81.1 | | µg/l | 0.500 | 100 | | 81 | 40-140 | | |
| Dibenzo (a,h) anthracene | 79.6 | | µg/l | 0.500 | 100 | | 80 | 40-140 | | |
| Benzo (g,h,i) perylene | 81.4 | | µg/l | 1.00 | 100 | | 81 | 40-140 | | |
| Naphthalene (aliphatic fraction) | 0.000100 | | µg/l | | 100 | | 0.0001 | 0-200 | | |
| 2-Methylnaphthalene (aliphatic fraction) | 0.000100 | | µg/l | | 100 | | 0.0001 | 0-200 | | |

## Extractable Petroleum Hydrocarbons - Quality Control

| Analyte(s) | Result | Flag | Units | *RDL | Spike Level | Source Result | %REC | %REC Limits | RPD | RPD Limit |
|---|---|---|---|---|---|---|---|---|---|---|
| **Batch 1105621 - SW846 3510C** | | | | | | | | | | |
| LCS (1105621-BS1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| *Surrogate: 1-Chlorooctadecane* | *33.4* | | µg/l | | *50.0* | | *67* | *40-140* | | |
| *Surrogate: Ortho-Terphenyl* | *32.7* | | µg/l | | *50.0* | | *65* | *40-140* | | |
| *Surrogate: 2-Fluorobiphenyl* | *26.4* | | µg/l | | *40.0* | | *66* | *40-140* | | |
| Naphthalene Breakthrough | 0.00 | | % | | | | | 0-5 | | |
| 2-Methylnaphthalene Breakthrough | 0.00 | | % | | | | | 0-5 | | |
| LCS (1105621-BS2) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| C9-C18 Aliphatic Hydrocarbons | 0.426 | | mg/l | 0.05 | 0.600 | | 71 | 40-140 | | |
| C19-C36 Aliphatic Hydrocarbons | 0.622 | | mg/l | 0.05 | 0.800 | | 78 | 40-140 | | |
| C11-C22 Aromatic Hydrocarbons | 0.940 | | mg/l | 0.05 | 1.70 | | 55 | 40-140 | | |
| Naphthalene | 40.0 | | µg/l | 1.00 | 100 | | 40 | 40-140 | | |
| 2-Methylnaphthalene | 42.9 | | µg/l | 1.00 | 100 | | 43 | 40-140 | | |
| Acenaphthylene | 52.0 | | µg/l | 1.00 | 100 | | 52 | 40-140 | | |
| Acenaphthene | 49.9 | | µg/l | 1.00 | 100 | | 50 | 40-140 | | |
| Fluorene | 54.6 | | µg/l | 1.00 | 100 | | 55 | 40-140 | | |
| Phenanthrene | 61.5 | | µg/l | 1.00 | 100 | | 61 | 40-140 | | |
| Anthracene | 60.3 | | µg/l | 1.00 | 100 | | 60 | 40-140 | | |
| Fluoranthene | 64.8 | | µg/l | 1.00 | 100 | | 65 | 40-140 | | |
| Pyrene | 64.8 | | µg/l | 1.00 | 100 | | 65 | 40-140 | | |
| Benzo (a) anthracene | 70.9 | | µg/l | 1.00 | 100 | | 71 | 40-140 | | |
| Chrysene | 72.5 | | µg/l | 1.00 | 100 | | 73 | 40-140 | | |
| Benzo (b) fluoranthene | 85.5 | | µg/l | 1.00 | 100 | | 85 | 40-140 | | |
| Benzo (k) fluoranthene | 78.8 | | µg/l | 1.00 | 100 | | 79 | 40-140 | | |
| Benzo (a) pyrene | 73.8 | | µg/l | 0.200 | 100 | | 74 | 40-140 | | |
| Indeno (1,2,3-cd) pyrene | 81.5 | | µg/l | 0.500 | 100 | | 81 | 40-140 | | |
| Dibenzo (a,h) anthracene | 79.8 | | µg/l | 0.500 | 100 | | 80 | 40-140 | | |
| Benzo (g,h,i) perylene | 79.4 | | µg/l | 1.00 | 100 | | 79 | 40-140 | | |
| Naphthalene (aliphatic fraction) | 0.00 | | µg/l | | 100 | | | 0-200 | | |
| 2-Methylnaphthalene (aliphatic fraction) | 0.00 | | µg/l | | 100 | | | 0-200 | | |
| *Surrogate: 1-Chlorooctadecane* | *35.1* | | µg/l | | *50.0* | | *70* | *40-140* | | |
| *Surrogate: Ortho-Terphenyl* | *32.1* | | µg/l | | *50.0* | | *64* | *40-140* | | |
| *Surrogate: 2-Fluorobiphenyl* | *25.0* | | µg/l | | *40.0* | | *62* | *40-140* | | |
| Naphthalene Breakthrough | 0.00 | | % | | | | | 0-5 | | |
| 2-Methylnaphthalene Breakthrough | 0.00 | | % | | | | | 0-5 | | |
| LCS Dup (1105621-BSD1) | | | | | Prepared & Analyzed: 31-Mar-11 | | | | | |
| C9-C18 Aliphatic Hydrocarbons | 0.390 | | mg/l | 0.05 | 0.600 | | 65 | 40-140 | 6 | 25 |
| C19-C36 Aliphatic Hydrocarbons | 0.587 | | mg/l | 0.05 | 0.800 | | 73 | 40-140 | 2 | 25 |
| C11-C22 Aromatic Hydrocarbons | 0.980 | | mg/l | 0.05 | 1.70 | | 58 | 40-140 | 4 | 25 |
| Naphthalene | 41.1 | | µg/l | 1.00 | 100 | | 41 | 40-140 | 2 | 25 |
| 2-Methylnaphthalene | 45.6 | | µg/l | 1.00 | 100 | | 46 | 40-140 | 5 | 25 |
| Acenaphthylene | 54.3 | | µg/l | 1.00 | 100 | | 54 | 40-140 | 4 | 25 |
| Acenaphthene | 52.6 | | µg/l | 1.00 | 100 | | 53 | 40-140 | 5 | 25 |
| Fluorene | 56.5 | | µg/l | 1.00 | 100 | | 56 | 40-140 | 4 | 25 |
| Phenanthrene | 64.3 | | µg/l | 1.00 | 100 | | 64 | 40-140 | 3 | 25 |
| Anthracene | 63.1 | | µg/l | 1.00 | 100 | | 63 | 40-140 | 3 | 25 |
| Fluoranthene | 67.4 | | µg/l | 1.00 | 100 | | 67 | 40-140 | 3 | 25 |
| Pyrene | 67.8 | | µg/l | 1.00 | 100 | | 68 | 40-140 | 3 | 25 |
| Benzo (a) anthracene | 74.4 | | µg/l | 1.00 | 100 | | 74 | 40-140 | 4 | 25 |
| Chrysene | 74.8 | | µg/l | 1.00 | 100 | | 75 | 40-140 | 2 | 25 |
| Benzo (b) fluoranthene | 83.7 | | µg/l | 1.00 | 100 | | 84 | 40-140 | 0.8 | 25 |
| Benzo (k) fluoranthene | 80.5 | | µg/l | 1.00 | 100 | | 80 | 40-140 | 0.4 | 25 |

## Notes and Definitions

| | |
|---|---|
| HT2 | This sample was received outside the EPA recommended holding time for the analysis specified. |
| QM9 | The spike recovery for this QC sample is outside the established control limits. The sample results for the QC batch were accepted based on LCS/LCSD or SRM recoveries within the control limits. |
| QR2 | The RPD result exceeded the QC control limits; however, both percent recoveries were acceptable. Sample results for the QC batch were accepted based on percent recoveries and completeness of QC data. |
| BRL | Below Reporting Limit - Analyte NOT DETECTED at or above the reporting limit |
| dry | Sample results reported on a dry weight basis |
| NR | Not Reported |
| RPD | Relative Percent Difference |

A plus sign (+) in the Method Reference column indicates the method is not accredited by NELAC.

A Matrix Spike and Matrix Spike Duplicate (MS/MSD) for MADEP EPH CAM may not have been analyzed with the samples in this work order. According to the method these spikes are performed only when requested by the client. If requested the spike recoveries are included in the batch QC data.

Laboratory Control Sample (LCS): A known matrix spiked with compound(s) representative of the target analytes, which is used to document laboratory performance.

Matrix Duplicate: An intra-laboratory split sample which is used to document the precision of a method in a given sample matrix.

Matrix Spike: An aliquot of a sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Method Blank: An analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.

Method Detection Limit (MDL): The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte.

Reportable Detection Limit (RDL): The lowest concentration that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. For many analytes the RDL analyte concentration is selected as the lowest non-zero standard in the calibration curve. While the RDL is approximately 5 to 10 times the MDL, the RDL for each sample takes into account the sample volume/weight, extract/digestate volume, cleanup procedures and, if applicable, dry weight correction. Sample RDLs are highly matrix-dependent.

Surrogate: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. These compounds are spiked into all blanks, standards, and samples prior to analysis. Percent recoveries are calculated for each surrogate.

Continuing Calibration Verification: The calibration relationship established during the initial calibration must be verified at periodic intervals. Concentrations, intervals, and criteria are method specific.

Validated by:
Kimberly Wisk
Nicole Leja

The following outlines the condition of all EPH samples contained within this report upon laboratory receipt.

| | |
|---|---|
| **Matrices** | Ground Water |
| **Containers** | ✓ Satisfactory |
| **Aqueous Preservative** | N/A ✓ pH≤2 pH>2 pH adjusted to <2 in lab |
| **Temperature** | ✓ Received on ice ✓ Received at 4 ± 2 °C |

Were all QA/QC procedures followed as required by the EPH method? *Yes*
Were any significant modifications made to the EPH method as specified in Section 11.3? *No*
Were all performance/acceptance standards for required QA/QC procedures achieved? *Yes*

I attest that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Authorized by:

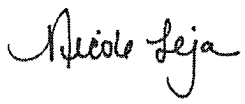
Nicole Leja
Laboratory Director

## MassDEP Analytical Protocol Certification Form

| | | | | | |
|---|---|---|---|---|---|
| **Laboratory Name:** Spectrum Analytical, Inc. | | | **Project #:** 18285 | | |
| **Project Location:** Whitinsville, MA | | | **RTN:** | | |
| **This form provides certifications for the following data set:** SB26357-01 | | | | | |
| **Matrices:** Ground Water | | | | | |
| **CAM Protocol** | | | | | |
| ✓ 8260 VOC CAM II A | 7470/7471 Hg CAM III B | MassDEP VPH CAM IV A | 8081 Pesticides CAM V B | ✓ 7196 Hex Cr CAM VI B | MassDEP APH CAM IX A |
| 8270 SVOC CAM II B | 7010 Metals CAM III C | ✓ MassDEP EPH CAM IV B | 8151 Herbicides CAM V C | 8330 Explosives CAM VIII A | TO-15 VOC CAM IX B |
| ✓ 6010 Metals CAM III A | 6020 Metals CAM III D | 8082 PCB CAM V A | 9014 Total Cyanide/PAC CAM VI A | 6860 Perchlorate CAM VIII B | |

| | | |
|---|---|---|
| | ***Affirmative responses to questions A through F are required for "Presumptive Certainty" status*** | |
| **A** | Were all samples received in a condition consistent with those described on the Chain of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times? | Yes ✓ No |
| **B** | Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed? | ✓ Yes No |
| **C** | Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances? | ✓ Yes No |
| **D** | Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? | ✓ Yes No |
| **E** | a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)?<br>b. APH and TO-15 Methods only: Was the complete analyte list reported for each method? | ✓ Yes No<br>Yes No |
| **F** | Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to questions A through E)? | ✓ Yes No |
| | ***Responses to questions G, H and I below are required for "Presumptive Certainty" status*** | |
| **G** | Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)? | ✓ Yes No |
| | ***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.** | |
| **H** | Were all QC performance standards specified in the CAM protocol(s) achieved? | Yes ✓ No |
| **I** | Were results reported for the complete analyte list specified in the selected CAM protocol(s)? | Yes ✓ No |
| | ***All negative responses are addressed in a case narrative on the cover page of this report.*** | |

***I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.***



Nicole Leja
Laboratory Director
Date: 4/4/2011

✓ SB 26357 e

# CHAIN OF CUSTODY RECORD

Page 1 of 1

MITKEM LABORATORIES
A Division of SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

**Special Handling:**
- ☐ Standard TAT - 10 to 15 business days
- ☒ Rush TAT - Date Needed: 4/4/11 by 5pm
- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Comeau Pierce
400 Libbey Industrial Parkway
Weymouth, MA 02189

Project Mgr.:

Invoice To: Same

P.O. No.: RQN:

Project No.: 1825
Site Name: Whitman
Location: Whitman State: MA
Sampler(s): J. Nans

1=$Na_2S2O_3$ 2=HCl 3=$H_2SO_4$ 4=$HNO_3$ 5=NaOH 6=Ascorbic Acid
7=$CH_3OH$ 8=$NaHSO_4$ 9= None 10=

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW=Surface Water SO=Soil SL=Sludge A=Air
X1= X2= X3=

G=Grab C=Composite

| Lab Id: | Sample Id: | Date: | Time: | Type | Matrix | Preservative | Containers: # of VOA Vials | # of Amber Glass | # of Clear Glass | # of Plastic | Analyses: EPH w/ PAHs | BTEX, Acetone | Chromium TT | Chromium VI | Nickel, Zinc, Tin | TSS | QA Reporting Notes: (check if needed) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26357-01 | Common Sump | 3/29/11 | 17 30 | G | GW | 3+9 | 3 | 1 | | 3 | X | X | X | X | X | X | |

☑ Provide MA DEP MCP CAM Report
☐ Provide CT DEP RCP Report

QA/QC Reporting Level
☑ Standard ☐ No QC
☐ Other

State specific reporting standards: GW-1

☐ Fax results when available to ( )
☒ E-mail to cpierce@verterra.com
EDD Format

Condition upon receipt: ☒ Iced ☐ Ambient ☐ °C 5.2 CIK

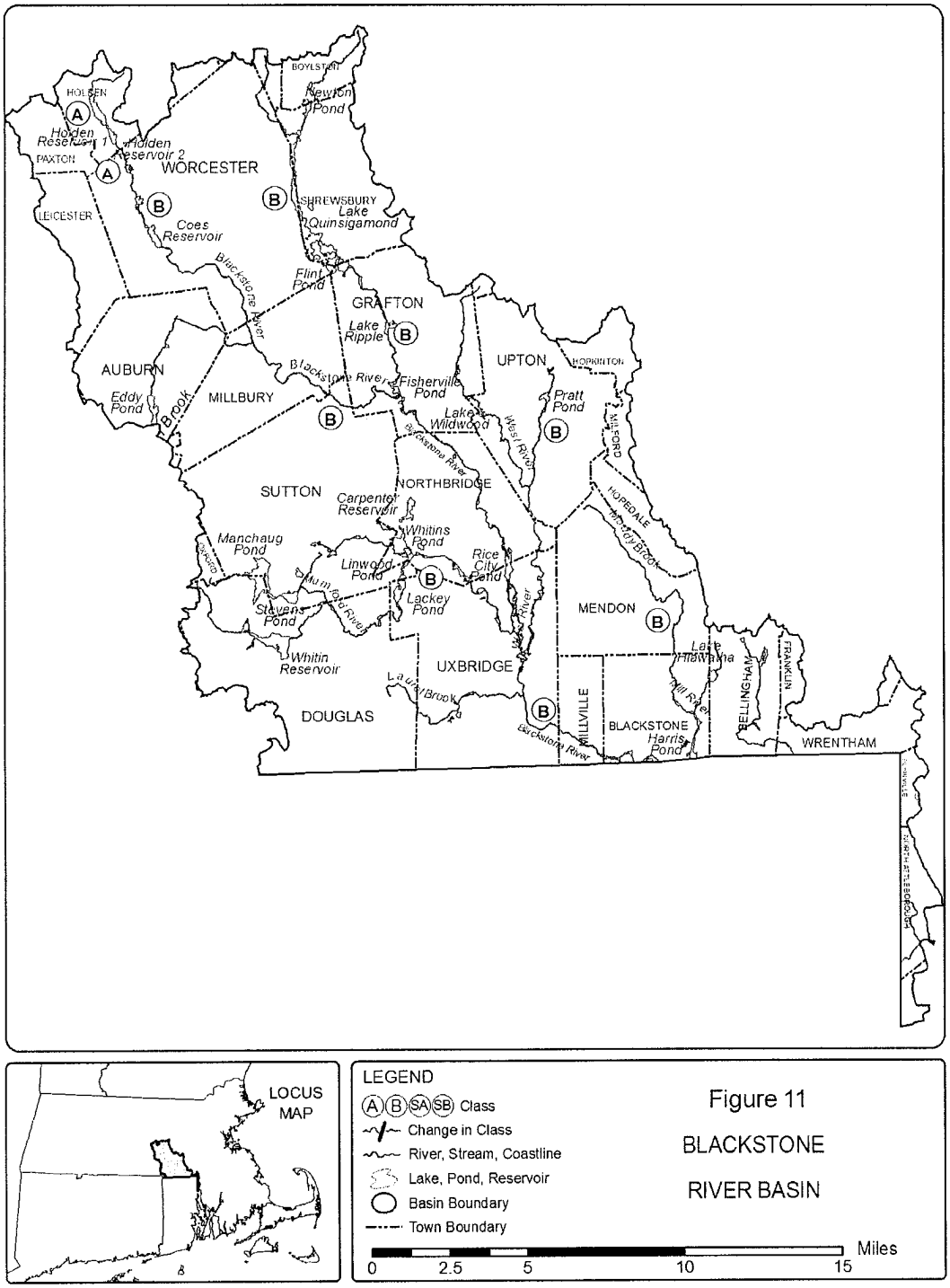
| Relinquished by: | Received by: | Date: | Time: |
|---|---|---|---|
| | | 3/30/11 | 1245 |
| | | 3/30/11 | 1758 |

1.6°

# Massachusetts Category 4c Waters
# "Impairment not Caused by a Pollutant"

| NAME | SEGMENT ID | DESCRIPTION | SIZE | IMPAIRMENT CAUSE [EPA APPROVAL DATE-DOCUMENT CONTROL NUMBER] |
|---|---|---|---|---|
| **Blackstone** | | | | |
| Auburn Pond (51004) | MA51004_2008 | Auburn | 4.1 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Brierly Pond (51010) | MA51010_2008 | Millbury | 18.3 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Caprons Pond (51014) | MA51014_2008 | Uxbridge | 10.1 acres | -(Exotic species*) |
| Coes Reservoir (51024) | MA51024_2008 | Worcester | 86.9 acres | -(Exotic species*) |
| Cook Pond (51027) | MA51027_2008 | Worcester | 16.9 acres | -(Flow alteration*)<br>-(Exotic species*) |
| Curtis Ponds (51032) | MA51032_2008 | Worcester | 31.1 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Dark Brook Reservoir (51035) | MA51035_2008 | Auburn | 58.0 acres | -(Exotic species*) |
| Dark Brook Reservoir (51036) | MA51036_2008 | Auburn | 171 acres | -(Exotic species*) |
| Dorothy Pond (51039) | MA51039_2008 | Millbury | 127 acres | -Turbidity [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Eddy Pond (51043) | MA51043_2008 | Auburn | 98.5 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Flint Pond (51050) | MA51050_2008 | Shrewsbury/Grafton/Worcester | 92.5 acres | -Noxious aquatic plants [6/28/2002-CN115.0]<br>-Turbidity [6/28/2002-CN115.0]<br>-(Exotic species*) |
| Flint Pond (51188) | MA51188_2008 | Shrewsbury/Grafton/Worcester | 173 acres | -Noxious aquatic plants [6/28/2002-CN115.0]<br>-(Exotic species*) |
| Girard Pond (51053) | MA51053_2008 | Sutton | 1.9 acres | -(Exotic species*) |
| Hopedale Pond (51065) | MA51065_2008 | Hopedale | 87.9 acres | -(Exotic species*) |
| Hovey Pond (51068) | MA51068_2008 | Grafton | 20.1 acres | -(Exotic species*) |
| Howe Reservoirs (51070) | MA51070_2008 | Millbury | 2.4 acres | -(Flow alteration*)<br>-(Exotic species*) |
| Ironstone Reservoir (51074) | MA51074_2008 | Uxbridge | 28.0 acres | -(Exotic species*) |
| Jenks Reservoir (51075) | MA51075_2008 | Bellingham | 26.1 acres | -(Exotic species*) |
| Lackey Pond (51083) | MA51083_2008 | Uxbridge/Sutton | 90.0 acres | -(Flow alteration*) |
| Leesville Pond (51087) | MA51087_2008 | Auburn/Worcester | 34.3 acres | -Nutrients [6/28/2002-CN117.0]<br>-Organic enrichment/Low DO [6/28/2002-CN117.0]<br>-(Exotic species*) |
| Linwood Pond (51088) | MA51088_2008 | Northbridge | 36.4 acres | -(Exotic species*) |
| Mill Pond (51104) | MA51104_2008 | Upton | 9.8 acres | -(Exotic species*) |
| Miscoe Lake (51106) | MA51106_2008 | Wrentham/Cumberland, R.I. | 44.4 acres | -(Exotic species*) |
| Newton Pond (51110) | MA51110_2008 | Shrewsbury/Boylston | 53.7 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| North Pond (51112) | MA51112_2008 | Hopkinton/Milford | 213 acres | -(Exotic species*) |
| Pondville Pond (51120) | MA51120_2008 | Auburn | 35.7 acres | -Noxious aquatic plants [5/2/2002-CN070.1]<br>-(Exotic species*) |
| Pratt Pond (51123) | MA51123_2008 | Upton | 39.4 acres | -(Exotic species*) |
| Lake Quinsigamond (51125) | MA51125_2008 | Shrewsbury/Worcester | 471 acres | -Noxious aquatic plants [6/28/2002-CN115.0]<br>-(Exotic species*) |
| Riverlin Street Pond (51137) | MA51137_2008 | Millbury | 2.4 acres | -(Exotic species*) |
| Rivulet Pond (51138) | MA51138_2008 | Uxbridge | 4.2 acres | -(Exotic species*) |

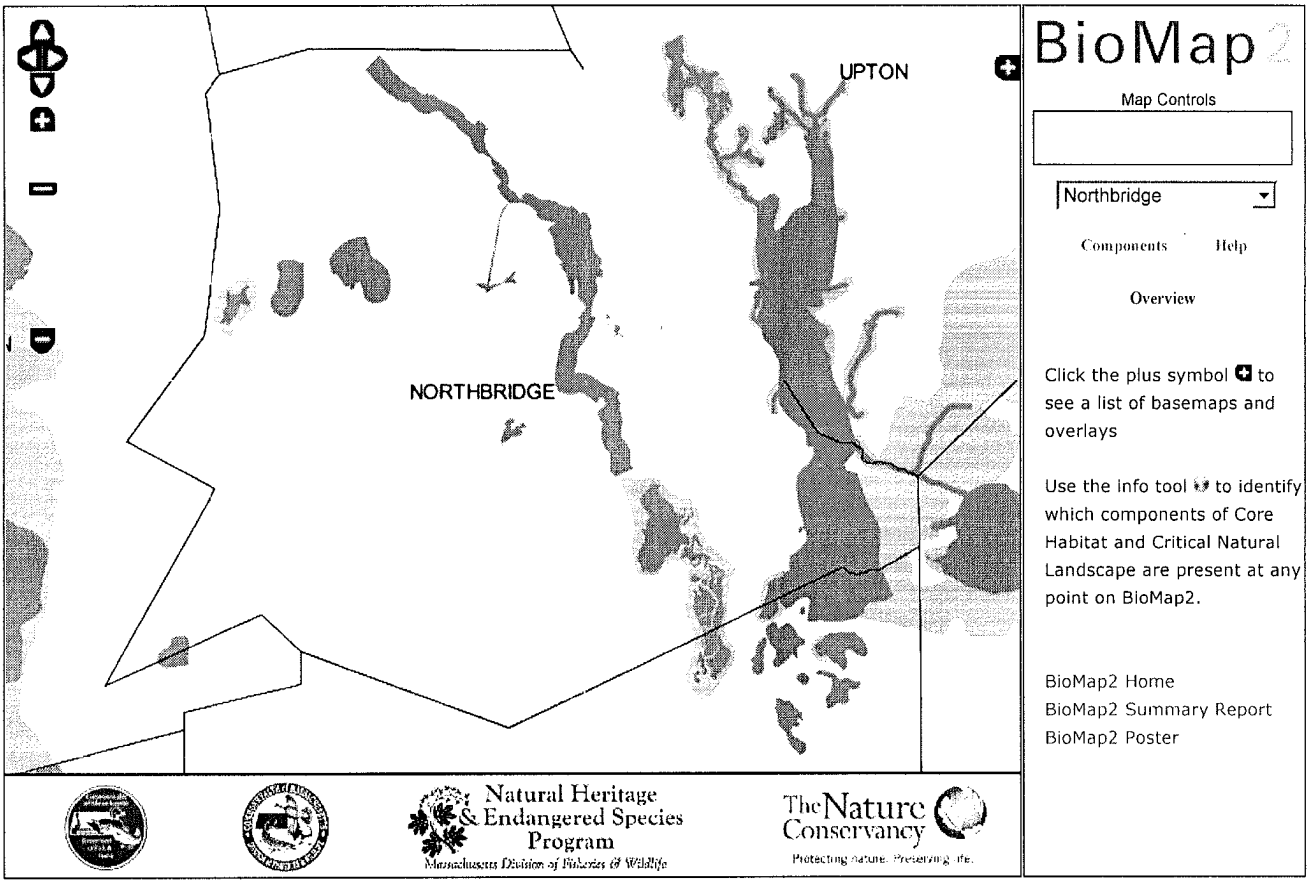
4.06: continued



The Official Website of the Department of Fish and Game (DFG)

Department of Fish and Game Commissioner Mary B. Griffin

DFG Home Mass.Gov Home State Agencies BIOMAP2 Project Home




BioMap 2

Map Controls

Northbridge

Components Help

Overview

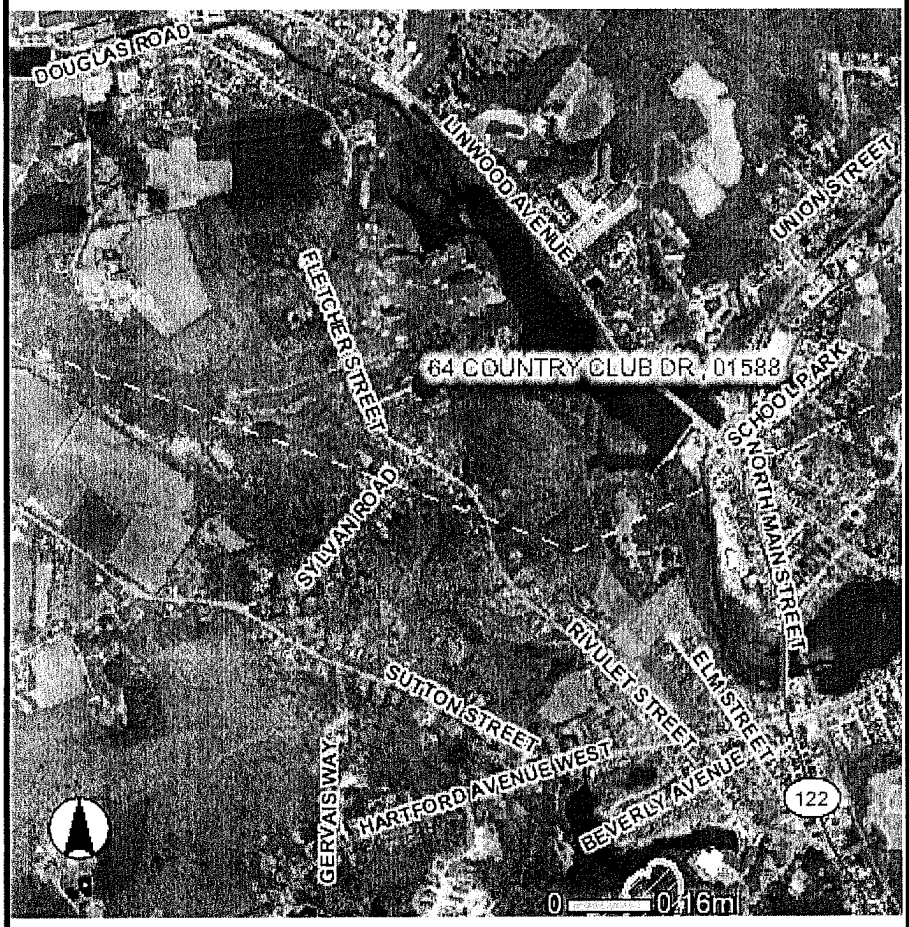
Click the plus symbol to see a list of basemaps and overlays

Use the info tool to identify which components of Core Habitat and Critical Natural Landscape are present at any point on BioMap2.

BioMap2 Home
BioMap2 Summary Report
BioMap2 Poster

Dept. Fish & Game | MassWildlife | NHESP | Energy & Env. Affairs | MassGov | MassGIS
Massachusetts Division of Fisheries and Wildlife, 1 Rabbit Hill Rd, Westborough, MA 01581
Tel: (508) 389-6300; Fax: (508) 389-7890
Natural Heritage & Endangered Species Program Tel: (508) 389-6360; Fax: (508) 389-7891

# 2008 Priority Habitat and Estimated Habitat Natural Heritage & Endangered Species Program




Legend

EOT-OTP Roads Names

EOT-OTP Roads

Limited Access Highway

Multi-lane Hwy, Not Limited Access

Other Numbered Hwy

Surrounding States Labels

Surrounding States

NHESP 2008 Priority Habitats of Rare Species and also Estimated Habitats of Rare Wildlife

NHESP 2008 MA Priority Habitats of Rare Species

Color Orthos 2005

| Town | Taxonomic Group | Scientific Name | Common Name | MESA Status | Federal Status | Most Recent Observation |
|---|---|---|---|---|---|---|
| NORTHBRIDGE | Dragonfly/Damselfly | Ophiogomphus aspersus | Brook Snaketail | SC | | 2004 |
| NORTHBRIDGE | Dragonfly/Damselfly | Stylurus spiniceps | Arrow Clubtail | T | | 2004 |
| NORTHBRIDGE | Mussel | Alasmidonta undulata | Triangle Floater | SC | | 1997 |
| NORTHBRIDGE | Reptile | Glyptemys insculpta | Wood Turtle | SC | | 2006 |
| NORTHBRIDGE | Reptile | Terrapene carolina | Eastern Box Turtle | SC | | 1993 |
| NORTHBRIDGE | Vascular Plant | Asclepias purpurascens | Purple Milkweed | E | | 1954 |
| NORTHBRIDGE | Vascular Plant | Carex polymorpha | Variable Sedge | E | | 2002 |
| NORTHBRIDGE | Vascular Plant | Lygodium palmatum | Climbing Fern | SC | | 2007 |
| NORTHBRIDGE | Vascular Plant | Scleria triglomerata | Tall Nut-sedge | E | | 2007 |