



May 16, 2011
Project No.M1242.02

US Environmental Protection Agency
Dewatering GP Processing
Municipal Assistance Unit (CMU),
1 Congress Street, Suite 1100
Boston, MA 02114-2023
Submitted via email to: GeneralPermit.Dewatering@epa.gov

And

Department of Environmental Protections
Division of Watershed Management
627 Main Street, 2nd Floor
Worcester, MA 01608

RE: EPA Dewatering General Permit
71 Frankland Road
Hopkinton, MA

To Whom It May Concern:

On behalf of Liberty Mutual Group, Wheatstone Engineering & Consulting, Inc. (Wheatstone) is pleased to provide the US Environmental Protection Agency with this Notice of Intent for a General Construction Dewatering Permit (DGP). The reason the DGP is necessary is because a short-term construction project to install an underground holding tank will require dewatering. Although onsite recharge may occur, a dewatering permit is being obtained in case recharge is not feasible.

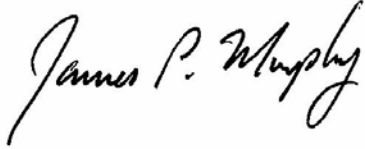
The excavation to install the 5,000 gallon holding tank will be conducted to approximately 13 feet below grade. Because groundwater is located approximately 10 feet below grade, dewatering may be necessary. The duration of the excavation below the water table may be limited to a day or two; therefore significant ongoing dewatering is not anticipated.

Groundwater assessment at the site has not identified contaminants of concern (see attached table). In order to manage sediment from the dewatering program, the groundwater will be pumped to a frac tank to settle total suspended solids in the tanks. Once settlement has occurred, the groundwater will be discharged to an onsite catch basin that discharges to a drainage basin containing the Sudbury River (Class B Water Body).

If you have any questions regarding this submittal, please do not hesitate to contact us.

Sincerely,

Wheatstone Engineering & Consulting, Inc.

Handwritten signature of James P. Murphy in black ink.

James P. Murphy, LSP
Principal

Handwritten signature of Robert C. Reynolds in black ink.

Robert C. Reynolds
Project Manager

Attachments:

- EPA Notice of Intent Form
- Drawing No. 17 Sanitary Sewer Disposal System Plan
- Priority Habitat and Estimated Natural Heritage & Endangered and Species Program
- MassGIS Topographic Map
- Table No. 1 Groundwater Analytical
- Laboratory Reports

II. Suggested Notice of Intent (NOI) Form

1. General facility information. Please provide the following information about the facility.

a) Name of facility: Liberty Mutual Research Group		Mailing Address for the Facility: 9 Riverside Road Weston, MA 02493	
b) Location Address of the Facility (if different from mailing address): 71 Frankland Road Hopkinton, MA 01748		Facility Location longitude: 71.494 latitude: 42.243	Type of Business: Research Facility Facility SIC codes: 8734
c) Name of facility owner: <u>Liberty Mutual</u> Owner's email: <u>Richard.Barry@LibertyMutual.com</u> Owner's Tel #: <u>(781) 891-8900 ext. 27311</u> Owner's Fax #: <u>(781) 899-0634</u> Address of owner (if different from facility address) 9 Riverside Road Weston, MA 02493 Owner is (check one): 1. Federal ____ 2. State ____ 3. Tribal ____ 4. Private ☒ 4. Other ____ (Describe)			
Legal name of Operator, if not owner: <u>Wheatstone Engineering and Consulting, Inc.</u> Operator Contact Name: <u>James P. Murphy</u> Operator Tel Number: <u>(781) 726-2519</u> Fax Number: <u>(781) 380-0601</u> Operator's email: <u>JMurphy@wheatstonecorp.com</u> Operator Address (if different from owner) 220 Forbes Road, Ste. 405 Braintree, MA 02184			
d) Attach a topographic map indicating the location of the facility and the outfall(s) to the receiving water. Map attached? ☒			
e) Check Yes or No for the following: 1. Has a prior NPDES permit been granted for the discharge? Yes ____ No ☒ If Yes, Permit Number: _____ 2. Is the discharge a "new discharge" as defined by 40 CFR Section 122.22? Yes ____ No ☒ 3. Is the facility covered by an individual NPDES permit? Yes ____ No ☒ If Yes, Permit Number ____ 4. Is there a pending application on file with EPA for this discharge? Yes ____ No ☒ If Yes, date of submittal: _____			

2. Discharge information. Please provide information about the discharge, (attaching additional sheets as needed)

a) Name of receiving water into which discharge will occur: _____
State Water Quality Classification: B Freshwater: X Marine Water: _____

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

1. Construction dewatering of groundwater intrusion and/or storm water accumulation.
2. Short-term or long-term dewatering of foundation sumps.
3. Other.

c) Number of outfalls 1

For each outfall:

d) Estimate the maximum daily and average monthly flow of the discharge (in gallons per day – GPD). Max Daily Flow 24000 GPD
Average Monthly Flow 6000 GPD

e) What is the maximum and minimum monthly pH of the discharge (in s.u.)? Max pH 8.0 Min pH 6.0

f) Identify the source of the discharge (i.e. potable water, surface water, or groundwater). If groundwater, the facility shall submit effluent test results, as required in Section 4.4.5 of the General Permit. Groundwater

g) What treatment does the wastewater receive prior to discharge? Frac tank sedimentation control

h) Is the discharge continuous? Yes _____ No X If no, is the discharge periodic (P) (occurs regularly, i.e., monthly or seasonally, but is not continuous all year) or intermittent (I) (occurs sometimes but not regularly) or both (B) one time for construction of holding tank
If (P), number of days or months per year of the discharge NA and the specific months of discharge _____;
If (I), number of days/year there is a discharge 5
Is the discharge temporary? Yes X No _____
If yes, approximate start date of dewatering May 2011 approximate end date of dewatering July 2011

i) Latitude and longitude of each discharge within 100 feet (See http://www.epa.gov/tri/report/siting_tool): Outfall 1: long.:71.495_ lat.:42.244;
Outfall 2: long._____ lat._____; Outfall 3: long._____ lat._____.

j) If the source of the discharge is potable water, please provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water and attach any calculation sheets used to support stream flow and dilution calculations NA cfs
(See Appendix VII for equations and additional information)

MASSACHUSETTS FACILITIES: See Section 3.4 and Appendix 1 of the General Permit for more information on Areas of Critical Environmental Concern (ACEC):

- k) Does the discharge occur in an ACEC? Yes _____ No _____
If yes, provide the name of the ACEC: _____

3. Contaminant Information

- a) Are any pH neutralization and/or dechlorination chemicals used in the discharge? If so, include the chemical name and manufacturer; maximum and average daily quantity used as well as the maximum and average daily expected concentrations (mg/l) in the discharge, and the vendor's reported aquatic toxicity (NOAEL and/or LC₅₀ in percent for aquatic organism(s)). NA
- b) Please report any known remediation activities or water-quality issues in the vicinity of the discharge. NA

4. Determination of Endangered Species Act Eligibility: Provide documentation of ESA eligibility as required at Part 3.4 and Appendices III and IV. In addition, respond to the following questions.

- a) Are any listed threatened or endangered species, or designated critical habitat, in proximity to the discharge? Yes ___ No X ___
- b) Has any consultation with the federal services been completed? Yes ___ No X ___
- c) Is consultation underway? Yes ___ No X ___
- d) What were the results of the consultation with the U.S. Fish and Wildlife Service and/or NOAA Fisheries Service (check one): a "no jeopardy" opinion ___ or written concurrence ___ on a finding that the discharges are not likely to adversely affect any endangered species or critical habitat.
- e) Which of the five eligibility criteria listed in Appendix 2, Section B (A,B,C,D,or E) have you met? A _____
- f) Please attach a copy of the most current federal listing of endangered and threatened species, found at USF&W website.

5. Documentation of National Historic Preservation Act requirements: Please respond to the following questions:

- a) Are any historic properties listed or eligible for listing on the National Register of Historic Places located on the facility site or in proximity to the discharge? Yes ___ No ___
- b) Have any State or Tribal historic preservation officers been consulted in this determination? Yes ___ or No ___ If yes, attach the results of the consultation(s).
- c) Which of the three National Historic Preservation Act requirements listed in Appendix 3, Section C (1,2 or 3) have you met? _____

6. 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

7. Signature Requirements: The Notice of Intent must be signed by the operator in accordance with the signatory requirements of 40 CFR Section 122.22 (see below) including the following certification:

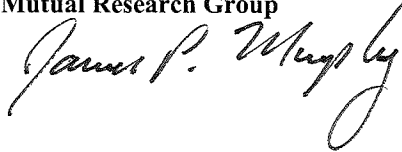
I certify under penalty of law that (1) no biocides or other chemical additives except for those used for pH adjustment and/or dechlorination are used in the dewatering system; (2) the discharge consists solely of dewatering and authorized pH adjustment and/or

dechlorination chemicals; (3) the discharge does not come in contact with any raw materials, intermediate product, water product or finished product; (4) if the discharge of dewatering subsequently mixes with other permitted wastewater (i.e. stormwater) prior to discharging to the receiving water, any monitoring provided under this permit will be only for dewatering discharge; (5) where applicable, the facility has complied with the requirements of this permit specific to the Endangered Species Act and National Historic Preservation Act; and (6) 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 Name: Liberty Mutual Research Group

Operator signature:



Title: Principal

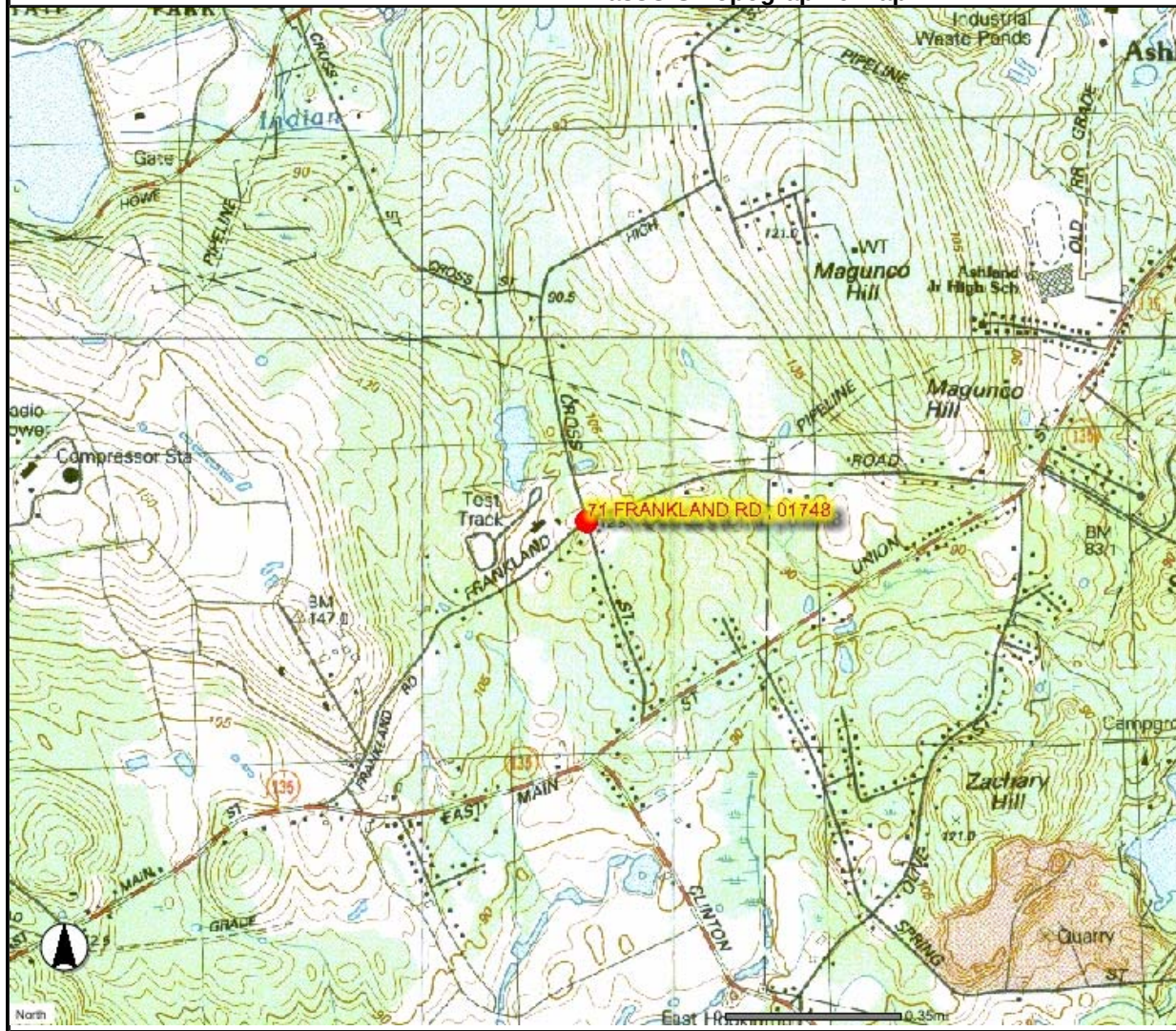
Date:

5/16/11

Federal regulations require this application to be signed as follows:

1. For a corporation, by a principal executive officer of at least the level of vice president;
2. For partnership or sole proprietorship, by a general partner or the proprietor, respectively, or,
3. For a municipality, State, Federal or other public facility, by either a principal executive officer or ranking elected official.

MassGIS Topographic Map



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

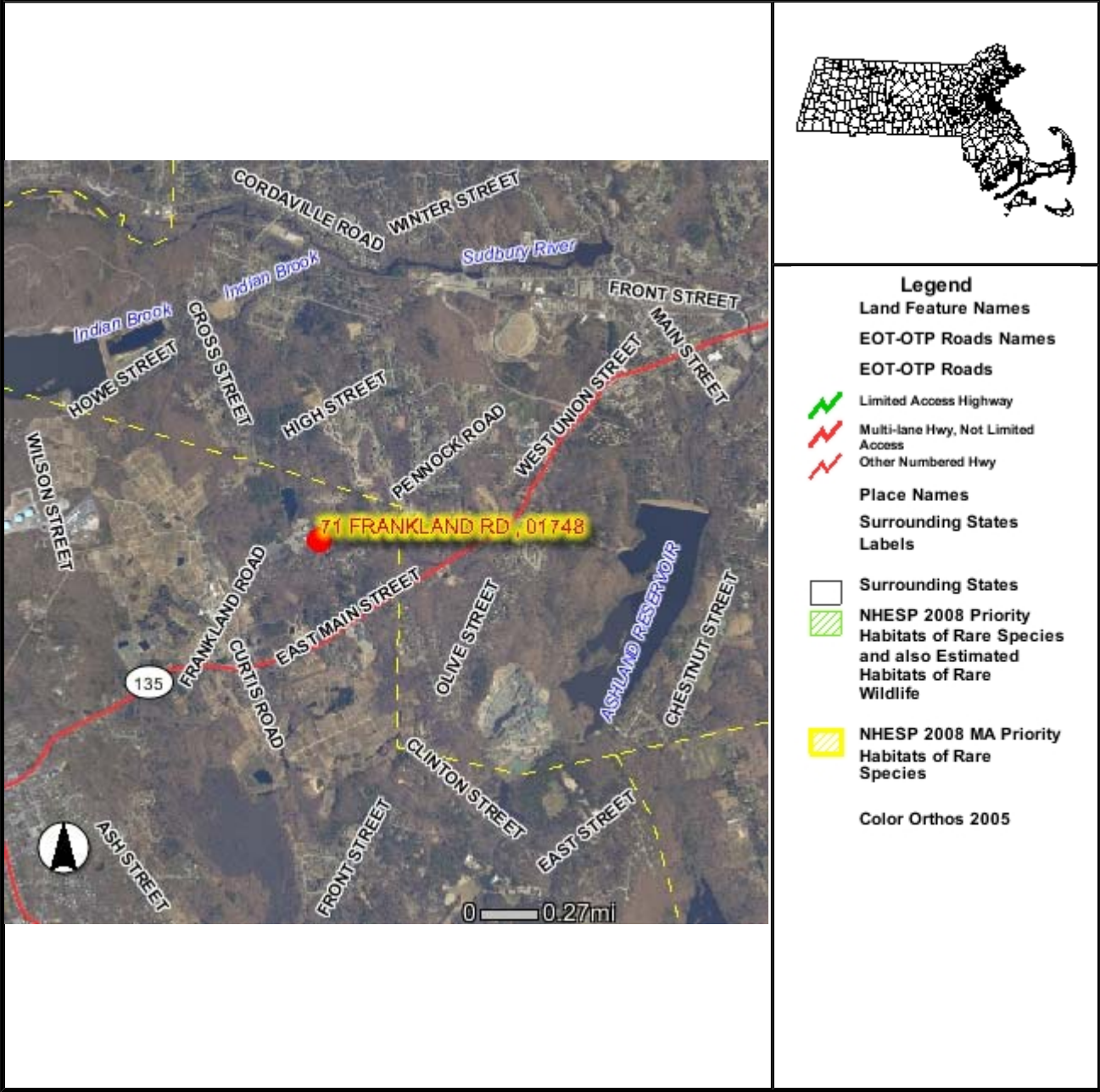


Table No. 1					
Groundwater Analytical Results					
71 Frankland Road					
Hopkinton, MA					
		P1OW	P4OW	Reportable	
		2/24/2011	2/24/2011	Concentrations	
Method / Analyte	Units			RCGW-1	RCGW-2
Extractable Petroleum Hydrocarbons - MADEP EPH 5/2004 R					
C9-C18 Aliphatic Hydrocarbons	mg/l	BRL	BRL	0.7	5
C19-C36 Aliphatic Hydrocarbons	mg/l	BRL	BRL	14	50
C11-C22 Aromatic Hydrocarbons	mg/l	BRL	BRL	0.2	5
Total Petroleum Hydrocarbons	mg/l	BRL	BRL	0.2	5
Naphthalene	µg/l	BRL	BRL	140	1000
Volatile Petroleum Hydrocarbons - MADEP VPH 5/2004 Rev. 1.1					
C5-C8 Aliphatic Hydrocarbons	mg/l	BRL	BRL	0.3	3
C9-C12 Aliphatic Hydrocarbons	mg/l	BRL	BRL	0.7	5
C9-C10 Aromatic Hydrocarbons	mg/l	BRL	BRL	0.2	7
Benzene	µg/l	BRL	BRL	5	2000
Ethylbenzene	µg/l	BRL	BRL	700	4000
Methyl tert-butyl ether	µg/l	BRL	BRL	70	5000
Naphthalene	µg/l	BRL	BRL	140	1000
Toluene	µg/l	BRL	BRL	1000	4000
m,p-Xylene	µg/l	BRL	BRL		
o-Xylene	µg/l	BRL	BRL	6000	6000
RCRA 8 Metals SW846 6010C					
Silver	mg/l	BRL	NT	0.007	0.007
Arsenic	mg/l	BRL	NT	0.01	0.9
Barium	mg/l	0.093	NT	2	50
Cadmium	mg/l	BRL	NT	0.004	0.004
Chromium	mg/l	BRL	NT	0.1	0.3
Lead	mg/l	BRL	NT	0.01	0.01
Selenium	mg/l	BRL	NT	0.05	0.1
Mercury	mg/l	BRL	NT	0.002	0.02
VOCs - SW846 8260C					
Trichloroethene	µg/l	BRL	BRL	5	30
Vinyl chloride	µg/l	BRL	BRL	2	2
Ethanol	µg/l	BRL	BRL	1000	10000
Notes:					
BRL indicated Below Reporting Limit					
NT indicates Not Tested					
NA indicates Not Applicable/Not Available					
Compounds with detections are shown on this table. Not all compounds that were tested that were BRL are shown on this table, refer to laboratory reports for all compounds tested.					
Compounds compared with MassDEP Reportable Concentrations Categories RCGW-1 and RCGW-2					

Current Massachusetts Listing of Endangered, Threatened, and Special Concern Species

VERTEBRATES

Common Name	Scientific Name	MA Status	Fed Status	Notes
Fish				
American Brook Lamprey	<i>Lampetra appendix</i>	T		
Shortnose Sturgeon	<i>Acipenser brevirostrum</i>	E	E	
Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>	E		
Lake Chub	<i>Couesius plumbeus</i>	E		
Eastern Silvery Minnow	<i>Hybognathus regius</i>	SC		
Bridle Shiner	<i>Notropis bifrenatus</i>	SC		
Northern Redbelly Dace	<i>Phoxinus eos</i>	E		
Longnose Sucker	<i>Catostomus catostomus</i>	SC		
Burbot	<i>Lota lota</i>	SC		
Threespine Stickleback	<i>Gasterosteus aculeatus</i>	T		1
Amphibians				
Jefferson Salamander	<i>Ambystoma jeffersonianum</i>	SC		2
Blue-Spotted Salamander	<i>Ambystoma laterale</i>	SC		3
Marbled Salamander	<i>Ambystoma opacum</i>	T		
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	T		
Reptiles				
Loggerhead Seaturtle	<i>Caretta caretta</i>	T	T	
Green Seaturtle	<i>Chelonia mydas</i>	T	T	
Hawksbill Seaturtle	<i>Eretmochelys imbricata</i>	E	E	
Kemp's Ridley Seaturtle	<i>Lepidochelys kempii</i>	E	E	
Leatherback Seaturtle	<i>Dermochelys coriacea</i>	E	E	
Wood Turtle	<i>Glyptemys insculpta</i>	SC		
Bog Turtle	<i>Glyptemys muhlenbergii</i>	E	T	
Blanding's Turtle	<i>Emydoidea blandingii</i>	T		
Diamond-backed Terrapin	<i>Malaclemys terrapin</i>	T		
Northern Red-bellied Cooter	<i>Pseudemys rubriventris</i>	E	E	4
Eastern Box Turtle	<i>Terrapene carolina</i>	SC		
Eastern Wormsnake	<i>Carphophis amoenus</i>	T		
Eastern Ratsnake	<i>Pantherophis alleghaniensis</i>	E		
Copperhead	<i>Agkistrodon contortrix</i>	E		
Timber Rattlesnake	<i>Crotalus horridus</i>	E		
Birds				

Common Loon	<i>Gavia immer</i>	SC	
Pied-Billed Grebe	<i>Podilymbus podiceps</i>	E	
Leach's Storm-Petrel	<i>Oceanodroma leucorhoa</i>	E	
American Bittern	<i>Botaurus lentiginosus</i>	E	
Least Bittern	<i>Ixobrychus exilis</i>	E	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	E	
Northern Harrier	<i>Circus cyaneus</i>	T	
Sharp-Shinned Hawk	<i>Accipiter striatus</i>	SC	
Peregrine Falcon	<i>Falco peregrinus</i>	E	
King Rail	<i>Rallus elegans</i>	T	
Common Moorhen	<i>Gallinula chloropus</i>	SC	
Piping Plover	<i>Charadrius melodus</i>	T	T
Upland Sandpiper	<i>Bartramia longicauda</i>	E	
Roseate Tern	<i>Sterna dougallii</i>	E	E
Common Tern	<i>Sterna hirundo</i>	SC	
Arctic Tern	<i>Sterna paradisaea</i>	SC	
Least Tern	<i>Sternula antillarum</i>	SC	
Barn Owl	<i>Tyto alba</i>	SC	
Long-Eared Owl	<i>Asio otus</i>	SC	
Short-Eared Owl	<i>Asio flammeus</i>	E	
Sedge Wren	<i>Cistothorus platensis</i>	E	
Golden-Winged Warbler	<i>Vermivora chrysoptera</i>	E	
Northern Parula	<i>Parula americana</i>	T	
Blackpoll Warbler	<i>Dendroica striata</i>	SC	
Mourning Warbler	<i>Oporornis philadelphia</i>	SC	
Vesper Sparrow	<i>Poocetes gramineus</i>	T	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	T	
Henslow's Sparrow	<i>Ammodramus henslowii</i>	E	
Mammals			
Water Shrew	<i>Sorex palustris</i>	SC	
Rock Shrew	<i>Sorex dispar</i>	SC	
Indiana Myotis	<i>Myotis sodalis</i>	E	E
Small-Footed Myotis	<i>Myotis leibii</i>	SC	
Southern Bog Lemming	<i>Synaptomys cooperi</i>	SC	
Sperm Whale	<i>Physeter catodon</i>	E	E
Fin Whale	<i>Balaenoptera physalus</i>	E	E
Sei Whale	<i>Balaenoptera borealis</i>	E	E
Blue Whale	<i>Balaenoptera musculus</i>	E	E

Humpback Whale	<i>Megaptera novaeangliae</i>	E	E
Northern Right Whale	<i>Eubalaena glacialis</i>	E	E

INVERTEBRATES

Common Name	Scientific Name	MA Status	Fed Status	Notes
Sponges				
Smooth Branched Sponge	<i>Spongilla aspinosa</i>	SC		
Flatworms				
Sunderland Spring Planarian	<i>Polycelis remota</i>	E		
Segmented Worms				
New England Medicinal Leech	<i>Macrobdella sestertia</i>	SC		
Snails				
New England Siltsnail	<i>Floridobia winkleyi</i>	SC		
Walker's Limpet	<i>Ferrissia walkeri</i>	SC		
Coastal Marsh Snail	<i>Littoridinops tenuipes</i>	SC		
Slender Walker	<i>Pomatiopsis lapidaria</i>	E		
Boreal Marstonia	<i>Marstonia lustrica</i>	E		
Boreal Turret Snail	<i>Valvata sincera</i>	E		
Mussels				
Dwarf Wedgemussel	<i>Alasmidonta heterodon</i>	E	E	
Triangle Floater	<i>Alasmidonta undulata</i>	SC		
Brook Floater	<i>Alasmidonta varicosa</i>	E		
Yellow Lampmussel	<i>Lampsilis cariosa</i>	E		
Tidewater Mucket	<i>Leptodea ochracea</i>	SC		
Eastern Pondmussel	<i>Ligumia nasuta</i>	SC		
Creeper	<i>Strophitus undulatus</i>	SC		
Crustaceans				
Intricate Fairy Shrimp	<i>Eubbranchipus intricatus</i>	SC		
Agassiz's Clam Shrimp	<i>Eulimnadia agassizii</i>	E		
Northern Spring Amphipod	<i>Gammarus pseudolimnaeus</i>	SC		
American Clam Shrimp	<i>Limnadia lenticularis</i>	SC		
Taconic Cave Amphipod	<i>Stygobromus borealis</i>	E		
Piedmont Groundwater Amphipod	<i>Stygobromus tenuis tenuis</i>	SC		
Coastal Swamp Amphipod	<i>Synurella chamberlaini</i>	SC		
Dragonflies				
Spatterdock Darner	<i>Rhionaeschna mutata</i>	SC		
Subarctic Darner	<i>Aeshna subarctica</i>	T		

Comet Darner	<i>Anax longipes</i>	SC	
Ocellated Darner	<i>Boyeria grafiana</i>	SC	
Spine-Crowned Clubtail	<i>Gomphus abbreviatus</i>	E	
Harpoon Clubtail	<i>Gomphus descriptus</i>	E	
Midland Clubtail	<i>Gomphus fraternus</i>	E	
Rapids Clubtail	<i>Gomphus quadricolor</i>	T	
Cobra Clubtail	<i>Gomphus vastus</i>	SC	
Skillet Clubtail	<i>Gomphus ventricosus</i>	SC	
Umber Shadowdragon	<i>Neurocordulia obsoleta</i>	SC	
Stygian Shadowdragon	<i>Neurocordulia yamaskanensis</i>	SC	
Brook Snaketail	<i>Ophiogomphus aspersus</i>	SC	
Riffle Snaketail	<i>Ophiogomphus carolus</i>	T	
Ski-tipped Emerald	<i>Somatochlora elongata</i>	SC	
Forcipate Emerald	<i>Somatochlora forcipata</i>	SC	
Coppery Emerald	<i>Somatochlora georgiana</i>	E	
Incurvate Emerald	<i>Somatochlora incurvata</i>	T	
Kennedy's Emerald	<i>Somatochlora kennedyi</i>	E	
Mocha Emerald	<i>Somatochlora linearis</i>	SC	
Riverine Clubtail	<i>Stylurus amnicola</i>	E	
Zebra Clubtail	<i>Stylurus scudderi</i>	SC	
Arrow Clubtail	<i>Stylurus spiniceps</i>	T	
Ebony Boghaunter	<i>Williamsonia fletcheri</i>	E	
Ringed Boghaunter	<i>Williamsonia lintneri</i>	E	
Damselflies			
Tule Bluet	<i>Enallagma carunculatum</i>	SC	
Attenuated Bluet	<i>Enallagma daeckii</i>	SC	
New England Bluet	<i>Enallagma laterale</i>	SC	
Scarlet Bluet	<i>Enallagma pictum</i>	T	
Pine Barrens Bluet	<i>Enallagma recurvatum</i>	T	
Beetles			
Twelve-Spotted Tiger Beetle	<i>Cicindela duodecimguttata</i>	SC	
Hentz's Redbelly Tiger Beetle	<i>Cicindela rufiventris hentzii</i>	T	
Northeastern Beach Tiger Beetle	<i>Cicindela dorsalis dorsalis</i>	E	T
Bank Tiger Beetle	<i>Cicindela limbalis</i>	SC	
Cobblestone Tiger Beetle	<i>Cicindela marginipennis</i>	E	
Barrens Tiger Beetle	<i>Cicindela patruela</i>	E	
Puritan Tiger Beetle	<i>Cicindela puritana</i>	E	T
Purple Tiger Beetle	<i>Cicindela purpurea</i>	SC	

American Burying Beetle	<i>Nicrophorus americanus</i>	E	E
Butterflies and Moths			
Coastal Heathland Cutworm	<i>Abagrotis nefascia</i>	SC	
Barrens Daggermoth	<i>Acronicta albarufa</i>	T	
Drunk Apamea Moth	<i>Apamea inebriata</i>	SC	
New Jersey Tea Inchworm	<i>Apodrepanulatrix liberaria</i>	E	
Straight Lined Mallow Moth	<i>Bagisara rectifascia</i>	SC	
Hessel's Hairstreak	<i>Callophrys hesseli</i>	SC	
Frosted Elfin	<i>Callophrys irus</i>	SC	
Bog Elfin	<i>Callophrys lanoraieensis</i>	T	
Gerhard's Underwing	<i>Catocala herodias gerhardi</i>	SC	
Precious Underwing Moth	<i>Catocala pretiosa pretiosa</i>	E	
Waxed Sallow Moth	<i>Chaetagnalea cerata</i>	SC	
Melsheimer's Sack Bearer	<i>Cicinnus melsheimeri</i>	T	
Chain Dot Geometer	<i>Cingilia catenaria</i>	SC	
Unexpected Cycnia	<i>Cycnia inopinatus</i>	T	
Three-Lined Angle Moth	<i>Digrammia eremiata</i>	T	
Imperial Moth	<i>Eacles imperialis</i>	T	
Early Hairstreak	<i>Erora laeta</i>	T	
Persius Duskywing	<i>Erynnis persius persius</i>	E	
Sandplain Euchlaena	<i>Euchlaena madusaria</i>	SC	
Dion Skipper	<i>Euphyes dion</i>	T	
The Pink Streak	<i>Faronta rubripennis</i>	T	
Phyllira Tiger Moth	<i>Grammia phyllira</i>	E	
Slender Clearwing Sphinx Moth	<i>Hemaris gracilis</i>	SC	
Barrens Buckmoth	<i>Hemileuca maia</i>	SC	
Buchholz's Gray	<i>Hypomecis buchholzaria</i>	E	
Pine Barrens Itame	<i>Itame</i> sp. 1	SC	5
Pale Green Pinion Moth	<i>Lithophane viridipallens</i>	SC	
Twilight Moth	<i>Lycia rachelae</i>	E	
Pine Barrens Lycia	<i>Lycia ypsilon</i>	T	
Barrens Metarranthus	<i>Metarranthus apiciaria</i>	E	
Coastal Swamp Metarranthus	<i>Metarranthus pilosaria</i>	SC	
Northern Brocade Moth	<i>Neoligia semicana</i>	SC	
Dune Noctuid Moth	<i>Oncocnemis riparia</i>	SC	
Pitcher Plant Borer	<i>Papaipema appassioata</i>	T	
Ostrich Fern Borer	<i>Papaipema</i> sp. 2	.SC	6
Chain Fern Borer	<i>Papaipema stenocelis</i>	T	

Water-willow Stem Borer	<i>Papaipema sulphurata</i>	T	
Mustard White	<i>Pieris oleracea</i>	T	
Pink Sallow Moth	<i>Psectraglaea carnosae</i>	SC	
Southern Ptichodis	<i>Ptichodis bistrigata</i>	T	
Orange Sallow Moth	<i>Rhodoecia aurantiago</i>	T	
Oak Hairstreak	<i>Satyrium favonius</i>	SC	
Spartina Borer	<i>Spartiniphaga inops</i>	SC	
Faded Gray Geometer	<i>Stenoporpia polygrammaria</i>	T	
Pine Barrens Zale	<i>Zale</i> sp. 1	SC	7
Pine Barrens Zanclognatha	<i>Zanclognatha martha</i>	T	

PLANTS

Common Name	Scientific Name	MA Status	Fed Status	Notes
Aceraceae (Maples)				
Black Maple	<i>Acer nigrum</i>	SC		
Adiantaceae (Cliff Ferns)				
Fragile Rock-Brake	<i>Cryptogramma stelleri</i>	E		
Alismataceae (Arrowheads)				
Estuary Arrowhead	<i>Sagittaria montevidensis</i> ssp. <i>spongiosa</i>	E		
Wapato	<i>Sagittaria cuneata</i>	T		
River Arrowhead	<i>Sagittaria subulata</i>	E		
Terete Arrowhead	<i>Sagittaria teres</i>	SC		
Apiaceae (Parsleys, Angelicas)				
Hemlock Parsley	<i>Conioselinum chinense</i>	SC		
Saltpond Pennywort	<i>Hydrocotyle verticillata</i>	T		
Canadian Sanicle	<i>Sanicula canadensis</i>	T		
Long-Styled Sanicle	<i>Sanicula odorata</i>	T		
Aquifoliaceae (Hollies)				
Mountain Winterberry	<i>Ilex montana</i>	E		
Araceae (Arums)				
Green Dragon	<i>Arisaema dracontium</i>	T		
Golden Club	<i>Orontium aquaticum</i>	E		
Araliaceae (Ginsengs)				
Ginseng	<i>Panax quinquefolius</i>	SC		
Asclepiadaceae (Milkweeds)				
Purple Milkweed	<i>Asclepias purpurascens</i>	E		
Linear-Leaved Milkweed	<i>Asclepias verticillata</i>	T		

Aspleniaceae (Spleenworts)

Mountain Spleenwort	<i>Asplenium montanum</i>	E
Wall-Rue Spleenwort	<i>Asplenium ruta-muraria</i>	T

Asteraceae (Asters, Composites)

Lesser Snakeroot	<i>Ageratina aromatica</i>	E
Eaton's Beggar-ticks	<i>Bidens eatonii</i>	E
Estuary Beggar-ticks	<i>Bidens hyperborea</i>	E
Cornel-leaved Aster	<i>Doellingeria infirma</i>	E
New England Boneset	<i>Eupatorium novae-angliae</i>	E
Purple Cudweed	<i>Gamochaeta purpurea</i>	E
New England Blazing Star	<i>Liatris scariosa</i> var. <i>novae-angliae</i>	SC
Lion's Foot	<i>Nabalus serpentarius</i>	E
Sweet Coltsfoot	<i>Petasites frigidus</i> var. <i>palmatus</i>	E
Sclerolepis	<i>Sclerolepis uniflora</i>	E
Large-Leaved Goldenrod	<i>Solidago macrophylla</i>	T
Upland White Aster	<i>Solidago ptarmicoides</i>	E
	<i>Solidago simplex</i> ssp. <i>randii</i> var. <i>monticola</i>	E
Rand's Goldenrod		E
Eastern Silvery Aster	<i>Symphyotrichum concolor</i>	E
Crooked-Stem Aster	<i>Symphyotrichum prenanthoides</i>	T
Tradescant's Aster	<i>Symphyotrichum tradescantii</i>	T

Betulaceae (Birches, Alders)

Mountain Alder	<i>Alnus viridis</i> ssp. <i>crispa</i>	T
Swamp Birch	<i>Betula pumila</i>	E

Boraginaceae (Borages)

Northern Wild Comfrey	<i>Cynoglossum virginianum</i> var. <i>boreale</i>	E
Oysterleaf	<i>Mertensia maritima</i>	E

Brassicaceae (Mustards)

Lyre-Leaved Rock-cress	<i>Arabidopsis lyrata</i>	E
Smooth Rock-cress	<i>Boechera laevigata</i>	T
Green Rock-cress	<i>Boechera missouriensis</i>	T
Purple Cress	<i>Cardamine douglassii</i>	E
Long's Bitter-cress	<i>Cardamine longii</i>	E
Fen Cuckoo Flower	<i>Cardamine pratensis</i> var. <i>palustris</i>	T

Cactaceae (Cacti)

Prickly Pear	<i>Opuntia humifusa</i>	E
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Campanulaceae (Bluebells,

Lobelias)		
Great Blue Lobelia	<i>Lobelia siphilitica</i>	E
Caprifoliaceae (Honeysuckles)		
Hairy Honeysuckle	<i>Lonicera hirsuta</i>	E
Snowberry	<i>Symphoricarpos albus</i> var. <i>albus</i>	E
Broad Tinker's-weed	<i>Triosteum perfoliatum</i>	E
Downy Arrowwood	<i>Viburnum rafinesquianum</i>	E
Caryophyllaceae (Pinks, Sandworts)		
Nodding Chickweed	<i>Cerastium nutans</i>	E
Michaux's Sandwort	<i>Minuartia michauxii</i>	T
Large-leaved Sandwort	<i>Moehringia macrophylla</i>	E
Silverling	<i>Paronychia argyrocoma</i>	E
Chenopodiaceae (Saltworts)		
Fogg's Goosefoot	<i>Chenopodium foggii</i>	E
American Sea-blite	<i>Suaeda calceoliformis</i>	SC
Cistaceae (Rockroses, Pinweeds)		
Bushy Rockrose	<i>Crocanthemum dumosum</i>	SC
Beaded Pinweed	<i>Lechea pulchella</i> var. <i>moniliformis</i>	E
Clusiaceae (St. John's-worts)		
Creeping St. John's-wort	<i>Hypericum adpressum</i>	T
Giant St. John's-wort	<i>Hypericum ascyron</i>	E
St. Andrew's Cross	<i>Hypericum hypericoides</i> ssp. <i>multicaule</i>	E
Convolvulaceae (Morning Glories)		
Low Bindweed	<i>Calystegia spithamea</i>	E
Crassulaceae (Sedums)		
Pygmyweed	<i>Tillaea aquatica</i>	T
Cupressaceae (Cedars, Junipers)		
Arborvitae	<i>Thuja occidentalis</i>	E
Cyperaceae (Sedges)		
River Bulrush	<i>Bolboschoenus fluviatilis</i>	SC
Foxtail Sedge	<i>Carex alopecoidea</i>	T
Back's Sedge	<i>Carex backii</i>	E
Bailey's Sedge	<i>Carex baileyi</i>	T
Bush's Sedge	<i>Carex bushii</i>	E
Chestnut-colored Sedge	<i>Carex castanea</i>	E
Creeping Sedge	<i>Carex chordorrhiza</i>	E

Davis's Sedge	<i>Carex davisii</i>	E
Glaucescent Sedge	<i>Carex glaucoidea</i>	E
Handsome Sedge	<i>Carex formosa</i>	T
Slender Woodland Sedge	<i>Carex gracilescens</i>	E
Gray's Sedge	<i>Carex grayi</i>	T
Hitchcock's Sedge	<i>Carex hitchcockiana</i>	SC
Shore Sedge	<i>Carex lenticularis</i>	T
Glaucous Sedge	<i>Carex livida</i>	E
False Hop Sedge	<i>Carex lupuliformis</i>	E
Midland Sedge	<i>Carex mesochorea</i>	E
Michaux's Sedge	<i>Carex michauxiana</i>	E
Mitchell's Sedge	<i>Carex mitchelliana</i>	T
Few-fruited Sedge	<i>Carex oligosperma</i>	E
Few-flowered Sedge	<i>Carex pauciflora</i>	E
Variable Sedge	<i>Carex polymorpha</i>	E
Schweinitz's Sedge	<i>Carex schweinitzii</i>	E
Dioecious Sedge	<i>Carex sterilis</i>	T
Walter's Sedge	<i>Carex striata</i>	E
Fen Sedge	<i>Carex tetanica</i>	SC
Hairy-fruited Sedge	<i>Carex trichocarpa</i>	T
Tuckerman's Sedge	<i>Carex tuckermanii</i>	E
Cat-tail Sedge	<i>Carex typhina</i>	T
Wiegand's Sedge	<i>Carex wiegandii</i>	E
Engelmann's Umbrella-sedge	<i>Cyperus engelmannii</i>	T
Houghton's Flatsedge	<i>Cyperus houghtonii</i>	E
Wright's Spike-rush	<i>Eleocharis diandra</i>	E
Intermediate Spike-sedge	<i>Eleocharis intermedia</i>	T
Tiny-fruited Spike-rush or Spike-sedge	<i>Eleocharis microcarpa</i> var. <i>filiculmis</i>	E
Ovate Spike-rush or Spike-sedge	<i>Eleocharis ovata</i>	E
Few-flowered Spike-sedge	<i>Eleocharis quinqueflora</i>	E
Three-angled Spike-sedge	<i>Eleocharis tricostata</i>	E
Slender Cottongrass	<i>Eriophorum gracile</i>	T
Dwarf Bulrush	<i>Lipocarpa micrantha</i>	T
Capillary Beak-rush or Beak-sedge	<i>Rhynchospora capillacea</i>	E
Inundated Horned-sedge	<i>Rhynchospora inundata</i>	T
Short-beaked Bald-sedge	<i>Rhynchospora nitens</i>	T
Long-beaked Bald-sedge	<i>Rhynchospora scirpoides</i>	SC
Torrey's Beak-sedge	<i>Rhynchospora torreyana</i>	E

Northeastern Bulrush	<i>Scirpus ancistrochaetus</i>	E	E
Long's Bulrush	<i>Scirpus longii</i>	T	
Papillose Nut-sedge	<i>Scleria pauciflora</i>	E	8
Tall Nut-sedge	<i>Scleria triglomerata</i>	E	
Dryopteridaceae (Wood Ferns)			
Braun's Holly-fern	<i>Polystichum braunii</i>	E	
Smooth Woodsia	<i>Woodsia glabella</i>	E	
Elatinaceae (Waterworts)			
American Waterwort	<i>Elatine americana</i>	E	
Empetraceae (Crowberries)			
Broom Crowberry	<i>Corema conradii</i>	SC	
Equisetaceae (Horsetails)			
Dwarf Scouring-rush	<i>Equisetum scirpoides</i>	SC	
Ericaceae (Laurels, Blueberries)			
Great Laurel	<i>Rhododendron maximum</i>	T	
Mountain Cranberry	<i>Vaccinium vitis-idaea</i> ssp. <i>minus</i>	E	
Eriocaulaceae (Pipeworts)			
Parker's Pipewort	<i>Eriocaulon parkeri</i>	E	
Fabaceae (Beans, Peas, Clovers)			
Large-bracted Tick-trefoil	<i>Desmodium cuspidatum</i>	T	
Wild Senna	<i>Senna hebecarpa</i>	E	
Fagaceae (Oaks, Beeches)			
Bur Oak	<i>Quercus macrocarpa</i>	SC	
Yellow Oak	<i>Quercus muehlenbergii</i>	T	
Fumariaceae (Fumitories)			
Climbing Fumitory	<i>Adlumia fungosa</i>	SC	
Gentianaceae (Gentians)			
Andrew's Bottle Gentian	<i>Gentiana andrewsii</i>	E	
Spurred Gentian	<i>Halenia deflexa</i>	E	
Slender Marsh Pink	<i>Sabatia campanulata</i>	E	
Plymouth Gentian	<i>Sabatia kennedyana</i>	SC	

Sea Pink	<i>Sabatia stellaris</i>	E
Grossulariaceae (Currants)		
Bristly Black Currant	<i>Ribes lacustre</i>	SC
Haemodoraceae (Redroots)		
Redroot	<i>Lachnanthes caroliana</i>	SC
Haloragaceae (Water- milfoils)		
Alternate-flowered Water- milfoil	<i>Myriophyllum alterniflorum</i>	E
Farwell's Water-milfoil	<i>Myriophyllum farwellii</i>	E
Pinnate Water-milfoil	<i>Myriophyllum pinnatum</i>	SC
Comb Water-milfoil	<i>Myriophyllum verticillatum</i>	E
Hydrophyllaceae (Waterleaves)		
Broad Waterleaf	<i>Hydrophyllum canadense</i>	E
Hymenophyllaceae (Filmy-ferns)		
Weft Bristle-fern	<i>Trichomanes intricatum</i>	E
Iridaceae (Irises)		
Sandplain Blue-eyed Grass	<i>Sisyrinchium fuscatum</i>	SC
Slender Blue-eyed Grass	<i>Sisyrinchium mucronatum</i>	E
Isoetaceae (Quillworts)		
Acadian Quillwort	<i>Isoetes acadiensis</i>	E
Lake Quillwort	<i>Isoetes lacustris</i>	E
Juncaceae (Rushes)		
Weak Rush	<i>Juncus debilis</i>	E
Thread Rush	<i>Juncus filiformis</i>	E
Black-fruited Woodrush	<i>Luzula parviflora</i> ssp. <i>melanocarpa</i>	E
Lamiaceae (Mints)		
Purple Giant-hyssop	<i>Agastache scrophulariifolia</i>	E
Downy Wood-mint	<i>Blephilia ciliata</i>	E
Hairy Wood-mint	<i>Blephilia hirsuta</i>	E
Gypsywort	<i>Lycopus rubellus</i>	E
False Pennyroyal	<i>Trichostema brachiatum</i>	E
Lentibulariaceae (Bladderworts)		
Resupinate Bladderwort	<i>Utricularia resupinata</i>	T

Subulate Bladderwort	<i>Utricularia subulata</i>	SC
Liliaceae (Lilies)		
Devil's-bit	<i>Chamaelirium luteum</i>	E
Linaceae (Flaxes)		
Sandplain Flax	<i>Linum intercursum</i>	SC
Rigid Flax	<i>Linum medium</i> var. <i>texanum</i>	T
Lycopodiaceae (Clubmosses)		
Foxtail Clubmoss	<i>Lycopodiella alopecuroides</i>	E
Mountain Firmoss	<i>Huperzia selago</i>	E
Lythraceae (Loosestrifes)		
Toothcup	<i>Rotala ramosior</i>	E
Magnoliaceae (Magnolias)		
Sweetbay Magnolia	<i>Magnolia virginiana</i>	E
Melastomataceae (Meadow Beauties)		
Maryland Meadow Beauty	<i>Rhexia mariana</i>	E
Moraceae (Mulberries)		
Red Mulberry	<i>Morus rubra</i>	E
Nymphaeaceae (Water Lilies)		
Tiny Cow-lily	<i>Nuphar microphylla</i>	E
Onagraceae (Evening Primroses)		
Many-fruited False-loosestrife	<i>Ludwigia polycarpa</i>	E
Round-fruited False-loosestrife	<i>Ludwigia sphaerocarpa</i>	E
Ophioglossaceae (Grape Ferns)		
Adder's-tongue Fern	<i>Ophioglossum pusillum</i>	T
Orchidaceae (Orchids)		
Putty-root	<i>Aplectrum hyemale</i>	E
Arethusa	<i>Arethusa bulbosa</i>	T
Autumn Coralroot	<i>Corallorhiza odontorhiza</i>	SC
Ram's-head Lady's-slipper	<i>Cypripedium arietinum</i>	E
Small Yellow Lady's-slipper	<i>Cypripedium parviflorum</i> var. <i>makasin</i>	E
Showy Lady's-slipper	<i>Cypripedium reginae</i>	SC
Dwarf Rattlesnake-	<i>Goodyera repens</i>	E

plantain			
Small Whorled Pogonia	<i>Isotria medeoloides</i>	E	T
Lily-leaf Twayblade	<i>Liparis liliifolia</i>	T	
Heartleaf Twayblade	<i>Listera cordata</i>	E	
Bayard's Green Adder's-mouth	<i>Malaxis bayardii</i>	E	
White Adder's-mouth	<i>Malaxis monophyllos</i> var. <i>brachypoda</i>	E	
Crested Fringed Orchis	<i>Platanthera cristata</i>	E	
Leafy White Orchis	<i>Platanthera dilatata</i>	T	
Pale Green Orchis	<i>Platanthera flava</i> var. <i>herbiola</i>	T	
Hooded Ladies'-tresses	<i>Spiranthes romanzoffiana</i>	E	
Grass-leaved Ladies'-tresses	<i>Spiranthes vernalis</i>	T	
Crane-fly Orchid	<i>Tipularia discolor</i>	E	
Three Bird Orchid (Nodding Pogonia)	<i>Triphora trianthophora</i>	E	
Oxalidaceae (Wood-sorrels)			
Violet Wood-sorrel	<i>Oxalis violacea</i>	E	
Poaceae (Grasses)			
Annual Peanutgrass	<i>Amphicarpum amphicarpon</i>	E	
Purple Needlegrass	<i>Aristida purpurascens</i>	T	
Seabeach Needlegrass	<i>Aristida tuberculosa</i>	T	
Reed Bentgrass	<i>Calamagrostis pickeringii</i>	E	
New England Northern Reedgrass	<i>Calamagrostis stricta</i> ssp. <i>inexpansa</i>	E	
Tufted Hairgrass	<i>Deschampsia cespitosa</i> ssp. <i>glauca</i>	E	
Common's Panic-grass	<i>Dichanthelium ovale</i> ssp. <i>pseudopubescens</i>	SC	
Mattamuskeet Panic-grass	<i>Dichanthelium dichotomum</i> ssp. <i>mattamuskeetense</i>	E	
Rough Panic-grass	<i>Dichanthelium scabriusculum</i>	T	
Wright's Panic-grass	<i>Dichanthelium wrightianum</i>	SC	
Hairy Wild Rye	<i>Elymus villosus</i>	E	
Frank's Lovegrass	<i>Eragrostis frankii</i>	SC	
Saltpond Grass	<i>Leptochloa fusca</i> ssp. <i>fascicularis</i>	T	
Sea Lyme-grass	<i>Leymus mollis</i>	E	

Woodland Millet	<i>Milium effusum</i>	T
Gettinger's Panic-grass	<i>Panicum philadelphicum</i> <i>ssp. gettingeri</i>	SC
Long-Leaved Panic-grass	<i>Panicum rigidulum</i> ssp. <i>pubescens</i>	T
Philadelphia Panic-grass	<i>Panicum philadelphicum</i> <i>ssp. philadelphicum</i>	SC
Drooping Speargrass	<i>Poa saltuensis</i> ssp. <i>languida</i>	E
Bristly Foxtail	<i>Setaria parviflora</i>	SC
Salt Reedgrass	<i>Spartina cynosuroides</i>	T
Shining Wedgegrass	<i>Sphenopholis nitida</i>	T
Swamp Oats	<i>Sphenopholis pensylvanica</i>	T
Small Dropseed	<i>Sporobolus neglectus</i>	E
Northern Gama-grass	<i>Tripsacum dactyloides</i>	E
Spiked False-oats	<i>Trisetum spicatum</i>	E
Podostemaceae (Threadfeet)		
Threadfoot	<i>Podostemum ceratophyllum</i>	SC
Polygonaceae (Docks, Knotweeds)		
Strigose Knotweed	<i>Persicaria setacea</i>	T
Sea-beach Knotweed	<i>Polygonum glaucum</i>	SC
Pondshore Knotweed	<i>Polygonum puritanorum</i>	SC
Seabeach Dock	<i>Rumex pallidus</i>	T
Swamp Dock	<i>Rumex verticillatus</i>	T
Portulacaceae (Spring Beauties)		
Narrow-leaved Spring Beauty	<i>Claytonia virginica</i>	E
Potamogetonaceae (Pondweeds)		
Algae-like Pondweed	<i>Potamogeton confervoides</i>	T
Frie's Pondweed	<i>Potamogeton friesii</i>	E
Hill's Pondweed	<i>Potamogeton hillii</i>	SC
Ogden's Pondweed	<i>Potamogeton ogdenii</i>	E
Straight-leaved Pondweed	<i>Potamogeton strictifolius</i>	E
Vasey's Pondweed	<i>Potamogeton vaseyi</i>	E
Pyrolaceae (Shinleaf)		
Pink Pyrola	<i>Pyrola asarifolia</i> ssp. <i>asarifolia</i>	E
Ranunculaceae		

(Buttercups)

Black Cohosh	<i>Actaea racemosa</i>	E
Purple Clematis	<i>Clematis occidentalis</i>	SC
Golden Seal	<i>Hydrastis canadensis</i>	E
Tiny-flowered Buttercup	<i>Ranunculus micranthus</i>	E
Bristly Buttercup	<i>Ranunculus pensylvanicus</i>	SC

**Rosaceae (Roses,
Shadbushes)**

Small-flowered Agrimony	<i>Agrimonia parviflora</i>	E
Hairy Agrimony	<i>Agrimonia pubescens</i>	T
Bartram's Shadbush	<i>Amelanchier bartramiana</i>	T
Nantucket Shadbush	<i>Amelanchier nantucketensis</i>	SC
Roundleaf Shadbush	<i>Amelanchier sanguinea</i>	SC
Bicknell's Hawthorn	<i>Crataegus bicknellii</i>	E
Sandbar Cherry	<i>Prunus pumila</i> var. <i>depressa</i>	T
Northern Prickly Rose	<i>Rosa acicularis</i> ssp. <i>sayi</i>	E
Northern Mountain-ash	<i>Sorbus decora</i>	E
Barren Strawberry	<i>Waldsteinia fragarioides</i>	SC

**Rubiaceae (Bedstraws,
Bluets)**

Northern Bedstraw	<i>Galium boreale</i>	E
Labrador Bedstraw	<i>Galium labradoricum</i>	T
Long-leaved Bluet	<i>Houstonia longifolia</i>	E

Salicaceae (Willows)

Swamp Cottonwood	<i>Populus heterophylla</i>	E
Sandbar Willow	<i>Salix exigua</i> ssp. <i>interior</i>	T

**Scheuchzeriaceae (Pod-
grasses)**

Pod-grass	<i>Scheuchzeria palustris</i>	E
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**Schizaeaceae (Climbing
Ferns)**

Climbing Fern	<i>Lygodium palmatum</i>	SC
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**Scrophulariaceae
(Figworts)**

Sandplain Gerardia	<i>Agalinis acuta</i>	E	E
Winged Monkey-flower	<i>Mimulus alatus</i>	E	
Muskflower	<i>Mimulus moschatus</i>	E	
Swamp Lousewort	<i>Pedicularis lanceolata</i>	E	
Hairy Beardtongue	<i>Penstemon hirsutus</i>	E	

Sessile Water-speedwell	<i>Veronica catenata</i>	E
Culver's-root	<i>Veronicastrum virginicum</i>	T
Sparganiaceae (Bur-reeds)		
Small Bur-reed	<i>Sparganium natans</i>	E
Verbenaceae (Vervains)		
Narrow-leaved Vervain	<i>Verbena simplex</i>	E
Violaceae (Violets)		
Sand Violet	<i>Viola adunca</i>	SC
Britton's Violet	<i>Viola brittoniana</i>	T
Viscaceae (Christmas-mistletoes)		
Dwarf Mistletoe	<i>Arceuthobium pusillum</i>	SC

1. Trimorphic freshwater population only.
2. Including triploid and other polyploid forms within the *Ambystoma jeffersonianum*/*Ambystoma laterale* complex.
3. Ditto
4. This species is listed by the U. S. Fish and Wildlife Service as *P. r. bangsi* (Plymouth Redbelly Turtle) in 50 CFR 17.11.
5. Undescribed species near *I. inextricata*
6. Undescribed species near *P. pterisii*
7. Undescribed species near *Z. lunifera*
8. Includes the two varieties of this species that occur in Massachusetts: s.p. var. *pauciflora* and s.p. var. *caroliniana*.

Definitions

"Endangered" (E) species are native species which are in danger of extinction throughout all or part of their range, or which are in danger of extirpation from Massachusetts, as documented by biological research and inventory.

"Threatened" (T) species are native species which are likely to become endangered in the foreseeable future, or which are declining or rare as determined by biological research and inventory.

"Special concern" (SC) species are native species which have been documented by biological research or inventory to have suffered a decline that could threaten the species if allowed to continue unchecked, or which occur in such small numbers or with such restricted distribution or specialized habitat requirements that they could easily become threatened within Massachusetts.

Report Date:
03-Mar-11 15:32



- ☒ Final Report
☐ Re-Issued Report
☐ Revised Report

SPECTRUM ANALYTICAL, INC.

Featuring

HANIBAL TECHNOLOGY

Laboratory Report

Wheatstone Engineering & Consulting, Inc.
220 Forbes Road, Suite 405
Braintree, MA 02184-2705
Attn: Robert Reynolds

Project: 71 Frankland Rd-Hopkinton, MA
Project #: S-1242

<u>Laboratory ID</u>	<u>Client Sample ID</u>	<u>Matrix</u>	<u>Date Sampled</u>	<u>Date Received</u>
SB25023-01	P1OW	Ground Water	24-Feb-11 11:30	25-Feb-11 17:30
SB25023-02	P4OW	Ground Water	24-Feb-11 12:00	25-Feb-11 17:30

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



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 29 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.

Spectrum Analytical, Inc. is a NELAC accredited laboratory organization and meets NELAC testing standards. Use of the NELAC logo however does not insure that Spectrum is currently accredited for the specific method or analyte indicated. Please refer to our "Quality" web page at www.spectrum-analytical.com for a full listing of our current certifications and fields of accreditation. States in which Spectrum Analytical, Inc. holds NELAC certification are New York, New Hampshire, New Jersey and Florida. All analytical work for Volatile Organic and Air analysis are transferred to and conducted at our 830 Silver Street location (NY-11840, FL-E87936 and NJ-MA012).

CASE NARRATIVE:

The sample temperature upon receipt by Spectrum Analytical courier was recorded as 4.7 degrees Celsius. The condition of these samples was further noted as refrigerated. The samples were transported on ice to the laboratory facility and the temperature was recorded at 2.0 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.

EPA 200.7/3005A/6010

Samples:

SB25023-01 *PIOW*

Sample submitted with insufficient time to prepare within the method recommended holding time.

Filtration

SW846 8260C

Calibration:

1101029

Analyte quantified by quadratic equation type calibration.

1,2-Dibromo-3-chloropropane
trans-1,4-Dichloro-2-butene
Vinyl chloride

This affected the following samples:

1103538-BLK1
1103538-BS1
1103538-BSD1
PIOW
P4OW
S100621-ICV1
S101456-CCV1

Laboratory Control Samples:

1103538 BS/BSD

Laboratory Control Samples:

1103538 BS/BSD

Bromomethane percent recoveries (64/68) 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 low bias:

P1OW

P4OW

Samples:

S101456-CCV1

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

1,1,2-Trichlorotrifluoroethane (Freon 113) (27.3%)

1,1-Dichloroethene (20.7%)

2,2-Dichloropropane (30.6%)

2-Hexanone (MBK) (-21.6%)

Carbon tetrachloride (22.8%)

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

Bromomethane (-39.3%)

This affected the following samples:

1103538-BLK1

1103538-BS1

1103538-BSD1

P1OW

P4OW

SB25023-01

P1OW

Insufficient preservative to reduce the sample pH to less than 2.

Sample Identification

P10W

SB25023-01

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 11:30

Received

25-Feb-11

CAS No.	Analyte(s)	Result	Flag	Units	*RDL	Dilution	Method Ref.	Prepared	Analyzed	Analyst	Batch	Cert.
Volatile Organic Compounds												
Volatile Organic Compounds			PH									
Prepared by method SW846 5030 Water MS												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	28-Feb-11	28-Feb-11	ek	1103538	
67-64-1	Acetone	BRL		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

P10W

SB25023-01

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 11:30

Received

25-Feb-11

CAS No.	Analyte(s)	Result	Flag	Units	*RDL	Dilution	Method Ref.	Prepared	Analyzed	Analyst	Batch	Cert.
Volatile Organic Compounds												
Volatile Organic Compounds			PH									
Prepared by method SW846 5030 Water MS												
99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	28-Feb-11	28-Feb-11	ek	1103538	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	84		70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	98		70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	104		70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	106		70-130 %		"	"	"	"	"	

VPH Aliphatic/Aromatic Carbon RangesPrepared by method VPH - EPA 5030B

C5-C8 Aliphatic Hydrocarbons	BRL		mg/l	0.0750	5	+MADEP VPH 5/2004 Rev. 1.1	01-Mar-11	01-Mar-11	MP	1103593	
C9-C12 Aliphatic Hydrocarbons	BRL		mg/l	0.0250	5	"	"	"	"	"	
C9-C10 Aromatic Hydrocarbons	BRL		mg/l	0.0250	5	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification**P10W**

SB25023-01

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 11:30

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>VPH Aliphatic/Aromatic Carbon Ranges</u>												
<u>Prepared by method VPH - EPA 5030B</u>												
	Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL		mg/l	0.0750	5	+MADEP VPH 5/2004 Rev. 1.1	01-Mar-11	01-Mar-11	MP	1103593	
	Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL		mg/l	0.0250	5	"	"	"	"	"	
<u>VPH Target Analytes</u>												
<u>Prepared by method VPH - EPA 5030B</u>												
71-43-2	Benzene	BRL		µg/l	5.0	5	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	5.0	5	"	"	"	"	"	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	5.0	5	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/l	5.0	5	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	5.0	5	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	10.0	5	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	5.0	5	"	"	"	"	"	
<u>Surrogate recoveries:</u>												
615-59-8	2,5-Dibromotoluene (FID)	113			70-130 %		"	"	"	"	"	
615-59-8	2,5-Dibromotoluene (PID)	115			70-130 %		"	"	"	"	"	
Extractable Petroleum Hydrocarbons												
<u>EPH Aliphatic/Aromatic Ranges</u>												
<u>Prepared by method SW846 3510C</u>												
	C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	28-Feb-11	02-Mar-11	MM	1103561	
	C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Total Petroleum Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Unadjusted Total Petroleum Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
<u>EPH Target PAH Analytes</u>												
<u>Prepared by method SW846 3510C</u>												
91-20-3	Naphthalene	BRL		µg/l	5.21	1	"	"	"	"	"	
91-57-6	2-Methylnaphthalene	BRL		µg/l	5.21	1	"	"	"	"	"	
208-96-8	Acenaphthylene	BRL		µg/l	5.21	1	"	"	"	"	"	
83-32-9	Acenaphthene	BRL		µg/l	5.21	1	"	"	"	"	"	
86-73-7	Fluorene	BRL		µg/l	5.21	1	"	"	"	"	"	
85-01-8	Phenanthrene	BRL		µg/l	5.21	1	"	"	"	"	"	
120-12-7	Anthracene	BRL		µg/l	5.21	1	"	"	"	"	"	
206-44-0	Fluoranthene	BRL		µg/l	5.21	1	"	"	"	"	"	
129-00-0	Pyrene	BRL		µg/l	5.21	1	"	"	"	"	"	
56-55-3	Benzo (a) anthracene	BRL		µg/l	5.21	1	"	"	"	"	"	
218-01-9	Chrysene	BRL		µg/l	5.21	1	"	"	"	"	"	
205-99-2	Benzo (b) fluoranthene	BRL		µg/l	5.21	1	"	"	"	"	"	
207-08-9	Benzo (k) fluoranthene	BRL		µg/l	5.21	1	"	"	"	"	"	
50-32-8	Benzo (a) pyrene	BRL		µg/l	5.21	1	"	"	"	"	"	
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/l	5.21	1	"	"	"	"	"	
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/l	5.21	1	"	"	"	"	"	
191-24-2	Benzo (g,h,i) perylene	BRL		µg/l	5.21	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

P1OW

SB25023-01

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 11:30

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Target PAH AnalytesPrepared by method SW846 3510C*Surrogate recoveries:*

3386-33-2	1-Chlorooctadecane	57			40-140 %		+MADEP EPH 5/2004 R	28-Feb-11	02-Mar-11	MM	1103561	
84-15-1	Ortho-Terphenyl	50			40-140 %		"	"	"	"	"	
321-60-8	2-Fluorobiphenyl	52			40-140 %		"	"	"	"	"	

Soluble Metals by EPA 200/6000 Series Methods

Filtration	Lab Filtered	HT1	N/A			1	EPA 200.7/3005A/6010	25-Feb-11 18:15	25-Feb-11 18:15	JS	1103440	
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Soluble Metals by EPA 6000/7000 Series Methods

7440-22-4	Silver	BRL		mg/l	0.0050	1	SW846 6010C	28-Feb-11	28-Feb-11	TBC	1103530	
7440-38-2	Arsenic	BRL		mg/l	0.0040	1	"	"	"	"	"	
7440-39-3	Barium	0.0930		mg/l	0.0050	1	"	"	"	"	"	
7440-43-9	Cadmium	BRL		mg/l	0.0025	1	"	"	"	"	"	
7440-47-3	Chromium	BRL		mg/l	0.0050	1	"	"	"	"	"	
7439-92-1	Lead	BRL		mg/l	0.0075	1	"	"	"	"	"	
7782-49-2	Selenium	BRL		mg/l	0.0150	1	"	"	"	"	"	

Soluble Metals by EPA 200 Series Methods

7439-97-6	Mercury	BRL		mg/l	0.00020	1	EPA 245.1/7470A	28-Feb-11	28-Feb-11	ARF	1103531	X
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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

P4OW

SB25023-02

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 12:00

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
76-13-1	1,1,2-Trichlorotrifluoroethane (Freon 113)	BRL		µg/l	1.0	1	SW846 8260C	28-Feb-11	28-Feb-11	ek	1103538	
67-64-1	Acetone	12.8		µg/l	10.0	1	"	"	"	"	"	
107-13-1	Acrylonitrile	BRL		µg/l	0.5	1	"	"	"	"	"	
71-43-2	Benzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-86-1	Bromobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
74-97-5	Bromochloromethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-27-4	Bromodichloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
75-25-2	Bromoform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-83-9	Bromomethane	BRL		µg/l	2.0	1	"	"	"	"	"	
78-93-3	2-Butanone (MEK)	BRL		µg/l	10.0	1	"	"	"	"	"	
104-51-8	n-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
135-98-8	sec-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
98-06-6	tert-Butylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-15-0	Carbon disulfide	BRL		µg/l	2.0	1	"	"	"	"	"	
56-23-5	Carbon tetrachloride	BRL		µg/l	1.0	1	"	"	"	"	"	
108-90-7	Chlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-00-3	Chloroethane	BRL		µg/l	2.0	1	"	"	"	"	"	
67-66-3	Chloroform	BRL		µg/l	1.0	1	"	"	"	"	"	
74-87-3	Chloromethane	BRL		µg/l	2.0	1	"	"	"	"	"	
95-49-8	2-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-43-4	4-Chlorotoluene	BRL		µg/l	1.0	1	"	"	"	"	"	
96-12-8	1,2-Dibromo-3-chloropropane	BRL		µg/l	2.0	1	"	"	"	"	"	
124-48-1	Dibromochloromethane	BRL		µg/l	0.5	1	"	"	"	"	"	
106-93-4	1,2-Dibromoethane (EDB)	BRL		µg/l	0.5	1	"	"	"	"	"	
74-95-3	Dibromomethane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-50-1	1,2-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
541-73-1	1,3-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
106-46-7	1,4-Dichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-71-8	Dichlorodifluoromethane (Freon12)	BRL		µg/l	2.0	1	"	"	"	"	"	
75-34-3	1,1-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
107-06-2	1,2-Dichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
75-35-4	1,1-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-59-2	cis-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
156-60-5	trans-1,2-Dichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
78-87-5	1,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
142-28-9	1,3-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
594-20-7	2,2-Dichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
563-58-6	1,1-Dichloropropene	BRL		µg/l	1.0	1	"	"	"	"	"	
10061-01-5	cis-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
10061-02-6	trans-1,3-Dichloropropene	BRL		µg/l	0.5	1	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-68-3	Hexachlorobutadiene	BRL		µg/l	0.5	1	"	"	"	"	"	
591-78-6	2-Hexanone (MBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
98-82-8	Isopropylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

P4OW

SB25023-02

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 12:00

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
Volatile Organic Compounds												
<u>Volatile Organic Compounds</u>												
<u>Prepared by method SW846 5030 Water MS</u>												
99-87-6	4-Isopropyltoluene	BRL		µg/l	1.0	1	SW846 8260C	28-Feb-11	28-Feb-11	ek	1103538	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-10-1	4-Methyl-2-pentanone (MIBK)	BRL		µg/l	10.0	1	"	"	"	"	"	
75-09-2	Methylene chloride	BRL		µg/l	2.0	1	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/l	1.0	1	"	"	"	"	"	
103-65-1	n-Propylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
100-42-5	Styrene	BRL		µg/l	1.0	1	"	"	"	"	"	
630-20-6	1,1,1,2-Tetrachloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-34-5	1,1,2,2-Tetrachloroethane	BRL		µg/l	0.5	1	"	"	"	"	"	
127-18-4	Tetrachloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	1.0	1	"	"	"	"	"	
87-61-6	1,2,3-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
120-82-1	1,2,4-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-70-3	1,3,5-Trichlorobenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
71-55-6	1,1,1-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-00-5	1,1,2-Trichloroethane	BRL		µg/l	1.0	1	"	"	"	"	"	
79-01-6	Trichloroethene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-69-4	Trichlorofluoromethane (Freon 11)	BRL		µg/l	1.0	1	"	"	"	"	"	
96-18-4	1,2,3-Trichloropropane	BRL		µg/l	1.0	1	"	"	"	"	"	
95-63-6	1,2,4-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
108-67-8	1,3,5-Trimethylbenzene	BRL		µg/l	1.0	1	"	"	"	"	"	
75-01-4	Vinyl chloride	BRL		µg/l	1.0	1	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	2.0	1	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	1.0	1	"	"	"	"	"	
109-99-9	Tetrahydrofuran	BRL		µg/l	2.0	1	"	"	"	"	"	
60-29-7	Ethyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
994-05-8	Tert-amyl methyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
637-92-3	Ethyl tert-butyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
108-20-3	Di-isopropyl ether	BRL		µg/l	1.0	1	"	"	"	"	"	
75-65-0	Tert-Butanol / butyl alcohol	BRL		µg/l	10.0	1	"	"	"	"	"	
123-91-1	1,4-Dioxane	BRL		µg/l	20.0	1	"	"	"	"	"	
110-57-6	trans-1,4-Dichloro-2-butene	BRL		µg/l	5.0	1	"	"	"	"	"	
64-17-5	Ethanol	BRL		µg/l	400	1	"	"	"	"	"	

Surrogate recoveries:

460-00-4	4-Bromofluorobenzene	86		70-130 %		"	"	"	"	"	
2037-26-5	Toluene-d8	99		70-130 %		"	"	"	"	"	
17060-07-0	1,2-Dichloroethane-d4	106		70-130 %		"	"	"	"	"	
1868-53-7	Dibromofluoromethane	108		70-130 %		"	"	"	"	"	

VPH Aliphatic/Aromatic Carbon RangesPrepared by method VPH - EPA 5030B

C5-C8 Aliphatic Hydrocarbons	BRL	mg/l	0.0750	5	+MADEP VPH 5/2004 Rev. 1.1	01-Mar-11	01-Mar-11	MP	1103593
C9-C12 Aliphatic Hydrocarbons	BRL	mg/l	0.0250	5	"	"	"	"	"
C9-C10 Aromatic Hydrocarbons	BRL	mg/l	0.0250	5	"	"	"	"	"

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification

P4OW

SB25023-02

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 12:00

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Volatile Organic CompoundsVPH Aliphatic/Aromatic Carbon RangesPrepared by method VPH - EPA 5030B

	Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL		mg/l	0.0750	5	+MADEP VPH 5/2004 Rev. 1.1	01-Mar-11	01-Mar-11	MP	1103593	
	Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL		mg/l	0.0250	5	"	"	"	"	"	

VPH Target AnalytesPrepared by method VPH - EPA 5030B

71-43-2	Benzene	BRL		µg/l	5.0	5	"	"	"	"	"	
100-41-4	Ethylbenzene	BRL		µg/l	5.0	5	"	"	"	"	"	
1634-04-4	Methyl tert-butyl ether	BRL		µg/l	5.0	5	"	"	"	"	"	
91-20-3	Naphthalene	BRL		µg/l	5.0	5	"	"	"	"	"	
108-88-3	Toluene	BRL		µg/l	5.0	5	"	"	"	"	"	
179601-23-1	m,p-Xylene	BRL		µg/l	10.0	5	"	"	"	"	"	
95-47-6	o-Xylene	BRL		µg/l	5.0	5	"	"	"	"	"	

Surrogate recoveries:

615-59-8	2,5-Dibromotoluene (FID)	111			70-130 %		"	"	"	"	"	
615-59-8	2,5-Dibromotoluene (PID)	112			70-130 %		"	"	"	"	"	

Extractable Petroleum HydrocarbonsEPH Aliphatic/Aromatic RangesPrepared by method SW846 3510C

	C9-C18 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	+MADEP EPH 5/2004 R	28-Feb-11	02-Mar-11	MM	1103561	
	C19-C36 Aliphatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Unadjusted C11-C22 Aromatic Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Total Petroleum Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	
	Unadjusted Total Petroleum Hydrocarbons	BRL		mg/l	0.1	1	"	"	"	"	"	

EPH Target PAH AnalytesPrepared by method SW846 3510C

91-20-3	Naphthalene	BRL		µg/l	5.15	1	"	"	"	"	"	
91-57-6	2-Methylnaphthalene	BRL		µg/l	5.15	1	"	"	"	"	"	
208-96-8	Acenaphthylene	BRL		µg/l	5.15	1	"	"	"	"	"	
83-32-9	Acenaphthene	BRL		µg/l	5.15	1	"	"	"	"	"	
86-73-7	Fluorene	BRL		µg/l	5.15	1	"	"	"	"	"	
85-01-8	Phenanthrene	BRL		µg/l	5.15	1	"	"	"	"	"	
120-12-7	Anthracene	BRL		µg/l	5.15	1	"	"	"	"	"	
206-44-0	Fluoranthene	BRL		µg/l	5.15	1	"	"	"	"	"	
129-00-0	Pyrene	BRL		µg/l	5.15	1	"	"	"	"	"	
56-55-3	Benzo (a) anthracene	BRL		µg/l	5.15	1	"	"	"	"	"	
218-01-9	Chrysene	BRL		µg/l	5.15	1	"	"	"	"	"	
205-99-2	Benzo (b) fluoranthene	BRL		µg/l	5.15	1	"	"	"	"	"	
207-08-9	Benzo (k) fluoranthene	BRL		µg/l	5.15	1	"	"	"	"	"	
50-32-8	Benzo (a) pyrene	BRL		µg/l	5.15	1	"	"	"	"	"	
193-39-5	Indeno (1,2,3-cd) pyrene	BRL		µg/l	5.15	1	"	"	"	"	"	
53-70-3	Dibenzo (a,h) anthracene	BRL		µg/l	5.15	1	"	"	"	"	"	
191-24-2	Benzo (g,h,i) perylene	BRL		µg/l	5.15	1	"	"	"	"	"	

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Sample Identification**P4OW**

SB25023-02

Client Project #

S-1242

Matrix

Ground Water

Collection Date/Time

24-Feb-11 12:00

Received

25-Feb-11

<i>CAS No.</i>	<i>Analyte(s)</i>	<i>Result</i>	<i>Flag</i>	<i>Units</i>	<i>*RDL</i>	<i>Dilution</i>	<i>Method Ref.</i>	<i>Prepared</i>	<i>Analyzed</i>	<i>Analyst</i>	<i>Batch</i>	<i>Cert.</i>
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Extractable Petroleum HydrocarbonsEPH Target PAH AnalytesPrepared by method SW846 3510C*Surrogate recoveries:*

3386-33-2	1-Chlorooctadecane	60			40-140 %		+MADEP EPH 5/2004 R	28-Feb-11	02-Mar-11	MM	1103561	
84-15-1	Ortho-Terphenyl	49			40-140 %		"	"	"	"	"	
321-60-8	2-Fluorobiphenyl	51			40-140 %		"	"	"	"	"	

Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103538 - SW846 5030 Water MS										
Blank (1103538-BLK1)										<u>Prepared & Analyzed: 28-Feb-11</u>
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						

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* Reportable Detection Limit

BRL = Below Reporting Limit

Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103538 - SW846 5030 Water MS										
Blank (1103538-BLK1)					<u>Prepared & Analyzed: 28-Feb-11</u>					
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						
<i>Surrogate: 4-Bromofluorobenzene</i>	42.4		µg/l		50.0		85	70-130		
<i>Surrogate: Toluene-d8</i>	49.6		µg/l		50.0		99	70-130		
<i>Surrogate: 1,2-Dichloroethane-d4</i>	52.6		µg/l		50.0		105	70-130		
<i>Surrogate: Dibromofluoromethane</i>	53.2		µg/l		50.0		106	70-130		
LCS (1103538-BS1)					<u>Prepared & Analyzed: 28-Feb-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	24.4		µg/l		20.0		122	70-130		
Acetone	16.0		µg/l		20.0		80	70-130		
Acrylonitrile	21.8		µg/l		20.0		109	70-130		
Benzene	20.8		µg/l		20.0		104	70-130		
Bromobenzene	21.0		µg/l		20.0		105	70-130		
Bromochloromethane	20.4		µg/l		20.0		102	70-130		
Bromodichloromethane	22.5		µg/l		20.0		112	70-130		
Bromoform	19.8		µg/l		20.0		99	70-130		
Bromomethane	12.9		µg/l		20.0		64	70-130		
2-Butanone (MEK)	21.1		µg/l		20.0		106	70-130		
n-Butylbenzene	17.4		µg/l		20.0		87	70-130		
sec-Butylbenzene	21.9		µg/l		20.0		110	70-130		
tert-Butylbenzene	21.1		µg/l		20.0		105	70-130		
Carbon disulfide	23.1		µg/l		20.0		115	70-130		
Carbon tetrachloride	24.0		µg/l		20.0		120	70-130		
Chlorobenzene	20.6		µg/l		20.0		103	70-130		
Chloroethane	23.9		µg/l		20.0		119	70-130		
Chloroform	20.6		µg/l		20.0		103	70-130		
Chloromethane	23.6		µg/l		20.0		118	70-130		
2-Chlorotoluene	21.5		µg/l		20.0		108	70-130		
4-Chlorotoluene	19.4		µg/l		20.0		97	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103538 - SW846 5030 Water MS										
<u>LCS (1103538-BS1)</u>	<u>Prepared & Analyzed: 28-Feb-11</u>									
1,2-Dibromo-3-chloropropane	18.6		µg/l		20.0		93	70-130		
Dibromochloromethane	20.1		µg/l		20.0		100	70-130		
1,2-Dibromoethane (EDB)	18.7		µg/l		20.0		94	70-130		
Dibromomethane	20.9		µg/l		20.0		105	70-130		
1,2-Dichlorobenzene	20.1		µg/l		20.0		100	70-130		
1,3-Dichlorobenzene	21.6		µg/l		20.0		108	70-130		
1,4-Dichlorobenzene	20.0		µg/l		20.0		100	70-130		
Dichlorodifluoromethane (Freon12)	22.2		µg/l		20.0		111	70-130		
1,1-Dichloroethane	20.7		µg/l		20.0		103	70-130		
1,2-Dichloroethane	20.4		µg/l		20.0		102	70-130		
1,1-Dichloroethene	23.4		µg/l		20.0		117	70-130		
cis-1,2-Dichloroethene	22.1		µg/l		20.0		111	70-130		
trans-1,2-Dichloroethene	21.5		µg/l		20.0		108	70-130		
1,2-Dichloropropane	21.2		µg/l		20.0		106	70-130		
1,3-Dichloropropane	20.4		µg/l		20.0		102	70-130		
2,2-Dichloropropane	24.8		µg/l		20.0		124	70-130		
1,1-Dichloropropene	20.5		µg/l		20.0		103	70-130		
cis-1,3-Dichloropropene	21.2		µg/l		20.0		106	70-130		
trans-1,3-Dichloropropene	19.1		µg/l		20.0		95	70-130		
Ethylbenzene	20.8		µg/l		20.0		104	70-130		
Hexachlorobutadiene	21.8		µg/l		20.0		109	70-130		
2-Hexanone (MBK)	15.1		µg/l		20.0		75	70-130		
Isopropylbenzene	20.4		µg/l		20.0		102	70-130		
4-Isopropyltoluene	20.7		µg/l		20.0		103	70-130		
Methyl tert-butyl ether	21.0		µg/l		20.0		105	70-130		
4-Methyl-2-pentanone (MIBK)	16.3		µg/l		20.0		81	70-130		
Methylene chloride	22.0		µg/l		20.0		110	70-130		
Naphthalene	19.0		µg/l		20.0		95	70-130		
n-Propylbenzene	17.8		µg/l		20.0		89	70-130		
Styrene	16.9		µg/l		20.0		84	70-130		
1,1,1,2-Tetrachloroethane	23.3		µg/l		20.0		117	70-130		
1,1,2,2-Tetrachloroethane	22.6		µg/l		20.0		113	70-130		
Tetrachloroethene	20.9		µg/l		20.0		105	70-130		
Toluene	20.1		µg/l		20.0		101	70-130		
1,2,3-Trichlorobenzene	21.5		µg/l		20.0		107	70-130		
1,2,4-Trichlorobenzene	20.1		µg/l		20.0		101	70-130		
1,3,5-Trichlorobenzene	20.8		µg/l		20.0		104	70-130		
1,1,1-Trichloroethane	22.6		µg/l		20.0		113	70-130		
1,1,2-Trichloroethane	21.2		µg/l		20.0		106	70-130		
Trichloroethene	19.3		µg/l		20.0		97	70-130		
Trichlorofluoromethane (Freon 11)	22.3		µg/l		20.0		112	70-130		
1,2,3-Trichloropropane	21.9		µg/l		20.0		109	70-130		
1,2,4-Trimethylbenzene	20.9		µg/l		20.0		104	70-130		
1,3,5-Trimethylbenzene	21.2		µg/l		20.0		106	70-130		
Vinyl chloride	19.6		µg/l		20.0		98	70-130		
m,p-Xylene	42.2		µg/l		40.0		105	70-130		
o-Xylene	21.1		µg/l		20.0		106	70-130		
Tetrahydrofuran	19.2		µg/l		20.0		96	70-130		
Ethyl ether	22.4		µg/l		20.0		112	70-130		
Tert-amyl methyl ether	18.0		µg/l		20.0		90	70-130		
Ethyl tert-butyl ether	21.3		µg/l		20.0		107	70-130		
Di-isopropyl ether	21.3		µg/l		20.0		107	70-130		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103538 - SW846 5030 Water MS										
<u>LCS (1103538-BS1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
Tert-Butanol / butyl alcohol	210		µg/l		200		105	70-130		
1,4-Dioxane	193		µg/l		200		97	70-130		
trans-1,4-Dichloro-2-butene	17.1		µg/l		20.0		85	70-130		
Ethanol	399		µg/l		400		100	70-130		
Surrogate: 4-Bromofluorobenzene	51.4		µg/l		50.0		103	70-130		
Surrogate: Toluene-d8	48.8		µg/l		50.0		98	70-130		
Surrogate: 1,2-Dichloroethane-d4	49.6		µg/l		50.0		99	70-130		
Surrogate: Dibromofluoromethane	51.3		µg/l		50.0		103	70-130		
<u>LCS Dup (1103538-BS1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
1,1,2-Trichlorotrifluoroethane (Freon 113)	22.5		µg/l		20.0		112	70-130	8	25
Acetone	16.6		µg/l		20.0		83	70-130	4	50
Acrylonitrile	21.4		µg/l		20.0		107	70-130	2	25
Benzene	19.4		µg/l		20.0		97	70-130	7	25
Bromobenzene	20.4		µg/l		20.0		102	70-130	3	25
Bromochloromethane	19.8		µg/l		20.0		99	70-130	3	25
Bromodichloromethane	21.5		µg/l		20.0		107	70-130	5	25
Bromoform	20.3		µg/l		20.0		101	70-130	2	25
Bromomethane	13.5		µg/l		20.0		68	70-130	5	50
2-Butanone (MEK)	19.6		µg/l		20.0		98	70-130	7	50
n-Butylbenzene	16.6		µg/l		20.0		83	70-130	5	25
sec-Butylbenzene	19.7		µg/l		20.0		98	70-130	11	25
tert-Butylbenzene	19.6		µg/l		20.0		98	70-130	7	25
Carbon disulfide	21.4		µg/l		20.0		107	70-130	7	25
Carbon tetrachloride	21.9		µg/l		20.0		109	70-130	9	25
Chlorobenzene	19.7		µg/l		20.0		98	70-130	4	25
Chloroethane	22.0		µg/l		20.0		110	70-130	8	50
Chloroform	19.5		µg/l		20.0		98	70-130	5	25
Chloromethane	21.5		µg/l		20.0		108	70-130	9	25
2-Chlorotoluene	18.6		µg/l		20.0		93	70-130	15	25
4-Chlorotoluene	18.3		µg/l		20.0		92	70-130	6	25
1,2-Dibromo-3-chloropropane	19.2		µg/l		20.0		96	70-130	3	25
Dibromochloromethane	19.6		µg/l		20.0		98	70-130	2	50
1,2-Dibromoethane (EDB)	18.5		µg/l		20.0		93	70-130	1	25
Dibromomethane	20.2		µg/l		20.0		101	70-130	3	25
1,2-Dichlorobenzene	19.5		µg/l		20.0		97	70-130	3	25
1,3-Dichlorobenzene	20.2		µg/l		20.0		101	70-130	7	25
1,4-Dichlorobenzene	19.0		µg/l		20.0		95	70-130	5	25
Dichlorodifluoromethane (Freon12)	20.1		µg/l		20.0		100	70-130	10	50
1,1-Dichloroethane	19.6		µg/l		20.0		98	70-130	5	25
1,2-Dichloroethane	19.7		µg/l		20.0		99	70-130	3	25
1,1-Dichloroethene	21.0		µg/l		20.0		105	70-130	11	25
cis-1,2-Dichloroethene	20.9		µg/l		20.0		104	70-130	6	25
trans-1,2-Dichloroethene	20.2		µg/l		20.0		101	70-130	7	25
1,2-Dichloropropane	19.8		µg/l		20.0		99	70-130	7	25
1,3-Dichloropropane	20.1		µg/l		20.0		100	70-130	1	25
2,2-Dichloropropane	21.6		µg/l		20.0		108	70-130	14	25
1,1-Dichloropropene	18.9		µg/l		20.0		94	70-130	8	25
cis-1,3-Dichloropropene	20.7		µg/l		20.0		103	70-130	2	25
trans-1,3-Dichloropropene	18.5		µg/l		20.0		93	70-130	3	25
Ethylbenzene	19.4		µg/l		20.0		97	70-130	7	25
Hexachlorobutadiene	20.3		µg/l		20.0		102	70-130	7	50

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103538 - SW846 5030 Water MS										
<u>LCS Dup (1103538-BSD1)</u>	<u>Prepared & Analyzed: 28-Feb-11</u>									
2-Hexanone (MBK)	14.3		µg/l		20.0		72	70-130	5	25
Isopropylbenzene	19.6		µg/l		20.0		98	70-130	4	25
4-Isopropyltoluene	19.5		µg/l		20.0		97	70-130	6	25
Methyl tert-butyl ether	20.6		µg/l		20.0		103	70-130	2	25
4-Methyl-2-pentanone (MIBK)	16.7		µg/l		20.0		83	70-130	2	50
Methylene chloride	21.5		µg/l		20.0		107	70-130	3	25
Naphthalene	18.4		µg/l		20.0		92	70-130	3	25
n-Propylbenzene	17.1		µg/l		20.0		86	70-130	4	25
Styrene	16.2		µg/l		20.0		81	70-130	4	25
1,1,1,2-Tetrachloroethane	22.5		µg/l		20.0		112	70-130	4	25
1,1,2,2-Tetrachloroethane	22.2		µg/l		20.0		111	70-130	2	25
Tetrachloroethene	19.1		µg/l		20.0		95	70-130	9	25
Toluene	19.2		µg/l		20.0		96	70-130	5	25
1,2,3-Trichlorobenzene	20.6		µg/l		20.0		103	70-130	4	25
1,2,4-Trichlorobenzene	19.7		µg/l		20.0		98	70-130	2	25
1,3,5-Trichlorobenzene	19.9		µg/l		20.0		100	70-130	4	25
1,1,1-Trichloroethane	20.9		µg/l		20.0		105	70-130	8	25
1,1,2-Trichloroethane	20.4		µg/l		20.0		102	70-130	4	25
Trichloroethene	17.9		µg/l		20.0		89	70-130	8	25
Trichlorofluoromethane (Freon 11)	20.6		µg/l		20.0		103	70-130	8	50
1,2,3-Trichloropropane	21.1		µg/l		20.0		106	70-130	4	25
1,2,4-Trimethylbenzene	19.6		µg/l		20.0		98	70-130	6	25
1,3,5-Trimethylbenzene	19.8		µg/l		20.0		99	70-130	7	25
Vinyl chloride	18.0		µg/l		20.0		90	70-130	8	25
m,p-Xylene	39.6		µg/l		40.0		99	70-130	6	25
o-Xylene	19.7		µg/l		20.0		99	70-130	7	25
Tetrahydrofuran	18.4		µg/l		20.0		92	70-130	4	25
Ethyl ether	22.3		µg/l		20.0		111	70-130	0.5	50
Tert-amyl methyl ether	17.6		µg/l		20.0		88	70-130	2	25
Ethyl tert-butyl ether	20.8		µg/l		20.0		104	70-130	2	25
Di-isopropyl ether	21.0		µg/l		20.0		105	70-130	2	25
Tert-Butanol / butyl alcohol	195		µg/l		200		97	70-130	8	25
1,4-Dioxane	181		µg/l		200		91	70-130	6	25
trans-1,4-Dichloro-2-butene	15.5		µg/l		20.0		77	70-130	10	25
Ethanol	393		µg/l		400		98	70-130	1	30
Surrogate: 4-Bromofluorobenzene	50.6		µg/l		50.0		101	70-130		
Surrogate: Toluene-d8	50.4		µg/l		50.0		101	70-130		
Surrogate: 1,2-Dichloroethane-d4	49.9		µg/l		50.0		100	70-130		
Surrogate: Dibromofluoromethane	50.5		µg/l		50.0		101	70-130		
Batch 1103593 - VPH - EPA 5030B										
<u>Blank (1103593-BLK1)</u>	<u>Prepared & Analyzed: 28-Feb-11</u>									
C5-C8 Aliphatic Hydrocarbons	BRL		mg/l	0.0750						
C9-C12 Aliphatic Hydrocarbons	BRL		mg/l	0.0250						
C9-C10 Aromatic Hydrocarbons	BRL		mg/l	0.0250						
Unadjusted C5-C8 Aliphatic Hydrocarbons	BRL		mg/l	0.0750						
Unadjusted C9-C12 Aliphatic Hydrocarbons	BRL		mg/l	0.0250						
Benzene	BRL		µg/l	5.0						
Ethylbenzene	BRL		µg/l	5.0						
Methyl tert-butyl ether	BRL		µg/l	5.0						
Naphthalene	BRL		µg/l	5.0						

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103593 - VPH - EPA 5030B										
<u>Blank (1103593-BLK1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
Toluene	BRL		µg/l	5.0						
m,p-Xylene	BRL		µg/l	10.0						
o-Xylene	BRL		µg/l	5.0						
2-Methylpentane	BRL		µg/l	5.0						
n-Nonane	BRL		µg/l	10.0						
n-Pentane	BRL		µg/l	10.0						
1,2,4-Trimethylbenzene	BRL		µg/l	5.0						
2,2,4-Trimethylpentane	BRL		µg/l	5.0						
n-Butylcyclohexane	BRL		µg/l	5.0						
n-Decane	BRL		µg/l	5.0						
Surrogate: 2,5-Dibromotoluene (FID)	50.6		µg/l		50.0		101	70-130		
Surrogate: 2,5-Dibromotoluene (PID)	50.3		µg/l		50.0		101	70-130		
<u>LCS (1103593-BS1)</u>					<u>Prepared: 28-Feb-11 Analyzed: 01-Mar-11</u>					
C5-C8 Aliphatic Hydrocarbons	61.9		mg/l		60.0		103	70-130		
C9-C12 Aliphatic Hydrocarbons	60.8		mg/l		60.0		101	70-130		
C9-C10 Aromatic Hydrocarbons	20.2		mg/l		20.0		101	70-130		
Unadjusted C5-C8 Aliphatic Hydrocarbons	215		mg/l		200		107	70-130		
Unadjusted C9-C12 Aliphatic Hydrocarbons	80.9		mg/l		80.0		101	70-130		
Benzene	21.6		µg/l		20.0		108	70-130		
Ethylbenzene	21.8		µg/l		20.0		109	70-130		
Methyl tert-butyl ether	20.8		µg/l		20.0		104	70-130		
Naphthalene	21.7		µg/l		20.0		108	70-130		
Toluene	22.1		µg/l		20.0		111	70-130		
m,p-Xylene	44.0		µg/l		40.0		110	70-130		
o-Xylene	22.2		µg/l		20.0		111	70-130		
2-Methylpentane	21.0		µg/l		20.0		105	70-130		
n-Nonane	18.2		µg/l		20.0		91	70-130		
n-Pentane	21.1		µg/l		20.0		106	70-130		
1,2,4-Trimethylbenzene	21.7		µg/l		20.0		109	70-130		
2,2,4-Trimethylpentane	20.7		µg/l		20.0		103	70-130		
n-Butylcyclohexane	18.6		µg/l		20.0		93	70-130		
n-Decane	18.4		µg/l		20.0		92	70-130		
Surrogate: 2,5-Dibromotoluene (FID)	55.3		µg/l		50.0		111	70-130		
Surrogate: 2,5-Dibromotoluene (PID)	54.5		µg/l		50.0		109	70-130		
<u>LCS Dup (1103593-BSD1)</u>					<u>Prepared: 28-Feb-11 Analyzed: 01-Mar-11</u>					
C5-C8 Aliphatic Hydrocarbons	62.8		mg/l		60.0		105	70-130	1	25
C9-C12 Aliphatic Hydrocarbons	58.9		mg/l		60.0		98	70-130	3	25
C9-C10 Aromatic Hydrocarbons	19.0		mg/l		20.0		95	70-130	6	25
Unadjusted C5-C8 Aliphatic Hydrocarbons	210		mg/l		200		105	70-130	2	25
Unadjusted C9-C12 Aliphatic Hydrocarbons	77.9		mg/l		80.0		97	70-130	4	25
Benzene	20.9		µg/l		20.0		105	70-130	3	25
Ethylbenzene	20.9		µg/l		20.0		105	70-130	4	25
Methyl tert-butyl ether	19.8		µg/l		20.0		99	70-130	5	25
Naphthalene	20.1		µg/l		20.0		101	70-130	7	25
Toluene	21.3		µg/l		20.0		107	70-130	4	25
m,p-Xylene	42.3		µg/l		40.0		106	70-130	4	25
o-Xylene	21.5		µg/l		20.0		108	70-130	3	25
2-Methylpentane	19.0		µg/l		20.0		95	70-130	10	25
n-Nonane	16.7		µg/l		20.0		83	70-130	9	25

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Volatile Organic Compounds - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103593 - VPH - EPA 5030B										
<u>LCS Dup (1103593-BSD1)</u>					<u>Prepared: 28-Feb-11 Analyzed: 01-Mar-11</u>					
n-Pentane	22.9		µg/l		20.0		114	70-130	8	25
1,2,4-Trimethylbenzene	20.9		µg/l		20.0		104	70-130	4	25
2,2,4-Trimethylpentane	19.3		µg/l		20.0		97	70-130	7	25
n-Butylcyclohexane	16.8		µg/l		20.0		84	70-130	10	25
n-Decane	16.0		µg/l		20.0		80	70-130	14	25
Surrogate: 2,5-Dibromotoluene (FID)	51.4		µg/l		50.0		103	70-130		
Surrogate: 2,5-Dibromotoluene (PID)	50.8		µg/l		50.0		102	70-130		

Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103561 - SW846 3510C										
Blank (1103561-BLK1)					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
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	2.50						
2-Methylnaphthalene	BRL		µg/l	2.50						
Acenaphthylene	BRL		µg/l	2.50						
Acenaphthene	BRL		µg/l	2.50						
Fluorene	BRL		µg/l	2.50						
Phenanthrene	BRL		µg/l	2.50						
Anthracene	BRL		µg/l	2.50						
Fluoranthene	BRL		µg/l	2.50						
Pyrene	BRL		µg/l	2.50						
Benzo (a) anthracene	BRL		µg/l	2.50						
Chrysene	BRL		µg/l	2.50						
Benzo (b) fluoranthene	BRL		µg/l	2.50						
Benzo (k) fluoranthene	BRL		µg/l	2.50						
Benzo (a) pyrene	BRL		µg/l	2.50						
Indeno (1,2,3-cd) pyrene	BRL		µg/l	2.50						
Dibenzo (a,h) anthracene	BRL		µg/l	2.50						
Benzo (g,h,i) perylene	BRL		µg/l	2.50						
Naphthalene (aliphatic fraction)	0.00		µg/l							
2-Methylnaphthalene (aliphatic fraction)	0.00		µg/l							
Surrogate: 1-Chlorooctadecane	36.8		µg/l		50.0		74	40-140		
Surrogate: Ortho-Terphenyl	31.0		µg/l		50.0		62	40-140		
Surrogate: 2-Fluorobiphenyl	20.3		µg/l		40.0		51	40-140		
LCS (1103561-BS1)					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.358		mg/l	0.05	0.600		60	40-140		
C19-C36 Aliphatic Hydrocarbons	0.550		mg/l	0.05	0.800		69	40-140		
C11-C22 Aromatic Hydrocarbons	0.910		mg/l	0.05	1.70		54	40-140		
Naphthalene	40.7		µg/l	2.50	100		41	40-140		
2-Methylnaphthalene	42.6		µg/l	2.50	100		43	40-140		
Acenaphthylene	48.0		µg/l	2.50	100		48	40-140		
Acenaphthene	48.6		µg/l	2.50	100		49	40-140		
Fluorene	52.8		µg/l	2.50	100		53	40-140		
Phenanthrene	58.2		µg/l	2.50	100		58	40-140		
Anthracene	59.3		µg/l	2.50	100		59	40-140		
Fluoranthene	62.6		µg/l	2.50	100		63	40-140		
Pyrene	63.5		µg/l	2.50	100		63	40-140		
Benzo (a) anthracene	66.4		µg/l	2.50	100		66	40-140		
Chrysene	67.5		µg/l	2.50	100		67	40-140		
Benzo (b) fluoranthene	67.4		µg/l	2.50	100		67	40-140		
Benzo (k) fluoranthene	70.7		µg/l	2.50	100		71	40-140		
Benzo (a) pyrene	64.2		µg/l	2.50	100		64	40-140		
Indeno (1,2,3-cd) pyrene	71.0		µg/l	2.50	100		71	40-140		
Dibenzo (a,h) anthracene	69.7		µg/l	2.50	100		70	40-140		
Benzo (g,h,i) perylene	72.1		µg/l	2.50	100		72	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		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103561 - SW846 3510C										
<u>LCS (1103561-BS1)</u>					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
Surrogate: 1-Chlorooctadecane	30.5		µg/l		50.0		61	40-140		
Surrogate: Ortho-Terphenyl	26.9		µg/l		50.0		54	40-140		
Surrogate: 2-Fluorobiphenyl	20.1		µg/l		40.0		50	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS (1103561-BS2)</u>					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.437		mg/l	0.05	0.600		73	40-140		
C19-C36 Aliphatic Hydrocarbons	0.663		mg/l	0.05	0.800		83	40-140		
C11-C22 Aromatic Hydrocarbons	1.04		mg/l	0.05	1.70		61	40-140		
Naphthalene	49.8		µg/l	2.50	100		50	40-140		
2-Methylnaphthalene	54.3		µg/l	2.50	100		54	40-140		
Acenaphthylene	62.2		µg/l	2.50	100		62	40-140		
Acenaphthene	60.7		µg/l	2.50	100		61	40-140		
Fluorene	64.9		µg/l	2.50	100		65	40-140		
Phenanthrene	69.9		µg/l	2.50	100		70	40-140		
Anthracene	70.9		µg/l	2.50	100		71	40-140		
Fluoranthene	73.9		µg/l	2.50	100		74	40-140		
Pyrene	73.9		µg/l	2.50	100		74	40-140		
Benzo (a) anthracene	75.5		µg/l	2.50	100		76	40-140		
Chrysene	74.2		µg/l	2.50	100		74	40-140		
Benzo (b) fluoranthene	68.3		µg/l	2.50	100		68	40-140		
Benzo (k) fluoranthene	75.5		µg/l	2.50	100		76	40-140		
Benzo (a) pyrene	75.6		µg/l	2.50	100		76	40-140		
Indeno (1,2,3-cd) pyrene	77.9		µg/l	2.50	100		78	40-140		
Dibenzo (a,h) anthracene	77.8		µg/l	2.50	100		78	40-140		
Benzo (g,h,i) perylene	79.6		µg/l	2.50	100		80	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	40.7		µg/l		50.0		81	40-140		
Surrogate: Ortho-Terphenyl	33.3		µg/l		50.0		67	40-140		
Surrogate: 2-Fluorobiphenyl	21.7		µg/l		40.0		54	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		
<u>LCS Dup (1103561-BSD1)</u>					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
C9-C18 Aliphatic Hydrocarbons	0.397		mg/l	0.05	0.600		66	40-140	10	25
C19-C36 Aliphatic Hydrocarbons	0.562		mg/l	0.05	0.800		70	40-140	2	25
C11-C22 Aromatic Hydrocarbons	0.850		mg/l	0.05	1.70		50	40-140	7	25
Naphthalene	40.4		µg/l	2.50	100		40	40-140	0.8	25
2-Methylnaphthalene	41.7		µg/l	2.50	100		42	40-140	2	25
Acenaphthylene	46.9		µg/l	2.50	100		47	40-140	2	25
Acenaphthene	47.4		µg/l	2.50	100		47	40-140	3	25
Fluorene	51.5		µg/l	2.50	100		51	40-140	2	25
Phenanthrene	56.2		µg/l	2.50	100		56	40-140	4	25
Anthracene	56.6		µg/l	2.50	100		57	40-140	5	25
Fluoranthene	58.0		µg/l	2.50	100		58	40-140	8	25
Pyrene	57.4		µg/l	2.50	100		57	40-140	10	25
Benzo (a) anthracene	58.6		µg/l	2.50	100		59	40-140	12	25
Chrysene	59.1		µg/l	2.50	100		59	40-140	13	25
Benzo (b) fluoranthene	62.7		µg/l	2.50	100		63	40-140	7	25
Benzo (k) fluoranthene	62.4		µg/l	2.50	100		62	40-140	12	25

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Extractable Petroleum Hydrocarbons - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103561 - SW846 3510C										
<u>LCS Dup (1103561-BS01)</u>					<u>Prepared: 28-Feb-11 Analyzed: 02-Mar-11</u>					
Benzo (a) pyrene	56.6		µg/l	2.50	100		57	40-140	13	25
Indeno (1,2,3-cd) pyrene	64.4		µg/l	2.50	100		64	40-140	10	25
Dibenzo (a,h) anthracene	63.6		µg/l	2.50	100		64	40-140	9	25
Benzo (g,h,i) perylene	66.1		µg/l	2.50	100		66	40-140	9	25
Naphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200	0	200
2-Methylnaphthalene (aliphatic fraction)	0.000100		µg/l		100		0.0001	0-200	0	200
Surrogate: 1-Chlorooctadecane	33.2		µg/l		50.0		66	40-140		
Surrogate: Ortho-Terphenyl	26.2		µg/l		50.0		52	40-140		
Surrogate: 2-Fluorobiphenyl	20.0		µg/l		40.0		50	40-140		
Naphthalene Breakthrough	0.00		%					0-5		
2-Methylnaphthalene Breakthrough	0.00		%					0-5		

Soluble Metals by EPA 6000/7000 Series Methods - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103530 - SW846 3005A										
<u>Blank (1103530-BLK1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
Lead	BRL		mg/l	0.0075						
Selenium	BRL		mg/l	0.0150						
Arsenic	BRL		mg/l	0.0040						
Chromium	BRL		mg/l	0.0050						
Cadmium	BRL		mg/l	0.0025						
Barium	BRL		mg/l	0.0050						
Silver	BRL		mg/l	0.0050						
<u>LCS (1103530-BS1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
Lead	1.29		mg/l	0.0075	1.25		103	85-115		
Selenium	1.24		mg/l	0.0150	1.25		99	85-115		
Arsenic	1.24		mg/l	0.0040	1.25		99	85-115		
Silver	1.27		mg/l	0.0050	1.25		102	85-115		
Barium	1.33		mg/l	0.0050	1.25		107	85-115		
Cadmium	1.29		mg/l	0.0025	1.25		103	85-115		
Chromium	1.29		mg/l	0.0050	1.25		103	85-115		
<u>LCS Dup (1103530-BSD1)</u>					<u>Prepared & Analyzed: 28-Feb-11</u>					
Selenium	1.25		mg/l	0.0150	1.25		100	85-115	0.6	20
Lead	1.30		mg/l	0.0075	1.25		104	85-115	0.4	20
Barium	1.33		mg/l	0.0050	1.25		106	85-115	0.3	20
Cadmium	1.29		mg/l	0.0025	1.25		103	85-115	0.2	20
Chromium	1.29		mg/l	0.0050	1.25		103	85-115	0.1	20
Silver	1.28		mg/l	0.0050	1.25		102	85-115	0.4	20
Arsenic	1.25		mg/l	0.0040	1.25		100	85-115	0.8	20
<u>Duplicate (1103530-DUP1)</u>					<u>Source: SB25023-01</u>		<u>Prepared & Analyzed: 28-Feb-11</u>			
Lead	BRL		mg/l	0.0075		BRL				20
Selenium	BRL		mg/l	0.0150		BRL				20
Barium	0.0942		mg/l	0.0050		0.0930			1	20
Cadmium	BRL		mg/l	0.0025		BRL				20
Chromium	BRL		mg/l	0.0050		BRL				20
Silver	BRL		mg/l	0.0050		BRL				20
Arsenic	BRL		mg/l	0.0040		BRL				20
<u>Matrix Spike (1103530-MS1)</u>					<u>Source: SB25023-01</u>		<u>Prepared & Analyzed: 28-Feb-11</u>			
Selenium	1.27		mg/l	0.0150	1.25	BRL	102	75-125		
Lead	1.29		mg/l	0.0075	1.25	BRL	103	75-125		
Arsenic	1.28		mg/l	0.0040	1.25	BRL	102	75-125		
Chromium	1.30		mg/l	0.0050	1.25	BRL	104	75-125		
Silver	1.31		mg/l	0.0050	1.25	BRL	105	75-125		
Cadmium	1.28		mg/l	0.0025	1.25	BRL	103	75-125		
Barium	1.42		mg/l	0.0050	1.25	0.0930	106	75-125		
<u>Matrix Spike Dup (1103530-MSD1)</u>					<u>Source: SB25023-01</u>		<u>Prepared & Analyzed: 28-Feb-11</u>			
Lead	1.25		mg/l	0.0075	1.25	BRL	100	75-125	3	20
Selenium	1.24		mg/l	0.0150	1.25	BRL	99	75-125	3	20
Cadmium	1.25		mg/l	0.0025	1.25	BRL	100	75-125	3	20
Barium	1.39		mg/l	0.0050	1.25	0.0930	104	75-125	2	20
Arsenic	1.24		mg/l	0.0040	1.25	BRL	100	75-125	3	20
Silver	1.28		mg/l	0.0050	1.25	BRL	102	75-125	3	20
Chromium	1.27		mg/l	0.0050	1.25	BRL	102	75-125	2	20
<u>Post Spike (1103530-PS1)</u>					<u>Source: SB25023-01</u>		<u>Prepared & Analyzed: 28-Feb-11</u>			
Lead	1.29		mg/l	0.0075	1.25	BRL	103	80-120		
Selenium	1.27		mg/l	0.0150	1.25	BRL	102	80-120		
Silver	1.31		mg/l	0.0050	1.25	BRL	105	80-120		

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* Reportable Detection Limit

BRL = Below Reporting Limit

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Soluble Metals by EPA 6000/7000 Series Methods - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103530 - SW846 3005A										
<u>Post Spike (1103530-PS1)</u>				<u>Source: SB25023-01</u>				<u>Prepared & Analyzed: 28-Feb-11</u>		
Arsenic	1.28		mg/l	0.0040	1.25	BRL	103	80-120		
Barium	1.42		mg/l	0.0050	1.25	0.0930	106	80-120		
Cadmium	1.28		mg/l	0.0025	1.25	BRL	103	80-120		
Chromium	1.31		mg/l	0.0050	1.25	BRL	105	80-120		

Soluble Metals by EPA 200 Series Methods - Quality Control

Analyte(s)	Result	Flag	Units	*RDL	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Batch 1103531 - EPA200/SW7000 Series										
<u>Blank (1103531-BLK1)</u>										
Mercury	BRL		mg/l	0.00020						
<u>LCS (1103531-BS1)</u>										
Mercury	0.00427		mg/l	0.00020	0.00500		85	85-115		
<u>Duplicate (1103531-DUP1)</u>										
Mercury	BRL		mg/l	0.00020		BRL				20
<u>Matrix Spike (1103531-MS1)</u>										
Mercury	0.00429		mg/l	0.00020	0.00500	BRL	86	80-120		
<u>Matrix Spike Dup (1103531-MSD1)</u>										
Mercury	0.00406		mg/l	0.00020	0.00500	BRL	81	80-120	6	20
<u>Post Spike (1103531-PS1)</u>										
Mercury	0.00417	QM9	mg/l	0.00020	0.00500	BRL	83	85-115		

Extractable Petroleum Hydrocarbons - CCV Evaluation Report

Analyte(s)	Average RF	CCRF	% D	Limit
Batch S101576				
<u>Calibration Check (S101576-CCV1)</u>				
C9-C18 Aliphatic Hydrocarbons	1.917982E+08	1.589552E+08	-4.8	25
C19-C36 Aliphatic Hydrocarbons	2.886707E+08	1.856838E+08	-3.9	25
C11-C22 Aromatic Hydrocarbons	17.79424	16.55381	-10.6	25
Naphthalene	8.291966	8.301226	0.1	25
2-Methylnaphthalene	5.37928	5.454982	1.4	25
Acenaphthylene	7.131872	7.377484	3.4	25
Acenaphthene	4.885553	5.024036	2.8	25
Fluorene	5.253678	5.486159	4.4	25
Phenanthrene	6.681795	6.996309	4.7	25
Anthracene	6.803102	5.594557	-17.8	25
Fluoranthene	6.840752	7.069706	3.3	25
Pyrene	6.957097	7.176767	3.2	25
Benzo (a) anthracene	5.415309	5.564629	2.8	25
Chrysene	5.508209	5.780568	4.9	25
Benzo (b) fluoranthene	4.540565	4.841974	6.6	25
Benzo (k) fluoranthene	5.288965	5.81436	9.9	25
Benzo (a) pyrene	4.41144	4.933988	11.8	25
Indeno (1,2,3-cd) pyrene	4.864981	5.817438	19.6	25
Dibenzo (a,h) anthracene	4.00496	4.664488	16.5	25
Benzo (g,h,i) perylene	4.182575	4.992834	19.4	25

Volatile Organic Compounds - CCV Evaluation Report

Analyte(s)	Average RF	CCRF	% D	Limit
Batch S101545				
<u>Calibration Check (S101545-CCV1)</u>				
Benzene	223138.6	235414.4	5.5	25
Ethylbenzene	150757.4	158902.2	5.4	25
Methyl tert-butyl ether	37810.33	45540.02	20.4	25
Naphthalene	117531.8	112852.6	-4.0	25
Toluene	186755.2	197935.9	6.0	25
m,p-Xylene	175810	184848	5.1	25
o-Xylene	151959.6	160492.3	5.6	25
2-Methylpentane	38256.03	37881.9	-1.0	25
n-Nonane	28212.85	24190.38	-14.3	25
n-Pentane	35528.69	41965.82	18.1	25
1,2,4-Trimethylbenzene	141201.2	147185.2	4.2	25
2,2,4-Trimethylpentane	37351.85	36665.38	-1.8	25
n-Butylcyclohexane	30946.78	25955.64	-16.1	25
n-Decane	22744.81	18487.8	-18.7	25

Notes and Definitions

HT1	Sample submitted with insufficient time to prepare within the method recommended holding time.
PH	Insufficient preservative to reduce the sample pH to less than 2.
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.
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:
June O'Connor

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

Matrices	Ground Water		
Containers	✓ Satisfactory		
Sample Preservative	Aqueous (acid preserved)	N/A ✓ pH≤2 pH>2	
	Soil or Sediment	✓ N/A Samples not received in Methanol	ml Methanol/g soil 1:1 +/-25% Other
		Samples received in Methanol: covering soil/sediment not covering soil/sediment	
		Samples received in air-tight container	
Temperature	Received on ice ✓ Received at 4 ± 2 °C		

Were all QA/QC procedures followed as required by the VPH method? *Yes*

Were any significant modifications made to the VPH method as specified in section 11.3? *No *see below*

Were all performance/acceptance standards for required QA/QC procedures achieved? *Yes*

* Yes, if PID and FID surrogate recoveries are listed as n/a, then that sample was run via GCMS using all QC criteria specified in the method

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 #: S-1242		
Project Location: 71 Frankland Rd-Hopkinton, MA			RTN:		
This form provides certifications for the following data set:			SB25023-01 through SB25023-02		
Matrices: Ground Water					
CAM Protocol					
✓	8260 VOC CAM II A	✓	7470/7471 Hg CAM III B	✓	MassDEP VPH CAM IV A
	8270 SVOC CAM II B		7010 Metals CAM III C	✓	MassDEP EPH CAM IV B
✓	6010 Metals CAM III A		6020 Metals CAM III D		8082 PCB CAM V A
					8081 Pesticides CAM V B
					8151 Herbicides CAM V C
					7196 Hex Cr CAM VI B
					MassDEP APH CAM IX A
					8330 Explosives CAM VIII A
					TO-15 VOC CAM IX B
					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)? b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?				✓ Yes No 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>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.</i>  Nicole Leja Laboratory Director Date: 3/3/2011					

