Salisbury Pond Dredging Feasibility Study

City of Worcester, MA

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Executive Summary

The City of Worcester Department of Public Works and Parks hired Weston & Sampson to develop a Dredging Feasibility Study for Salisbury Pond. This approximately 16-acre pond is city owned and located adjacent to Institute Park in Worcester, Massachusetts. The watershed for the pond encompasses more than 14,000 acres of mostly urban developed land. Waters from the watershed drain into the pond from three inputs. This has resulted in significant infilling caused by the accumulation of large quantities of sediment over the course of many decades, within Salisbury Pond. The Feasibility Study evaluated the following criteria to determine if dredging is a feasible alternative for improving ecological qualities and recreation value within Salisbury Pond and surrounding areas: sediment quantity and quality, ecological impacts, dredging logistics, disposal and permitting schedules, project costs and present funding opportunities. Salisbury Pond presents an ideal situation to use dredging as a remedial method as it is located near an urban center, located within a Public Park, and is accessed by a large population for recreational uses.

Existing Bathymetry, Sediment Thickness & Volume, Proposed Bathymetry

In order to evaluate existing conditions, Weston & Sampson utilized a graduated pole, which was hand driven through the sediment layer until refusal was encountered. Measurements taken at the top of soft sediment and at the depth to hard sediment (taken as the point of refusal) were recorded. These data points were used to identify existing bathymetry, sediment thickness and proposed bathymetry (proposed at refusal). The following information was calculated:

- Average existing depth of water is approximately 3 feet; some areas are shallower than 1 foot
- Average depth of sediment is 2 feet over the 16 acres; this equals 40,000 CY
    - Some areas of the pond contain as much as 5 feet of sediment
    - It is estimated that shallow areas along the banks of the pond will contribute another 5,000 CY of sediment
- Total estimated sediment volume within the pond is 45,000 CY, and by adding a 10% contingency factor the total estimated sediment volume equals 50,000 CY
    - Assuming that 50% of the sediment volume is made up of water, a total of 25,000 CY will need to be dredged and disposed of after dewatering
- After sediment removal, the average depth of water will be 5 feet, with the deepest locations being 10 feet

Sediment Quality

Chemical Analysis- Based on the lab results the contaminants that pose the most immediate concern regarding disposal are heavy metals (cadmium, chromium, lead and nickel), arsenic, TPH and SVOC's. These elements are not uncommon within sediments found underlying urban water bodies. Of the elements encountered, arsenic, TPH and SVOC's are all above the Comm 97 standards allowing for reuse at landfills, which could result in the need to dispose of the sediment at a landfill under a cap.

Physical Analysis- Sediments at Salisbury Pond contain on average about 44% solids, and this is well within the solids range normally encountered in ponds. This means that sediment sitting on the pond bottom is about 56% water. The soil sample taken from the sand bar near the inlet to the pond had a much higher percentage (89%) of water. Sediments with low solids percentages may require considerable drying time or treatment with a coagulant prior to handling for disposal. However, once

dewatered and dried this sediment may have a volume as little as 25% of the in place aqueous volume, which could lower total disposal costs.

Ecological Assessment

Under the Wetlands Protection Act (WPA), the resource areas impacted by a dredging operation would include Land Under Water (LUW), Bordering Vegetated Wetland (BVW), Bank and Buffer Zone. Although these areas will be impacted during construction, all impacts would be temporary and all areas would be fully restored post-construction. The only exception to this is the BVW associated with the in-filled areas immediately adjacent to the bank of the pond. These areas would be restored as LUW.

Dredging Logistics

Dredging could be accomplished by conventional dry dredging or hydraulic means. Dry dredging will require draining the lake, routing water to prevent refilling, and constructing a haul road within the pond to allow equipment access and movements. If dewatering operations cannot be accommodated within the confines of the pond, temporary storage and processing within Institute Park would be necessary at an increased cost.

Hydraulic dredging does not require any change in water level or other modification to the pond. However, sediment mixed with coarse gravel or rock (sand bars near inlets) cannot be excavated through this approach and a standalone containment area on adjacent land would be required. Additionally, heavily vegetated areas including the marshes identified in Figure 3 could also cause potential problem for hydraulic dredging, as vegetation tends to plug the dredging equipment.

Open and easily accessible areas within Institute Park provide the best option for the siting of a local containment area, where dredged material could be processed for eventual disposal elsewhere. However, the available space may be inadequate to hold the total targeted volume of sediment (15,000 CY of estimated 25,000 CY). This lends itself to a staged dredging approach where approximately half of the material could be dredged at a time.

Disposal and Permitting

Determining where to dispose of dredged sediments is often be the most challenging and most important part of designing and permitting any dredging project. The most common dredged material disposal methods fall into three basic categories:

1) *Beneficial Use*: Clean material can be used as fill in local beneficial use projects such as urban parks, vacant low areas to raise grades, etc.
2) *Daily Cover*: Moderately clean material can be spread at a local landfill as daily cover
3) *Disposal*: Contaminated or hazardous material must be disposed of under a cap at an approved facility. Based on sediment quality data, this is the most likely scenario for sediment found in Salisbury Pond.

Before the dredging process can begin, local, state and federal permits need to be acquired. Several permits are applicable for dredging projects. The overall timeline to receive all approvals would be about 18 months.

Estimated Project Costs

Overall project costs are based on the total quantity of sediment to be dredged and the quality (physical and chemical) of that sediment, which dictates disposal options. Based on the quality and

quantity of the sediments at Salisbury Pond to be dredged and disposed of, we estimate costs as follows:

Cost Categories	**Total Cost**
Dredge + Disposal	$5.5 - $5.75 M
Drying, Containment, Restoration	$1.1 M
Engineering/Permitting (20%)	$1.3 M
Total Cost for Dredging Project	**$7.9 - $8.15M**

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1.0 PROJECT BACKGROUND/REASONS FOR DREDGING FEASIBILITY STUDY

The City of Worcester has hired Weston & Sampson (W&S) to develop a Dredging Feasibility Study for Salisbury Pond. This approximately 16-acre pond is city owned and located adjacent to Institute Park in Worcester, Massachusetts (Figure 1). One tributary drains into the pond from the north. Additional inputs into the pond come from stormwater drainage systems located west and south of the pond. The overall watershed for the pond is comprised of over 14,000 acres.

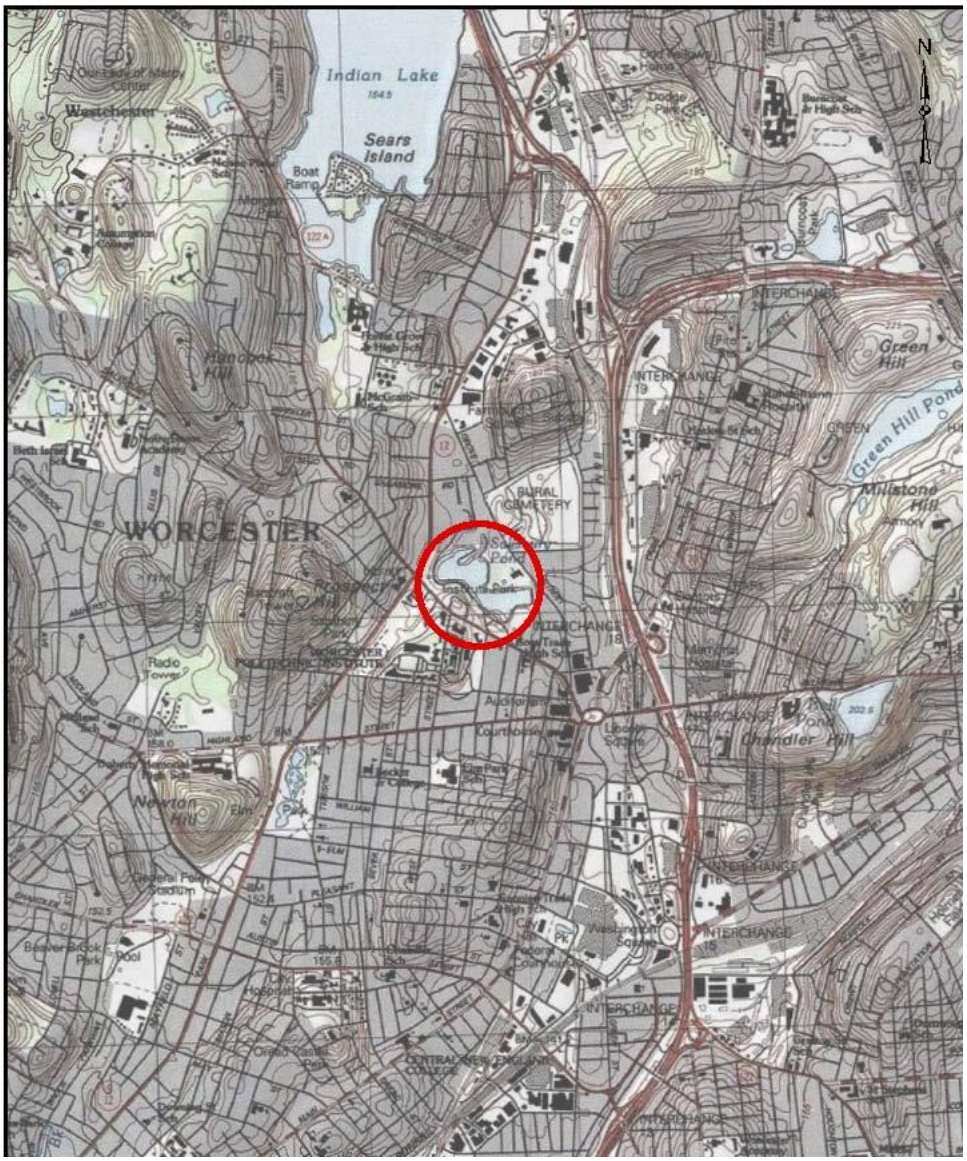

Figure 1: Locus Map

From these three sources, as well as other land use practices directly adjacent to the pond, sediment has gradually accumulated, over the course of many decades, to a point where the pond is no longer functioning as the City has intended. Through their natural processes, streams and tributaries carry suspended sediment (sand, soil and organic debris) along with them as they flow

toward settling basins such as ponds and lakes. As the stream enters a pond, the velocity of the water decreases and the sediment carried within the water column drops out of the stream.

Additionally, internally generated organic matter, mainly rooted plants and algae, also add to the sediment volume. Over time this material accumulates to a substantial depth at the bottom the pond, much like what is occurring in Salisbury Pond. As stream or river velocity slows, heavier materials, like sand and gravel will settle out first, while finer particles travel further into the pond. This is even more evident in streams that carry stormwater runoff, where road sands are carried with the flow of water.

This study will evaluate the following criteria to determine if dredging is feasible to alleviate this problem:

- sediment quality
- sediment quantity
- dredging alternatives & logistics
- costs
- schedules and permitting effort
- ecological impacts
- funding opportunities

Dredging has always been a major undertaking, but was not uncommon in the 20th century. However, changes in environmental regulations in the 1980s and 1990s made approval for dredging project more difficult to obtain, and fewer projects have been performed in recent years. Most problematic has been a tightening of the regulations for disposal of material, based largely on quality considerations, which can greatly increase the cost of projects. Impacts on habitat, both in the lake and downstream, have also made it harder to permit dredging projects and have increased costs. Careful consideration of the many factors that affect dredging feasibility is therefore essential at this early stage of management planning.

2.0 EXISTING BATHYMETRY

The quantity of material to be dredged is a key feature of the pond with regard to assessing dredging feasibility, and relates to the current and potential future water depth contours, or bathymetry. One of the primary reasons to dredge a pond is to regain lost volume; this can minimize pollutant impacts and reduce the extent and severity of rooted plant growths.

On October 5, 2012, W&S employees accessed the pond in order to evaluate existing bathymetry and sediment thickness within Salisbury Pond. The result was a map that shows that the average depth of Salisbury Pond is approximately 3 feet, with some areas that are shallower than 1 foot.

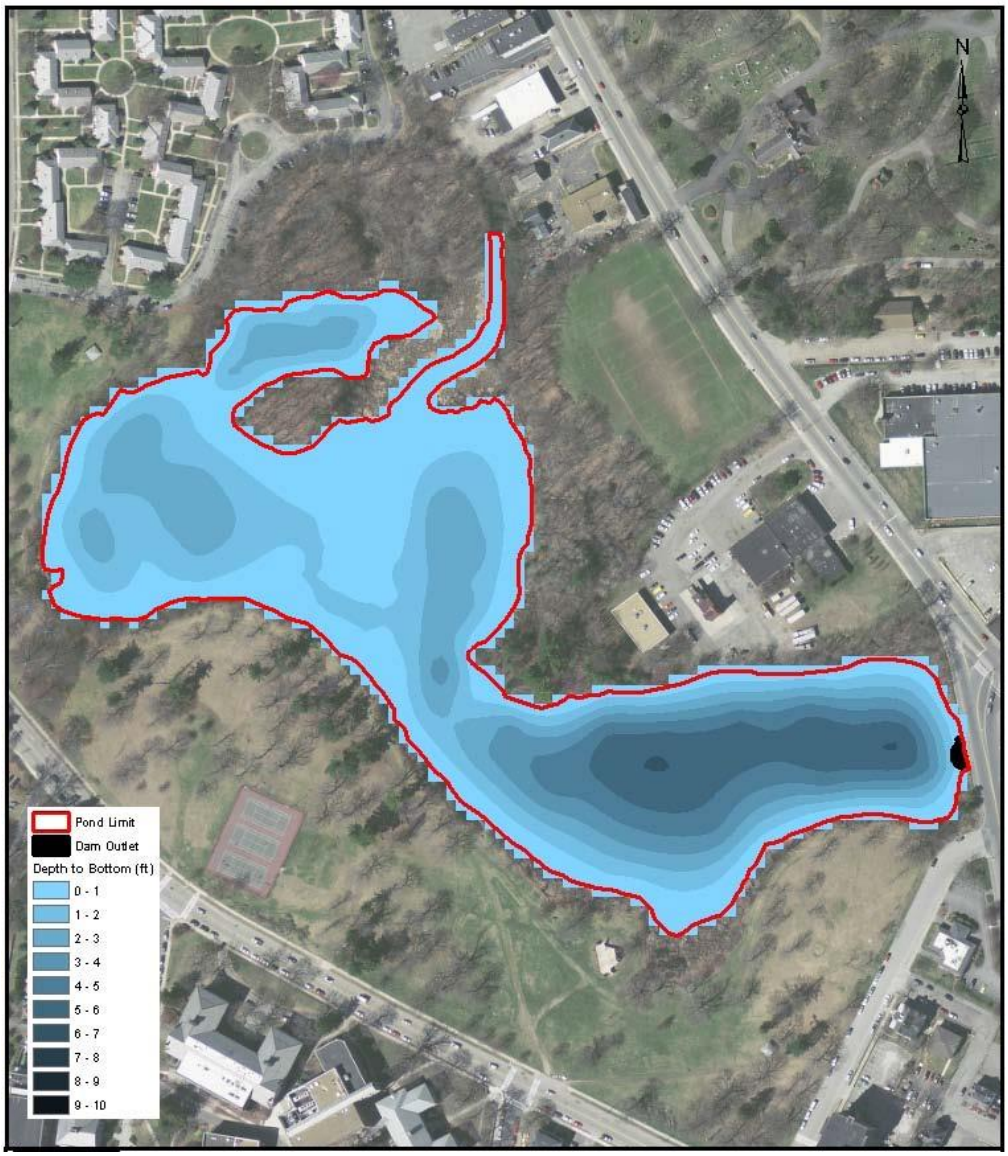

Figure 2: Existing Bathymetry

3.0 SEDIMENT VOLUME ANALYSIS

Measured soft sediment depths in Salisbury Pond, using the 2012 W&S data, were applied to develop a sediment thickness map (Figure 3). In order to calculate volumes, W&S utilized a graduated pole, which was hand driven through the sediment layer until refusal was encountered. Each point was located using GPS and then incorporated into GIS based software. At each location the depth to the top of soft sediment and the depth to hard sediment (taken as the point of refusal) were recorded.

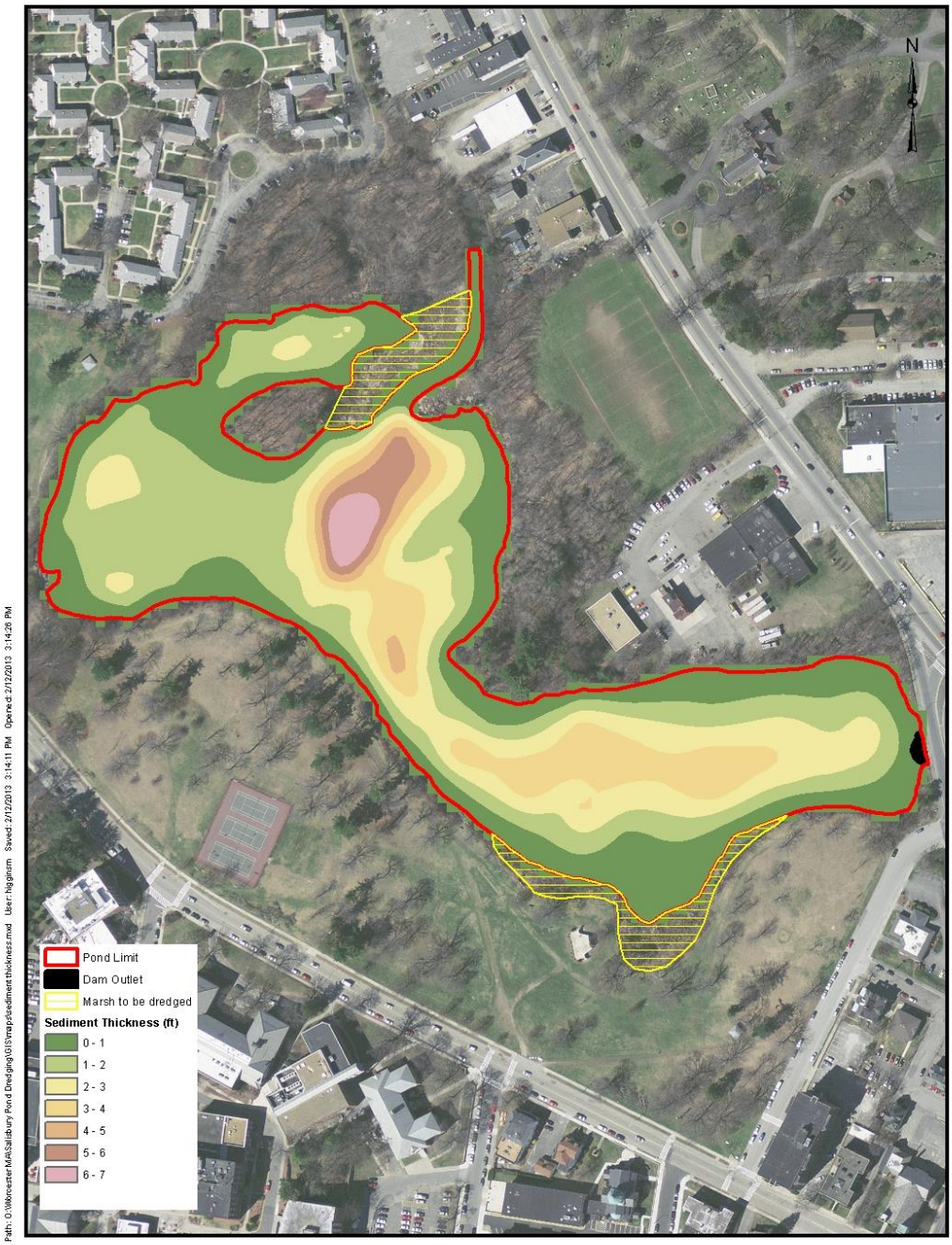

Figure 3: Sediment Thickness

Salisbury Pond had an average depth of 2 feet of sediment and an overall area of 16 acres. Some areas of the pond exhibited upwards of 5-6 feet of sediment accumulation. Based on this average there is approximately 40,000 CY of unconsolidated sediment in Salisbury Pond. This volume is taken from the current open-water pond. Additional sediment buildup has resulted in marshes being developed in pockets of the pond. In these areas, most notable just west of the inlet and near the band stand in Institute Park, bathymetry could not be collected, as the pond has been filled in with sediment. To return these marsh areas back to open water, with an average depth of 2.5 feet an additional 4,000-5,000 CY would need to be dredged.

If the City elects to dredge Salisbury Pond, it is estimated that approximately 45,000 CY of soft unconsolidated sediment will be removed. Based on the variability observed, the desirability of removing all soft sediment, and the value of doing some contouring of the bottom, it is suggested that planned volumes be set 10% higher as a contingency. This would suggest a dredging volume of approximately 50,000 CY for Salisbury Pond. This volume is estimated, and a refinement of this volume can be completed with additional sampling. However, at this time, this estimate is sufficient to complete this feasibility of this dredging project.

4.0 PROPOSED BATHYMETRY

Based on the existing bathymetry and the amount of sediment calculated in Section 3, we were able to develop a proposed bathymetry map for Salisbury Pond, if the City decided to proceed with a dredging program (Figure 4).

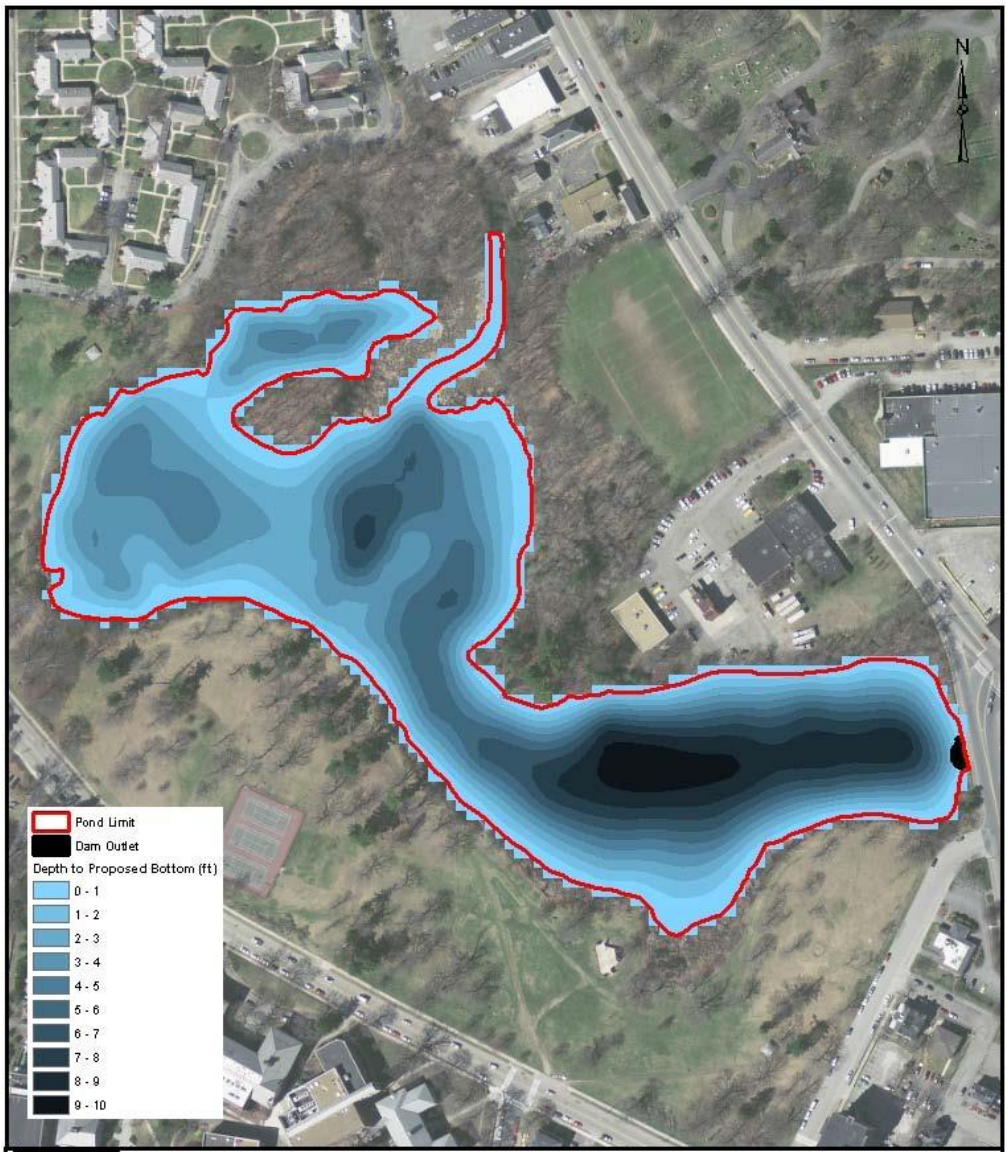

Figure 4: Proposed Bathymetry

The proposed bathymetry would result from the removal of all of the sediment identified in Figure 3. This would deepen the pond by an average of 2 foot, but the increase would be 5 to 6 feet in many locations. The deepening of the pond would result in a pond with an average depth of 5 feet, with the deepest locations being about 10 feet.

Probing did not include actual sampling of the underlayment (material under the soft sediment), but it was reportedly very coarse, probably gravel or even rocks in some places. At this time the harder substrate under the soft sediment is not proposed for removal.

5.0 SEDIMENT QUALITY ANALYSIS

On October 5, 2012, three (3) composite sediment samples were collected at Salisbury Pond and one (1) soil sample was collected near the inlet to the pond. Each composite sample was created by compositing four to seven sediment samples from a general area within the pond to create a representative sediment sample for that area. Figure 5 shows the general sampling areas comprising each sample.

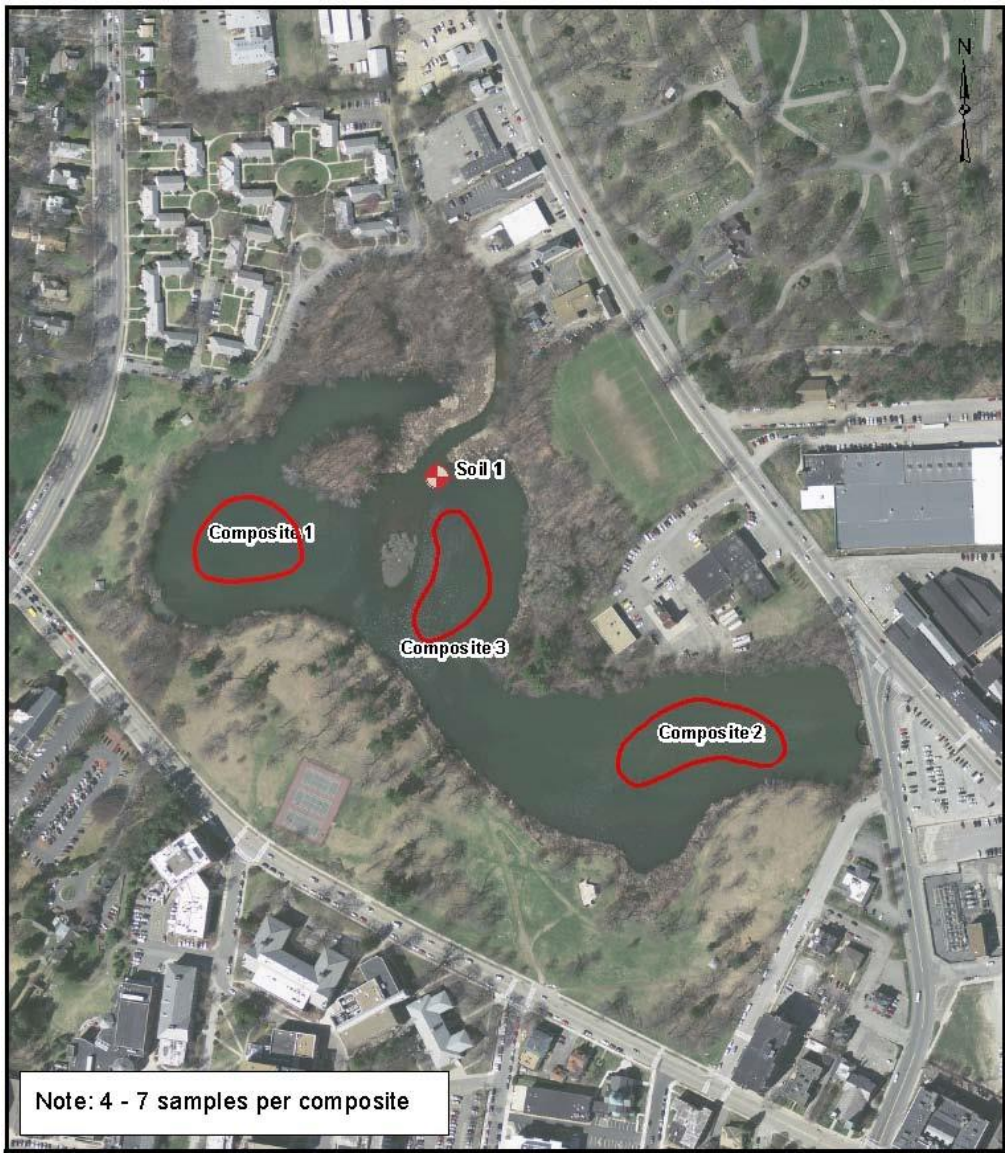

Figure 5: Sediment Sampling Locations

The three composite sediment samples were sent to ConTest Analytical Laboratory, a Massachusetts-certified laboratory, for analysis. Each sample was analyzed for the following features: Total Petroleum Hydrocarbons (TPH), Extractable Petroleum Hydrocarbons (EPH), specific conductance, total organic carbon, 8 metals relevant to Resource Conservation and Recovery Act (RCRA) regulations, mercury, Polychlorinated Biphenyls (PCBs), Volatile

Organic Compounds (VOC) and Semi-Volatile Organic Compounds (SVOC). These are not all the quality features necessary to obtain permits for dredging, but represent a suite of tests indicative of potential contamination and appropriate at this stage of feasibility assessment.

5.1 Chemical Nature of Material to be removed

Table 1 shows analytes that were detected above the laboratory reporting limits in the sediment samples. The full lab report can be found in Appendix A. Of these detections, several results were over the state reportable limit for soils. As this material is currently classified as aqueous sediment and not soil, the limits for soils do not apply and it is acceptable under the applicable regulations to leave it in place. However, once the material is dredged it would then become classified as soil and falls under the reporting limits of the Massachusetts Contingency Plan (MCP). This affects disposal options.

Based on the lab results the contaminants that pose the most immediate concern as far as disposal options are concerned are the heavy metals (cadmium, chromium, lead and nickel), arsenic, TPH and SVOC's. Of these concerns arsenic, TPH and SVOC's are all above the Comm 97 standards for reuse at landfills, which could result in needing to bury the material at a landfill under a cap. Other options are available and will be discussed in Section 8.0.

5.2 Physical Nature of Material to be removed

Within Salisbury Pond the sediments are well within the solids range normally encountered in ponds and are on average about 44% solids. This means that sediment sitting in place in the pond is about 56% water. Low solids content is typical of highly organic pond bottoms. Solids data directly relate to dredging issues. Very mucky soils (low % solids) can raise turbidity within the pond if subject to movement by conventional excavation equipment; hydraulic dredging is favored by such low solids content. More granular soils (high % solids) dry relatively quickly and allow less expensive excavation. Low solids content material requires considerable site preparation to allow truck traffic and handling. Removal from the pond by conventional mechanical excavation or hydraulic dredging is possible, but low solids materials may require considerable drying time or treatment with a coagulant prior to handling for disposal. However, once dewatered and dried this sediment may have a volume as little as 25% of the in place aqueous volume, which could lower disposal costs.

As anticipated, the soil sample taken from the sand bar near the inlet to the pond had a much higher % solid (89%). This is typical in areas near inlets where the heavier courser materials are the first to settle out. This sample consisted primarily of course sand.

Table 1: Salisbury Pond Sediment Quality Analysis

Parameter	Reportable Concentrations (RCs)	COMM97 Standards	Reporting Limits (401 WQC)	SAMPLING LOCATION			
	RCS-1			Comp-1	Comp-2	Comp-3	Soil-1
Sampling Date	Reuse			10/5/2012	10/5/2012	10/5/2012	10/5/2012
Sample Depth	Standards			1-4'- Feet	1-4'- Feet	1-4'- Feet	1-4'- Feet
MADEP-EPH-04-1.1 (mg/Kg dry) EPH							
C9-C18 ALIPHATICS	1000		0.02	670	650	210	75
C19-C36 ALIPHATICS	3000		0.02	2400	2400	1800	170
Unadjusted C11-C22 Aromatics	~		0.02	940	1400	1000	260
C11-C22 AROMATICS	1000		0.02	900	**1300**	850	240
ACENAPHTHENE	4		0.02	ND (1.1)	ND (1.2)	1.5	ND (0.56)
ACENAPHTHYLENE	1		0.02	**ND (1.1) ***	**ND (1.2) ***	ND (1.0)	ND (0.56)
ANTHRACENE	1000		0.02	ND (1.1)	2.0	2.4	ND (0.56)
BENZO(A)ANTHRACENE	7		0.02	4.2	4.7	**14**	0.70
BENZO(A)PYRENE	2		0.02	**2.9**	**4.7**	**10**	1.6
BENZO(B)FLUORANTHENE	7		0.02	4.8	**8.9**	**16**	1.6
BENZO(G,H,I)PERYLENE	1000		0.02	2.5	3.5	9.6	1.1
BENZO(K)FLUORANTHENE	70		0.02	1.4	3.7	8.9	0.67
CHRYSENE	70		0.02	4.6	6.8	14	1.2
DIBENZ(A,H)ANTHRACENE	0.7		0.02	**ND (1.1) ***	**ND (1.2) ***	**2.7**	ND (0.56)
FLUORANTHENE	1000		0.02	6.3	16	29	1.6
FLUORENE	1000		0.02	ND (1.1)	ND (1.2)	1.8	1.3
INDENO(1,2,3-CD)PYRENE	7		0.02	2.3	3.9	**8.6**	0.76
2-METHYLNAPHTHALENE	0.7		0.02	**ND (1.1) ***	**1.6**	**ND (1.0) ***	0.63
NAPHTHALENE	4		0.02	ND (1.1)	ND (1.2)	ND (1.0)	0.56
PHENANTHRENE	10		0.02	4.2	9.2	**18**	2.1
PYRENE	1000		0.02	6.2	14	25	2.1
SM 2540G (% Wt)							
% Solids	~		1.0%	43.4	41.6	48.0	89.0
Total Organic Carbon SM5310B (mg/Kg)							
	~			63900	89800	92900	4800
SM18-20 2510B (µmhos/cm)							
Specific Conductance	~	8000		21	17	14	4.8
SW-846 6010C (mg/Kg dry) Metals Digestion							
Cadmium	2	80	0.1	**3.4**	**5.8**	**2.8**	0.48
Chromium	30	1000	1.0	**110**	**110**	**49**	23
COPPER	1000		1.0	240	290	140	33
LEAD	300	2000	1.0	**500**	**530**	220	64
Nickel	20		1.0	**64**	**82**	**45**	13
Zinc	2500		1.0	400	580	290	90
SW-846 6010C (mg/L) 1311 TCLP EXT Metals							
LEAD	~		1.0	0.75	1.3	0.40	0.20
SW-846 6020A (mg/Kg dry) Metals Digestion							
Arsenic	20	40	0.5	**45**	**64**	**35**	14
SW-846 7471B (mg/Kg dry) Metals Digestion							
Mercury	20	10	0.02	0.26	0.31	0.21	ND (0.028)
SW-846 8100 Modified (mg/Kg dry) TPH							
TPH	1000	5000		**6600**	**4700**	**3300**	380
SW-846 8260C (mg/Kg dry) VOC's		Total VOCs 10	0.1	ND	ND	ND	ND
SW-846 8270D (mg/Kg dry) SVOCs							
ACETOPHENONE	1000			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
ANILINE	1000			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
ANTHRACENE	1000			NT	NT	2.5	NT
BENZO(A)ANTHRACENE	7			4.6	6.1	**10**	1.1
BENZO(A)PYRENE	2			**5.1**	**6.3**	**10**	0.88
BENZO(B)FLUORANTHENE	7			**8.3**	**10**	**15**	1.3
BENZO(G,H,I)PERYLENE	1000			2.7	3.2	4.8	0.39
BENZO(K)FLUORANTHENE	70			2.7	3.5	5.3	0.41
BIS(2-CHLOROETHOXY)METHANE	500			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
BIS(2-CHLOROETHYL)ETHER	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
BIS(2-CHLOROISOPROPYL)ETHER	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
BIS(2-ETHYLHEXYL)PHTHALATE	200			8.3	7.7	9.3	ND (0.76)
4-BROMOPHENYL PHENYL ETHER	100			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
BUTYLBENZYLPHTHALATE	100			ND (6.1)	ND (6.3)	ND (5.4)	ND (1.5)
4-CHLOROANILINE	1			**ND (6.1) ***	**ND (6.3) ***	**ND (5.4) ***	**ND (1.5) ***
2-CHLORONAPHTHALENE	1000			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
2-CHLOROPHENOL	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
CHRYSENE	70			6.5	8.7	13	1.2
DIBENZOFURAN	100			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
DI-N-BUTYLPHTHALATE	50			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
1,2-DICHLOROBENZENE	9			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
1,3-DICHLOROBENZENE	1			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	ND (0.76)
1,4-DICHLOROBENZENE	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
3,3'-DICHLOROBENZIDINE	1			**ND (1.6) ***	**ND (1.6) ***	**ND (1.4) ***	ND (0.38)
2,4-DICHLOROPHENOL	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
DIETHYLPHTHALATE	10			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)

Parameter	Reportable Concentrations (RCs)	COMM97 Standards	Reporting Limits (401 WQC)	SAMPLING LOCATION			
	RCS-1			Comp-1	Comp-2	Comp-3	Soil-1
Sampling Date	Reuse			10/5/2012	10/5/2012	10/5/2012	10/5/2012
Sample Depth	Standards			1-4'- Feet	1-4'- Feet	1-4'- Feet	1-4'- Feet
2,4-DIMETHYLPHENOL	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
DIMETHYLPHTHALATE	30			ND (6.1)	ND (6.3)	ND (5.4)	ND (1.5)
2,4-DINITROPHENOL	3			**ND (6.1) ***	**ND (6.3) ***	**ND (5.4) ***	ND (1.5)
2,4-DINITROTOLUENE	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
2,6-DINITROTOLUENE	100			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
DI-N-OCTYLPHTHALATE	1000			ND (6.1)	ND (6.3)	ND (5.4)	ND (1.5)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
FLUORANTHENE	1000			9.3	12	21	1.8
FLUORENE	1000			NT	NT	1.7	NT
HEXACHLOROBENZENE	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
HEXACHLOROBUTADIENE	6			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
HEXACHLOROETHANE	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
INDENO(1,2,3-CD)PYRENE	7			3.2	4.0	5.6	0.51
ISOPHORONE	100			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
O-CRESOL	500			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
M/P-CRESOL	500			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
NITROBENZENE	500			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
2-NITROPHENOL	100			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
4-NITROPHENOL	100			ND (6.1)	ND (6.3)	ND (5.4)	ND (1.5)
PENTACHLOROPHENOL	3			**ND (3.1) ***	**ND (3.2) ***	ND (2.8)	ND (0.76)
PHENANTHRENE	10			5.1	8.6	**15**	1.4
PHENOL	1			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	ND (0.76)
PYRENE	1000			8.2	13	19	2.1
1,2,4-TRICHLOROBENZENE	2			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	ND (0.76)
2,4,5-TRICHLOROPHENOL	4			ND (3.1)	ND (3.2)	ND (2.8)	ND (0.76)
2,4,6-TRICHLOROPHENOL	0.7			**ND (3.1) ***	**ND (3.2) ***	**ND (2.8) ***	**ND (0.76) ***
ACENAPHTHENE	4			ND (0.46)	ND (0.48)	1.1	ND (0.11)
ACENAPHTHYLENE	1			0.51	0.73	ND (0.41)	ND (0.11)
ANTHRACENE	1000			0.51	0.40	NT	0.10
DIBENZ(A,H)ANTHRACENE	0.7			0.52	0.64	**1.1**	ND (0.079)
FLUORENE	1000			ND (1.4)	ND (1.4)	NT	ND (0.34)
2-METHYLNAPHTHALENE	0.7			**ND (1.4) ***	**ND (1.4) ***	**ND (1.2) ***	ND (0.34)
NAPHTHALENE	4			ND (1.4)	ND (1.4)	ND (1.2)	ND (0.34)
Total SVOCs (Detects only)		100		65.54	84.87	**134.4**	11.19
Total SVOCs (Detects plus det limit F/ND)		100		**207.6**	**231.35**	**260.61**	46.97
SW846-8270M (mg/Kg dry) ***PCBs***							
Cl2-BZ#8	~		0.01	0.0039	0.0071	0.0023	ND (.00018)
Cl3-BZ#18	~		0.01	0.012	0.013	0.0039	ND (.00018)
Cl3-BZ#28	~		0.01	0.014	0.015	0.0057	ND (.00018)
Cl4-BZ#52	~		0.01	0.036	0.027	0.011	0.00049
Cl4-BZ#44	~		0.01	0.024	0.02	0.0086	ND (.00036)
Cl4-BZ#66	~		0.01	0.015	0.016	0.0057	ND (.00036)
Cl5-BZ#90/#101	~		0.01	0.042	0.033	0.014	0.00078
Cl5-BZ#118	~		0.01	0.03	0.027	0.011	0.00059
Cl6-BZ#153	~		0.01	0.053	0.05	0.027	0.0012
Cl5-BZ#105	~		0.01	0.012	0.0099	0.0043	ND (.00036)
Cl6-BZ#138	~		0.01	0.043	0.036	0.019	0.00084
Cl7-BZ#187	~		0.01	0.026	0.027	0.016	0.00067
Cl6-BZ#128/#162	~		0.01	0.0095	0.0072	ND (.0051)	ND (.00072)
Cl7-BZ#180	~		0.01	0.053	0.054	0.031	0.0014
Cl7-BZ#170	~		0.01	0.021	0.02	0.012	0.00043
Cl8-BZ#195	~		0.01	0.0065	0.006	ND (.0039)	ND (.00054)
Cl9-BZ#206	~		0.01	ND (.0045)	0.0052	ND (.0039)	ND (.00054)
Cl10-BZ#209	~		0.01	ND (.0045)	ND (4.7)	ND (.0039)	ND (.00054)
Summation of NOAA 18 Congeners	~	2	0.01	0.4	0.37	0.18	0.0075

NOTES:

1. An asterisk (*) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regulatory criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Shaded values exceed the MCP Reportable Concentrations (RCs).
6. Bolded values exceed the Method 1 Cleanup Standards.
7. Con-Test Laboratory is not responsible for the regulatory content, data comparisons with regulations, or decisions made based on data comparisons shown in this deliverable. Please notify us should you be aware of any regulatory information that may not be correct or that has changed.

6.0 ECOLOGICAL ASSESSMENT

6.1 Protected Resource Areas

Under the Wetlands Protection Act (WPA), the resource areas that could be impacted by a dredging operation would include Land Under Water (LUW), Bordering Vegetated Wetland (BVW), Bank and Buffer Zone. The BVW in this case is upstream wetland that would not be targeted for dredging. However, some wetland scientists might consider some areas of Salisbury Pond to include BVW; peripheral areas along the north shoreline are shallow enough for emergent vegetation to dominate, but the primary plant present is the invasive common reed (*Phragmites*). These areas have formed as a consequence of sediment accumulation. We include marginal BVW as LUW in this assessment, a move that has been supported in court cases, but still draws scientific and regulatory controversy. The Generic Environmental Impact Report on Eutrophication and Nuisance Plant Management in Massachusetts (Mattson et al. 2004) provides an overview of possible impacts on the interests of the WPA with regard to dredging projects.

LUW covers the entire pond area, about 16 acres. As the threshold for impact that triggers performance standard considerations is 10 acres, a thorough dredging process would require consideration of alternatives and mitigation needs. Given the condition of the LUW in Salisbury Pond, however, the dredging would represent improvement for nearly all interests of the WPA. The only questionable interest is habitat, which was added as the eighth interest after the WPA was originally passed, and creates problems since any condition represents habitat for some organism. Removing the accumulated soft sediment will benefit many populations of fish, birds, reptiles, amphibians, invertebrates, and plants, but would alter the habitat and be detrimental to the invasive plant species now present and possibly some fish and invertebrates that depend on dense plant assemblages for cover. This is usually not a stumbling block in the permitting process for dredging, but those involved should be aware that habitat will be changed to some degree and a case can be made for that change adversely impacting some organisms.

In terms of the original seven interests of the WPA, dredging can be characterized as follows:

- Protection of public and private water supply – Possible benefits to water quality, but no water supply function exists at Salisbury Pond. May affect water quantity by uncapping springs and seepage areas, but in this case the large urban watershed would be an overwhelming influence. Short-term limitation on available water is possible during dredging, but again, there is no water supply function for Salisbury Pond.
- Protection of groundwater supply – Generally neutral (no significant interaction), although uncapping of springs and seepage areas may increase interaction. Possible adverse impacts can occur below containment area if contaminants leach, but this is rare.
- Flood control – Generally neutral (no significant interaction), although greater depth could be an asset if drawdown is later practiced for flood control, as would be possible for Salisbury Pond. Possible short-term benefit or detriment during dredging, depending upon flow controls applied and weather pattern.
- Storm damage prevention – Generally neutral (no significant interaction), although greater depth could be an asset if drawdown is later practiced for damage control. Possible short-term benefit or detriment during dredging, depending upon flow controls applied.

- Prevention of pollution – Expected benefit in water quality enhancement, although short-term detriment is possible if flows contact disturbed sediment. Additional water quality benefits from greater volume, which provides more dilution and increased detention time that enhances transformations that improve water quality in the pond and downstream.
- Protection of land containing shellfish – Possible long-term benefit through water quality enhancement, but potential short-term detriment by direct removal and lack of water. However, no shellfish resources are known for Salisbury Pond.
- Protection of fisheries - Possible long-term benefit through water quality and physical habitat enhancement, but short-term detriment by habitat loss during dredging, mainly if dry dredging is applied.
- Protection of wildlife habitat – Expected long-term benefit through water quality enhancement and invasive plant control, but possible short-term detriments during the dredging process. As noted previously, habitat for some organisms will be compromised by loss of soft sediment and vegetation, but overall conditions are enhanced, leading to higher biodiversity and related biological conditions.

6.1.1 Bank

Bank would be damaged at access points, but restoration would be possible and the total area of bank damaged would normally be less than the mitigation thresholds of the WPA. Access to Salisbury Pond would likely be from within the park, where the bank is already disturbed or altered by humans (granite block walls). Banks tend to be steep around much of Salisbury Pond and contain minimal wetland vegetation above the water line (with the exception of the marsh areas). Trees, granite blocks and rocks stabilize much of the bank resource. Except at access points, bank would not be directly disturbed by dredging, and all observed bank resources would be resistant to impacts during temporary drawdown for any dry dredging operation. Bank habitat in other areas of the pond would not have to be altered by any means of dredging. In the case of conventional "dry dredging", temporary dewatering of the banks would occur, but this would not be expected to have any lasting impact.

Restoration would be entirely feasible, and the logical access areas already have disturbed buffer zones. If dry dredging was employed, road beds or mats would be placed in the pond to facilitated truck traffic, so the impacts would be to LUW, not bank or buffer zone.

The other major environmental law that applies to dredging projects is the Massachusetts Endangered Species Act, which is administered by the Natural Heritage and Endangered Species Program (NHESP). Listed species and associated potential habitats are protected under this law and program, and a set of maps is maintained that shows where priority habitats are located. For the Salisbury Pond area, there are no listed species or mapped habitat. This is not surprising for such an urbanized area, but sometimes listed species can still occur in such areas.

6.1.2 Bordering Vegetative Wetland

There is very little BVW near Salisbury Pond. The area along the edge of Salisbury Pond and that contain the marsh areas could be seen as BVW, however, an argument could be made that this is LUW that has accumulated sediment over time and only contains invasive species.

6.2 Containment Area Resources

Temporary or permanent disposal areas would be needed for a dredging project. If dredging was conducted with the lake drained, it might be possible to use part of the pond area as storage and drying area, but the area is unlikely to be truly dry and the potential for high flows to interfere is substantial. Based on sediment quality results permanent disposal is likely to be at a landfill out of the immediate area, but the obvious place to use for temporary staging of dredged material that cannot go directly to a final disposal location is O'Connell Field located on Grove Street. This field is a flat grassy area, which would make an excellent processing area for dredged material (Figure 6). There are several businesses to the north, the Worcester Fire Department to the south and a cemetery directly across the street. This is an ideal situation since there are no residences in the immediate vicinity of the field. Access to the park is afforded off of Grove Street.

Figure 6: Potential Temporary Sediment Staging and Processing Area

7.0 DREDGING LOGISTICS

The management objectives of a sediment removal project are usually to deepen a shallow lake or pond for recreation, or to remove nutrient rich sediments that can cause algal blooms or support dense growths of rooted plants. All of these objectives are applicable to the Salisbury Pond situation. The Practical Guide to Lake Management in Massachusetts (Wagner 2004) provides considerable applicable background on dredging and much of that review is embodied below.

Control of rooted aquatic vascular plants is achieved by either the removal of substrate hospitable for their growth or by deepening the area enough to create a light limitation on plant growth (the latter requiring depths of at least 10 ft and more often 15 ft). The release of algae-stimulating nutrients from lake sediments can be controlled by removing layers of enriched materials. This can reduce internal loading and suppress algal production if internal sources are the dominant nutrient source. Even where incoming nutrient loads remain high, dredging can reduce benthic mat formation and related problems with filamentous green and blue-green algae, as these forms may initially depend on nutrient-rich substrates for nutrition. Dredging also removes the accumulated seed bed established by many vascular plants and the resting cysts deposited by a variety of algae.

Although proposed dredging of Salisbury Pond will not reach the 10-15 foot depths for light limitation it will accomplish the goal of removing nutrient rich sediments that stimulate algal growth. In addition removal of the soft sediment will remove the seed bed which has been established by the existing phragmites.

7.1 Dredging Alternatives

Although there are several available methods used to conduct dredging, the three most common and typically used methods are conventional wet dredging, conventional dry dredging and hydraulic dredging. These three methods are outlined in this feasibility study. A quick graphical depiction of each method is provided in Figure 7.

7.1.1 Conventional Dredging Dry

Dry dredging involves partially or completely draining the lake and removing the exposed bottom sediments with a bulldozer or other conventional excavation equipment and trucking it away. Projects involving silts, sands, gravel and larger obstructions where water level can be controlled favor conventional, dry methodology. Although ponds rarely dry to the point where equipment can be used without some form of support (e.g., railroad tie mats or gravel placed to form a road), excavating under "dry" conditions allows very thorough sediment removal and a complete restructuring of the pond bottom. The term "dry" may be a misnomer in many cases, as organic sediments will not dewater sufficiently to be moved like upland soils. Dry dredging may resemble a large-scale excavation of pudding, and the more the material is handled, the more liquid it becomes.

Control of inflow to the lake is critical during dry excavation. For dry excavation, water can often be routed through the lake in a sequestered channel or pipe, limiting interaction with disturbed sediments. Water added from upstream or directly from precipitation will result in solids content rarely in excess of 50% and often as low as 30%. Consequently, some form of containment area is needed before material can be used productively in upland projects. Where

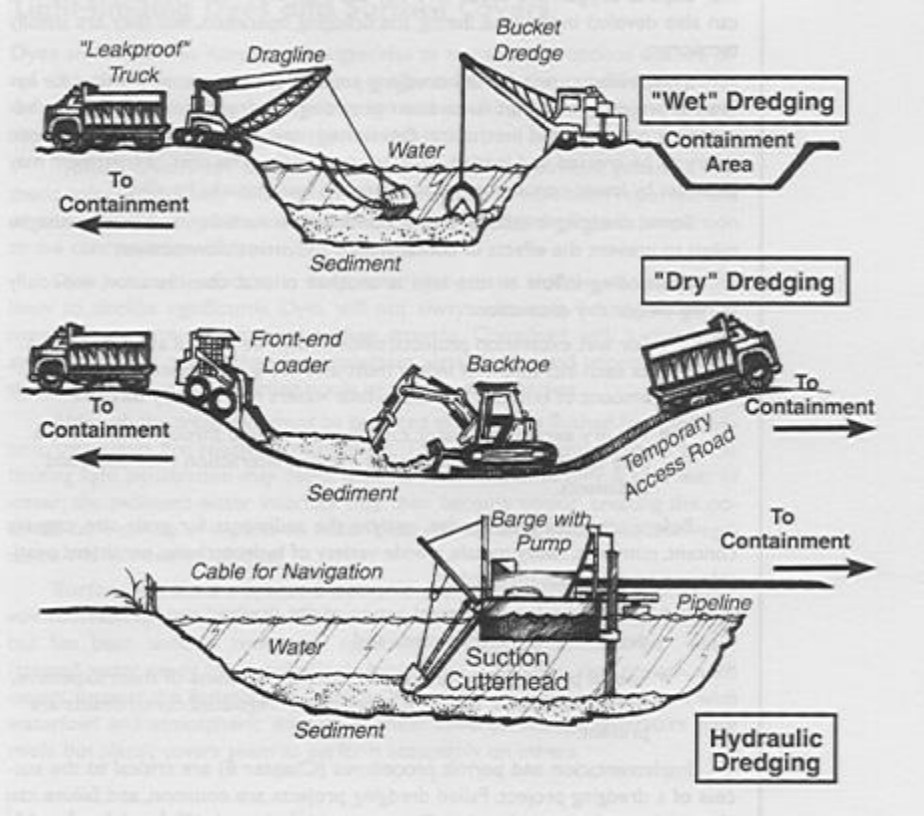

Figure 7: Wet, Dry and Hydraulic Dredging Approaches (from Wagner, 2001).

there is an old gravel pit or similar area to be filled, one-step disposal is facilitated, but most projects involve temporary and permanent disposal steps.

A properly conducted dredging program removes accumulated sediment from a lake and effectively sets it back in time, to a point prior to significant sedimentation. Partial dredging projects are possible and may be appropriate depending upon management goals, but for maximum benefit it is far better to remove all "soft" sediment. Failed dredging projects are common, and failure can almost always be traced to insufficient consideration of the many factors that govern dredging success (Appendix C).

At Salisbury Pond conventional dry dredging can be accomplished by the establishment of a roadway into the pond near the dam structure. The dryer material would then be placed into "water-tight" trucks and taken off-site. Any wetter material would need to be transported to a secondary dewatering/drying area for further dewatering. If a lot of material requires

dewatering, this project would need to be done in phases as the area could not handle the entire amount of sediment that would be expected to be removed.

Dewatering Salisbury Pond for dry dredging might be accomplished by using the dam structure. The dam crest can be reduced to an elevation where the majority of the pond drains and any inflow can be routed by utilizing channels or pipes.

Benefits

- Deepening of the lake for many purposes, including increased flood or water supply storage, improved recreational uses, enhanced pollutant trapping effectiveness, and dilution of nutrient loads,
- Control of existing rooted plants in the marsh areas,
- Reduced algal mat formation by reduced nutrient supply and elimination of resting cysts,
- Reduced planktonic algal abundance if internal loading is an important nutrient source and enough sediment is removed,
- Removal of toxic substances or other unwanted materials accumulated in the sediment,
- Reduced sediment-water interactions, with potential improvement in water quality,
- Complete removal of soft sediments in any target area or even "overdredging" to removal of sand or gravel is facilitated by dry dredging,

Detriments

- All possible impacts of drawdown, as the lake is lowered to facilitate dry dredging,
- Loss of most biological components of the drained portion of the lake through physical disturbance,
- Potential for downstream turbidity if through-flow is not controlled,
- Peripheral land disruption for access by equipment,
- Upland area must be provided for sediment disposal, with temporary alteration,
- Contaminated sediments potentially subject to many restrictions on disposal,

Information for Proper Application

- Appendix C lists the many considerations applicable to a dredging project. Key factors include:
- Sediment quality, which will determine disposal options and cost
- Sediment quantity, which determines disposal volume needs and greatly affects cost
- Ability to control the lake level, which affects choice of dredging method
- Sensitive biological resources, which affects project goals and permitting
- Monitoring to track system recovery and overall project impacts

Factors Favoring the Use of this Technique

- There is a distinct need for increased depth in the lake
- Studies have demonstrated the impact of internal loading on the lake
- Studies have demonstrated the presence of contaminants that are impacting lake biota or uses
- Rooted plants and algal mats dependent on the soft sediments are impairing recreation and habitat value
- Habitat is degraded to the extent that a complete restructuring is desirable

- Partial drawdown or sequestering of the dredged area can be performed to limit impacts to aquatic species
- Sediments are "clean", based on Massachusetts regulatory thresholds
- Suitable and sufficient containment and disposal areas are available close to the lake Performance Guidelines
- Design the dredging project with local conditions in mind; address water level and flow control, appropriate equipment, access and staging areas, material dewatering and transport for disposal
- Excavate in accordance with all permits
- Achieve a depth (light) or substrate (hard bottom) limitation if control of plant growth is a project goal; usually this involves removal of all soft sediment or achievement of a water depth in excess of 10 ft
- Remove sediment to expose a low nutrient layer if reduction of internal loading is a project goal; usually this involves removal of all soft sediment
- Restore or rehabilitate all access, temporary containment, and final disposal areas
- Monitor downstream flows and water quality during dry dredging
- Monitor recovery of lake biota and in-lake conditions relative to project goals (e.g., depth increase, plant control, water quality enhancement)

Cost Considerations

Because the cost varies depending on the volume of material removed, costs are usually expressed per cubic yard (CY) of material removed. Generally, the larger the project, the smaller the cost to dredge on a per cubic yard basis. The proper way to estimate dredging costs is to consider each element of the project, which may vary dramatically among projects. The total cost can be divided by the total yardage to get a cost per cubic yard, but this may not be especially meaningful in estimating other dredging projects. With that caveat in mind, a typical range of costs for dry dredging projects in recent years is $20 to $50/CY, with $30/CY suggested as a rough estimator for considering the general magnitude of a project under initial consideration. It is important, however, to develop a more careful estimate during further project planning, and many smaller projects (<50,000 CY) have incurred costs in excess of $30/CY. Additional costs will apply for any access preparation or sequestration of target areas so that the whole water body does not have to be drained, and disposal costs will depend heavily on sediment quality.

Total cost can be reduced if the dredged material is clean enough to be sold as a soil amendment. This is most likely not the case at Salisbury Pond. In some cases, contractors have wanted the material in the lake, or more likely the sand and gravel under the muck in the lake, and were willing to perform dry dredging at a much reduced cost. Income from excavation should not be assumed, however, unless a firm agreement is in hand. As part of a major overhaul of a lake, dredging is often accompanied by other management actions such as storm water treatment, construction of recreational amenities or fish habitat enhancement. These associated improvements add to overall project cost but are not specifically part of the dredging project cost estimated here.

7.1.2 Conventional Dredging Wet

Wet dredging may involve a partial drawdown, especially to avoid downstream flow of turbid water, but sediment will be excavated from areas overlain by water. Sediment will be very wet, often only 40 to 50% solids unless sand and gravel deposits are being removed. Clamshell dredges, draglines, and other specialized excavation equipment are used in what most people would consider a very messy operation. Excavated sediment must usually be deposited in a bermed area adjacent to the pond or into other water-holding structures until dewatering can occur. This approach is most often practiced when water level control is limited. Aside from small ponds, this technique is applicable to ocean harbors, and has been practiced in Boston and New Bedford.

Conventional wet dredging methods create considerable turbidity, and steps must be taken to prevent downstream mobilization of sediments and associated contaminants. For wet excavation projects, inflows must normally be routed around the lake, as each increment of inflow must be balanced by an equal amount of outflow, and the in-lake waters may be very turbid. It should be noted, however, that more recent bucket dredge designs greatly limit the release of turbid water and have been approved for use in potentially sensitive aquatic settings such as Boston Harbor.

Benefits

- Deepening of the lake for many purposes, including increased flood or water supply storage, improved recreation, enhanced pollutant trapping effectiveness and dilution of nutrient loads
- Control of rooted plants if a depth (light) or substrate limitation is imposed
- Reduced algal mat formation by reduced nutrient supply and elimination of resting cysts
- Reduced planktonic algal abundance if internal loading is an important nutrient source and enough sediment is removed
- Removal of toxic substances or other unwanted materials accumulated in the sediment
- Reduced sediment-water interactions, with potential improvement in water quality

Detriments

- All possible impacts of drawdown, if the lake is lowered to any appreciable extent
- Loss of many biological components of the lake through physical disturbance and high turbidity
- Potential for downstream turbidity if outflow is not controlled
- Peripheral land disruption for access by equipment
- Upland area must be provided for sediment disposal, with temporary alteration
- Contaminated sediments potentially subject to many restrictions on disposal
- Potentially incomplete dredging as a consequence of not being able to visually appraise underwater sediment conditions and high suspended solids levels that may form a thin muck layer upon settling

Factors Favoring the Use of this Technique

- Factors favoring this technique are similar to Dry Dredging, but also include:
- There is a distinct need for increased depth in the lake, but water level cannot be lowered and controlled to facilitate dry dredging, or water level must be maintained for other uses

- Sequestering of the dredged area can be performed to limit impacts to aquatic species
- Sediments are "clean", based on Massachusetts regulatory thresholds
- Suitable and sufficient containment and disposal areas are available close to the lake

Cost Considerations

The proper way to estimate dredging costs is to consider each element of the project, which may vary dramatically among projects. The total cost can be divided by the total yardage to get a cost per cubic yard, but this may not be especially meaningful in estimating other dredging projects. With that caveat in mind, a typical range of costs for wet dredging projects in recent years is $20 to $50/CY, with $30/CY suggested as a rough estimator for considering the general magnitude of a project under initial consideration. The cost tends to be similar to dry dredging, but some elements of the process are different, leading to lower costs for some aspects (e.g., less in-lake road construction) and higher costs for other elements (e.g., dewatering, as material is routinely too wet to go directly into trucks).

It is important to develop a more careful estimate during further project planning, as much higher costs are possible as a function of site-specific conditions. The cost of moving sediment from the initial deposit area (usually near shore) to temporary and final repositories is particularly variable. Resale of dredged material or allowing access to sand and gravel under muck deposits can reduce costs, but such income should not be assumed unless a firm agreement is in hand.

7.1.3 Hydraulic Dredging

A more advanced form of wet dredging, hydraulic dredging usually involves a suction type of dredge that has a cutter head. Agitation combined with suction removes the sediments as slurry containing approximately 15-20% solids by volume, although this may increase to as high as 30 to 40% in some cases or be as low as 5% with especially watery sediments in difficult areas. This slurry is typically pumped to a containment area in an upland setting where the excess water can be separated from the solids by settling (with or without augmentation). The supernatant water can be released back to the lake or some other waterway. The containment area for a hydraulic dredging project is usually a shallow diked area that is used as a settling basin or tight tank. The clarified water may be treated with flocculation and coagulation techniques to further reduce the suspended solids in the return water.

Hydraulic dredging is normally favored for removal of large amounts of highly organic sediments with few rocks, stumps or other obstructions and where water level control is limited. This type of project does require a containment area to be available where removed sediments are separated from water, and may involve secondary removal of the dried sediment from the containment area for ultimate disposal elsewhere. Usually the containment area is not far from the lake, but slurry can be pumped multiple miles along a suitable route with booster pumps.

Innovations in polymers and belt presses for sediment dewatering have reached the point where hydraulically dredged slurry can be treated as it leaves the lake to the extent necessary to load it directly onto trucks for transport to more remote sites. Solids content of the resultant material is still too low for many uses without further drying or mixing with sand, but the need for a large containment area can be avoided with this technology. The cost of coagulation and mechanical

dewatering may be at least partially offset by savings in containment area construction and ultimate material disposal. Likewise, pumping the slurry into geo-tubes (engineered filter bags) can also enhance dewatering in a limited space.

Benefits

- Deepening of the lake for many purposes, including increased flood or water supply storage, improved recreational uses, enhanced pollutant trapping effectiveness, and dilution of nutrient loads
- Control of rooted plants if a depth (light) or substrate limitation is imposed
- Reduced algal mat formation by reduced nutrient supply and elimination of resting cysts
- Reduced planktonic algal abundance if internal loading is an important nutrient source and enough sediment is removed
- Removal of toxic substances or other unwanted materials accumulated in the sediment
- Reduced sediment-water interactions, with potential improvement in water quality
- Less disruption of biological components of the aquatic system and less impact on peripheral land than for conventional excavation approaches

Detriments

- Upland area must be provided for sediment disposal, with temporary alteration
- Contaminated sediments potentially subject to many restrictions on disposal
- Loss of many biological components of the lake through physical disturbance and high turbidity
- Potentially incomplete dredging as a consequence of not being able to visually appraise underwater sediment conditions and high suspended solids levels that may form a thin muck layer upon settling
- Less effective than conventional excavation approaches where there are obstructions such as boulders, stumps or underwater structures

Factors Favoring the Use of this Technique

- Factors favoring this technique are similar to Dry Dredging, but also include:
- Significant biological resources remain and warrant protection during dredging
- Sediment is largely muck, and rocks, stumps and other obstructions are minimal
- Sediments are “clean”, based on Massachusetts regulatory thresholds
- Suitable and sufficient containment and disposal areas are available close to the lake

Performance Guidelines

- Restore or rehabilitate all access, temporary containment, and final disposal areas
- Monitor containment area discharge quality during hydraulic dredging
- Monitor downstream flows and water quality during hydraulic dredging
- Monitor recovery of lake biota and in-lake conditions relative to project goals (e.g., depth increase, plant control, water quality enhancement)

Cost Considerations

The proper way to estimate dredging costs is to consider each element of the project, which may vary dramatically among projects. The total cost can be divided by the total yardage to get a cost per cubic yard, but this may not be especially meaningful in estimating other dredging projects.

With that caveat in mind, a typical range of costs for dry dredging projects in recent years is $15 to $60/CY, a wider range than for the dry dredging approaches. This is largely a consequence of highly site specific conditions, such as the distance that the slurry must be pumped and whether or not the containment area is the final resting place for the material.

It is difficult to estimate a per cubic yard value to apply to Salisbury Pond, and would be better to cost out all the likely elements of the program. However, $35/CY is suggested as a rough estimator for considering the general magnitude of a project under initial consideration, about the same as for the more conventional approaches. It is important, however, to develop a more careful estimate during detailed project planning. Smaller dredging projects (<50,000 CY) applying hydraulic methods have often incurred costs in excess of $30/CY.

For hydraulic dredging, cost factors of major importance include:

- Volume of material – Hydraulic dredging is often not economical at low volumes
- Distance to containment area – The need for booster pumps increases cost
- Size of containment area – The size of dredge and rate of pumping depend upon the available volume for containment and resultant detention time. Additionally, cost will escalate if dredging must cease periodically to allow containment area clean-out
- Obstructions and clogging agents – Efficient use of the cutterhead and pipeline will be impeded by rocks, stumps, structures and dense plant growths

7.2 Site Layout and Design

Independent of which alternative is selected; proper staging and site design will be required for any dredging operation on site. This design layout consists of three areas of concern: access to the dredging location, staging areas for equipment and truck pick up, and a dewatering/drying bed location.

Salisbury Pond is an urban pond which is bordered by Institute Park on three sides. The City owned park gives ample access and staging areas for any dredging operation on site however the park is used throughout the year by the populace. This may make it unavailable for the staging and access areas. A more suitable site may be O'Connell Field located just north of the Worcester Fire Department, off of Grove Street. Access for dredging vehicles is possible along the eastern portions of the pond from this location however, some tree clearing may be necessary (Figure 8).

Once the material is dredged, truck access to load the sediment and transport it off site will be needed. If conventional dredging techniques are used, the sediment will either need to be trucked directly from the pond or moved to a drying location within the field. If a hydraulic dredge is used, a dewatering area will be needed, again within the field, and the access point off of Grove Street could provide access to the dewatered material.

Figure 8: Access Points and Staging Area

While O'Connell Field provides opportunities for staging and design of the dredging operation, there are some issues associated with this area that the City should take into consideration:

- Traffic will be increased during the operation
- Construction noise may be substantial
- Odor of drying material could be detectable
- Impacts to abutting properties/private property damage could occur

We believe that all of these concerns can be addressed through proper design and coordinated community outreach. By educating the local stakeholders it can be made clear to them that any disturbance will only be temporary in nature and that the rewards of a healthier and more useful pond outweigh those temporary inconveniences. As an additional benefit, the City could upgrade and improve the field as part of this project.

8.0 DISPOSAL OPTIONS:

Determining where to dispose of dredged sediment can often be the most challenging but important part of designing and permitting any dredging project. Many factors can affect disposal locations, including volume, chemical composition, physical features, and the need for material in nearby areas. The Army Corp of Engineers lists several options for disposal of sediment, however not all are viable in all circumstances. The most common dredged material disposal methods drop out into three categories:

- Beneficial Use: Clean material, which can be used as fill in local beneficial use projects such as urban parks, vacant low areas to bring up to grade, etc.
- Daily Cover: Moderately clean material can be spread at a local landfill as daily cover,
- Disposal: Contaminated or hazardous material must be disposed of under a cap at an approved facility

Other options for disposal, which are not as common, are disposal at a Thermal Desorption Recycler or recycled as base for asphalt at a company like Aggregate Industries.

The most common three scenarios are described below, as they relate to Salisbury Pond.

Beneficial Use:

Several types of beneficial uses are available, including, but not limited to:

- Filling of damaged land
- Habitat development
- Beach nourishment
- Shoreline stabilization and erosion control
- Recreational facility enhancement

In order to qualify for beneficial use disposal the sediment must meet a number of different quality criteria, which are very stringent. In most instances many of the above mentioned uses are not practicable, as the sediment quality has to meet a certain level. In urban ponds and lakes the sediment quality is usually impacted by any number of metals, which are deposited into the pond through the transport of sediment from industrial, residential and commercial sites. In order to determine the applicability of the sediment found in Salisbury Pond additional sampling would be required and a Beneficial Use Determination (BUD) would need to be completed. However, it does not appear that the Salisbury Pond sediment can meet the thresholds. In particular, arsenic, TPH and lead appear too high, and other features are marginally close to thresholds, necessitating further evaluation. A BUD does not appear likely for Salisbury Pond sediments.

Landfill Disposal as Daily Cover:

Sediment brought to a landfill can either be reused or disposed of, based on its quality. The parameters that must be met are outlined in "DEP Interim Policy # COMM-94-007: Interim

Policy for Sampling, Analysis, Handling and Tracking Requirements for Dredged Sediment Reused or Disposed at Massachusetts Permitted Landfills." This policy outlines the criteria used to determine whether the sediment can be reused (i.e., Daily Cover) or must be disposed of (buried under the cap in the landfill). The costs associated with both options vary greatly, but it is much costlier to dispose of the material than it is to reuse it. More complete testing of Salisbury Pond sediment would be necessary for a complete evaluation, but based on the available information, Salisbury Pond sediments may not qualify for use as landfill cover. The analytes of note are arsenic and TPH, which all appear very close, if not over the concentration limits.

Capped Disposal

Where dredged material is contaminated with metals, hydrocarbons, or other substances at high enough levels, use as daily landfill cover is prohibited. In these cases special handling will be used to prevent the contaminants from re-entering the environment during dredging and disposal.

The objective of capped disposal is to isolate contaminated material from the environment by capping (covering) the contaminated material with clean material, usually sand. Capped disposal for the isolation of contaminated sediment is practiced worldwide, but facilities do charge large fees to accept material. Dredging costs can therefore escalate to a point where dredging is no longer affordable. For Salisbury Pond, dredged sediment could certainly be placed in a capped situation.

9.0 PERMITTING ANALYSIS

Before the dredging process can begin, local, state and federal permits need to be acquired. Applicable permits are discussed below, with timelines and related information relevant to the application process.

Massachusetts Wetlands Protection Act (WPA) Review

The jurisdiction of the Massachusetts Protection Act includes disturbance in or near wetland resource areas. Sediment located under Salisbury Pond is considered a wetland resource area, specifically Land Under Water (LUW). Under the WPA, before conducting work in or near a wetland resource area, a Notice of Intent (NOI) needs to be submitted to the local conservation commission for review. If there is project acceptance by the commission, an Order of Conditions will be issued by the commission. A ten day appeal period exists for NOI approvals. The approval process normally takes at least two months, and often longer with dredging projects, as conservation commissions are not as familiar with this management option and have many questions.

Impacts to interests of the Wetlands Protection Act from a specific dredging project are highly dependent upon site-specific features and project design. For Salisbury Pond, these have been reviewed under the Ecological Assessment and not found to represent a major impediment to approval of a dredging project.

Massachusetts Environmental Protection Act (MEPA) Review

The MEPA office reviews environmental impacts of development projects for the State of Massachusetts if certain thresholds are triggered. The MEPA review process allows for public review of potential environmental impacts of projects for which state agency action is required. The MEPA review also assures the state that proposed projects will either avoid or minimize and mitigate environmental impacts to the maximum extent practicable.

The MEPA review process can include two levels of permitting. The first level of permitting needed is the submittal of an *Environmental Notification Form* (ENF). If, upon review by the State that additional information is needed, the more comprehensive *Environmental Impact Report* (EIR) will be required. These submittals are discussed in further detail, below.

An ENF is required when a proposed project meets or exceeds MEPA thresholds. A complete list of thresholds are noted in 301 CMR 11.03. It is anticipated that the Salisbury Pond dredging project will trigger the following thresholds:

- Dredging of 10,000 or more cubic yards (CY) of material (301 CMR 11.03 (3)(b)(3))
- Disposal of 10,000 or more cy of dredged material (301 CMR 11.03 (3)(b)(4))

Notice of the submitted ENF documents are published in the Environmental Monitor, which is published semi-monthly. The ENF review period is 30 days from the publication date of the Environmental Monitor. The first 20 days of this review period is for public and agency

comments. After the close of the public comment date, and before the last day of ENF review, the MEPA office will issue a certificate stating whether or not an EIR is required.

Because of the amount of impact area in and around Salisbury Pond, it is anticipated that an EIR will be required for this project. The ENF certificate will dictate the scope of the EIR. The scope will be limited to the potential environmental damages of the project that are within the subject matter of the required state permits. In theory, the Generic Environmental Impact Report for Eutrophication and Nuisance Plant Management in Massachusetts (the GEIR, Mattson et al. 2004) should suffice to meet the EIR requirement, but changes in positions by various agencies of the Commonwealth since the GEIR was published make this less certain today.

If a site specific EIR is required, notice of the submitted EIR documents are published in the Environmental Monitor. The EIR review period lasts for 37 days following the publication of the notice in the Environmental Monitor. The first 30 days of the EIR review period is for public and agency comments. Within seven days after the close of comments, the MEPA office will issue a certificate stating whether or not the EIR complies with MEPA policy.

Chapter 91 (Dredging Permit)

The Public Waterfront Act (M.G.L. c. 91) regulates the protection of tidelands and other waterways in Massachusetts. The jurisdiction of the Public Waterfront Act includes activities in flowed tidelands, filled tidelands, Great Ponds, and non-tidal rivers and streams. Activities requiring State authorization include placement of structures, filling, dredging, change in use, structural alteration or demolition/removal of structures.

There are four types of Chapter 91 licenses. Because this project involves dredging (and not work on structures or fill), a MassDEP Waterways Permit would be required if the project was in a Great Pond. The statutory definition of a Great Pond is that it covered at least 10 acres in its original (natural, or at least pre-1640s) condition.

Clean Water Act Section 401 (Water Quality Certificate)

A Water Quality Certificate (WQC) is required by the State of Massachusetts for any proposed activity that results in a discharge of dredged material, dredging, or dredged material disposal greater than 100 cubic yards (CY). Because this project includes dredging of more than 100 CY of material, a Water Quality Certificate review will be required. Reviews are divided into Major Projects (more than 5,000 CY of dredging) and minor projects (less than 5,000 CY of dredging). Because more than 5,000 CY of dredged material are expected from the project, a Major Project review is anticipated. A public notice will be published in a local paper within ten days of application submittal. There will be a 21-day comment period, after which time DEP will provide certification of the project.

The WQC process can be a costly and time consuming process. Additional sampling will be required for this permit and identification of the final disposal location will be needed. The WQC calls for one (1) sample per every 1,000 CY to determine the quality of sediment, however, negotiations with DEP to reduce the sampling requirement can be made if the sediment is uniform. This is expected to be the controlling regulatory process for dredging Salisbury Pond, and a consultation with the DEP is recommended if the City is considering moving

forward with a project. Given the available data and information in this document, the DEP should be able to provide specific guidance for this project with no difficulty.

Clean Water Act Section 404 (ACOE)

An Army Corps of Engineers (ACOE) 404 permit is required for projects that result in construction or placement of structures, dredging, and dredge material disposal in the waters of the United States. Because this project will result in dredging greater than 25,000 CY, a Category III (Individual) permit will be required. Once the permit is submitted, the ACOE will issue a public notice within 15 days seeking comments. The comment period closes after 30 days of the published public notice, at which time the Corps will evaluate comments and issue a permit (unless permit is denied).

The ACOE has a tendency to get behind on reviews, so this process is often more protracted than the timeline above might suggest. However, dredging Salisbury Pond is consistent with all ACOE interests with regard to lake management, and should not encounter opposition if it can meet all Section 401 (Water Quality Certificate) provisions.

Solid Waste Permit for Sediment Disposal (DEP)

This permit is for the review and approval process for dredged sediments proposed to be reused or disposed at Massachusetts permitted landfills. Reuse means beneficial use of sediments as daily cover, intermediate cover and pre-cap contouring material. Disposal means burial in a landfill. This permit will be necessary to move the sediment off-site to a licensed facility. In all likelihood, this would be required for dredging Salisbury Pond, as sediment quality may not be sufficient to allow a Beneficial Use Determination (see below). Should the quality be found acceptable by further sampling, landfill disposal would not be the first choice for disposal, and this permit may not be needed.

Beneficial Use Determination "BUD" (DEP)

Some types of sediment may be used as an effective substitute for a commercial product or commodity. This is termed "beneficial use" of a material. MassDEP must determine that this use of sediment is beneficial and will not harm public health or the environment. This application allows DEP to access the material for these parameters and possibly allow for the use of dredged sediment in areas where it could improve land, such as restoring a gravel pit or providing substrate for an artificial wetland. However, given what is currently known of sediment quality and expectations for ponds in urbanized areas, it is unlikely that a BUD can be obtained.

Discharge Permit (NPDES – federal and state)

As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. A NPDES discharge permit will be required if any dewatering is necessary. This permit regulates the discharge points and associated impacts. While it is possible that material could be dried in place to an extent that allowed direct trucking to a disposal site, it is more likely that dredged material will be dewatered in the Hawes Brook Land across Walpole Street from Salisbury Pond and will require a NPDES permit for the discharge of water separated from the sediment to dewater it.

Drawdown Notification (DFWELE)

The Massachusetts General Law Chapter 131 (section 48) of the Code of Massachusetts Regulations (131 CMR 48) states that any pond, reservoir or other body of water shall not be drained to an extend dangerous to fish life unless notice has been given to the Director of the Department of Fisheries and Wildlife at least 10 days prior to such activities. Drawdown performance standards, as approved by the Fisheries and Wildlife Board on September 23, 2002, shall be adhered to in order to protect the fish and wildlife resources.

If dry dredging was applied to Salisbury Pond, such notification would have to be given, but this is less of a permit and more of a notification, so that the DFWELE can take appropriate action to salvage fish or other water dependent wildlife that might have beneficial use elsewhere. This has seldom been practiced in recent years, however.

Overall Timeline

While most of the permitting processes can run concurrently, they must conclude in a specific order, as the results of one may influence the provisions of another. It is unusual to receive all necessary permits within a year, and significant lead time is necessary to prepare the plans and permitting documents needed for all the applicable processes. Realistically, a timeframe of at least 18 months should be allotted for design, planning and permit acquisition for a dredging project.

10.0 COSTS

Overall project costs for any dredge project are based on a number of variables. Based on sediment quality (physical and chemical) and volumes found within each project site a number of different design and disposal options will either be available or unavailable. Due to the high diversity of design options, dredge methodologies and disposal locations available or unavailable to any dredging project, the costs of each project might be dramatically different.

Provided below in Table 2 is a list of assumed costs for each option.

Table 2: Dredging and Disposal Cost Analysis

Dredging Methodologies	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Conventional Dry	$30	50,000 wet	$1,500,000
Conventional Wet	$30	50,000 wet	$1,500,000
Hydraulic Dredge	$35	50,000 wet	$1,750,000
Disposal Options	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Beneficial Use	$39	50,000 wet (assume 25,000 dry)	$975,000
Daily Cover	$65	50,000 wet (assume 25,000 dry)	$1,625,000
Disposal	$160	50,000 wet (assume 25,000 dry)	$4,000,000
Recycle (Thermal Desorption)	$90	50,000 wet (assume 25,000 dry)	$2,250,000
Recycle (Asphalt)	$80	50,000 wet (assume 25,000 dry)	$2,000,000

In addition to the variable costs associated with dredging methodology and disposal locations of the material, dredging projects also have additional costs. These costs are associated with the handling of spoils, the construction of a containment/storage and dewatering location, the cost to permit and design the dredge operation and finally any restoration of the site after the dredge project is complete. For the purpose of this Feasibility study and future planning purposes of this project the estimated costs for these items are provided below:

Table 3: Estimated Additional Costs

Fixed Costs	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Dredge Spoil Handling	$10	50,000 wet	$500,000
Const. of containment	$10	50,000 wet	$500,000
Restoration of Inst. Park	N/A	N/A	$50-$90,000
Engineering/Permitting Cost	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Eng/Permitting Cost	N/A	N/A	20% of Total Cost

In addition to dredging costs there are also costs associated with installing stormwater controls, which should be installed as part of this project. These controls will prevent sedimentation from occurring in the future. Recent estimates were in the range of $1.2 Million for the installation of an infiltration basin and up to 3 Stormceptor systems.

11.0 FUNDING OPPORTUNITIES

Based on our research, a variety of funding opportunities are available to off-set the cost to the City to undergo a dredging program, but few of these are funded at the necessary level, matching funds may be required at a substantial percentage, eligibility may be limited by policies of the Commonwealth, and competition for limited funds may be intense. Grants offered through state agencies or private organizations are identified in Appendix C, with information on the most common programs.

Realistically, under current economic conditions, the best source of funding is the Community Preservation Act, which accumulates funds from real estate transfers in City that have set up this process under state law. Funding availability varies by City, but can be large enough to support a program of this magnitude. CPA funds are intended to better community resources, and have been used in many communities to purchase land or improve City facilities to meet the needs of residents. The improvement of Salisbury Pond should be eligible under this program.

12.0 FEASIBILITY ASSESSMENT SUMMARY

Salisbury Pond would benefit from dredging. How much benefit can be derived at what cost becomes the key question upon which any decision to embark on the complicated and timely process of dredging must be based. This report assesses many factors that affect the feasibility of a dredging project. These factors are outlined and summarized below:

12.1 Feasibility Results

Reasons for Dredging:

- Regain detention capacity in Salisbury Ponds –There is a possibility of substantial increase in detention time, which could benefit downstream resources as well as the pond. However, larger storm events would still flush the pond within hours to days; the pond is simply too small to markedly alter water quality during large storm events.
- Alter/reduce rooted plant growths (substrate and/or light limitation) – currently excessive growths would be hindered by sediment removal, but a depth limitation could not be achieved within Salisbury Pond, without excavating hard sediment. Exposed substrate may still support aquatic plants, but densities should be reduced. In filling of soft sediment will occur post dredging, however, improving stormwater structures or management of stormwater around the pond should slow down the sedimentation process in the pond.
- Reduce internal nutrient reserves/recycling – the removal of soft sediment, with associated plant roots and seeds, will greatly alter system biology and possibly chemistry in beneficial ways. The lake will be "reset" biologically, but without active participation in developing a new set of biological communities, invasive species may proliferate. Additionally, if the dredging is not thorough, recovery of current invasive species is likely at a more rapid pace.

Existing and Proposed Bathymetry:

- Current bathymetry suggests a 3 ft average and 6 ft maximum depth, with large areas of the pond with less than 1 ft of depth.
- Dredging of soft sediment would regain an average of 2 ft of depth, with some areas increasing by up to 5-6 ft. Average depth would be 5 ft and maximum depth would be 10 ft.

Volume of Material to be removed:

- In-situ volume to be removed is estimated at 50,000 CY for Salisbury Pond
- The sediment is largely organic matter with 44% solids in Salisbury Pond; it will bulk up upon initial removal but then dewater and compact to as little as 50% of its in-place volume. Disposal of only about 25,000 CY might be necessary if dewatering and drying can be maximized.
- If coarser material is found in greater abundance, as in sample Soil 1 (89% solids), than volumes may be even less, once dewatered.

Physical Nature of Material to be removed:

- Solids content: Medium, at about 44% for soft sediment, higher at about 89% for the sandbar areas.
- Settling rate: Not directly tested – expected to be moderate to slow

- Drying factor: Reduced volume when water is removed, expect as much as a 50% reduction for Salisbury Pond sediment,
- Residual turbidity: Fine organic sediment is prone to suspension, turbidity expected to be high;

Chemical Nature of Material to be removed:

- Elevated levels: Several metals are elevated relative to RCS-1 standards for unregulated upland disposal; elevated for arsenic, TPH and lead relative to BUD thresholds. Arsenic SVOC's and TPH would preclude soils from being used as daily cover.
- Petroleum hydrocarbons: No values clearly over limits, but many detection limits were triggered, so there may be some concern; total under COMM 97 limits; unlikely to be allowed for beneficial use disposal.

Nature of Underlying Material to be exposed:

- Type of material: believed to be coarse sand, gravel and till/bedrock, based on probing but not actual observation.

Protected Resource Areas:

- Regulatory resource classifications: Target areas are all Land Under Water, Bank disturbance limited to access areas, preferred access areas are currently already disturbed. BVW is minimal along marsh areas and contains invasive species.
- NHESP Listed species: None listed or observed.
- NHESP Listed habitats: None listed or observed.
- Downstream habitats: No sensitive receptors known

Flow Management:

- It is assumed that water levels can be controlled at the outlet dam structure
- System hydrology: Pulsed large inflows possible; dry dredging will require substantial routing of water and still pose risks to the work area.
- Provisions for controlling water level could include sequestering target areas with porto-dams or sheet pile and having pump systems in place for underflow or leakage.
- Methodological implications: May be better as a hydraulic dredging project, but possible as dry dredging with sequestration of the pond (probably in two lengthwise halves).

Equipment Access:

- Possible input and output points: Can launch from western side of Grove Street athletic field off of Grove Street.
- Pipeline routing: Hydraulic dredging pipeline could be routed to the east of the pond into the aforementioned O'Connell Field.
- Property issues: The City owns adequate land for access and pipeline routing.

Relationship to Pond Uses:

- Impact on existing uses during project: Limited ability to support uses during work; access areas may be blocked, public parks may be blocked, water level could be lowered, pipeline for hydraulic dredging would limit recreational uses.

- Impact on existing uses after project: All uses will be enhanced. Diligent lake management will limit plant regrowth. Some control of rooted plant growth may still be necessary after dredging.
- Facilitation of additional uses: Recreational use of canoes and kayaks could be added once depths are increased to greater than 18-24 inches.

Potential Temporary Containment and Disposal Sites:

- Possible containment sites: Best choice is O'Connell Field, a small field on the eastern border of the pond. Could use tanks and belt press to limit needed footprint. Could dredge in stages, allowing dewatering in field with removal before the next stage of dredging.
- Necessary site preparation: Berms needed for in-ground containment, less prep work for tank and belt press operation.
- Volumetric capacity: O'Connell Field offers about 2.4 acres total useable area; assume 1.5 acres can be devoted to temporary dredge spoil storage for dewatering. This would allow for approximately 15,000 CY of storage of dredge spoils. This area would be restored or improved after the project is complete.
- Property issues: None for containment area; City owned property. City would have to agree to use of property for a period of time; access would be restricted.
- Long term disposal options: Most likely spoils would need to be transported to an out of state landfill for disposal as waste.

Dredging Methodologies:

- Hydraulic option: Highly applicable; avoids flow control, sediment appears amenable to hydraulic removal, pipeline routing straightforward. Compatible with tanks and belt press system for dewatering and loading for disposal elsewhere. Could also use geotubes (large cloth bags) into which slurry would be pumped and from which water would seep. Clogging of pipeline with plants may be an issue for work during growing season, and removal of sediment in areas colonized by phragmites may be tedious, as clogging would be possible when dealing with that plant, even in the non-growing season. Containment area size limitation will affect rate of dredging. Potentially rocky underlayment may impact thoroughness of dredging, which may limit plant control.
- Wet excavation: Too many possible impacts and will require shoreline disposal (at least temporarily) or in-lake barges for transfer. Not a likely option in a downtown setting.
- Dry excavation: Could be very effective, but flow control issues will necessitate isolating target area while work in progress. Could work in conjunction with temporary drawdown and sheet piling to split lake into two halves longwise. Would allow complete dredging to hard substrate, which would aid plant control. Would need to construct haul road within the pond. Material removed from the pond may not be dewatered enough to allow direct transport to disposal site, in which case temporary storage in O'Connell Field would be necessary. This methodology would provide the best method for removal of invasive species, marsh areas and sand bars created by sediment.

Applicable Regulatory Processes:

- MEPA process: Environmental Notification Form necessary, environmental impact report may be necessary.
- Wetlands protection statutes: Applicable but not a major impediment.

- Dredging permits: Not a Great Pond – Chapter 91 should not apply.
- Aquatic structures permits: None should be needed.
- Drawdown permits: Not a Great Pond – goes with Chapter 91 approval
- Water diversion/use permits: Not applicable.
- Clean Water Act Section 401 (Water quality certification): Necessary, will require additional sampling, consultation would be first step in permitting process.
- Clean Water Act Section 404 (US Army Corps of Engineers): Necessary, but no problems anticipated.
- Fish and wildlife permits/notification: Applicable but dredging process, design and selection can address problems.
- Dam safety/alteration permits: Inapplicable unless access results in any dam modification.
- Waste disposal permits: Applicable, probably necessary for landfill disposal.
- Discharge permits: NPDES likely to be needed for any discharges from likely containment area at O'Connell Field.

Costs:

- Engineering and permitting costs: Depends on volume and approach – assume 20% of dredging cost.
- Construction of containment area: Depends on volume and approach – assume $10/cy for initial planning purposes. Would be less for dry dredging, but offset by need for water routing control in ponds.
- Equipment purchases: More likely a contract job.
- Operational costs: More likely a contract job.
- Contract dredging costs: Depends on volume and approach – assume $30/cy for initial planning purposes.
- Material handling costs: Depends on volume and approach – assume $10/cy for initial planning purposes.
- Ultimate disposal costs: Depends on accepting site – assume $160/cy for initial planning purposes, as initial quality leads to disposal as waste.
- Other costs: Restoration of O'Connell Field – assume $50,000-$90,000.
- Other costs: Stormwater Controls – assume $1,200,000
- Total cost: Assuming 50,000 CY (wet volume) at $50/CY for dredge and 25,000 CY (dry volume) at $160/CY for disposal with 20% for engineering/permitting, $100,000 restoration cost for O'Connell Field, and $1.2 million for stormwater, this project has a rough estimate of **$8.7 - $9.7 million**.

Other Mitigating Factors:

- Necessary watershed management: Dredging will reduce existing sediment loads, but will not offset storm water quality inputs. Stormwater management is necessary to provide long term solution.
- Ancillary project impacts: Gains detention capacity as well as possible plant control. However, some regrowth by plants expected. Hydraulic dredging is expected to leave more soft sediment and allow more growth than dry dredging.
- Economic setting: Difficult to obtain funding these days for in-lake work; Community Preservation Act is best potential source of funding at this time.

- Sociological setting: Definite interest in rehabilitating the ponds, definite assets to community, location within a public park.

12.2 Overall Feasibility Assessment

Salisbury Pond presents an ideal situation to use dredging as a remedial method. Located near an urban center the pond and associated Institute Park is used and accessed by a large population for recreational use. However, current conditions of the pond limit its direct use due to high levels of sediment buildup throughout the pond. This sediment has reduced depths in some areas to less than 1 foot. This depth promotes vegetative growth and reduces access to the pond by the public. Removal of the sediment would increase the availability of the pond to act as a recreational point for the City of Worcester. Although ideally suited for dredging based on its location, urban impacts have resulted in the detection of at least some metals in Salisbury Pond sediments. Disposal of dredge spoils will therefore most likely be limited to disposal at a landfill. The required disposal of dredge spoils will increase the expense of the project. Thus, although dredging is feasible, the City of Worcester must balance the potential benefits with the costs of dredging and sediment disposal of Salisbury Pond.

Removal could be by conventional dry dredging or hydraulic means. Dry dredging will require draining the lake, routing water to prevent refilling, and constructing a haul road within the pond to allow equipment traffic. Unless dewatering is adequate within the pond, temporary storage at O'Connell Field would be necessary, increasing expense. Hydraulic dredging does not require any change in water level or other modification to the ponds to allow dredging, but cannot excavate sediment mixed with coarse gravel or rock (sand bars near inlet), and does require a more sophisticated containment area. Additionally, heavily vegetated areas, like the marshes identified in Figure 3 could also cause potential problem for hydraulic dredge, as vegetation tends to plug the dredge.

O'Connell Field provides the best local containment area, where dredged material could be processed for eventual disposal elsewhere, but the available space is inadequate to hold all targeted sediment (15,000 CY of estimated 25,000 CY). This suggests the project should be completed in stages. Alternatively, a more expensive process could be employed to speed up dewatering so that the material can be trucked off site. Removal of soft sediment will increase average depth by about 2 foot, restoring valuable volume and detention capacity but not deepening the lake enough to create a light limitation on plant growth. Dry dredging would more thoroughly remove soft sediment and reduce plant growths by creating a substrate limitation than would hydraulic dredging, since soft sediment mixed with gravel or rock is difficult to extract hydraulically. Dry dredging will have more impact on natural resources than hydraulic dredging as a function of extended drawdown and complete removal of the soft substrate. Regardless of the method or the use of a combination of methods the cost of dredging and sediment disposal for Salisbury Pond is expected to exceed $7.5 million.

12.3 Possible Dredging Design Alternatives

The cost will be substantial under any scenario. However, if further sampling suggested that sediments were cleaner than current data indicate (this is unlikely), or that blending of all dredged material could achieve levels of contamination below key thresholds for disposal

options (possible using the coarser material), the cost could be reduced. The coarser sediment was found to be cleaner (based on the data), therefore that material can be either isolated and removed to a less costly location, perhaps used as daily cover or recycled or used to blend with the more contaminated sediment. This coarser material has a higher percent solid and therefore will dewater less. This could make up a larger portion of the 25,000 CY of anticipated dewatered dredge spoils and therefore could either be used as blending material or, as mentioned above, be disposed of less expensively. Either way the project will still incur handling, trucking, engineering and permitting costs.

Alternative 1: Pond Division with Mechanical Dredge:

The best approach for reducing the amount of soft sediment and maximizing plant control is to drain the lake and dredge with conventional excavation equipment. If the lake was split into sections, utilizing sheet pile or other isolation methods, then water could be re-routed with an adjustable routing system to the outlet structure. This would allow portions of the lake to be drained one at a time. After each section is dredged that section of the pond could be flooded and another section could be drained and dredged. If material does not dewater sufficiently in the drained portion, temporary deposition in O'Connell Field would be possible. Dredging would proceed to a truly hard bottom, minimizing plant growth until substantial new sediment accumulates; at least several decades in the future. This approach would be phased, which could provide benefits, such as having to contain less material in a containment area and have a reduced upfront cost to dispose, as less material is being removed at any time, however, it will extend the project into the future and may require more than one construction season to complete. The greatest drawback to this approach is flow control (re-routing of any inlets to bypass the dredge area), impacts to the natural areas due to extended drawdown and the need to build roadways within the pond, and a temporary reduction of recreational uses within the pond.

Alternative 2: Hydraulic Dredge:

The approach with the lowest potential for adverse impact on resources outside of the pond and least in-lake preparation work would be hydraulic dredging. With hydraulic dredging water level change is not needed and a slurry of sediment and water can be pumped via pipeline to the eastern side of the pond into O'Connell Field, where a containment area could be set up. However, as a light limitation through increased depth is not expected, achieving a substrate limitation by reaching a hard bottom is critical to plant control, and this technique is unlikely to remove all soft sediment. Additionally, dredging in areas with dense vegetation and limited to no depth will slow progress or necessitate some pre-dredging work. Once the material is dredged, extensive dewatering will be needed, and the field is not large enough to handle all sediment expected to be removed. This will lead to a staged dredge to give the sediment time to dewater prior to being removed from the site.

Alternative 3: Combination of Hydraulic and Mechanical Dredge:

The best overall approach may be a combination of both methodologies. Isolating sections of the pond will allow for a phased and less costly approach. One area could be dredged per season. These areas can be either hydraulically dredged (deep water areas) or mechanically dredged (shallow marsh areas near inlet) depending on what section is isolated. In shallower sections the pond levels can be dropped using temporary coffer dams or sheet piles and conventional excavators can be utilized. In deep water areas, near the outlet, the isolated sections do not need

to be drained, rather a hydraulic dredge can be used to dredge the soft sediment. We would anticipate separating the pond into three sections to be completed over a three year period. This would allow for the City to pay for the project over a period of time, rather than in one upfront cost. By sectioning the pond off it may be possible to isolate the poorer quality sediment as well. This may reduce costs as sediment in one section of the pond may be suitable as daily cover, while another section may need to be disposed of.

12.4 Possible Phasing Alternatives

Although any of the three design alternatives can be utilized at Salisbury Pond to varying degrees of effectiveness, there are in addition many different phasing approaches that can be utilized. As mentioned in the dredging design alternative, segmenting the pond either in half or in quarters is one such alternative. Presented below is just a few of the other possible options that could be considered.

Phasing Alternative 1: Retaining emergent wetlands:

One alternate approach would be to leave some of the coarser material near the inlet intact. The coarser sediment, which is cleaner in nature than the soft sediment, has accumulated over time and built marsh areas, most notable near the inlet. These areas could be left as emergent wetlands/wetland islands and provide a more natural diversity within the pond. By leaving these areas intact the dredge and disposal cost will be reduced as less volume (approximately 10,000 CY) will be removed from the pond. This approach could reduce the overall cost of the project from approximately $8 million to approximately $6.36 million.

Table 4: Phasing Alternative 1 Costs

Dredging Methodologies	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Conventional Dry	$30	40,000 wet	$1,200,000
Disposal Options	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Disposal	$160	40,000 wet (assume 20,000 dry)	$3,200,000
Fixed Costs	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Const. of containment	$10	40,000 wet	$400,000
Dredge Spoil Handling	$10	40,000 wet	$400,000
Restoration of Inst. Park	N/A	N/A	$100,000
Engineering/Permitting Cost	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Eng/Permitting Cost	20%	N/A	$1,060,000
		TOTAL COST	
			$6,360,000

Phasing Alternative 2: Lowering the pond by 6 feet and only dredging the Northern Basin:

If the pond is lowered approximately 6 feet and water is routed around the northern basin of the pond than approximately half the pond can be dewatered. This would leave the lower, deeper portion of the pond inundated during dredging operations. The separation point would be located just northeast of the tennis courts at Institute Park along the narrowest part of the pond (see Figure 9).

N
PARK AVENUE
12
122A
RUMFORD AVENUE
Northern Basin
GROVE STREET
LANCASTER STREET
WEST STREET
SALISBURY STREET
HUMBOLDT AVENUE
FARADAY STREET
BOYNTON STREET
DEAN STREET
WACHUSETT STREET
Northern Basin
Dam Outlet
Path: O:\Worcester\MA\Salisbury Pond Dredging\GIS\maps
orthern basin map.mxd User: higginsm Saved: 2/12/2013 3:11:14 PM Opened: 2/12/2013 3:12:03 PM

Figure 9: Northern Basin Limits

This phased approach would allow the City to dredge the shallowest part of the pond and leave the deeper portion for another time. By deepening the shallowest areas the City can accomplish the goal of returning recreational uses to the pond as well as cleaning up the near shore areas (emergent marshes). This approach reduces the dredged volume to approximately 30,000 CY. This reduction of volume will also reduce the overall cost of the project. This approach could reduce the overall cost of the project from approximately $8 million to approximately $4.8 million.

Table 5: Phasing Alternative 2 Costs

Dredging Methodologies	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Conventional Dry	$30	30,000 wet	$900,000
Disposal Options	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Disposal	$160	30,000 wet (assume 15,000 dry)	$2,400,000
Fixed Costs	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Const. of containment	$10	30,000 wet	$300,000
Dredge Spoil Handling	$10	30,000 wet	$300,000
Restoration of Inst. Park	N/A	N/A	$100,000
Engineering/Permitting Cost	**Cost/CY**	**Sediment Volume (CY)**	**Total**
Eng/Permitting Cost	20%	N/A	$800,000
		TOTAL COST	
			$4,800,000

The costs associated with these phased approaches only consider the actual dredging project. The stormwater controls discussed in Section 10.0 will still need to be installed. This will add approximately $1.2 million to the total costs listed in Table 4 and 5.

13.0 REFERENCES

Mattson, M., Godfrey, P.J., Barletta, R.A. and A. Aiello. (edited by K. Wagner). 2004. Generic Environmental Impact Report for Eutrophication and Aquatic Plant Management in Massachusetts. MADCR/MADEP, Boston, MA

Wagner, 2004. The Practical Guide to Lake Management in Massachusetts. A Companion to the Final Generic Environmental Impact Report on Eutrophication and Aquatic Plant Management in Massachusetts. Prepared for: DEP, DCR, EOEA

APPENDIX A:

Sediment Quality Lab Report

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 24, 2012

Mel Higgins
Weston & Sampson Engineers MA
5 Centennial Drive
Peabody, MA 01960

Project Location: Worcester Salisbury Pond
Client Job Number:
Project Number: [none]
Laboratory Work Order Number: 12J0244

Enclosed are results of analyses for samples received by the laboratory on October 5, 2012. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Meghan E. Kelley
Project Manager

con-test® ANALYTICAL LABORATORY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Weston & Sampson Engineers MA
5 Centennial Drive
Peabody, MA 01960
ATTN: Mel Higgins

REPORT DATE: 10/24/2012

PURCHASE ORDER NUMBER: Worcester-Salisbury

PROJECT NUMBER: [none]

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 12J0244

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Worcester Salisbury Pond

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Comp-1	12J0244-01	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SM 5310B	MA M-MA071/CT PH-0520
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM18-20 2510B	
				SW-846 1311	
				SW-846 6010C	
				SW-846 6020A	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260C	
				SW-846 8270D	
				SW846-8270M	
Comp-2	12J0244-02	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SM 5310B	MA M-MA071/CT PH-0520
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM18-20 2510B	
				SW-846 1311	
				SW-846 6010C	
				SW-846 6020A	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260C	
				SW-846 8270D	
				SW846-8270M	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Weston & Sampson Engineers MA
5 Centennial Drive
Peabody, MA 01960
ATTN: Mel Higgins

REPORT DATE: 10/24/2012

PURCHASE ORDER NUMBER: Worcester-Salisbury

PROJECT NUMBER: [none]

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 12J0244

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Worcester Salisbury Pond

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Comp-3	12J0244-03	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SM 5310B	MA M-MA071/CT PH-0520
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM18-20 2510B	
				SW-846 1311	
				SW-846 6010C	
				SW-846 6020A	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260C	
				SW-846 8270D	
				SW846-8270M	
Soil-1	12J0244-04	Soil		MADEP-EPH-04-1.1	
				SM 2540G	
				SM 5310B	MA M-MA071/CT PH-0520
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM18-20 2510B	
				SW-846 1311	
				SW-846 6010C	
				SW-846 6020A	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260C	
				SW-846 8270D	
				SW846-8270M	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

SW-846 8100 Modified

Qualifications:

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

o-Terphenyl

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3]

SW-846 8260C

Qualifications:

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Vinyl Chloride

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1], B060398-BLK1, B060398-BS1, B060398-BSD1

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD outside of control limits. Reduced precision anticipated for any reported result for this compound.

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene, Naphthalene

B060398-BS1

Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.

Analyte & Samples(s) Qualified:

Bromomethane, Dichlorodifluoromethane (Freon 12)

B060398-BS1, B060398-BSD1

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene, 1,2,4-Trichlorobenzene, Naphthalene, Toluene

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1], B060398-BLK1, B060398-BS1, B060398-BSD1

Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene, Diisopropyl Ether (DIPE), Naphthalene, trans-1,2-Dichloroethylene

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1], B060398-BLK1, B060398-BS1, B060398-BSD1

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy are associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane, 2-Butanone (MEK), Acetone, Tetrahydrofuran

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1], B060398-BLK1, B060398-BS1, B060398-BSD1

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

Acetone

B060398-BS1, B060398-BSD1

SW-846 8270D

Qualifications:

Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.

Analyte & Samples(s) Qualified:

3/4-Methylphenol

B060742-BS1, B060742-BSD1

Elevated reporting limit due to sample matrix interference. Requested reporting limit not met.

Analyte & Samples(s) Qualified:

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1]

One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.

Analyte & Samples(s) Qualified:

2,4,6-Tribromophenol

12J0244-03[Comp-3], 12J0244-04[Soil-1]

Continuing calibration did not meet method specifications and was biased on the high side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the high side.

Analyte & Samples(s) Qualified:

Benzo(g,h,i)perylene, Bis(2-Ethylhexyl)phthalate, Indeno(1,2,3-cd)pyrene

12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1], 12J0244-01[Comp-1]

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

2,4,5-Trichlorophenol, 2,4-Dinitrotoluene, 2-Nitrophenol, 3,3-Dichlorobenzidine, 3/4-Methylphenol, 4-Nitrophenol, Bis(2-Ethylhexyl)phthalate, Butylbenzylphthalate, Di-n-octylphthalate

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1]

SW846-8270M

Qualifications:

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Tetrachloro-m-xylene

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3], 12J0244-04[Soil-1]

Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Cl7-BZ#187, Cl9-BZ#206

12J0244-01[Comp-1], 12J0244-02[Comp-2], 12J0244-03[Comp-3]

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MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C 11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

SW-846 8100 Modified

TPH (C9-C36) is quantitated against a calibration made with a diesel standard.

SW-846 8260C

Laboratory control sample recoveries for required MCP Data Enhancement 8260 compounds were all within limits specified by the method except for “difficult analytes” where recovery control limits of 40-160% are used and/or unless otherwise listed in this narrative. Difficult analytes: MIBK, MEK, acetone, 1,4-dioxane, chloromethane, dichlorodifluoromethane, 2-hexanone, and bromomethane.

SW-846 8270D

Laboratory control sample recoveries for required MCP Data Enhancement 8270 compounds were all within control limits specified by the method, 40-140% for base/neutrals and 30-130% for acids except for “difficult analytes” listed below and/or otherwise listed in this narrative. Difficult analytes limits are 15 and 140%: 2,4-dinitrophenol, 4-chloroaniline, 4-nitrophenol, and phenol.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and 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.

Daren J. Damboragian
Laboratory Manager

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

PCB Congeners in Soil by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Cl2-BZ#8	3.9	1.5	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl3-BZ#18	12	1.5	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl3-BZ#28	14	1.5	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl4-BZ#52	36	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl4-BZ#44	24	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl4-BZ#66	15	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl5-BZ#90/#101	42	6.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl5-BZ#118	30	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl6-BZ#153	53	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl5-BZ#105	12	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl6-BZ#138	43	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl7-BZ#187	26	3.0	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl6-BZ#128/#162	9.5	6.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl7-BZ#180	53	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl7-BZ#170	21	3.0	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl8-BZ#195	6.5	4.5	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl9-BZ#206	ND	4.5	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 12:47	CJM
Cl10-BZ#209	ND	4.5	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM
Summation of NOAA 18 Congeners	400	60	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 12:47	CJM

Surrogates	% Recovery	Recovery Limits	Flag		
Tetrachloro-m-xylene	*	40-140	S-01	10/24/12 12:47	

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.16	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Benzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Bromobenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Bromochloromethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Bromodichloromethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Bromoform	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Bromomethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
2-Butanone (MEK)	ND	0.064	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
n-Butylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
sec-Butylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
tert-Butylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Carbon Disulfide	ND	0.0096	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Carbon Tetrachloride	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Chlorobenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Chlorodibromomethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Chloroethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Chloroform	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Chloromethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
2-Chlorotoluene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
4-Chlorotoluene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2-Dibromoethane (EDB)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Dibromomethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2-Dichlorobenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,3-Dichlorobenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,4-Dichlorobenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1-Dichloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2-Dichloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1-Dichloroethylene	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
cis-1,2-Dichloroethylene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
trans-1,2-Dichloroethylene	ND	0.0032	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2-Dichloropropane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,3-Dichloropropane	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
2,2-Dichloropropane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1-Dichloropropene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
cis-1,3-Dichloropropene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
trans-1,3-Dichloropropene	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Diethyl Ether	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Diisopropyl Ether (DIPE)	ND	0.0016	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,4-Dioxane	ND	0.16	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Ethylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
2-Hexanone (MBK)	ND	0.032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Isopropylbenzene (Cumene)	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Methylene Chloride	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Naphthalene	ND	0.0064	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
n-Propylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Styrene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1,1,2-Tetrachloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1,2,2-Tetrachloroethane	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Tetrachloroethylene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Tetrahydrofuran	ND	0.016	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Toluene	ND	0.0032	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2,3-Trichlorobenzene	ND	0.0032	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2,4-Trichlorobenzene	ND	0.0032	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1,1-Trichloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,1,2-Trichloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Trichloroethylene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Trichlorofluoromethane (Freon 11)	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2,3-Trichloropropane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,2,4-Trimethylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
1,3,5-Trimethylbenzene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
Vinyl Chloride	ND	0.016	mg/Kg dry	1	L-04	SW-846 8260C	10/9/12	10/9/12 11:40	MFF
m+p Xylene	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF
o-Xylene	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 11:40	MFF

Surrogates	% Recovery	Recovery Limits	Flag	
1,2-Dichloroethane-d4	113	70-130		10/9/12 11:40
Toluene-d8	102	70-130		10/9/12 11:40
4-Bromofluorobenzene	96.0	70-130		10/9/12 11:40

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.46	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Acenaphthylene	0.51	0.46	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Acetophenone	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Aniline	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Anthracene	0.51	0.32	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Benzo(a)anthracene	4.6	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Benzo(a)pyrene	5.1	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Benzo(b)fluoranthene	8.3	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Benzo(g,h,i)perylene	2.7	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Benzo(k)fluoranthene	2.7	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Bis(2-chloroethoxy)methane	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Bis(2-chloroethyl)ether	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Bis(2-chloroisopropyl)ether	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Bis(2-Ethylhexyl)phthalate	8.3	3.1	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
4-Bromophenylphenylether	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Butylbenzylphthalate	ND	6.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
4-Chloroaniline	ND	6.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2-Chloronaphthalene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2-Chlorophenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Chrysene	6.5	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Dibenz(a,h)anthracene	0.52	0.32	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Dibenzofuran	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Di-n-butylphthalate	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
1,2-Dichlorobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
1,3-Dichlorobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
1,4-Dichlorobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
3,3-Dichlorobenzidine	ND	1.6	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4-Dichlorophenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Diethylphthalate	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4-Dimethylphenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Dimethylphthalate	ND	6.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4-Dinitrophenol	ND	6.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4-Dinitrotoluene	ND	3.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,6-Dinitrotoluene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Di-n-octylphthalate	ND	6.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Fluoranthene	9.3	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Fluorene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Hexachlorobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Hexachlorobutadiene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Hexachloroethane	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Indeno(1,2,3-cd)pyrene	3.2	1.6	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Isophorone	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2-Methylnaphthalene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
3/4-Methylphenol	ND	3.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Naphthalene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 21:38	BGL
Nitrobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2-Nitrophenol	ND	3.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
4-Nitrophenol	ND	6.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Pentachlorophenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Phenanthrene	5.1	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Phenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
Pyrene	8.2	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
1,2,4-Trichlorobenzene	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4,5-Trichlorophenol	ND	3.1	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:20	CDT
2,4,6-Trichlorophenol	ND	3.1	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:20	CDT

Surrogates	% Recovery	Recovery Limits	Flag	
2-Fluorophenol	111	30-130		10/17/12 18:20
Phenol-d6	114	30-130		10/17/12 18:20
Nitrobenzene-d5	91.5	30-130		10/17/12 18:20
Nitrobenzene-d5	77.3	30-130		10/20/12 21:38
2-Fluorobiphenyl	81.7	30-130		10/20/12 21:38
2-Fluorobiphenyl	80.3	30-130		10/17/12 18:20
2,4,6-Tribromophenol	126	30-130		10/17/12 18:20
Terphenyl-d14	73.4	30-130		10/17/12 18:20
Terphenyl-d14	80.0	30-130		10/20/12 21:38

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	6600	1100	mg/Kg dry	20		SW-846 8100 Modified	10/13/12	10/14/12 15:46	SCS

Surrogates	% Recovery	Recovery Limits	Flag		
o-Terphenyl	*	40-140	S-01		10/14/12 15:46

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	670	110	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
C19-C36 Aliphatics	2400	570	mg/Kg dry	25		MADEP-EPH-04-1.1	10/15/12	10/19/12 11:39	SCS
Unadjusted C11-C22 Aromatics	940	110	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
C11-C22 Aromatics	900	110	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Acenaphthene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Acenaphthylene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Anthracene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Benzo(a)anthracene	4.2	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Benzo(a)pyrene	2.9	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Benzo(b)fluoranthene	4.8	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Benzo(g,h,i)perylene	2.5	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Benzo(k)fluoranthene	1.4	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Chrysene	4.6	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Dibenz(a,h)anthracene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Fluoranthene	6.3	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Fluorene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Indeno(1,2,3-cd)pyrene	2.3	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
2-Methylnaphthalene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Naphthalene	ND	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Phenanthrene	4.2	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS
Pyrene	6.2	1.1	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 10:43	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	81.3	40-140		10/18/12 10:43
o-Terphenyl (OTP)	71.4	40-140		10/18/12 10:43
2-Bromonaphthalene	77.0	40-140		10/18/12 10:43
2-Fluorobiphenyl	81.9	40-140		10/18/12 10:43

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	45	0.55	mg/Kg dry	5		SW-846 6020A	10/6/12	10/9/12 15:04	KSH
Cadmium	3.4	0.14	mg/Kg dry	1		SW-846 6010C	10/6/12	10/9/12 14:56	OP
Chromium	110	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:02	OP
Copper	240	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:02	OP
Lead	500	1.7	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:02	OP
Mercury	0.26	0.056	mg/Kg dry	1		SW-846 7471B	10/8/12	10/8/12 13:09	SAJ
Nickel	64	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:02	OP
Zinc	400	2.2	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:02	OP

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Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Specific conductance	21	2.0	µmhos/cm	1		SM18-20 2510B	10/10/12	10/10/12 17:12	SBP
% Solids	43.4		% Wt	1		SM 2540G	10/8/12	10/9/12 10:41	RH

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

TCLP - Metals Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	0.75	0.010	mg/L	1		SW-846 6010C	10/11/12	10/11/12 15:55	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Total Organic Carbon	63900	100	mg/Kg	1		SM 5310B		10/9/12 0:00	SAL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		%	1		SM D 422-63			GTE

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

PCB Congeners in Soil by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Cl2-BZ#8	7.1	1.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl3-BZ#18	13	1.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl3-BZ#28	15	1.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl4-BZ#52	27	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl4-BZ#44	20	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl4-BZ#66	16	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl5-BZ#90/#101	33	6.2	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl5-BZ#118	27	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl6-BZ#153	50	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl5-BZ#105	9.9	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl6-BZ#138	36	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl7-BZ#187	27	3.1	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl6-BZ#128/#162	7.2	6.2	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl7-BZ#180	54	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl7-BZ#170	20	3.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl8-BZ#195	6.0	4.7	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl9-BZ#206	5.2	4.7	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 14:32	CJM
Cl10-BZ#209	ND	4.7	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM
Summation of NOAA 18 Congeners	370	62	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 14:32	CJM

Surrogates	% Recovery	Recovery Limits	Flag		
Tetrachloro-m-xylene	*	40-140	S-01		10/24/12 14:32

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.16	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Benzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Bromobenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Bromochloromethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Bromodichloromethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Bromoform	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Bromomethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
2-Butanone (MEK)	ND	0.065	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
n-Butylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
sec-Butylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
tert-Butylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Carbon Disulfide	ND	0.0098	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Carbon Tetrachloride	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Chlorobenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Chlorodibromomethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Chloroethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Chloroform	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Chloromethane	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
2-Chlorotoluene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
4-Chlorotoluene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2-Dibromoethane (EDB)	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Dibromomethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2-Dichlorobenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,3-Dichlorobenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,4-Dichlorobenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1-Dichloroethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2-Dichloroethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1-Dichloroethylene	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
cis-1,2-Dichloroethylene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
trans-1,2-Dichloroethylene	ND	0.0033	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2-Dichloropropane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,3-Dichloropropane	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
2,2-Dichloropropane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1-Dichloropropene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
cis-1,3-Dichloropropene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
trans-1,3-Dichloropropene	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Diethyl Ether	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Diisopropyl Ether (DIPE)	ND	0.0016	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,4-Dioxane	ND	0.16	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Ethylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
2-Hexanone (MBK)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Isopropylbenzene (Cumene)	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Methylene Chloride	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Naphthalene	ND	0.0065	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
n-Propylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Styrene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1,1,2-Tetrachloroethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1,2,2-Tetrachloroethane	ND	0.0016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Tetrachloroethylene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Tetrahydrofuran	ND	0.016	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Toluene	ND	0.0033	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2,3-Trichlorobenzene	ND	0.0033	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2,4-Trichlorobenzene	ND	0.0033	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1,1-Trichloroethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,1,2-Trichloroethane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Trichloroethylene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Trichlorofluoromethane (Freon 11)	ND	0.016	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2,3-Trichloropropane	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,2,4-Trimethylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
1,3,5-Trimethylbenzene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
Vinyl Chloride	ND	0.016	mg/Kg dry	1	L-04	SW-846 8260C	10/9/12	10/9/12 12:07	MFF
m+p Xylene	ND	0.0065	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF
o-Xylene	ND	0.0033	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:07	MFF

Surrogates	% Recovery	Recovery Limits	Flag	
1,2-Dichloroethane-d4	121	70-130		10/9/12 12:07
Toluene-d8	105	70-130		10/9/12 12:07
4-Bromofluorobenzene	106	70-130		10/9/12 12:07

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.48	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Acenaphthylene	0.73	0.48	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Acetophenone	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Aniline	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Anthracene	0.40	0.33	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Benzo(a)anthracene	6.1	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Benzo(a)pyrene	6.3	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Benzo(b)fluoranthene	10	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Benzo(g,h,i)perylene	3.2	1.6	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Benzo(k)fluoranthene	3.5	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Bis(2-chloroethoxy)methane	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Bis(2-chloroethyl)ether	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Bis(2-chloroisopropyl)ether	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Bis(2-Ethylhexyl)phthalate	7.7	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
4-Bromophenylphenylether	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Butylbenzylphthalate	ND	6.3	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
4-Chloroaniline	ND	6.3	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2-Chloronaphthalene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2-Chlorophenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Chrysene	8.7	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Dibenz(a,h)anthracene	0.64	0.33	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Dibenzofuran	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Di-n-butylphthalate	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
1,2-Dichlorobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
1,3-Dichlorobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
1,4-Dichlorobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
3,3-Dichlorobenzidine	ND	1.6	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4-Dichlorophenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Diethylphthalate	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4-Dimethylphenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Dimethylphthalate	ND	6.3	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4-Dinitrophenol	ND	6.3	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4-Dinitrotoluene	ND	3.2	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,6-Dinitrotoluene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Di-n-octylphthalate	ND	6.3	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Fluoranthene	12	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Fluorene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Hexachlorobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Hexachlorobutadiene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Hexachloroethane	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Indeno(1,2,3-cd)pyrene	4.0	1.6	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Isophorone	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2-Methylnaphthalene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
3/4-Methylphenol	ND	3.2	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Naphthalene	ND	1.4	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:13	BGL
Nitrobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2-Nitrophenol	ND	3.2	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
4-Nitrophenol	ND	6.3	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Pentachlorophenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Phenanthrene	8.6	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Phenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
Pyrene	13	1.6	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
1,2,4-Trichlorobenzene	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4,5-Trichlorophenol	ND	3.2	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 18:50	CDT
2,4,6-Trichlorophenol	ND	3.2	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 18:50	CDT

Surrogates	% Recovery	Recovery Limits	Flag	
2-Fluorophenol	96.2	30-130		10/17/12 18:50
Phenol-d6	103	30-130		10/17/12 18:50
Nitrobenzene-d5	64.0	30-130		10/20/12 22:13
Nitrobenzene-d5	74.0	30-130		10/17/12 18:50
2-Fluorobiphenyl	72.4	30-130		10/20/12 22:13
2-Fluorobiphenyl	81.2	30-130		10/17/12 18:50
2,4,6-Tribromophenol	123	30-130		10/17/12 18:50
Terphenyl-d14	71.2	30-130		10/17/12 18:50
Terphenyl-d14	72.0	30-130		10/20/12 22:13

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	4700	800	mg/Kg dry	20		SW-846 8100 Modified	10/13/12	10/14/12 16:04	SCS

Surrogates	% Recovery	Recovery Limits	Flag		
o-Terphenyl	*	40-140	S-01		10/14/12 16:04

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	650	120	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
C19-C36 Aliphatics	2400	600	mg/Kg dry	25		MADEP-EPH-04-1.1	10/18/12	10/21/12 11:32	SCS
Unadjusted C11-C22 Aromatics	1400	120	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
C11-C22 Aromatics	1300	120	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Acenaphthene	ND	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Acenaphthylene	ND	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Anthracene	2.0	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Benzo(a)anthracene	4.7	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Benzo(a)pyrene	4.7	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Benzo(b)fluoranthene	8.9	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Benzo(g,h,i)perylene	3.5	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Benzo(k)fluoranthene	3.7	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Chrysene	6.8	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Dibenz(a,h)anthracene	ND	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Fluoranthene	16	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Fluorene	ND	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Indeno(1,2,3-cd)pyrene	3.9	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
2-Methylnaphthalene	1.6	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Naphthalene	ND	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Phenanthrene	9.2	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS
Pyrene	14	1.2	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 9:44	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	57.1	40-140		10/21/12 9:44
o-Terphenyl (OTP)	68.9	40-140		10/21/12 9:44
2-Bromonaphthalene	82.4	40-140		10/21/12 9:44
2-Fluorobiphenyl	90.2	40-140		10/21/12 9:44

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	64	0.57	mg/Kg dry	5		SW-846 6020A	10/6/12	10/9/12 15:07	KSH
Cadmium	5.8	0.15	mg/Kg dry	1		SW-846 6010C	10/6/12	10/9/12 15:16	OP
Chromium	110	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:07	OP
Copper	290	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:07	OP
Lead	530	1.7	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:07	OP
Mercury	0.31	0.059	mg/Kg dry	1		SW-846 7471B	10/8/12	10/8/12 13:10	SAJ
Nickel	82	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:07	OP
Zinc	580	2.3	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:07	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Specific conductance	17	2.0	µmhos/cm	1		SM18-20 2510B	10/10/12	10/10/12 17:12	SBP
% Solids	41.6		% Wt	1		SM 2540G	10/8/12	10/9/12 10:41	RH

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

TCLP - Metals Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	1.3	0.010	mg/L	1		SW-846 6010C	10/11/12	10/11/12 16:17	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Total Organic Carbon	89800	100	mg/Kg	1		SM 5310B		10/9/12 0:00	SAL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-2 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		%	1		SM D 422-63			GTE

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

PCB Congeners in Soil by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Cl2-BZ#8	2.3	1.3	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl3-BZ#18	3.9	1.3	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl3-BZ#28	5.7	1.3	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl4-BZ#52	11	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl4-BZ#44	8.6	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl4-BZ#66	5.7	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl5-BZ#90/#101	14	5.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl5-BZ#118	11	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl6-BZ#153	27	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl5-BZ#105	4.3	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl6-BZ#138	19	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl7-BZ#187	16	2.6	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl6-BZ#128/#162	ND	5.1	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl7-BZ#180	31	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl7-BZ#170	12	2.6	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl8-BZ#195	ND	3.9	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl9-BZ#206	ND	3.9	µg/Kg dry	20	V-05	SW846-8270M	10/8/12	10/24/12 16:17	CJM
Cl10-BZ#209	ND	3.9	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM
Summation of NOAA 18 Congeners	180	51	µg/Kg dry	20		SW846-8270M	10/8/12	10/24/12 16:17	CJM

Surrogates	% Recovery	Recovery Limits	Flag	
Tetrachloro-m-xylene	*	40-140	S-01	10/24/12 16:17

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.11	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Benzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Bromobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Bromochloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Bromodichloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Bromoform	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Bromomethane	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
2-Butanone (MEK)	ND	0.044	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
n-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
sec-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
tert-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Carbon Disulfide	ND	0.0066	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Carbon Tetrachloride	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Chlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Chlorodibromomethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Chloroethane	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Chloroform	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Chloromethane	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
2-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
4-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2-Dibromoethane (EDB)	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Dibromomethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,3-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,4-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1-Dichloroethylene	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
cis-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
trans-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,3-Dichloropropane	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
2,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1-Dichloropropene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
cis-1,3-Dichloropropene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
trans-1,3-Dichloropropene	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Diethyl Ether	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Diisopropyl Ether (DIPE)	ND	0.0011	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,4-Dioxane	ND	0.11	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Ethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
2-Hexanone (MBK)	ND	0.022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Isopropylbenzene (Cumene)	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Methylene Chloride	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Naphthalene	ND	0.0044	mg/Kg dry	1	V-05, R-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
n-Propylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Styrene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1,1,2-Tetrachloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1,2,2-Tetrachloroethane	ND	0.0011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Tetrachloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Tetrahydrofuran	ND	0.011	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Toluene	ND	0.0022	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2,3-Trichlorobenzene	ND	0.0022	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2,4-Trichlorobenzene	ND	0.0022	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1,1-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,1,2-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Trichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Trichlorofluoromethane (Freon 11)	ND	0.011	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2,3-Trichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,2,4-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
1,3,5-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
Vinyl Chloride	ND	0.011	mg/Kg dry	1	L-04	SW-846 8260C	10/9/12	10/9/12 12:34	MFF
m+p Xylene	ND	0.0044	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF
o-Xylene	ND	0.0022	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 12:34	MFF

Surrogates	% Recovery	Recovery Limits	Flag	
1,2-Dichloroethane-d4	127	70-130		10/9/12 12:34
Toluene-d8	98.7	70-130		10/9/12 12:34
4-Bromofluorobenzene	105	70-130		10/9/12 12:34

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	1.1	0.41	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:48	BGL
Acenaphthylene	ND	0.41	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:48	BGL
Acetophenone	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Aniline	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Anthracene	2.5	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Benzo(a)anthracene	10	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Benzo(a)pyrene	10	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Benzo(b)fluoranthene	15	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Benzo(g,h,i)perylene	4.8	1.4	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Benzo(k)fluoranthene	5.3	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Bis(2-chloroethoxy)methane	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Bis(2-chloroethyl)ether	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Bis(2-chloroisopropyl)ether	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Bis(2-Ethylhexyl)phthalate	9.3	2.8	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
4-Bromophenylphenylether	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Butylbenzylphthalate	ND	5.4	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
4-Chloroaniline	ND	5.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2-Chloronaphthalene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2-Chlorophenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Chrysene	13	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Dibenz(a,h)anthracene	1.1	0.29	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:48	BGL
Dibenzofuran	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Di-n-butylphthalate	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
1,2-Dichlorobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
1,3-Dichlorobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
1,4-Dichlorobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
3,3-Dichlorobenzidine	ND	1.4	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4-Dichlorophenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Diethylphthalate	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4-Dimethylphenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Dimethylphthalate	ND	5.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4-Dinitrophenol	ND	5.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4-Dinitrotoluene	ND	2.8	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,6-Dinitrotoluene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Di-n-octylphthalate	ND	5.4	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Fluoranthene	21	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Fluorene	1.7	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Hexachlorobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Hexachlorobutadiene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Hexachloroethane	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Indeno(1,2,3-cd)pyrene	5.6	1.4	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Isophorone	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2-Methylnaphthalene	ND	1.2	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:48	BGL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
3/4-Methylphenol	ND	2.8	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Naphthalene	ND	1.2	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 22:48	BGL
Nitrobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2-Nitrophenol	ND	2.8	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
4-Nitrophenol	ND	5.4	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Pentachlorophenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Phenanthrene	15	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Phenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
Pyrene	19	1.4	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
1,2,4-Trichlorobenzene	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4,5-Trichlorophenol	ND	2.8	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:20	CDT
2,4,6-Trichlorophenol	ND	2.8	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:20	CDT

Surrogates	% Recovery		Recovery Limits	Flag	
2-Fluorophenol	86.0		30-130		10/17/12 19:20
Phenol-d6	88.0		30-130		10/17/12 19:20
Nitrobenzene-d5	72.0		30-130		10/17/12 19:20
Nitrobenzene-d5	62.0		30-130		10/20/12 22:48
2-Fluorobiphenyl	79.7		30-130		10/17/12 19:20
2-Fluorobiphenyl	68.3		30-130		10/20/12 22:48
2,4,6-Tribromophenol	**132**	*	30-130	S-07	10/17/12 19:20
Terphenyl-d14	74.7		30-130		10/20/12 22:48
Terphenyl-d14	72.1		30-130		10/17/12 19:20

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	3300	690	mg/Kg dry	20		SW-846 8100 Modified	10/13/12	10/14/12 16:21	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
o-Terphenyl	*	40-140	S-01	10/14/12 16:21

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	210	100	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
C19-C36 Aliphatics	1800	520	mg/Kg dry	25		MADEP-EPH-04-1.1	10/18/12	10/21/12 11:11	SCS
Unadjusted C11-C22 Aromatics	1000	100	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
C11-C22 Aromatics	850	100	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Acenaphthene	1.5	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Acenaphthylene	ND	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Anthracene	2.4	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Benzo(a)anthracene	14	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Benzo(a)pyrene	10	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Benzo(b)fluoranthene	16	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Benzo(g,h,i)perylene	9.6	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Benzo(k)fluoranthene	8.9	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Chrysene	14	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Dibenz(a,h)anthracene	2.7	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Fluoranthene	29	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Fluorene	1.8	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Indeno(1,2,3-cd)pyrene	8.6	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
2-Methylnaphthalene	ND	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Naphthalene	ND	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Phenanthrene	18	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS
Pyrene	25	1.0	mg/Kg dry	5		MADEP-EPH-04-1.1	10/18/12	10/21/12 10:05	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	68.7	40-140		10/21/12 10:05
o-Terphenyl (OTP)	73.1	40-140		10/21/12 10:05
2-Bromonaphthalene	84.0	40-140		10/21/12 10:05
2-Fluorobiphenyl	91.1	40-140		10/21/12 10:05

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	35	0.48	mg/Kg dry	5		SW-846 6020A	10/6/12	10/9/12 15:11	KSH
Cadmium	2.8	0.13	mg/Kg dry	1		SW-846 6010C	10/6/12	10/9/12 15:20	OP
Chromium	49	0.96	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:11	OP
Copper	140	0.96	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:11	OP
Lead	220	1.4	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:11	OP
Mercury	0.21	0.052	mg/Kg dry	1		SW-846 7471B	10/8/12	10/8/12 13:12	SAJ
Nickel	45	0.96	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:11	OP
Zinc	290	1.9	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:11	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Specific conductance	14	2.0	µmhos/cm	1		SM18-20 2510B	10/10/12	10/10/12 17:12	SBP
% Solids	48.0		% Wt	1		SM 2540G	10/8/12	10/9/12 10:41	RH

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

TCLP - Metals Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	0.40	0.010	mg/L	1		SW-846 6010C	10/11/12	10/11/12 16:23	OP

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Total Organic Carbon	92900	100	mg/Kg	1		SM 5310B		10/9/12 0:00	SAL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Comp-3 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		%	1		SM D 422-63			GTE

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

PCB Congeners in Soil by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Cl2-BZ#8	ND	0.18	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl3-BZ#18	ND	0.18	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl3-BZ#28	ND	0.18	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl4-BZ#52	0.49	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl4-BZ#44	ND	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl4-BZ#66	ND	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl5-BZ#90/#101	0.78	0.72	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl5-BZ#118	0.59	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl6-BZ#153	1.2	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl5-BZ#105	ND	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl6-BZ#138	0.84	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl7-BZ#187	0.67	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl6-BZ#128/#162	ND	0.72	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl7-BZ#180	1.4	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl7-BZ#170	0.43	0.36	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl8-BZ#195	ND	0.54	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl9-BZ#206	ND	0.54	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Cl10-BZ#209	ND	0.54	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM
Summation of NOAA 18 Congeners	7.5	7.2	µg/Kg dry	5		SW846-8270M	10/8/12	10/18/12 12:03	CJM

Surrogates	% Recovery	Recovery Limits	Flag	
Tetrachloro-m-xylene	*	40-140	S-01	10/18/12 12:03

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.032	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Benzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Bromobenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Bromochloromethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Bromodichloromethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Bromoform	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Bromomethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
2-Butanone (MEK)	ND	0.013	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
n-Butylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
sec-Butylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
tert-Butylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Carbon Disulfide	ND	0.0019	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Carbon Tetrachloride	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Chlorobenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Chlorodibromomethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Chloroethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Chloroform	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Chloromethane	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
2-Chlorotoluene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
4-Chlorotoluene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2-Dibromoethane (EDB)	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Dibromomethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2-Dichlorobenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,3-Dichlorobenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,4-Dichlorobenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1-Dichloroethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2-Dichloroethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1-Dichloroethylene	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
cis-1,2-Dichloroethylene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
trans-1,2-Dichloroethylene	ND	0.00064	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2-Dichloropropane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,3-Dichloropropane	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
2,2-Dichloropropane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1-Dichloropropene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
cis-1,3-Dichloropropene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
trans-1,3-Dichloropropene	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Diethyl Ether	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Diisopropyl Ether (DIPE)	ND	0.00032	mg/Kg dry	1	V-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,4-Dioxane	ND	0.032	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Ethylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
2-Hexanone (MBK)	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Isopropylbenzene (Cumene)	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Methylene Chloride	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.0064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Naphthalene	ND	0.0013	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
n-Propylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Styrene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1,1,2-Tetrachloroethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1,2,2-Tetrachloroethane	ND	0.00032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Tetrachloroethylene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Tetrahydrofuran	ND	0.0032	mg/Kg dry	1	V-16	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Toluene	ND	0.00064	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2,3-Trichlorobenzene	ND	0.00064	mg/Kg dry	1	R-05, V-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2,4-Trichlorobenzene	ND	0.00064	mg/Kg dry	1	R-05	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1,1-Trichloroethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,1,2-Trichloroethane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Trichloroethylene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Trichlorofluoromethane (Freon 11)	ND	0.0032	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2,3-Trichloropropane	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,2,4-Trimethylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
1,3,5-Trimethylbenzene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
Vinyl Chloride	ND	0.0032	mg/Kg dry	1	L-04	SW-846 8260C	10/9/12	10/9/12 13:01	MFF
m+p Xylene	ND	0.0013	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF
o-Xylene	ND	0.00064	mg/Kg dry	1		SW-846 8260C	10/9/12	10/9/12 13:01	MFF

Surrogates	% Recovery	Recovery Limits	Flag	
1,2-Dichloroethane-d4	120	70-130		10/9/12 13:01
Toluene-d8	96.2	70-130		10/9/12 13:01
4-Bromofluorobenzene	96.6	70-130		10/9/12 13:01

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.11	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Acenaphthylene	ND	0.11	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Acetophenone	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Aniline	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Anthracene	0.10	0.079	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Benzo(a)anthracene	1.1	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Benzo(a)pyrene	0.88	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Benzo(b)fluoranthene	1.3	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Benzo(g,h,i)perylene	0.39	0.38	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Benzo(k)fluoranthene	0.41	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Bis(2-chloroethoxy)methane	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Bis(2-chloroethyl)ether	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Bis(2-chloroisopropyl)ether	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
4-Bromophenylphenylether	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Butylbenzylphthalate	ND	1.5	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
4-Chloroaniline	ND	1.5	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2-Chloronaphthalene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2-Chlorophenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Chrysene	1.2	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Dibenz(a,h)anthracene	ND	0.079	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Dibenzofuran	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Di-n-butylphthalate	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
1,2-Dichlorobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
1,3-Dichlorobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
1,4-Dichlorobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
3,3-Dichlorobenzidine	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4-Dichlorophenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Diethylphthalate	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4-Dimethylphenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Dimethylphthalate	ND	1.5	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4-Dinitrophenol	ND	1.5	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4-Dinitrotoluene	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,6-Dinitrotoluene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Di-n-octylphthalate	ND	1.5	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Fluoranthene	1.8	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Fluorene	ND	0.34	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Hexachlorobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Hexachlorobutadiene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Hexachloroethane	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Indeno(1,2,3-cd)pyrene	0.51	0.38	mg/Kg dry	1	V-06	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Isophorone	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2-Methylnaphthalene	ND	0.34	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
3/4-Methylphenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Naphthalene	ND	0.34	mg/Kg dry	5		SW-846 8270D	10/13/12	10/20/12 23:22	BGL
Nitrobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2-Nitrophenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
4-Nitrophenol	ND	1.5	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Pentachlorophenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Phenanthrene	1.4	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Phenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
Pyrene	2.1	0.38	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
1,2,4-Trichlorobenzene	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4,5-Trichlorophenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/13/12	10/17/12 19:49	CDT
2,4,6-Trichlorophenol	ND	0.76	mg/Kg dry	1		SW-846 8270D	10/13/12	10/17/12 19:49	CDT

Surrogates	% Recovery		Recovery Limits	Flag	
2-Fluorophenol	104		30-130		10/17/12 19:49
Phenol-d6	110		30-130		10/17/12 19:49
Nitrobenzene-d5	78.5		30-130		10/20/12 23:22
Nitrobenzene-d5	92.1		30-130		10/17/12 19:49
2-Fluorobiphenyl	82.3		30-130		10/20/12 23:22
2-Fluorobiphenyl	100		30-130		10/17/12 19:49
2,4,6-Tribromophenol	**148**	*	30-130	S-07	10/17/12 19:49
Terphenyl-d14	89.4		30-130		10/20/12 23:22
Terphenyl-d14	126		30-130		10/17/12 19:49

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	380	190	mg/Kg dry	10		SW-846 8100 Modified	10/13/12	10/14/12 16:38	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
o-Terphenyl	80.2	40-140		10/14/12 16:38

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	75	56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
C19-C36 Aliphatics	170	56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Unadjusted C11-C22 Aromatics	260	56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
C11-C22 Aromatics	240	56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Acenaphthene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Acenaphthylene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Benzo(a)anthracene	0.70	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Benzo(a)pyrene	1.6	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Benzo(b)fluoranthene	1.6	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Benzo(g,h,i)perylene	1.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Benzo(k)fluoranthene	0.67	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Chrysene	1.2	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Dibenz(a,h)anthracene	ND	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Fluoranthene	1.6	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Fluorene	1.3	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Indeno(1,2,3-cd)pyrene	0.76	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
2-Methylnaphthalene	0.63	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Naphthalene	0.56	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Phenanthrene	2.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS
Pyrene	2.1	0.56	mg/Kg dry	5		MADEP-EPH-04-1.1	10/15/12	10/18/12 8:48	SCS

Surrogates	% Recovery	Recovery Limits	Flag	
Chlorooctadecane (COD)	113	40-140		10/18/12 8:48
o-Terphenyl (OTP)	99.1	40-140		10/18/12 8:48
2-Bromonaphthalene	80.5	40-140		10/18/12 8:48
2-Fluorobiphenyl	86.4	40-140		10/18/12 8:48

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	14	0.28	mg/Kg dry	5		SW-846 6020A	10/6/12	10/9/12 15:14	KSH
Cadmium	0.48	0.068	mg/Kg dry	1		SW-846 6010C	10/6/12	10/9/12 15:23	OP
Chromium	23	0.56	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:16	OP
Copper	33	0.56	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:16	OP
Lead	64	0.84	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:16	OP
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	10/8/12	10/8/12 13:14	SAJ
Nickel	13	0.56	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:16	OP
Zinc	90	1.1	mg/Kg dry	1		SW-846 6010C	10/6/12	10/8/12 15:16	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Specific conductance	4.8	2.0	µmhos/cm	1		SM18-20 2510B	10/10/12	10/10/12 17:12	SBP
% Solids	89.0		% Wt	1		SM 2540G	10/8/12	10/9/12 10:41	RH

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

TCLP - Metals Analyses

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Lead	0.20	0.010	mg/L	1		SW-846 6010C	10/11/12	10/11/12 16:29	OP

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
Total Organic Carbon	4800	100	mg/Kg	1		SM 5310B		10/9/12 0:00	SAL

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Project Location: Worcester Salisbury Pond | Sample Description: | Work Order: 12J0244

Date Received: 10/5/2012

Field Sample #: Soil-1 | Sampled: 10/5/2012 00:00

Sample ID: 12J0244-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-8

Analyte	Results	RL	Units	Dilution	Flag	Method	Date Prepared	Date/Time Analyzed	Analyst
See Attached Subcontracted Report	-		%	1		SM D 422-63			GTE

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060774	20.1	2.00	10/15/12
12J0244-04 [Soil-1]	B060774	20.0	2.00	10/15/12

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-02RE1 [Comp-2]	B061078	20.0	2.00	10/18/12
12J0244-03RE1 [Comp-3]	B061078	20.2	2.00	10/18/12

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
12J0244-01 [Comp-1]	B060360	10/08/12
12J0244-02 [Comp-2]	B060360	10/08/12
12J0244-03 [Comp-3]	B060360	10/08/12
12J0244-04 [Soil-1]	B060360	10/08/12

SM18-20 2510B

Lab Number [Field ID]	Batch	Initial [g]	Date
12J0244-01 [Comp-1]	B060530	1.00	10/10/12
12J0244-02 [Comp-2]	B060530	1.00	10/10/12
12J0244-03 [Comp-3]	B060530	1.00	10/10/12
12J0244-04 [Soil-1]	B060530	1.00	10/10/12

Prep Method: SW-846 3050B-SW-846 6010C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060275	1.04	50.0	10/06/12
12J0244-02 [Comp-2]	B060275	1.06	50.0	10/06/12
12J0244-03 [Comp-3]	B060275	1.08	50.0	10/06/12
12J0244-04 [Soil-1]	B060275	1.01	50.0	10/06/12

Prep Method: SW-846 3050B-SW-846 6010C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060278	2.08	25.0	10/06/12
12J0244-02 [Comp-2]	B060278	2.02	25.0	10/06/12
12J0244-03 [Comp-3]	B060278	2.05	25.0	10/06/12
12J0244-04 [Soil-1]	B060278	2.05	25.0	10/06/12

Prep Method: SW-846 3010A-SW-846 6010C **Leachates were extracted on 10/10/2012 per SW-846 1311 in Batch B060497**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
12J0244-01 [Comp-1]	B060550	50.0	50.0	10/11/12
12J0244-02 [Comp-2]	B060550	50.0	50.0	10/11/12
12J0244-03 [Comp-3]	B060550	50.0	50.0	10/11/12

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Sample Extraction Data

Prep Method: SW-846 3010A-SW-846 6010C **Leachates were extracted on 10/10/2012 per SW-846 1311 in Batch B060497**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
12J0244-04 [Soil-1]	B060550	50.0	50.0	10/11/12

Prep Method: SW-846 3050B-SW-846 6020A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060276	1.04	50.0	10/06/12
12J0244-02 [Comp-2]	B060276	1.06	50.0	10/06/12
12J0244-03 [Comp-3]	B060276	1.08	50.0	10/06/12
12J0244-04 [Soil-1]	B060276	1.01	50.0	10/06/12

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060259	0.618	50.0	10/08/12
12J0244-02 [Comp-2]	B060259	0.609	50.0	10/08/12
12J0244-03 [Comp-3]	B060259	0.604	50.0	10/08/12
12J0244-04 [Soil-1]	B060259	0.605	50.0	10/08/12

Prep Method: SW-846 3546-SW-846 8100 Modified

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060726	15.1	1.50	10/13/12
12J0244-02 [Comp-2]	B060726	15.0	1.00	10/13/12
12J0244-03 [Comp-3]	B060726	15.0	1.00	10/13/12
12J0244-04 [Soil-1]	B060726	15.0	1.00	10/13/12

Prep Method: SW-846 5035-SW-846 8260C

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060398	7.23	10.0	10/09/12
12J0244-02 [Comp-2]	B060398	7.38	10.0	10/09/12
12J0244-03 [Comp-3]	B060398	9.40	10.0	10/09/12
12J0244-04 [Soil-1]	B060398	17.5	10.0	10/09/12

Prep Method: SW-846 3546-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060742	15.0	2.00	10/13/12
12J0244-02 [Comp-2]	B060742	15.1	2.00	10/13/12
12J0244-03 [Comp-3]	B060742	15.3	2.00	10/13/12
12J0244-04 [Soil-1]	B060742	30.0	2.00	10/13/12

Prep Method: SW-846 3546-SW846-8270M

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-01 [Comp-1]	B060317	30.7	1.00	10/08/12
12J0244-02 [Comp-2]	B060317	30.9	1.00	10/08/12

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Sample Extraction Data

Prep Method: SW-846 3546-SW846-8270M

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
12J0244-03 [Comp-3]	B060317	32.4	1.00	10/08/12
12J0244-04 [Soil-1]	B060317	31.1	1.00	10/08/12

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QUALITY CONTROL

PCB Congeners in Soil by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060317 - SW-846 3546										
Blank (B060317-BLK1)				Prepared: 10/08/12 Analyzed: 10/12/12						
Cl2-BZ#8	ND	0.033	µg/Kg wet							
Cl3-BZ#18	ND	0.033	µg/Kg wet							
Cl3-BZ#28	ND	0.033	µg/Kg wet							
Cl4-BZ#52	ND	0.066	µg/Kg wet							
Cl4-BZ#44	ND	0.066	µg/Kg wet							
Cl4-BZ#66	ND	0.066	µg/Kg wet							
Cl5-BZ#90/#101	ND	0.13	µg/Kg wet							
Cl5-BZ#118	ND	0.066	µg/Kg wet							
Cl6-BZ#153	ND	0.066	µg/Kg wet							
Cl5-BZ#105	ND	0.066	µg/Kg wet							
Cl6-BZ#138	ND	0.066	µg/Kg wet							
Cl7-BZ#187	ND	0.066	µg/Kg wet							
Cl6-BZ#128/#162	ND	0.13	µg/Kg wet							
Cl7-BZ#180	ND	0.066	µg/Kg wet							
Cl7-BZ#170	ND	0.066	µg/Kg wet							
Cl8-BZ#195	ND	0.099	µg/Kg wet							
Cl9-BZ#206	ND	0.099	µg/Kg wet							
Cl10-BZ#209	ND	0.099	µg/Kg wet							
Summation of NOAA 18 Congeners	ND	1.3	µg/Kg wet							
Surrogate: Tetrachloro-m-xylene	*0.321*		µg/Kg wet	0.330		97.3	40-140			
LCS (B060317-BS1)				Prepared: 10/08/12 Analyzed: 10/12/12						
Cl2-BZ#8	1.47	0.033	µg/Kg wet	1.64		89.9	40-140			
Cl3-BZ#18	1.52	0.033	µg/Kg wet	1.64		92.5	40-140			
Cl3-BZ#28	1.27	0.033	µg/Kg wet	1.64		77.5	40-140			
Cl4-BZ#52	1.35	0.066	µg/Kg wet	1.64		82.5	40-140			
Cl4-BZ#44	1.43	0.066	µg/Kg wet	1.64		87.4	40-140			
Cl4-BZ#66	1.24	0.066	µg/Kg wet	1.64		75.8	40-140			
Cl5-BZ#90/#101	1.57	0.13	µg/Kg wet	1.64		96.0	40-140			
Cl5-BZ#118	1.73	0.066	µg/Kg wet	1.64		106	40-140			
Cl6-BZ#153	1.59	0.066	µg/Kg wet	1.64		97.1	40-140			
Cl5-BZ#105	1.46	0.066	µg/Kg wet	1.64		88.9	40-140			
Cl6-BZ#138	1.41	0.066	µg/Kg wet	1.64		85.8	40-140			
Cl7-BZ#187	1.40	0.066	µg/Kg wet	1.64		85.4	40-140			
Cl6-BZ#128/#162	1.12	0.13	µg/Kg wet	1.64		68.0	40-140			
Cl7-BZ#180	1.49	0.066	µg/Kg wet	1.64		90.9	40-140			
Cl7-BZ#170	1.30	0.066	µg/Kg wet	1.64		79.6	40-140			
Cl8-BZ#195	1.47	0.098	µg/Kg wet	1.64		89.5	40-140			
Cl9-BZ#206	1.56	0.098	µg/Kg wet	1.64		94.9	40-140			
Cl10-BZ#209	1.43	0.098	µg/Kg wet	1.64		87.2	40-140			
Summation of NOAA 18 Congeners	24.4	1.3	µg/Kg wet	29.5		82.6	40-140			
Surrogate: Tetrachloro-m-xylene	*0.404*		µg/Kg wet	0.328		123	40-140			

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QUALITY CONTROL

PCB Congeners in Soil by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060317 - SW-846 3546										
LCS Dup (B060317-BSD1)				Prepared: 10/08/12 Analyzed: 10/12/12						
Cl2-BZ#8	1.47	0.032	µg/Kg wet	1.62		90.4	40-140	0.493	30	
Cl3-BZ#18	1.51	0.032	µg/Kg wet	1.62		92.9	40-140	0.631	30	
Cl3-BZ#28	1.20	0.032	µg/Kg wet	1.62		73.9	40-140	5.79	30	
Cl4-BZ#52	1.26	0.065	µg/Kg wet	1.62		77.9	40-140	6.76	30	
Cl4-BZ#44	1.36	0.065	µg/Kg wet	1.62		83.9	40-140	5.04	30	
Cl4-BZ#66	1.19	0.065	µg/Kg wet	1.62		73.4	40-140	4.25	30	
Cl5-BZ#90/#101	1.50	0.13	µg/Kg wet	1.62		92.4	40-140	4.86	30	
Cl5-BZ#118	1.70	0.065	µg/Kg wet	1.62		105	40-140	1.88	30	
Cl6-BZ#153	1.58	0.065	µg/Kg wet	1.62		97.4	40-140	0.683	30	
Cl5-BZ#105	1.43	0.065	µg/Kg wet	1.62		88.3	40-140	1.64	30	
Cl6-BZ#138	1.39	0.065	µg/Kg wet	1.62		85.7	40-140	1.07	30	
Cl7-BZ#187	1.38	0.065	µg/Kg wet	1.62		85.2	40-140	1.24	30	
Cl6-BZ#128/#162	1.11	0.13	µg/Kg wet	1.62		68.5	40-140	0.328	30	
Cl7-BZ#180	1.54	0.065	µg/Kg wet	1.62		94.8	40-140	3.17	30	
Cl7-BZ#170	1.36	0.065	µg/Kg wet	1.62		83.5	40-140	3.85	30	
Cl8-BZ#195	1.39	0.097	µg/Kg wet	1.62		85.9	40-140	5.01	30	
Cl9-BZ#206	1.53	0.097	µg/Kg wet	1.62		94.0	40-140	1.89	30	
Cl10-BZ#209	1.43	0.097	µg/Kg wet	1.62		87.9	40-140	0.243	30	
Summation of NOAA 18 Congeners	23.9	1.3	µg/Kg wet	29.2		81.8	40-140	1.98	30	
Surrogate: Tetrachloro-m-xylene	*0.355*		µg/Kg wet	0.325		109	40-140			
Matrix Spike (B060317-MS1)		**Source: 12J0244-04**		Prepared: 10/08/12 Analyzed: 10/18/12						
Cl2-BZ#8	1.51	0.17	µg/Kg dry	1.71	ND	88.1	40-140			
Cl3-BZ#18	1.55	0.17	µg/Kg dry	1.71	0.0526	87.7	40-140			
Cl3-BZ#28	1.59	0.17	µg/Kg dry	1.71	0.0892	87.8	40-140			
Cl4-BZ#52	1.68	0.34	µg/Kg dry	1.71	0.486	69.5	40-140			
Cl4-BZ#44	1.64	0.34	µg/Kg dry	1.71	0.303	78.0	40-140			
Cl4-BZ#66	1.37	0.34	µg/Kg dry	1.71	0.227	66.6	40-140			
Cl5-BZ#90/#101	2.15	0.68	µg/Kg dry	1.71	0.781	80.0	40-140			
Cl5-BZ#118	2.11	0.34	µg/Kg dry	1.71	0.591	88.7	40-140			
Cl6-BZ#153	2.69	0.34	µg/Kg dry	1.71	1.18	88.0	40-140			
Cl5-BZ#105	1.43	0.34	µg/Kg dry	1.71	ND	83.5	40-140			
Cl6-BZ#138	2.17	0.34	µg/Kg dry	1.71	0.839	77.7	40-140			
Cl7-BZ#187	1.87	0.34	µg/Kg dry	1.71	0.669	70.0	40-140			
Cl6-BZ#128/#162	1.17	0.68	µg/Kg dry	1.71	ND	68.3	40-140			
Cl7-BZ#180	2.79	0.34	µg/Kg dry	1.71	1.41	80.7	40-140			
Cl7-BZ#170	1.70	0.34	µg/Kg dry	1.71	0.433	73.9	40-140			
Cl8-BZ#195	1.48	0.51	µg/Kg dry	1.71	ND	86.3	40-140			
Cl9-BZ#206	1.50	0.51	µg/Kg dry	1.71	ND	87.3	40-140			
Cl10-BZ#209	1.25	0.51	µg/Kg dry	1.71	ND	72.9	40-140			
Summation of NOAA 18 Congeners	30.4	6.8	µg/Kg dry	30.8	7.48	74.3	40-140			
Surrogate: Tetrachloro-m-xylene	*0.254*		µg/Kg dry	0.343		74.1	40-140			

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QUALITY CONTROL

PCB Congeners in Soil by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060317 - SW-846 3546										
Matrix Spike Dup (B060317-MSD1)	**Source: 12J0244-04**			Prepared: 10/08/12 Analyzed: 10/18/12						
Cl2-BZ#8	1.55	0.18	µg/Kg dry	1.78	ND	86.7	40-140	2.45	50	
Cl3-BZ#18	1.66	0.18	µg/Kg dry	1.78	0.0526	90.0	40-140	6.43	50	
Cl3-BZ#28	1.61	0.18	µg/Kg dry	1.78	0.0892	85.0	40-140	0.820	50	
Cl4-BZ#52	1.87	0.36	µg/Kg dry	1.78	0.486	77.5	40-140	10.8	50	
Cl4-BZ#44	1.84	0.36	µg/Kg dry	1.78	0.303	85.9	40-140	11.3	50	
Cl4-BZ#66	1.47	0.36	µg/Kg dry	1.78	0.227	69.7	40-140	7.32	50	
Cl5-BZ#90/#101	2.13	0.71	µg/Kg dry	1.78	0.781	75.8	40-140	0.842	50	
Cl5-BZ#118	2.12	0.36	µg/Kg dry	1.78	0.591	86.0	40-140	0.660	50	
Cl6-BZ#153	2.72	0.36	µg/Kg dry	1.78	1.18	86.4	40-140	1.21	50	
Cl5-BZ#105	1.49	0.36	µg/Kg dry	1.78	ND	83.8	40-140	4.37	50	
Cl6-BZ#138	2.24	0.36	µg/Kg dry	1.78	0.839	78.3	40-140	2.97	50	
Cl7-BZ#187	1.94	0.36	µg/Kg dry	1.78	0.669	71.3	40-140	3.87	50	
Cl6-BZ#128/#162	1.22	0.71	µg/Kg dry	1.78	ND	68.5	40-140	4.28	50	
Cl7-BZ#180	2.94	0.36	µg/Kg dry	1.78	1.41	85.8	40-140	5.16	50	
Cl7-BZ#170	1.70	0.36	µg/Kg dry	1.78	0.433	70.8	40-140	0.189	50	
Cl8-BZ#195	1.53	0.54	µg/Kg dry	1.78	ND	85.7	40-140	3.33	50	
Cl9-BZ#206	1.60	0.54	µg/Kg dry	1.78	ND	89.9	40-140	6.93	50	
Cl10-BZ#209	1.39	0.54	µg/Kg dry	1.78	ND	78.1	40-140	11.0	50	
Summation of NOAA 18 Congeners	31.6	7.1	µg/Kg dry	32.1	7.48	75.2	40-140	3.97	50	
Surrogate: Tetrachloro-m-xylene	*0.345*		µg/Kg dry	0.357		96.7	40-140			

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060398 - SW-846 5035										
Blank (B060398-BLK1)				Prepared & Analyzed: 10/09/12						
Acetone	ND	0.10	mg/Kg wet							V-16
tert-Amyl Methyl Ether (TAME)	ND	0.0010	mg/Kg wet							
Benzene	ND	0.0020	mg/Kg wet							
Bromobenzene	ND	0.0020	mg/Kg wet							
Bromochloromethane	ND	0.0020	mg/Kg wet							
Bromodichloromethane	ND	0.0020	mg/Kg wet							
Bromoform	ND	0.0040	mg/Kg wet							
Bromomethane	ND	0.010	mg/Kg wet							
2-Butanone (MEK)	ND	0.040	mg/Kg wet							V-16
n-Butylbenzene	ND	0.0020	mg/Kg wet							
sec-Butylbenzene	ND	0.0020	mg/Kg wet							
tert-Butylbenzene	ND	0.0020	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.0010	mg/Kg wet							
Carbon Disulfide	ND	0.0060	mg/Kg wet							
Carbon Tetrachloride	ND	0.0020	mg/Kg wet							
Chlorobenzene	ND	0.0020	mg/Kg wet							
Chlorodibromomethane	ND	0.0020	mg/Kg wet							
Chloroethane	ND	0.010	mg/Kg wet							
Chloroform	ND	0.0040	mg/Kg wet							
Chloromethane	ND	0.010	mg/Kg wet							
2-Chlorotoluene	ND	0.0020	mg/Kg wet							
4-Chlorotoluene	ND	0.0020	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0040	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.0010	mg/Kg wet							
Dibromomethane	ND	0.0020	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.0020	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.0020	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.0020	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.010	mg/Kg wet							
1,1-Dichloroethane	ND	0.0020	mg/Kg wet							
1,2-Dichloroethane	ND	0.0020	mg/Kg wet							
1,1-Dichloroethylene	ND	0.0040	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.0020	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.0020	mg/Kg wet							V-05
1,2-Dichloropropane	ND	0.0020	mg/Kg wet							
1,3-Dichloropropane	ND	0.0010	mg/Kg wet							
2,2-Dichloropropane	ND	0.0020	mg/Kg wet							
1,1-Dichloropropene	ND	0.0020	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.0020	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.0010	mg/Kg wet							
Diethyl Ether	ND	0.010	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.0010	mg/Kg wet							V-05
1,4-Dioxane	ND	0.10	mg/Kg wet							V-16
Ethylbenzene	ND	0.0020	mg/Kg wet							
Hexachlorobutadiene	ND	0.0020	mg/Kg wet							
2-Hexanone (MBK)	ND	0.020	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.0020	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.0020	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.0040	mg/Kg wet							
Methylene Chloride	ND	0.010	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.020	mg/Kg wet							
Naphthalene	ND	0.0040	mg/Kg wet							R-05, V-05

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B060398 - SW-846 5035											
Blank (B060398-BLK1)				Prepared & Analyzed: 10/09/12							
n-Propylbenzene	ND	0.0020	mg/Kg wet								
Styrene	ND	0.0020	mg/Kg wet								
1,1,1,2-Tetrachloroethane	ND	0.0020	mg/Kg wet								
1,1,2,2-Tetrachloroethane	ND	0.0010	mg/Kg wet								
Tetrachloroethylene	ND	0.0020	mg/Kg wet								
Tetrahydrofuran	ND	0.010	mg/Kg wet							V-16	
Toluene	ND	0.0020	mg/Kg wet							R-05	
1,2,3-Trichlorobenzene	ND	0.0020	mg/Kg wet							R-05, V-05	
1,2,4-Trichlorobenzene	ND	0.0020	mg/Kg wet							R-05	
1,1,1-Trichloroethane	ND	0.0020	mg/Kg wet								
1,1,2-Trichloroethane	ND	0.0020	mg/Kg wet								
Trichloroethylene	ND	0.0020	mg/Kg wet								
Trichlorofluoromethane (Freon 11)	ND	0.010	mg/Kg wet								
1,2,3-Trichloropropane	ND	0.0020	mg/Kg wet								
1,2,4-Trimethylbenzene	ND	0.0020	mg/Kg wet								
1,3,5-Trimethylbenzene	ND	0.0020	mg/Kg wet								
Vinyl Chloride	ND	0.010	mg/Kg wet							L-04	
m+p Xylene	ND	0.0040	mg/Kg wet								
o-Xylene	ND	0.0020	mg/Kg wet								
Surrogate: 1,2-Dichloroethane-d4	*0.0591*		mg/Kg wet	0.0500		118	70-130				
Surrogate: Toluene-d8	*0.0460*		mg/Kg wet	0.0500		92.0	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0523*		mg/Kg wet	0.0500		105	70-130				
LCS (B060398-BS1)				Prepared & Analyzed: 10/09/12							
Acetone	0.170	0.10	mg/Kg wet	0.200		85.0	40-160			V-16, V-20	†
tert-Amyl Methyl Ether (TAME)	0.0223	0.0010	mg/Kg wet	0.0200		112	70-130				
Benzene	0.0187	0.0020	mg/Kg wet	0.0200		93.3	70-130				
Bromobenzene	0.0199	0.0020	mg/Kg wet	0.0200		99.6	70-130				
Bromochloromethane	0.0215	0.0020	mg/Kg wet	0.0200		107	70-130				
Bromodichloromethane	0.0192	0.0020	mg/Kg wet	0.0200		96.1	70-130				
Bromoform	0.0188	0.0040	mg/Kg wet	0.0200		94.1	70-130				
Bromomethane	0.0107	0.010	mg/Kg wet	0.0200		53.4	40-160			L-14	†
2-Butanone (MEK)	0.158	0.040	mg/Kg wet	0.200		78.8	40-160			V-16	†
n-Butylbenzene	0.0208	0.0020	mg/Kg wet	0.0200		104	70-130				
sec-Butylbenzene	0.0217	0.0020	mg/Kg wet	0.0200		108	70-130				
tert-Butylbenzene	0.0205	0.0020	mg/Kg wet	0.0200		103	70-130				
tert-Butyl Ethyl Ether (TBEE)	0.0185	0.0010	mg/Kg wet	0.0200		92.5	70-130				
Carbon Disulfide	0.0200	0.0060	mg/Kg wet	0.0200		99.9	70-130				
Carbon Tetrachloride	0.0216	0.0020	mg/Kg wet	0.0200		108	70-130				
Chlorobenzene	0.0196	0.0020	mg/Kg wet	0.0200		98.0	70-130				
Chlorodibromomethane	0.0194	0.0020	mg/Kg wet	0.0200		96.9	70-130				
Chloroethane	0.0179	0.010	mg/Kg wet	0.0200		89.3	70-130				
Chloroform	0.0224	0.0040	mg/Kg wet	0.0200		112	70-130				
Chloromethane	0.0153	0.010	mg/Kg wet	0.0200		76.4	40-160				†
2-Chlorotoluene	0.0219	0.0020	mg/Kg wet	0.0200		110	70-130				
4-Chlorotoluene	0.0222	0.0020	mg/Kg wet	0.0200		111	70-130				
1,2-Dibromo-3-chloropropane (DBCP)	0.0176	0.0040	mg/Kg wet	0.0200		87.8	70-130				
1,2-Dibromoethane (EDB)	0.0166	0.0010	mg/Kg wet	0.0200		83.1	70-130				
Dibromomethane	0.0206	0.0020	mg/Kg wet	0.0200		103	70-130				
1,2-Dichlorobenzene	0.0191	0.0020	mg/Kg wet	0.0200		95.7	70-130				
1,3-Dichlorobenzene	0.0197	0.0020	mg/Kg wet	0.0200		98.6	70-130				
1,4-Dichlorobenzene	0.0199	0.0020	mg/Kg wet	0.0200		99.4	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B060398 - SW-846 5035												
LCS (B060398-BS1)				Prepared & Analyzed: 10/09/12								
Dichlorodifluoromethane (Freon 12)	0.00918	0.010	mg/Kg wet	0.0200		45.9		40-160			L-14	†
1,1-Dichloroethane	0.0169	0.0020	mg/Kg wet	0.0200		84.3		70-130				
1,2-Dichloroethane	0.0202	0.0020	mg/Kg wet	0.0200		101		70-130				
1,1-Dichloroethylene	0.0187	0.0040	mg/Kg wet	0.0200		93.4		70-130				
cis-1,2-Dichloroethylene	0.0176	0.0020	mg/Kg wet	0.0200		88.2		70-130				
trans-1,2-Dichloroethylene	0.0151	0.0020	mg/Kg wet	0.0200		75.6		70-130			V-05	
1,2-Dichloropropane	0.0201	0.0020	mg/Kg wet	0.0200		101		70-130				
1,3-Dichloropropane	0.0180	0.0010	mg/Kg wet	0.0200		90.1		70-130				
2,2-Dichloropropane	0.0202	0.0020	mg/Kg wet	0.0200		101		70-130				
1,1-Dichloropropene	0.0207	0.0020	mg/Kg wet	0.0200		104		70-130				
cis-1,3-Dichloropropene	0.0194	0.0020	mg/Kg wet	0.0200		96.9		70-130				
trans-1,3-Dichloropropene	0.0213	0.0010	mg/Kg wet	0.0200		106		70-130				
Diethyl Ether	0.0170	0.010	mg/Kg wet	0.0200		85.2		70-130				
Diisopropyl Ether (DIPE)	0.0162	0.0010	mg/Kg wet	0.0200		81.2		70-130			V-05	
1,4-Dioxane	0.179	0.10	mg/Kg wet	0.200		89.4		40-160			V-16	†
Ethylbenzene	0.0209	0.0020	mg/Kg wet	0.0200		104		70-130				
Hexachlorobutadiene	0.0206	0.0020	mg/Kg wet	0.0200		103		70-130				
2-Hexanone (MBK)	0.165	0.020	mg/Kg wet	0.200		82.7		40-160				†
Isopropylbenzene (Cumene)	0.0211	0.0020	mg/Kg wet	0.0200		105		70-130				
p-Isopropyltoluene (p-Cymene)	0.0230	0.0020	mg/Kg wet	0.0200		115		70-130				
Methyl tert-Butyl Ether (MTBE)	0.0187	0.0040	mg/Kg wet	0.0200		93.6		70-130				
Methylene Chloride	0.0178	0.010	mg/Kg wet	0.0200		89.2		70-130				
4-Methyl-2-pentanone (MIBK)	0.181	0.020	mg/Kg wet	0.200		90.3		40-160				†
Naphthalene	0.0125	0.0040	mg/Kg wet	0.0200		**62.7**	*	70-130			L-07A, R-05, V-05	
n-Propylbenzene	0.0227	0.0020	mg/Kg wet	0.0200		113		70-130				
Styrene	0.0192	0.0020	mg/Kg wet	0.0200		95.8		70-130				
1,1,1,2-Tetrachloroethane	0.0219	0.0020	mg/Kg wet	0.0200		110		70-130				
1,1,2,2-Tetrachloroethane	0.0204	0.0010	mg/Kg wet	0.0200		102		70-130				
Tetrachloroethylene	0.0176	0.0020	mg/Kg wet	0.0200		88.0		70-130				
Tetrahydrofuran	0.0193	0.010	mg/Kg wet	0.0200		96.6		70-130			V-16	
Toluene	0.0151	0.0020	mg/Kg wet	0.0200		75.7		70-130			R-05	
1,2,3-Trichlorobenzene	0.0137	0.0020	mg/Kg wet	0.0200		**68.5**	*	70-130			L-07A, R-05, V-05	
1,2,4-Trichlorobenzene	0.0158	0.0020	mg/Kg wet	0.0200		78.9		70-130			R-05	
1,1,1-Trichloroethane	0.0220	0.0020	mg/Kg wet	0.0200		110		70-130				
1,1,2-Trichloroethane	0.0177	0.0020	mg/Kg wet	0.0200		88.4		70-130				
Trichloroethylene	0.0197	0.0020	mg/Kg wet	0.0200		98.7		70-130				
Trichlorofluoromethane (Freon 11)	0.0199	0.010	mg/Kg wet	0.0200		99.6		70-130				
1,2,3-Trichloropropane	0.0210	0.0020	mg/Kg wet	0.0200		105		70-130				
1,2,4-Trimethylbenzene	0.0196	0.0020	mg/Kg wet	0.0200		98.0		70-130				
1,3,5-Trimethylbenzene	0.0219	0.0020	mg/Kg wet	0.0200		110		70-130				
Vinyl Chloride	0.0139	0.010	mg/Kg wet	0.0200		**69.4**	*	70-130			L-04	
m+p Xylene	0.0391	0.0040	mg/Kg wet	0.0400		97.8		70-130				
o-Xylene	0.0184	0.0020	mg/Kg wet	0.0200		92.2		70-130				
Surrogate: 1,2-Dichloroethane-d4	*0.0599*		mg/Kg wet	0.0500		120		70-130				
Surrogate: Toluene-d8	*0.0460*		mg/Kg wet	0.0500		92.0		70-130				
Surrogate: 4-Bromofluorobenzene	*0.0530*		mg/Kg wet	0.0500		106		70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B060398 - SW-846 5035											
LCS Dup (B060398-BSD1)				Prepared & Analyzed: 10/09/12							
Acetone	0.173	0.10	mg/Kg wet	0.200		86.4	40-160	1.67	20	V-16, V-20	†
tert-Amyl Methyl Ether (TAME)	0.0212	0.0010	mg/Kg wet	0.0200		106	70-130	4.87	20		
Benzene	0.0215	0.0020	mg/Kg wet	0.0200		107	70-130	14.1	20		
Bromobenzene	0.0227	0.0020	mg/Kg wet	0.0200		113	70-130	13.0	20		
Bromochloromethane	0.0206	0.0020	mg/Kg wet	0.0200		103	70-130	4.09	20		
Bromodichloromethane	0.0198	0.0020	mg/Kg wet	0.0200		98.9	70-130	2.87	20		
Bromoform	0.0186	0.0040	mg/Kg wet	0.0200		93.0	70-130	1.18	20		
Bromomethane	0.0116	0.010	mg/Kg wet	0.0200		58.0	40-160	8.26	20	L-14	†
2-Butanone (MEK)	0.162	0.040	mg/Kg wet	0.200		81.0	40-160	2.72	20	V-16	†
n-Butylbenzene	0.0227	0.0020	mg/Kg wet	0.0200		113	70-130	8.55	20		
sec-Butylbenzene	0.0250	0.0020	mg/Kg wet	0.0200		125	70-130	14.1	20		
tert-Butylbenzene	0.0225	0.0020	mg/Kg wet	0.0200		112	70-130	9.11	20		
tert-Butyl Ethyl Ether (TBEE)	0.0191	0.0010	mg/Kg wet	0.0200		95.6	70-130	3.30	20		
Carbon Disulfide	0.0204	0.0060	mg/Kg wet	0.0200		102	70-130	2.18	20		
Carbon Tetrachloride	0.0230	0.0020	mg/Kg wet	0.0200		115	70-130	6.09	20		
Chlorobenzene	0.0203	0.0020	mg/Kg wet	0.0200		102	70-130	3.71	20		
Chlorodibromomethane	0.0200	0.0020	mg/Kg wet	0.0200		100	70-130	3.35	20		
Chloroethane	0.0171	0.010	mg/Kg wet	0.0200		85.6	70-130	4.23	20		
Chloroform	0.0217	0.0040	mg/Kg wet	0.0200		109	70-130	2.99	20		
Chloromethane	0.0149	0.010	mg/Kg wet	0.0200		74.7	40-160	2.25	20		†
2-Chlorotoluene	0.0224	0.0020	mg/Kg wet	0.0200		112	70-130	2.16	20		
4-Chlorotoluene	0.0231	0.0020	mg/Kg wet	0.0200		116	70-130	4.06	20		
1,2-Dibromo-3-chloropropane (DBCP)	0.0214	0.0040	mg/Kg wet	0.0200		107	70-130	19.9	20		
1,2-Dibromoethane (EDB)	0.0183	0.0010	mg/Kg wet	0.0200		91.6	70-130	9.73	20		
Dibromomethane	0.0216	0.0020	mg/Kg wet	0.0200		108	70-130	4.55	20		
1,2-Dichlorobenzene	0.0209	0.0020	mg/Kg wet	0.0200		105	70-130	8.89	20		
1,3-Dichlorobenzene	0.0206	0.0020	mg/Kg wet	0.0200		103	70-130	4.56	20		
1,4-Dichlorobenzene	0.0211	0.0020	mg/Kg wet	0.0200		105	70-130	5.86	20		
Dichlorodifluoromethane (Freon 12)	0.00878	0.010	mg/Kg wet	0.0200		43.9	40-160	4.45	20	L-14	†
1,1-Dichloroethane	0.0173	0.0020	mg/Kg wet	0.0200		86.7	70-130	2.81	20		
1,2-Dichloroethane	0.0228	0.0020	mg/Kg wet	0.0200		114	70-130	11.8	20		
1,1-Dichloroethylene	0.0187	0.0040	mg/Kg wet	0.0200		93.6	70-130	0.214	20		
cis-1,2-Dichloroethylene	0.0179	0.0020	mg/Kg wet	0.0200		89.7	70-130	1.69	20		
trans-1,2-Dichloroethylene	0.0155	0.0020	mg/Kg wet	0.0200		77.3	70-130	2.22	20	V-05	
1,2-Dichloropropane	0.0224	0.0020	mg/Kg wet	0.0200		112	70-130	10.5	20		
1,3-Dichloropropane	0.0179	0.0010	mg/Kg wet	0.0200		89.7	70-130	0.445	20		
2,2-Dichloropropane	0.0204	0.0020	mg/Kg wet	0.0200		102	70-130	0.984	20		
1,1-Dichloropropene	0.0227	0.0020	mg/Kg wet	0.0200		114	70-130	9.12	20		
cis-1,3-Dichloropropene	0.0198	0.0020	mg/Kg wet	0.0200		98.9	70-130	2.04	20		
trans-1,3-Dichloropropene	0.0231	0.0010	mg/Kg wet	0.0200		115	70-130	8.02	20		
Diethyl Ether	0.0174	0.010	mg/Kg wet	0.0200		86.8	70-130	1.86	20		
Diisopropyl Ether (DIPE)	0.0170	0.0010	mg/Kg wet	0.0200		84.8	70-130	4.34	20	V-05	
1,4-Dioxane	0.195	0.10	mg/Kg wet	0.200		97.5	40-160	8.71	20	V-16	†
Ethylbenzene	0.0216	0.0020	mg/Kg wet	0.0200		108	70-130	3.20	20		
Hexachlorobutadiene	0.0245	0.0020	mg/Kg wet	0.0200		123	70-130	17.4	20		
2-Hexanone (MBK)	0.166	0.020	mg/Kg wet	0.200		82.8	40-160	0.181	20		†
Isopropylbenzene (Cumene)	0.0249	0.0020	mg/Kg wet	0.0200		124	70-130	16.5	20		
p-Isopropyltoluene (p-Cymene)	0.0246	0.0020	mg/Kg wet	0.0200		123	70-130	6.80	20		
Methyl tert-Butyl Ether (MTBE)	0.0190	0.0040	mg/Kg wet	0.0200		95.1	70-130	1.59	20		
Methylene Chloride	0.0182	0.010	mg/Kg wet	0.0200		91.0	70-130	2.00	20		
4-Methyl-2-pentanone (MIBK)	0.180	0.020	mg/Kg wet	0.200		90.2	40-160	0.155	20		†
Naphthalene	0.0190	0.0040	mg/Kg wet	0.0200		95.1	70-130	**41.1** *	20	V-05, R-05	

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD		RPD Limit	Notes
Batch B060398 - SW-846 5035												
LCS Dup (B060398-BSD1)				Prepared & Analyzed: 10/09/12								
n-Propylbenzene	0.0234	0.0020	mg/Kg wet	0.0200		117		70-130	3.30		20	
Styrene	0.0197	0.0020	mg/Kg wet	0.0200		98.5		70-130	2.78		20	
1,1,1,2-Tetrachloroethane	0.0225	0.0020	mg/Kg wet	0.0200		112		70-130	2.52		20	
1,1,2,2-Tetrachloroethane	0.0208	0.0010	mg/Kg wet	0.0200		104		70-130	1.75		20	
Tetrachloroethylene	0.0199	0.0020	mg/Kg wet	0.0200		99.3		70-130	12.1		20	
Tetrahydrofuran	0.0195	0.010	mg/Kg wet	0.0200		97.3		70-130	0.722		20	V-16
Toluene	0.0187	0.0020	mg/Kg wet	0.0200		93.4		70-130	**20.9**	*	20	R-05
1,2,3-Trichlorobenzene	0.0205	0.0020	mg/Kg wet	0.0200		102		70-130	**39.8**	*	20	R-05, V-05
1,2,4-Trichlorobenzene	0.0207	0.0020	mg/Kg wet	0.0200		104		70-130	**27.0**	*	20	R-05
1,1,1-Trichloroethane	0.0228	0.0020	mg/Kg wet	0.0200		114		70-130	3.57		20	
1,1,2-Trichloroethane	0.0189	0.0020	mg/Kg wet	0.0200		94.6		70-130	6.78		20	
Trichloroethylene	0.0213	0.0020	mg/Kg wet	0.0200		106		70-130	7.51		20	
Trichlorofluoromethane (Freon 11)	0.0203	0.010	mg/Kg wet	0.0200		102		70-130	1.89		20	
1,2,3-Trichloropropane	0.0205	0.0020	mg/Kg wet	0.0200		102		70-130	2.60		20	
1,2,4-Trimethylbenzene	0.0218	0.0020	mg/Kg wet	0.0200		109		70-130	10.8		20	
1,3,5-Trimethylbenzene	0.0230	0.0020	mg/Kg wet	0.0200		115		70-130	4.98		20	
Vinyl Chloride	0.0136	0.010	mg/Kg wet	0.0200		**67.9**	*	70-130	2.18		20	L-04
m+p Xylene	0.0414	0.0040	mg/Kg wet	0.0400		104		70-130	5.71		20	
o-Xylene	0.0194	0.0020	mg/Kg wet	0.0200		96.8		70-130	4.87		20	
Surrogate: 1,2-Dichloroethane-d4	*0.0593*		mg/Kg wet	0.0500		119		70-130				
Surrogate: Toluene-d8	*0.0473*		mg/Kg wet	0.0500		94.6		70-130				
Surrogate: 4-Bromofluorobenzene	*0.0573*		mg/Kg wet	0.0500		115		70-130				

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060742 - SW-846 3546										
Blank (B060742-BLK1)				Prepared: 10/13/12 Analyzed: 10/20/12						
Acenaphthene	ND	0.010	mg/Kg wet							
Acenaphthylene	ND	0.010	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							
Anthracene	ND	0.0070	mg/Kg wet							
Benzo(a)anthracene	ND	0.0020	mg/Kg wet							
Benzo(a)pyrene	ND	0.0030	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.0020	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.017	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.0070	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.66	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.0070	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.0070	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.66	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.66	mg/Kg wet							
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.017	mg/Kg wet							
Fluorene	ND	0.030	mg/Kg wet							
Hexachlorobenzene	ND	0.34	mg/Kg wet							
Hexachlorobutadiene	ND	0.34	mg/Kg wet							
Hexachloroethane	ND	0.34	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.0070	mg/Kg wet							
Isophorone	ND	0.34	mg/Kg wet							
2-Methylnaphthalene	ND	0.030	mg/Kg wet							
2-Methylphenol	ND	0.34	mg/Kg wet							
3/4-Methylphenol	ND	0.34	mg/Kg wet							
Naphthalene	ND	0.030	mg/Kg wet							
Nitrobenzene	ND	0.34	mg/Kg wet							
2-Nitrophenol	ND	0.34	mg/Kg wet							
4-Nitrophenol	ND	0.66	mg/Kg wet							
Pentachlorophenol	ND	0.34	mg/Kg wet							
Phenanthrene	ND	0.0020	mg/Kg wet							

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060742 - SW-846 3546										
Blank (B060742-BLK1)				Prepared: 10/13/12 Analyzed: 10/15/12						
Phenol	ND	0.34	mg/Kg wet							
Pyrene	ND	0.030	mg/Kg wet							
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet							
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet							
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet							
Surrogate: 2-Fluorophenol	*7.09*		mg/Kg wet	6.67		106	30-130			
Surrogate: Phenol-d6	*6.34*		mg/Kg wet	6.67		95.1	30-130			
Surrogate: Nitrobenzene-d5	*2.88*		mg/Kg wet	3.33		86.4	30-130			
Surrogate: Nitrobenzene-d5	*2.91*		mg/Kg wet	3.33		87.2	30-130			
Surrogate: 2-Fluorobiphenyl	*2.58*		mg/Kg wet	3.33		77.5	30-130			
Surrogate: 2-Fluorobiphenyl	*2.63*		mg/Kg wet	3.33		78.8	30-130			
Surrogate: 2,4,6-Tribromophenol	*6.57*		mg/Kg wet	6.67		98.6	30-130			
Surrogate: Terphenyl-d14	*2.69*		mg/Kg wet	3.33		80.7	30-130			
Surrogate: Terphenyl-d14	*2.46*		mg/Kg wet	3.33		73.9	30-130			
LCS (B060742-BS1)				Prepared: 10/13/12 Analyzed: 10/20/12						
Acenaphthene	1.31	0.25	mg/Kg wet	1.67		78.5	40-140			
Acenaphthylene	1.92	0.25	mg/Kg wet	1.67		115	40-140			
Acetophenone	1.16	0.34	mg/Kg wet	1.67		69.7	40-140		30	
Aniline	0.976	0.34	mg/Kg wet	1.67		58.6	40-140		30	
Anthracene	1.21	0.18	mg/Kg wet	1.67		72.5	40-140			
Benzo(a)anthracene	1.08	0.050	mg/Kg wet	1.67		64.5	40-140			
Benzo(a)pyrene	1.17	0.075	mg/Kg wet	1.67		70.0	40-140			
Benzo(b)fluoranthene	1.19	0.050	mg/Kg wet	1.67		71.5	40-140			
Benzo(g,h,i)perylene	1.30	0.42	mg/Kg wet	1.67		78.0	40-140			
Benzo(k)fluoranthene	1.18	0.18	mg/Kg wet	1.67		70.5	40-140			
Bis(2-chloroethoxy)methane	1.34	0.34	mg/Kg wet	1.67		80.7	40-140		30	
Bis(2-chloroethyl)ether	1.32	0.34	mg/Kg wet	1.67		79.2	40-140		30	
Bis(2-chloroisopropyl)ether	1.24	0.34	mg/Kg wet	1.67		74.6	40-140		30	
Bis(2-Ethylhexyl)phthalate	1.33	0.34	mg/Kg wet	1.67		79.8	40-140		30	
4-Bromophenylphenylether	1.38	0.34	mg/Kg wet	1.67		82.9	40-140		30	
Butylbenzylphthalate	1.32	0.66	mg/Kg wet	1.67		79.2	40-140		30	
4-Chloroaniline	0.657	0.66	mg/Kg wet	1.67		39.4	15-140		30	†
2-Chloronaphthalene	1.28	0.34	mg/Kg wet	1.67		76.9	40-140		30	
2-Chlorophenol	1.25	0.34	mg/Kg wet	1.67		75.2	30-130		30	
Chrysene	1.15	0.18	mg/Kg wet	1.67		69.0	40-140			
Dibenz(a,h)anthracene	1.44	0.18	mg/Kg wet	1.67		86.5	40-140			
Dibenzofuran	1.14	0.34	mg/Kg wet	1.67		68.4	40-140		30	
Di-n-butylphthalate	1.37	0.34	mg/Kg wet	1.67		82.3	40-140		30	
1,2-Dichlorobenzene	1.18	0.34	mg/Kg wet	1.67		70.8	40-140		30	
1,3-Dichlorobenzene	1.16	0.34	mg/Kg wet	1.67		69.8	40-140		30	
1,4-Dichlorobenzene	1.17	0.34	mg/Kg wet	1.67		70.1	40-140		30	
3,3-Dichlorobenzidine	1.20	0.17	mg/Kg wet	1.67		72.0	40-140		30	
2,4-Dichlorophenol	1.32	0.34	mg/Kg wet	1.67		79.4	30-130		30	
Diethylphthalate	1.23	0.34	mg/Kg wet	1.67		73.7	40-140		30	
2,4-Dimethylphenol	1.35	0.34	mg/Kg wet	1.67		80.8	30-130		30	
Dimethylphthalate	1.29	0.66	mg/Kg wet	1.67		77.5	40-140		30	
2,4-Dinitrophenol	1.10	0.66	mg/Kg wet	1.67		66.1	15-140		30	†
2,4-Dinitrotoluene	1.28	0.34	mg/Kg wet	1.67		76.8	40-140		30	
2,6-Dinitrotoluene	1.32	0.34	mg/Kg wet	1.67		79.1	40-140		30	
Di-n-octylphthalate	1.26	0.66	mg/Kg wet	1.67		75.8	40-140		30	
1,2-Diphenylhydrazine (as Azobenzene)	1.35	0.34	mg/Kg wet	1.67		80.7	40-140		30	

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B060742 - SW-846 3546												
LCS (B060742-BS1)				Prepared: 10/13/12 Analyzed: 10/20/12								
Fluoranthene	1.20	0.42	mg/Kg wet	1.67		72.0		40-140				
Fluorene	1.23	0.75	mg/Kg wet	1.67		74.0		40-140				
Hexachlorobenzene	1.43	0.34	mg/Kg wet	1.67		86.1		40-140		30		
Hexachlorobutadiene	1.30	0.34	mg/Kg wet	1.67		77.8		40-140		30		
Hexachloroethane	1.18	0.34	mg/Kg wet	1.67		70.7		40-140		30		
Indeno(1,2,3-cd)pyrene	1.32	0.18	mg/Kg wet	1.67		79.5		40-140				
Isophorone	1.31	0.34	mg/Kg wet	1.67		78.7		40-140		30		
2-Methylnaphthalene	1.11	0.75	mg/Kg wet	1.67		66.5		40-140				
2-Methylphenol	1.29	0.34	mg/Kg wet	1.67		77.6		30-130		30		
3/4-Methylphenol	2.31	0.34	mg/Kg wet	1.67		**139**	*	30-130		30	L-02	
Naphthalene	1.14	0.75	mg/Kg wet	1.67		68.5		40-140				
Nitrobenzene	1.23	0.34	mg/Kg wet	1.67		73.6		40-140		30		
2-Nitrophenol	1.30	0.34	mg/Kg wet	1.67		77.7		30-130		30		
4-Nitrophenol	1.18	0.66	mg/Kg wet	1.67		70.5		15-140		30		†
Pentachlorophenol	1.28	0.34	mg/Kg wet	1.67		77.0		30-130		30		
Phenanthrene	1.14	0.050	mg/Kg wet	1.67		68.5		40-140				
Phenol	1.18	0.34	mg/Kg wet	1.67		70.6		15-140		30		†
Pyrene	1.18	0.75	mg/Kg wet	1.67		70.5		40-140				
1,2,4-Trichlorobenzene	1.26	0.34	mg/Kg wet	1.67		75.4		40-140		30		
2,4,5-Trichlorophenol	1.27	0.34	mg/Kg wet	1.67		75.9		30-130		30		
2,4,6-Trichlorophenol	1.39	0.34	mg/Kg wet	1.67		83.6		30-130		30		
Surrogate: 2-Fluorophenol	*6.58*		mg/Kg wet	6.67		98.7		30-130				
Surrogate: Phenol-d6	*5.28*		mg/Kg wet	6.67		79.2		30-130				
Surrogate: Nitrobenzene-d5	*2.49*		mg/Kg wet	3.33		74.8		30-130				
Surrogate: Nitrobenzene-d5	*2.26*		mg/Kg wet	3.33		67.8		30-130				
Surrogate: 2-Fluorobiphenyl	*2.50*		mg/Kg wet	3.33		75.0		30-130				
Surrogate: 2-Fluorobiphenyl	*2.40*		mg/Kg wet	3.33		71.9		30-130				
Surrogate: 2,4,6-Tribromophenol	*5.54*		mg/Kg wet	6.67		83.1		30-130				
Surrogate: Terphenyl-d14	*2.49*		mg/Kg wet	3.33		74.6		30-130				
Surrogate: Terphenyl-d14	*2.38*		mg/Kg wet	3.33		71.5		30-130				
LCS Dup (B060742-BSD1)				Prepared: 10/13/12 Analyzed: 10/20/12								
Acenaphthene	1.41	0.25	mg/Kg wet	1.67		84.5		40-140	7.36	30		
Acenaphthylene	2.18	0.25	mg/Kg wet	1.67		130		40-140	12.6	30		
Acetophenone	1.19	0.34	mg/Kg wet	1.67		71.3		40-140	2.30	30		
Aniline	0.956	0.34	mg/Kg wet	1.67		57.4		40-140	2.04	30		
Anthracene	1.37	0.18	mg/Kg wet	1.67		82.0		40-140	12.3	30		
Benzo(a)anthracene	1.27	0.050	mg/Kg wet	1.67		76.0		40-140	16.4	30		
Benzo(a)pyrene	1.33	0.075	mg/Kg wet	1.67		80.0		40-140	13.3	30		
Benzo(b)fluoranthene	1.56	0.050	mg/Kg wet	1.67		93.5		40-140	26.7	30		
Benzo(g,h,i)perylene	1.44	0.42	mg/Kg wet	1.67		86.5		40-140	10.3	30		
Benzo(k)fluoranthene	1.34	0.18	mg/Kg wet	1.67		80.5		40-140	13.2	30		
Bis(2-chloroethoxy)methane	1.32	0.34	mg/Kg wet	1.67		79.2		40-140	1.85	30		
Bis(2-chloroethyl)ether	1.45	0.34	mg/Kg wet	1.67		87.1		40-140	9.40	30		
Bis(2-chloroisopropyl)ether	1.28	0.34	mg/Kg wet	1.67		76.6		40-140	2.70	30		
Bis(2-Ethylhexyl)phthalate	1.30	0.34	mg/Kg wet	1.67		78.2		40-140	2.03	30		
4-Bromophenylphenylether	1.35	0.34	mg/Kg wet	1.67		80.9		40-140	2.52	30		
Butylbenzylphthalate	1.32	0.66	mg/Kg wet	1.67		79.2		40-140	0.00	30		
4-Chloroaniline	0.568	0.66	mg/Kg wet	1.67		34.1		15-140	14.5	30		†
2-Chloronaphthalene	1.22	0.34	mg/Kg wet	1.67		73.2		40-140	4.90	30		
2-Chlorophenol	1.29	0.34	mg/Kg wet	1.67		77.5		30-130	3.04	30		
Chrysene	1.31	0.18	mg/Kg wet	1.67		78.5		40-140	12.9	30		

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B060742 - SW-846 3546												
LCS Dup (B060742-BSD1)				Prepared: 10/13/12 Analyzed: 10/20/12								
Dibenz(a,h)anthracene	1.62	0.18	mg/Kg wet	1.67		97.5		40-140	12.0	30		
Dibenzofuran	1.15	0.34	mg/Kg wet	1.67		68.7		40-140	0.496	30		
Di-n-butylphthalate	1.40	0.34	mg/Kg wet	1.67		84.0		40-140	2.00	30		
1,2-Dichlorobenzene	1.21	0.34	mg/Kg wet	1.67		72.6		40-140	2.48	30		
1,3-Dichlorobenzene	1.19	0.34	mg/Kg wet	1.67		71.2		40-140	1.96	30		
1,4-Dichlorobenzene	1.19	0.34	mg/Kg wet	1.67		71.4		40-140	1.86	30		
3,3-Dichlorobenzidine	1.16	0.17	mg/Kg wet	1.67		69.6		40-140	3.36	30		
2,4-Dichlorophenol	1.33	0.34	mg/Kg wet	1.67		79.6		30-130	0.327	30		
Diethylphthalate	1.28	0.34	mg/Kg wet	1.67		76.6		40-140	3.97	30		
2,4-Dimethylphenol	1.36	0.34	mg/Kg wet	1.67		81.4		30-130	0.691	30		
Dimethylphthalate	1.32	0.66	mg/Kg wet	1.67		79.1		40-140	2.15	30		
2,4-Dinitrophenol	1.17	0.66	mg/Kg wet	1.67		70.3		15-140	6.19	30		†
2,4-Dinitrotoluene	1.32	0.34	mg/Kg wet	1.67		79.5		40-140	3.45	30		
2,6-Dinitrotoluene	1.38	0.34	mg/Kg wet	1.67		82.8		40-140	4.50	30		
Di-n-octylphthalate	1.31	0.66	mg/Kg wet	1.67		78.6		40-140	3.68	30		
1,2-Diphenylhydrazine (as Azobenzene)	1.48	0.34	mg/Kg wet	1.67		88.7		40-140	9.35	30		
Fluoranthene	1.36	0.42	mg/Kg wet	1.67		81.5		40-140	12.4	30		
Fluorene	1.42	0.75	mg/Kg wet	1.67		85.5		40-140	14.4	30		
Hexachlorobenzene	1.44	0.34	mg/Kg wet	1.67		86.6		40-140	0.579	30		
Hexachlorobutadiene	1.27	0.34	mg/Kg wet	1.67		76.2		40-140	2.16	30		
Hexachloroethane	1.23	0.34	mg/Kg wet	1.67		73.7		40-140	4.13	30		
Indeno(1,2,3-cd)pyrene	1.54	0.18	mg/Kg wet	1.67		92.5		40-140	15.1	30		
Isophorone	1.33	0.34	mg/Kg wet	1.67		79.6		40-140	1.14	30		
2-Methylnaphthalene	1.31	0.75	mg/Kg wet	1.67		78.5		40-140	16.6	30		
2-Methylphenol	1.36	0.34	mg/Kg wet	1.67		81.5		30-130	4.88	30		
3/4-Methylphenol	2.32	0.34	mg/Kg wet	1.67		**139**	*	30-130	0.518	30	L-02	
Naphthalene	1.29	0.75	mg/Kg wet	1.67		77.5		40-140	12.3	30		
Nitrobenzene	1.22	0.34	mg/Kg wet	1.67		73.3		40-140	0.435	30		
2-Nitrophenol	1.30	0.34	mg/Kg wet	1.67		78.3		30-130	0.718	30		
4-Nitrophenol	1.24	0.66	mg/Kg wet	1.67		74.6		15-140	5.59	30		†
Pentachlorophenol	1.37	0.34	mg/Kg wet	1.67		82.2		30-130	6.51	30		
Phenanthrene	1.32	0.050	mg/Kg wet	1.67		79.5		40-140	14.9	30		
Phenol	1.20	0.34	mg/Kg wet	1.67		71.8		15-140	1.63	30		†
Pyrene	1.37	0.75	mg/Kg wet	1.67		82.0		40-140	15.1	30		
1,2,4-Trichlorobenzene	1.28	0.34	mg/Kg wet	1.67		76.5		40-140	1.55	30		
2,4,5-Trichlorophenol	1.29	0.34	mg/Kg wet	1.67		77.4		30-130	1.93	30		
2,4,6-Trichlorophenol	1.41	0.34	mg/Kg wet	1.67		84.3		30-130	0.929	30		
Surrogate: 2-Fluorophenol	*6.53*		mg/Kg wet	6.67		97.9		30-130				
Surrogate: Phenol-d6	*5.28*		mg/Kg wet	6.67		79.2		30-130				
Surrogate: Nitrobenzene-d5	*2.75*		mg/Kg wet	3.33		82.5		30-130				
Surrogate: Nitrobenzene-d5	*2.50*		mg/Kg wet	3.33		75.0		30-130				
Surrogate: 2-Fluorobiphenyl	*2.35*		mg/Kg wet	3.33		70.5		30-130				
Surrogate: 2-Fluorobiphenyl	*3.00*		mg/Kg wet	3.33		90.0		30-130				
Surrogate: 2,4,6-Tribromophenol	*5.79*		mg/Kg wet	6.67		86.9		30-130				
Surrogate: Terphenyl-d14	*2.46*		mg/Kg wet	3.33		73.8		30-130				
Surrogate: Terphenyl-d14	*2.89*		mg/Kg wet	3.33		86.8		30-130				

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060726 - SW-846 3546										
Blank (B060726-BLK1)				Prepared: 10/13/12 Analyzed: 10/14/12						
TPH (C9-C36)	ND	8.3	mg/Kg wet							
Surrogate: o-Terphenyl	*3.15*		mg/Kg wet	3.33		94.5	40-140			
LCS (B060726-BS1)				Prepared: 10/13/12 Analyzed: 10/14/12						
TPH (C9-C36)	28.1	8.3	mg/Kg wet	33.3		84.4	40-140			
Surrogate: o-Terphenyl	*2.80*		mg/Kg wet	3.33		84.0	40-140			
LCS Dup (B060726-BSD1)				Prepared: 10/13/12 Analyzed: 10/14/12						
TPH (C9-C36)	28.3	8.3	mg/Kg wet	33.3		85.0	40-140	0.708	30	
Surrogate: o-Terphenyl	*2.85*		mg/Kg wet	3.33		85.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060774 - SW-846 3546										
Blank (B060774-BLK1)				Prepared: 10/15/12 Analyzed: 10/17/12						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.82*		mg/Kg wet	4.99		76.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.31*		mg/Kg wet	5.00		66.2	40-140			
Surrogate: 2-Bromonaphthalene	*3.64*		mg/Kg wet	5.00		72.8	40-140			
Surrogate: 2-Fluorobiphenyl	*3.96*		mg/Kg wet	5.00		79.1	40-140			
LCS (B060774-BS1)				Prepared: 10/15/12 Analyzed: 10/17/12						
Acenaphthene	4.09	0.10	mg/Kg wet	5.00		81.7	40-140			
Acenaphthylene	4.02	0.10	mg/Kg wet	5.00		80.5	40-140			
Anthracene	4.35	0.10	mg/Kg wet	5.00		87.0	40-140			
Benzo(a)anthracene	4.34	0.10	mg/Kg wet	5.00		86.8	40-140			
Benzo(a)pyrene	4.05	0.10	mg/Kg wet	5.00		81.0	40-140			
Benzo(b)fluoranthene	4.30	0.10	mg/Kg wet	5.00		86.0	40-140			
Benzo(g,h,i)perylene	4.52	0.10	mg/Kg wet	5.00		90.4	40-140			
Benzo(k)fluoranthene	4.23	0.10	mg/Kg wet	5.00		84.5	40-140			
Chrysene	4.06	0.10	mg/Kg wet	5.00		81.1	40-140			
Dibenz(a,h)anthracene	4.49	0.10	mg/Kg wet	5.00		89.7	40-140			
Fluoranthene	4.35	0.10	mg/Kg wet	5.00		86.9	40-140			
Fluorene	4.39	0.10	mg/Kg wet	5.00		87.8	40-140			
Indeno(1,2,3-cd)pyrene	4.50	0.10	mg/Kg wet	5.00		90.1	40-140			
2-Methylnaphthalene	3.85	0.10	mg/Kg wet	5.00		77.1	40-140			
Naphthalene	3.46	0.10	mg/Kg wet	5.00		69.1	40-140			
Phenanthrene	4.48	0.10	mg/Kg wet	5.00		89.6	40-140			
Pyrene	4.25	0.10	mg/Kg wet	5.00		85.0	40-140			
n-Decane	2.33	0.10	mg/Kg wet	5.00		46.6	40-140			
n-Docosane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140			
n-Dodecane	2.99	0.10	mg/Kg wet	5.00		59.9	40-140			
n-Eicosane	4.19	0.10	mg/Kg wet	5.00		83.7	40-140			
n-Hexacosane	4.15	0.10	mg/Kg wet	5.00		83.0	40-140			
n-Hexadecane	3.98	0.10	mg/Kg wet	5.00		79.7	40-140			
n-Hexatriacontane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140			
n-Nonadecane	4.21	0.10	mg/Kg wet	5.00		84.2	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060774 - SW-846 3546										
LCS (B060774-BS1)				Prepared: 10/15/12 Analyzed: 10/17/12						
n-Nonane	1.64	0.10	mg/Kg wet	5.00		32.8	30-140			
n-Octacosane	3.99	0.10	mg/Kg wet	5.00		79.9	40-140			
n-Octadecane	4.16	0.10	mg/Kg wet	5.00		83.2	40-140			
n-Tetracosane	4.19	0.10	mg/Kg wet	5.00		83.9	40-140			
n-Tetradecane	3.58	0.10	mg/Kg wet	5.00		71.6	40-140			
n-Triacontane	4.10	0.10	mg/Kg wet	5.00		82.0	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.94*		mg/Kg wet	4.99		78.9	40-140			
Surrogate: o-Terphenyl (OTP)	*4.09*		mg/Kg wet	5.00		81.8	40-140			
Surrogate: 2-Bromonaphthalene	*3.99*		mg/Kg wet	5.00		79.7	40-140			
Surrogate: 2-Fluorobiphenyl	*4.37*		mg/Kg wet	5.00		87.4	40-140			
LCS Dup (B060774-BSD1)				Prepared: 10/15/12 Analyzed: 10/17/12						
Acenaphthene	3.80	0.10	mg/Kg wet	5.00		75.9	40-140	7.39	25	
Acenaphthylene	3.74	0.10	mg/Kg wet	5.00		74.8	40-140	7.27	25	
Anthracene	4.09	0.10	mg/Kg wet	5.00		81.8	40-140	6.13	25	
Benzo(a)anthracene	4.04	0.10	mg/Kg wet	5.00		80.9	40-140	7.04	25	
Benzo(a)pyrene	3.79	0.10	mg/Kg wet	5.00		75.8	40-140	6.62	25	
Benzo(b)fluoranthene	4.01	0.10	mg/Kg wet	5.00		80.2	40-140	7.01	25	
Benzo(g,h,i)perylene	4.23	0.10	mg/Kg wet	5.00		84.7	40-140	6.50	25	
Benzo(k)fluoranthene	3.96	0.10	mg/Kg wet	5.00		79.1	40-140	6.61	25	
Chrysene	3.77	0.10	mg/Kg wet	5.00		75.5	40-140	7.22	25	
Dibenz(a,h)anthracene	4.23	0.10	mg/Kg wet	5.00		84.6	40-140	5.92	25	
Fluoranthene	4.05	0.10	mg/Kg wet	5.00		81.0	40-140	7.08	25	
Fluorene	4.08	0.10	mg/Kg wet	5.00		81.6	40-140	7.36	25	
Indeno(1,2,3-cd)pyrene	4.23	0.10	mg/Kg wet	5.00		84.6	40-140	6.23	25	
2-Methylnaphthalene	3.55	0.10	mg/Kg wet	5.00		71.0	40-140	8.22	25	
Naphthalene	3.18	0.10	mg/Kg wet	5.00		63.7	40-140	8.25	25	
Phenanthrene	4.07	0.10	mg/Kg wet	5.00		81.5	40-140	9.47	25	
Pyrene	3.95	0.10	mg/Kg wet	5.00		78.9	40-140	7.35	25	
n-Decane	2.38	0.10	mg/Kg wet	5.00		47.6	40-140	2.09	25	
n-Docosane	4.28	0.10	mg/Kg wet	5.00		85.5	40-140	2.50	25	
n-Dodecane	3.04	0.10	mg/Kg wet	5.00		60.9	40-140	1.66	25	
n-Eicosane	4.21	0.10	mg/Kg wet	5.00		84.2	40-140	0.550	25	
n-Hexacosane	4.21	0.10	mg/Kg wet	5.00		84.2	40-140	1.40	25	
n-Hexadecane	3.96	0.10	mg/Kg wet	5.00		79.1	40-140	0.700	25	
n-Hexatriacontane	4.24	0.10	mg/Kg wet	5.00		84.8	40-140	1.67	25	
n-Nonadecane	4.23	0.10	mg/Kg wet	5.00		84.7	40-140	0.547	25	
n-Nonane	1.68	0.10	mg/Kg wet	5.00		33.6	30-140	2.37	25	
n-Octacosane	4.06	0.10	mg/Kg wet	5.00		81.1	40-140	1.59	25	
n-Octadecane	4.18	0.10	mg/Kg wet	5.00		83.6	40-140	0.523	25	
n-Tetracosane	4.23	0.10	mg/Kg wet	5.00		84.7	40-140	0.938	25	
n-Tetradecane	3.59	0.10	mg/Kg wet	5.00		71.8	40-140	0.307	25	
n-Triacontane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140	1.73	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.96*		mg/Kg wet	4.99		79.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.82*		mg/Kg wet	5.00		76.4	40-140			
Surrogate: 2-Bromonaphthalene	*3.70*		mg/Kg wet	5.00		74.1	40-140			
Surrogate: 2-Fluorobiphenyl	*4.05*		mg/Kg wet	5.00		81.0	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B061078 - SW-846 3546										
Blank (B061078-BLK1)				Prepared: 10/18/12 Analyzed: 10/20/12						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.93*		mg/Kg wet	4.99		78.7	40-140			
Surrogate: o-Terphenyl (OTP)	*3.72*		mg/Kg wet	5.00		74.4	40-140			
Surrogate: 2-Bromonaphthalene	*4.52*		mg/Kg wet	5.00		90.3	40-140			
Surrogate: 2-Fluorobiphenyl	*4.74*		mg/Kg wet	5.00		94.8	40-140			
LCS (B061078-BS1)				Prepared: 10/18/12 Analyzed: 10/20/12						
Acenaphthene	3.79	0.10	mg/Kg wet	5.00		75.8	40-140			
Acenaphthylene	3.75	0.10	mg/Kg wet	5.00		74.9	40-140			
Anthracene	4.12	0.10	mg/Kg wet	5.00		82.5	40-140			
Benzo(a)anthracene	4.10	0.10	mg/Kg wet	5.00		82.0	40-140			
Benzo(a)pyrene	3.82	0.10	mg/Kg wet	5.00		76.4	40-140			
Benzo(b)fluoranthene	4.02	0.10	mg/Kg wet	5.00		80.4	40-140			
Benzo(g,h,i)perylene	4.19	0.10	mg/Kg wet	5.00		83.7	40-140			
Benzo(k)fluoranthene	4.01	0.10	mg/Kg wet	5.00		80.1	40-140			
Chrysene	3.84	0.10	mg/Kg wet	5.00		76.9	40-140			
Dibenz(a,h)anthracene	4.21	0.10	mg/Kg wet	5.00		84.1	40-140			
Fluoranthene	4.08	0.10	mg/Kg wet	5.00		81.6	40-140			
Fluorene	3.94	0.10	mg/Kg wet	5.00		78.7	40-140			
Indeno(1,2,3-cd)pyrene	4.20	0.10	mg/Kg wet	5.00		83.9	40-140			
2-Methylnaphthalene	3.71	0.10	mg/Kg wet	5.00		74.3	40-140			
Naphthalene	3.42	0.10	mg/Kg wet	5.00		68.4	40-140			
Phenanthrene	4.04	0.10	mg/Kg wet	5.00		80.8	40-140			
Pyrene	3.98	0.10	mg/Kg wet	5.00		79.6	40-140			
n-Decane	2.45	0.10	mg/Kg wet	5.00		49.1	40-140			
n-Docosane	4.36	0.10	mg/Kg wet	5.00		87.2	40-140			
n-Dodecane	3.15	0.10	mg/Kg wet	5.00		63.0	40-140			
n-Eicosane	4.31	0.10	mg/Kg wet	5.00		86.2	40-140			
n-Hexacosane	4.29	0.10	mg/Kg wet	5.00		85.7	40-140			
n-Hexadecane	4.03	0.10	mg/Kg wet	5.00		80.7	40-140			
n-Hexatriacontane	4.33	0.10	mg/Kg wet	5.00		86.7	40-140			
n-Nonadecane	4.33	0.10	mg/Kg wet	5.00		86.7	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B061078 - SW-846 3546										
LCS (B061078-BS1)				Prepared: 10/18/12 Analyzed: 10/20/12						
n-Nonane	1.71	0.10	mg/Kg wet	5.00		34.2	30-140			
n-Octacosane	4.12	0.10	mg/Kg wet	5.00		82.5	40-140			
n-Octadecane	4.28	0.10	mg/Kg wet	5.00		85.5	40-140			
n-Tetracosane	4.32	0.10	mg/Kg wet	5.00		86.4	40-140			
n-Tetradecane	3.63	0.10	mg/Kg wet	5.00		72.6	40-140			
n-Triacontane	4.23	0.10	mg/Kg wet	5.00		84.5	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.96*		mg/Kg wet	4.99		79.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.82*		mg/Kg wet	5.00		76.4	40-140			
Surrogate: 2-Bromonaphthalene	*4.37*		mg/Kg wet	5.00		87.4	40-140			
Surrogate: 2-Fluorobiphenyl	*4.70*		mg/Kg wet	5.00		93.9	40-140			
LCS Dup (B061078-BSD1)				Prepared: 10/18/12 Analyzed: 10/20/12						
Acenaphthene	3.46	0.10	mg/Kg wet	5.00		69.3	40-140	8.98	25	
Acenaphthylene	3.46	0.10	mg/Kg wet	5.00		69.1	40-140	8.05	25	
Anthracene	3.70	0.10	mg/Kg wet	5.00		74.1	40-140	10.7	25	
Benzo(a)anthracene	3.77	0.10	mg/Kg wet	5.00		75.4	40-140	8.43	25	
Benzo(a)pyrene	3.52	0.10	mg/Kg wet	5.00		70.4	40-140	8.15	25	
Benzo(b)fluoranthene	3.73	0.10	mg/Kg wet	5.00		74.5	40-140	7.56	25	
Benzo(g,h,i)perylene	3.84	0.10	mg/Kg wet	5.00		76.8	40-140	8.65	25	
Benzo(k)fluoranthene	3.67	0.10	mg/Kg wet	5.00		73.5	40-140	8.63	25	
Chrysene	3.51	0.10	mg/Kg wet	5.00		70.3	40-140	8.99	25	
Dibenz(a,h)anthracene	3.88	0.10	mg/Kg wet	5.00		77.5	40-140	8.18	25	
Fluoranthene	3.74	0.10	mg/Kg wet	5.00		74.9	40-140	8.56	25	
Fluorene	3.60	0.10	mg/Kg wet	5.00		72.0	40-140	8.94	25	
Indeno(1,2,3-cd)pyrene	3.88	0.10	mg/Kg wet	5.00		77.6	40-140	7.88	25	
2-Methylnaphthalene	3.43	0.10	mg/Kg wet	5.00		68.6	40-140	7.92	25	
Naphthalene	3.17	0.10	mg/Kg wet	5.00		63.5	40-140	7.46	25	
Phenanthrene	3.74	0.10	mg/Kg wet	5.00		74.8	40-140	7.76	25	
Pyrene	3.66	0.10	mg/Kg wet	5.00		73.2	40-140	8.41	25	
n-Decane	2.53	0.10	mg/Kg wet	5.00		50.6	40-140	3.11	25	
n-Docosane	4.04	0.10	mg/Kg wet	5.00		80.8	40-140	7.58	25	
n-Dodecane	3.04	0.10	mg/Kg wet	5.00		60.8	40-140	3.43	25	
n-Eicosane	3.99	0.10	mg/Kg wet	5.00		79.8	40-140	7.70	25	
n-Hexacosane	3.98	0.10	mg/Kg wet	5.00		79.6	40-140	7.37	25	
n-Hexadecane	3.72	0.10	mg/Kg wet	5.00		74.4	40-140	8.01	25	
n-Hexatriacontane	4.02	0.10	mg/Kg wet	5.00		80.4	40-140	7.57	25	
n-Nonadecane	4.00	0.10	mg/Kg wet	5.00		80.1	40-140	7.90	25	
n-Nonane	1.88	0.10	mg/Kg wet	5.00		37.5	30-140	9.34	25	
n-Octacosane	3.83	0.10	mg/Kg wet	5.00		76.6	40-140	7.41	25	
n-Octadecane	3.94	0.10	mg/Kg wet	5.00		78.9	40-140	8.13	25	
n-Tetracosane	4.01	0.10	mg/Kg wet	5.00		80.3	40-140	7.37	25	
n-Tetradecane	3.39	0.10	mg/Kg wet	5.00		67.7	40-140	6.97	25	
n-Triacontane	3.93	0.10	mg/Kg wet	5.00		78.6	40-140	7.28	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.66*		mg/Kg wet	4.99		73.4	40-140			
Surrogate: o-Terphenyl (OTP)	*3.47*		mg/Kg wet	5.00		69.3	40-140			
Surrogate: 2-Bromonaphthalene	*4.20*		mg/Kg wet	5.00		84.0	40-140			
Surrogate: 2-Fluorobiphenyl	*4.49*		mg/Kg wet	5.00		89.9	40-140			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060259 - SW-846 7471										
Blank (B060259-BLK1)				Prepared & Analyzed: 10/08/12						
Mercury	ND	0.025	mg/Kg wet							
LCS (B060259-BS1)				Prepared & Analyzed: 10/08/12						
Mercury	3.68	0.33	mg/Kg wet	3.73		98.8	71.7-128.3			
LCS Dup (B060259-BSD1)				Prepared & Analyzed: 10/08/12						
Mercury	3.58	0.33	mg/Kg wet	3.73		96.1	71.7-128.3	2.74	30	
Batch B060275 - SW-846 3050B										
Blank (B060275-BLK1)				Prepared: 10/06/12 Analyzed: 10/08/12						
Chromium	ND	0.50	mg/Kg wet							
Copper	ND	0.50	mg/Kg wet							
Lead	ND	0.75	mg/Kg wet							
Nickel	ND	0.50	mg/Kg wet							
Zinc	ND	1.0	mg/Kg wet							
LCS (B060275-BS1)				Prepared: 10/06/12 Analyzed: 10/08/12						
Chromium	132	1.0	mg/Kg wet	119		111	81.6-117.6			
Copper	136	1.0	mg/Kg wet	118		116	81.6-117.8			
Lead	80.9	1.5	mg/Kg wet	76.9		105	81.3-118.7			
Nickel	75.5	1.0	mg/Kg wet	70.0		108	81.7-118.1			
Zinc	298	2.0	mg/Kg wet	276		108	82.2-117.8			
LCS (B060275-BS2)				Prepared: 10/06/12 Analyzed: 10/08/12						
Lead	0.811	0.74	mg/Kg wet	0.743		109	80-120			
LCS Dup (B060275-BSD1)				Prepared: 10/06/12 Analyzed: 10/08/12						
Chromium	124	0.99	mg/Kg wet	119		104	81.6-117.6	6.34	30	
Copper	128	0.99	mg/Kg wet	118		109	81.6-117.8	6.35	30	
Lead	78.6	1.5	mg/Kg wet	76.9		102	81.3-118.7	2.98	30	
Nickel	70.9	0.99	mg/Kg wet	70.0		101	81.7-118.1	6.33	30	
Zinc	282	2.0	mg/Kg wet	276		102	82.2-117.8	5.58	30	
Batch B060276 - SW-846 3050B										
Blank (B060276-BLK1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Arsenic	ND	0.25	mg/Kg wet							
LCS (B060276-BS1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Arsenic	184	2.0	mg/Kg wet	168		109	83.3-117.3			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060276 - SW-846 3050B										
LCS Dup (B060276-BSD1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Arsenic	178	2.0	mg/Kg wet	168		106	83.3-117.3	3.38	30	
Batch B060278 - SW-846 3050B										
Blank (B060278-BLK1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Cadmium	ND	0.062	mg/Kg wet							
LCS (B060278-BS1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Cadmium	108	0.25	mg/Kg wet	103		105	83.6-115.5			
LCS Dup (B060278-BSD1)				Prepared: 10/06/12 Analyzed: 10/09/12						
Cadmium	108	0.25	mg/Kg wet	103		105	83.6-115.5	0.313	30	
Duplicate (B060278-DUP1)	**Source: 12J0244-01**			Prepared: 10/06/12 Analyzed: 10/09/12						
Cadmium	3.59	0.14	mg/Kg dry		3.44			4.39	35	
Matrix Spike (B060278-MS1)	**Source: 12J0244-01**			Prepared: 10/06/12 Analyzed: 10/09/12						
Cadmium	106	0.14	mg/Kg dry	113	3.44	91.2	75-125			

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060530 - SM18-20 2510B										
Blank (B060530-BLK1)				Prepared & Analyzed: 10/10/12						
Specific conductance	ND	2.0	µmhos/cm							
LCS (B060530-BS1)				Prepared & Analyzed: 10/10/12						
Specific conductance	140	2.0	µmhos/cm	147		93.0	77.3-114			
Duplicate (B060530-DUP1)	**Source: 12J0244-04**			Prepared & Analyzed: 10/10/12						
Specific conductance	4.9	2.0	µmhos/cm		4.8			3.10	18.9	

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QUALITY CONTROL

TCLP - Metals Analyses - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B060550 - SW-846 3010A										
Blank (B060550-BLK1)				Prepared & Analyzed: 10/11/12						
Lead	ND	0.010	mg/L							
LCS (B060550-BS1)				Prepared & Analyzed: 10/11/12						
Lead	0.468	0.010	mg/L	0.500		93.6	80-120			
LCS Dup (B060550-BSD1)				Prepared & Analyzed: 10/11/12						
Lead	0.468	0.010	mg/L	0.500		93.6	80-120	0.00492	20	
Matrix Spike (B060550-MS1)	**Source: 12J0244-01**			Prepared & Analyzed: 10/11/12						
Lead	1.24	0.010	mg/L	0.500	0.748	98.5	75-125			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
L-02	Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-07A	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD outside of control limits. Reduced precision anticipated for any reported result for this compound.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
RL-04	Elevated reporting limit due to sample matrix interference. Requested reporting limit not met.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-07	One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the low side.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound. Increased uncertainty is associated with the reported value which is likely to be biased on the high side.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy are associated with reported result.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,WA,ME
C19-C36 Aliphatics	CT,NC,WA,ME
Unadjusted C11-C22 Aromatics	CT,NC,WA,ME
C11-C22 Aromatics	CT,NC,WA,ME
Acenaphthene	CT,NC,WA,ME
Acenaphthylene	CT,NC,WA,ME
Anthracene	CT,NC,WA,ME
Benzo(a)anthracene	CT,NC,WA,ME
Benzo(a)pyrene	CT,NC,WA,ME
Benzo(b)fluoranthene	CT,NC,WA,ME
Benzo(g,h,i)perylene	CT,NC,WA,ME
Benzo(k)fluoranthene	CT,NC,WA,ME
Chrysene	CT,NC,WA,ME
Dibenz(a,h)anthracene	CT,NC,WA,ME
Fluoranthene	CT,NC,WA,ME
Fluorene	CT,NC,WA,ME
Indeno(1,2,3-cd)pyrene	CT,NC,WA,ME
2-Methylnaphthalene	CT,NC,WA,ME
Naphthalene	CT,NC,WA,ME
Phenanthrene	CT,NC,WA,ME
Pyrene	CT,NC,WA,ME
SW-846 6010C in Soil	
Cadmium	CT,NH,NY,ME,NC
Chromium	CT,NH,NY,ME,NC
Copper	CT,NH,NY,ME,NC
Lead	CT,NH,NY,AIHA,ME,NC
Nickel	CT,NH,NY,ME,NC
Zinc	CT,NH,NY,ME,NC
SW-846 6010C in Water	
Lead	NY,CT,ME,NC,NH
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME
SW-846 8260C in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME
SW-846 8270D in Soil	
Acenaphthene	CT,NY,NH
Acenaphthene	NY,CT,NH
Acenaphthylene	NY,CT,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH
Aniline	NY,NH
Anthracene	CT,NY,NH
Anthracene	NY,CT,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)anthracene	NY,CT,NH
Benzo(a)pyrene	NY,CT,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	NY,CT,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	NY,CT,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	NY,CT,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	NY,CT,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	NY,CT,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Soil	
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY,NH
Fluoranthene	NY,CT,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	NY,CT,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Naphthalene	NY,CT,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenanthrene	NY,CT,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
Pyrene	NY,CT,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH

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The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC	100033	02/1/2014
MA	Massachusetts DEP	M-MA100	06/30/2013
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2013
NY	New York State Department of Health	10899 NELAP	04/1/2013
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2013
RI	Rhode Island Department of Health	LAO00112	12/30/2012
NC	North Carolina Div. of Water Quality	652	12/31/2012
NJ	New Jersey DEP	MA007 NELAP	06/30/2013
FL	Florida Department of Health	E871027 NELAP	06/30/2013
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2013
WA	State of Washington Department of Ecology	C2065	02/23/2013
ME	State of Maine	2011028	06/9/2013
VA	Commonwealth of Virginia	1381	12/14/2012

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Email: info@contestlabs.com
www.contestlabs.com
39 Spruce Street
East longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

12502414

Rev 04.05.12

Page ____ of ____

Company Name: Weston + Sampson
Address: 5 Centennial Drive Peabody MA
Attention: Tony Zerilli
Project Location: Worcester - Salisbury Pond
Sampled By: Blake Martin

Telephone: 978-532-1900
Project #
Client PO#: Worcester-Salisbury

DATA DELIVERY (check all that apply)
○ FAX ◉ EMAIL ○ WEBSITE
Fax #
Email: zerillia@wseinc.com
Format: ◉ PDF ◉ EXCEL ○ GIS ○ OTHER
○ "Enhanced Data Package"

Project Proposal Provided? (for billing purposes)
○ yes _____ proposal date

Con-Test Lab ID (laboratory use only)	Client Sample ID / Description	Collection Beginning Date/Time	Collection Ending Date/Time	Composite	Grab	*Matrix Code	Cont. Code	# of Containers	** Preservation	***Container Code	Metals	PAH's	PCB's	EPH	% Solids	TPH	SVOC's	Conductivity	TCLP Pb	Grain Size	VOC's
-01	Comp 1	10/5	10/5	X		S	U				X	X	X	X	X	X	X	X	X	X	X
-02	Comp 2	10/5	10/5	X		S	U				X	X	X	X	X	X	X	X	X	X	X
-03	Comp 3	10/5	10/5	X		S	U				X	X	X	X	X	X	X	X	X	X	X
-04	Soil 1	10/5	10/5	X		S	U				X	X	X	X	X	X	X	X	X	X	X

ANALYSIS REQUESTED

Dissolved Metals
○ Field Filtered
○ Lab to Filter

***Cont. Code:
A=amber glass
G=glass
P=plastic
ST=sterile
V=vial
S=summa can
T=tedlar bag
O=Other

**Preservation
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium bisulfate
X = Na hydroxide
T = Na thiosulfate
O = Other

*Matrix Code:
GW = groundwater
WW = wastewater
DW = drinking water
A = air
S = soil/solid
SL = sludge
O = other

Comments:
Samples collected for 401 Water Quality
Cert Standards & TDC needed via e-Mail 10/9

Please use the following codes to let Con-Test know if a specific sample may be high in concentration in Matrix/Conc. Code Box:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:
[signature] 10.5.12	1425
Received by: (signature)	Date/Time:
[signature] 10.5.12	1425
Relinquished by: (signature)	Date/Time:
[signature] 10.5.12	1720
Received by: (signature)	Date/Time:
[signature] 3.3C 10/5/12	17:22

Turnaround ††
☒ 7-Day
☒ 10-Day
☐ Other
RUSH †
☐ †24-Hr ☐ †48-Hr
☐ †72-Hr ☐ †4-Day
† Require lab approval

Detection Limit Requirements
Massachusetts: 401 WQC
Connecticut:
Other:

Is your project MCP or RCP ?
○ MCP Form Required
○ RCP Form Required
○ MA State DW Form Required PWSID # _____

NELAC & AIHA-LAP, LLC Accredited
WBE/DBE Certified

†† TURNAROUND TIME STARTS AT 9:00 A.M. THE DAY AFTER SAMPLE RECEIPT UNLESS THERE ARE QUESTIONS ON YOUR CHAIN. IF THIS FORM IS NOT FILLED OUT COMPLETELY OR IS INCORRECT, TURNAROUND TIME WILL NOT START UNTIL ALL QUESTIONS ARE ANSWERED BY OUR CLIENT.

PLEASE BE CAREFUL NOT TO CONTAMINATE THIS DOCUMENT

39 Spruce St.
East Longmeadow, MA. 01028
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F: 413-525-6405
www.contestlabs.com

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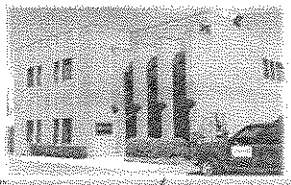


Sample Receipt Checklist

CLIENT NAME: Weston & Sampson RECEIVED BY: KKM DATE: 10/5/12

1) **Was the chain(s) of custody relinquished and signed?** (Yes) No No CoC Included

2) **Does the chain agree with the samples?** (Yes) No

If not, explain:

3) **Are all the samples in good condition?** (Yes) No

If not, explain:

4) **How were the samples received:**

On Ice ☑ Direct from Sampling ☐ Ambient ☐ In Cooler(s) ☑

Were the samples received in Temperature Compliance of (2-6°C)? (Yes) No N/A

Temperature °C by Temp blank _____ Temperature °C by Temp gun 3.3

5) **Are there Dissolved samples for the lab to filter?** Yes (No)

Who was notified _____ Date _____ Time _____

6) **Are there any RUSH or SHORT HOLDING TIME samples?** Yes (No)

Who was notified _____ Date _____ Time _____

7) **Location where samples are stored:** 19

Permission to subcontract samples? Yes No
(Walk-in clients only) if not already approved
Client Signature: _____

8) **Do all samples have the proper Acid pH:** Yes No (N/A) _____

9) **Do all samples have the proper Base pH:** Yes No (N/A) _____

10) **Was the PC notified of any discrepancies with the CoC vs the samples:** Yes No (N/A)

Containers received at Con-Test

	# of containers		# of containers
1 Liter Amber		8 oz amber/clear jar	
500 mL Amber	4	4 oz amber/clear jar	
250 mL Amber (8oz amber)	20	2 oz amber/clear jar	
1 Liter Plastic		Air Cassette	
500 mL Plastic		Hg/Hopcalite Tube	
250 mL plastic		Plastic Bag / Ziploc	
40 mL Vial - type listed below	12	PM 2.5 / PM 10	
Colisure / bacteria bottle		PUF Cartridge	
Dissolved Oxygen bottle		SOC Kit	
Encore		TO-17 Tubes	
Flashpoint bottle		Non-ConTest Container	
Perchlorate Kit		Other glass jar	
Other		Other	

Laboratory Comments:

40 mL vials: # HCl _____ # Methanol 4

Bisulfate 8 # DI Water _____

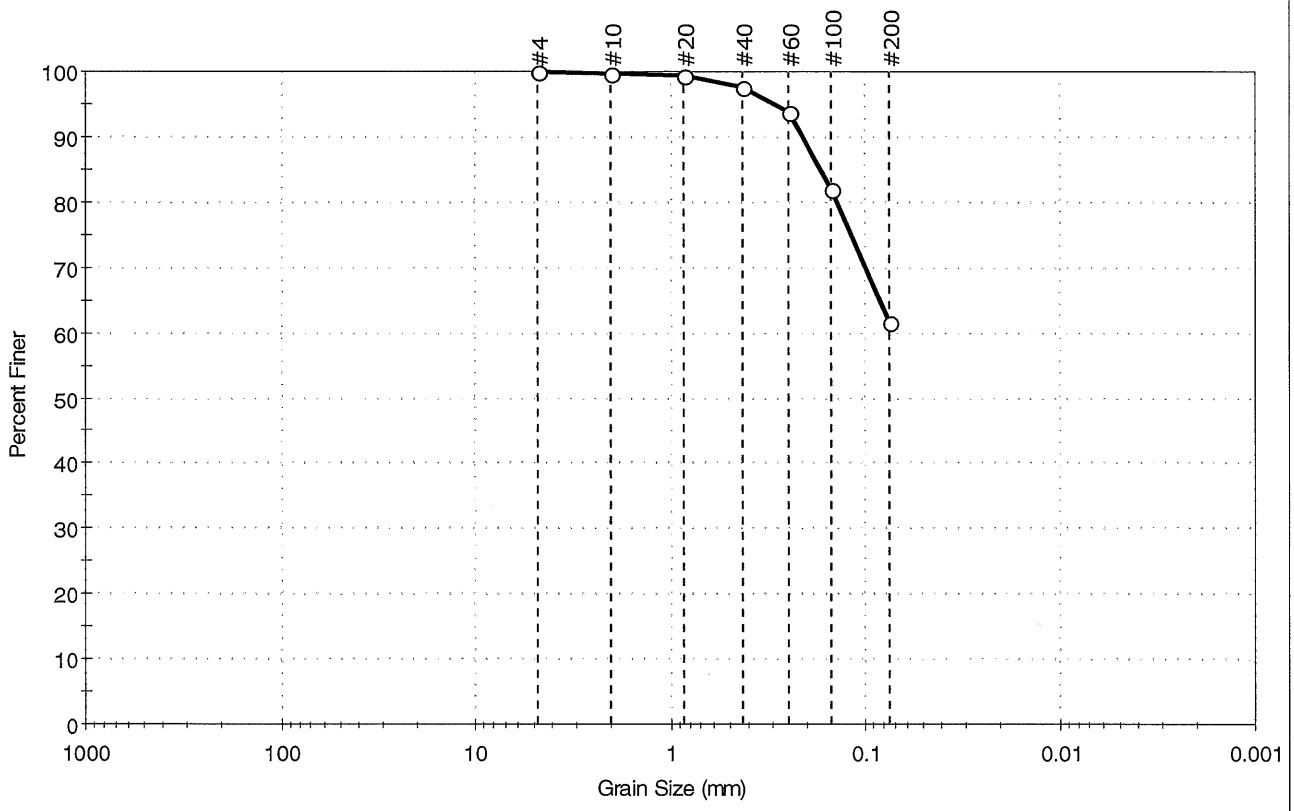
Thiosulfate _____ Unpreserved _____

Time and Date Frozen:

GeoTesting EXPRESS

Client:	Con-Test Analytical Lab				
Project:	12J0244				
Location:				Project No:	GTX-12320
Boring ID: ---		Sample Type:	jar	Tested By:	jbr
Sample ID:	12J0244-01	Test Date:	10/22/12	Checked By:	jdt
Depth :	---	Test Id:	252025		
Test Comment:	---				
Sample Description:	Wet, gray sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	38.5	61.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	98		
#60	0.25	94		
#100	0.15	82		
#200	0.075	62		

Coefficients

D_{85} = 0.1716 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

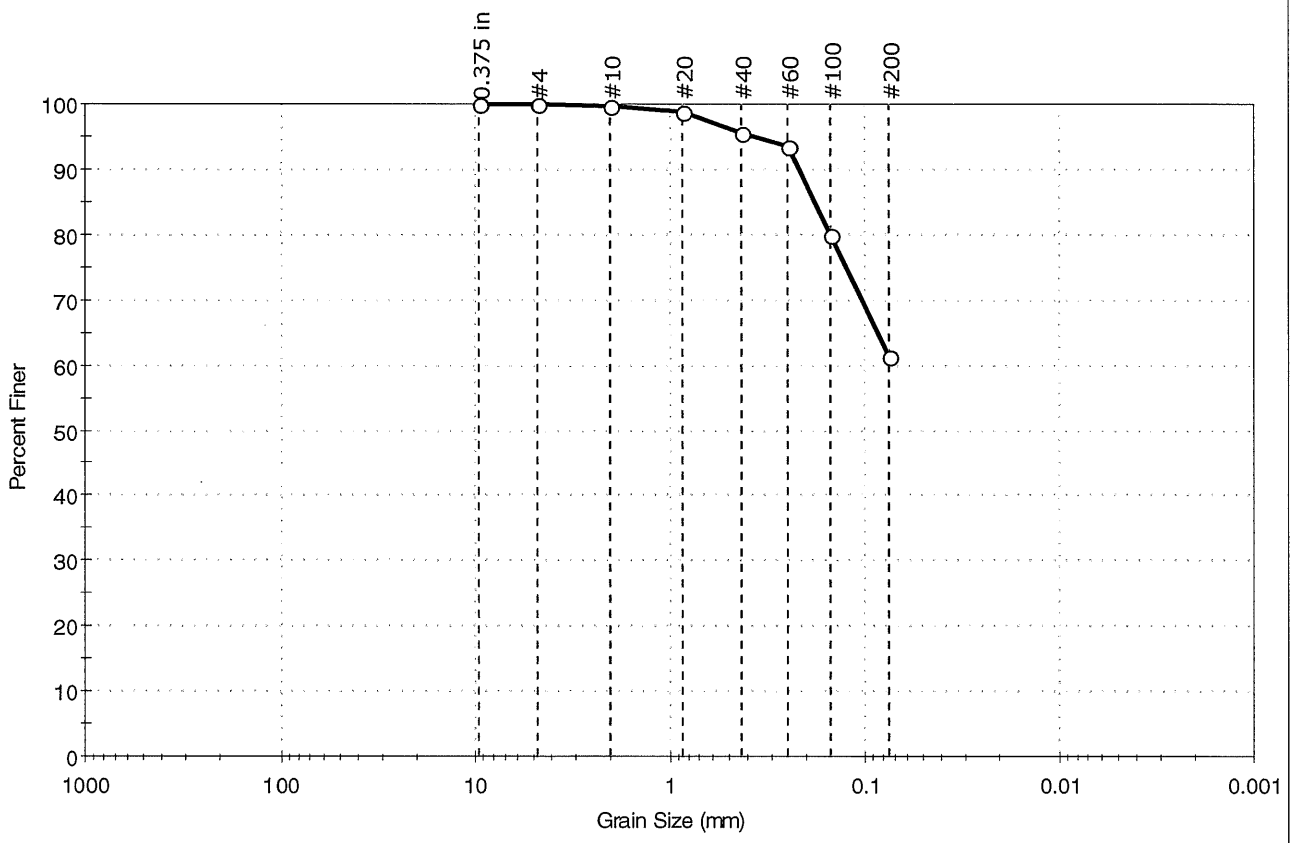
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting EXPRESS

Client:	Con-Test Analytical Lab				
Project:	12J0244				
Location:				Project No:	GTX-12320
Boring ID: ---		Sample Type:	jar	Tested By:	jbr
Sample ID:	12J0244-02	Test Date:	10/16/12	Checked By:	jdt
Depth :	---	Test Id:	252026		
Test Comment:	---				
Sample Description:	Wet, dark gray sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.1	38.6	61.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	96		
#60	0.25	93		
#100	0.15	80		
#200	0.075	61		

Coefficients

D_{85} = 0.1813 mm	D_{30} = N/A
D_{60} = N/A	D_{15} = N/A
D_{50} = N/A	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

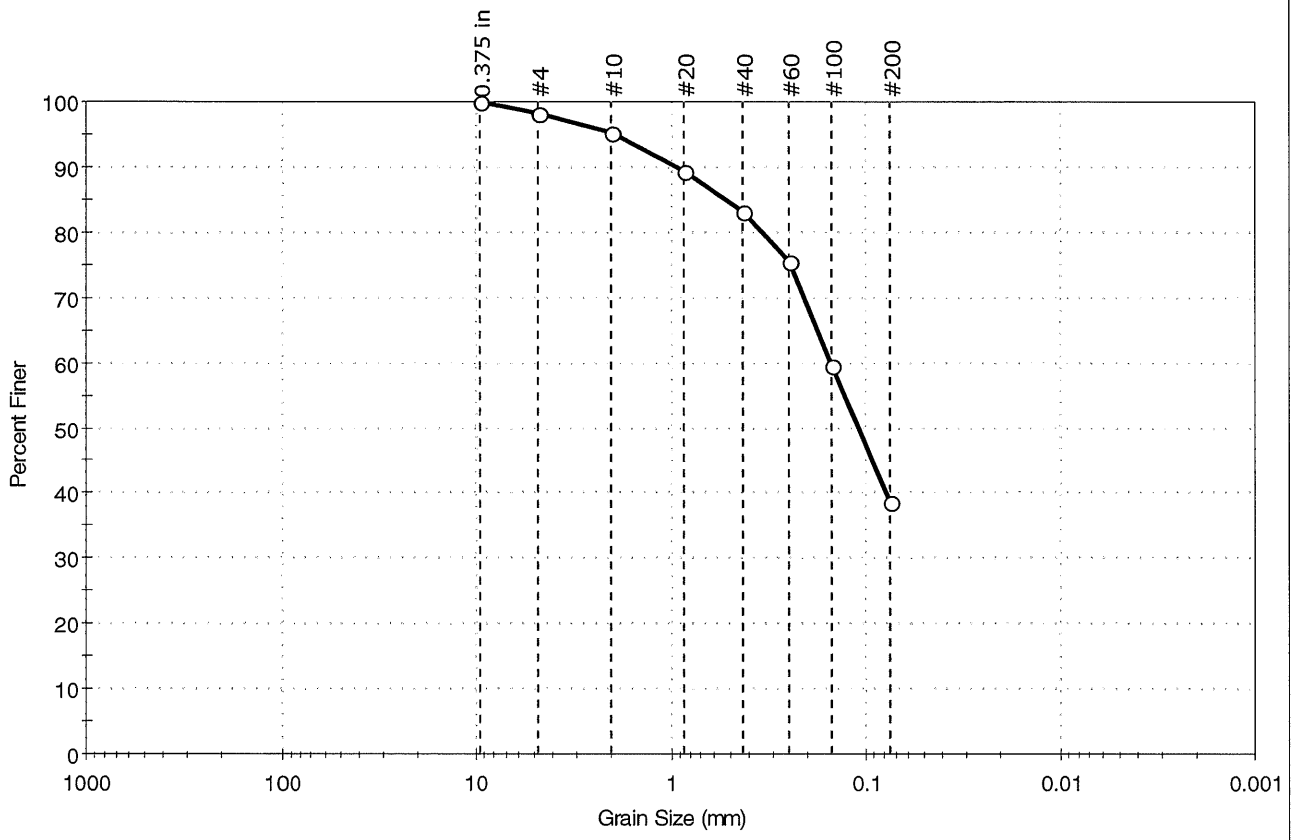
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting EXPRESS

Client:	Con-Test Analytical Lab				
Project:	12J0244				
Location:				Project No:	GTX-12320
Boring ID: ---		Sample Type:	jar	Tested By:	jbr
Sample ID:12J0244-03		Test Date:	10/22/12	Checked By:	jdt
Depth : ---		Test Id:	252027		
Test Comment:	---				
Sample Description:	Wet, gray silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	1.8	59.7	38.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	95		
#20	0.85	89		
#40	0.42	83		
#60	0.25	76		
#100	0.15	60		
#200	0.075	38		

Coefficients

D_{85} =0.5256 mm	D_{30} =N/A
D_{60} =0.1520 mm	D_{15} =N/A
D_{50} =0.1095 mm	D_{10} =N/A
C_u =N/A	C_c =N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

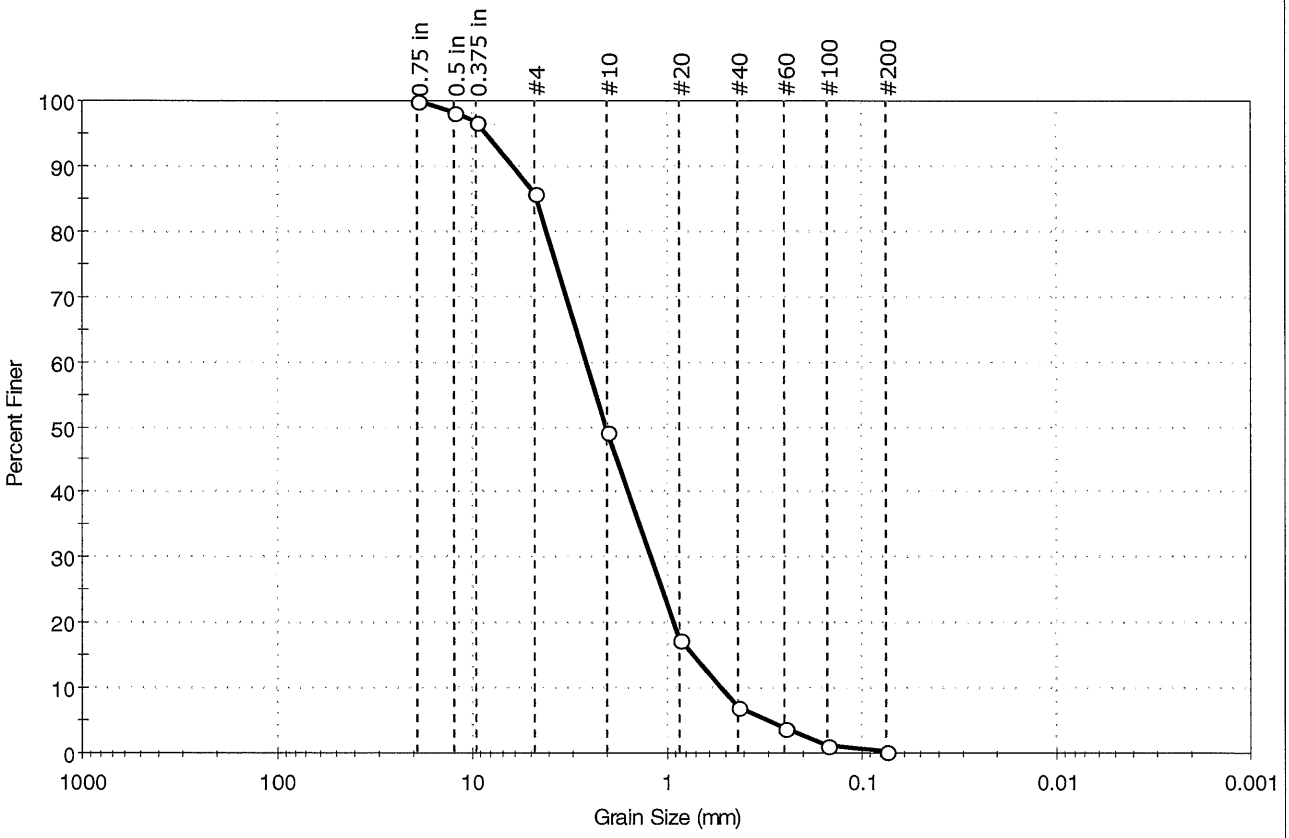
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting EXPRESS

Client:	Con-Test Analytical Lab				
Project:	12J0244				
Location:				Project No:	GTX-12320
Boring ID: ---		Sample Type:	jar	Tested By:	jbr
Sample ID:	12J0244-04	Test Date:	10/22/12	Checked By:	jdt
Depth :	---	Test Id:	252028		
Test Comment:	---				
Sample Description:	Moist, gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	14.3	85.5	0.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	98		
0.375 in	9.50	97		
#4	4.75	86		
#10	2.00	49		
#20	0.85	17		
#40	0.42	7		
#60	0.25	4		
#100	0.15	1		
#200	0.075	0		

Coefficients

D_{85} = 4.6702 mm D_{30} = 1.1907 mm
D_{60} = 2.5748 mm D_{15} = 0.7229 mm
D_{50} = 2.0291 mm D_{10} = 0.5154 mm
C_u = 4.996 C_c = 1.068

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

APPENDIX B:

Key Considerations for Dredging

Reasons for Dredging:
Increased depth/access
Removal of nutrient reserves
Control of aquatic vegetation
Alteration of bottom composition
Habitat enhancement
Reduction in oxygen demand

Volume of Material To Be Removed:
In-situ volume to be removed
Distribution of volume among sediment types
Distribution of volume over lake area (key sectors)
Bulked volume (see below)
Dried volume (see below)

Nature of Underlying Material to Be Exposed:
Type of material
Comparison with overlying material

Dewatering Capacity of Sediments:
Dewatering potential
Dewatering timeframe
Methodological considerations

Protected Resource Areas:
Wetlands
Endangered species
Habitats of special concern
Species of special concern
Regulatory resource classifications

Equipment Access:
Possible input and output points
Land slopes
Pipeline routing
Property issues

Potential Disposal Sites:
Possible containment sites
Soil conditions
Necessary site preparation
Volumetric capacity
Property issues
Long term disposal options

Existing and Proposed Bathymetry:
Existing mean depth
Existing maximum depth
Proposed distribution of lake area over depth range
Proposed mean depth
Proposed maximum depth
Proposed distribution of area over depth range

Physical Nature of Material To Be Removed:
Grain size distribution
Solids and organic content
Settling rate
Bulking factor
Drying factor
Residual turbidity

Chemical Nature of Material to Be Removed:
Metals levels
Petroleum hydrocarbon levels
Nutrient levels
Pesticides levels
PCB levels
Other organic contaminant levels
Other contaminants of concern (site-specific)

Flow Management:
System hydrology
Possible peak flows
Expected mean flows
Provisions for controlling water level
Methodological implications

Relationship to Lake Uses:
Impact on existing uses during project
Impact on existing uses after project
Facilitation of additional uses

Dredging Methodologies:
Hydraulic (or pneumatic) options
Wet excavation
Dry excavation

Applicable Regulatory Processes:

MEPA review (Environmental Notification Form)
Environmental impact reporting (EIR if needed)
Wetlands Protection Act (Order of Conditions)
Dredging permits (Chapter 91)
Aquatic structures permits (Chapter 91)
Drawdown notification (to DFWELE)
Water Management Act (diversion/use permits)
Clean Water Act Section 401 (WQ certification)
Clean Water Act Section 404 (USACE wetlands)
Dam safety/alteration permit (DCR)
Waste disposal permit (DEP)
Discharge permits (NPDES, USEPA/DEP)

Removal Costs:

Engineering and permitting costs
Construction of containment area
Equipment purchases
Operational costs
Contract dredging costs
Ultimate disposal costs
Monitoring costs
Total cost divided by volume to be removed

Uses or Sale Of Dredged Material:

Possible uses
Possible sale
Target markets

Other Mitigating Factors:

Necessary watershed management
Ancillary project impacts
Economic setting
Political setting
Sociological setting

APPENDIX C:

Funding Opportunities

Community Preservation Fund
CPA is a smart growth tool that helps communities preserve open space and historic sites, create affordable housing, and develop outdoor recreational facilities. CPA also helps strengthen the state and local economies by expanding housing opportunities and construction jobs for the Commonwealth's workforce, and by supporting the tourism industry through preservation of the Commonwealth's historic and natural resources. CPA allows communities to create a local Community Preservation Fund for open space protection, historic preservation, affordable housing and outdoor recreation. Community preservation monies are raised locally through the imposition of a surcharge of not more than 3% of the tax levy against real property, and municipalities must adopt CPA by ballot referendum. The CPA statute also creates a statewide Community Preservation Trust Fund, administered by the Department of Revenue (DOR), which provides distributions each October to communities that have adopted CPA. These annual disbursements serve as an incentive for communities to pass CPA.

Lakes and Ponds Grant Program
DCR's Lake and Pond grant program awards grants for the protection, preservation and enhancement of public lakes and ponds in the Commonwealth. A maximum grant of $25,000 is available to eligible applicants on a 50/50 cost sharing basis. The grant program helps municipalities and local organizations that are struggling to meet the challenges of providing long term solutions for lake and ponds management.

Rivers and Harbors Grant Program
The Department of Conservation and Recreation (DCR) supplies grants requiring matching funds for studies, surveys, design & engineering, environmental permitting and construction that addresses problems on coastal & inland waterways, lakes, ponds and great ponds. Grants are awarded in the following categories: 1) Coastal Waterways - for commercial and recreational navigation safety & to improve coastal habitat by improving tidal interchange; 2) Inland Waterways - to improve recreational use, water quality & wildlife habitats; 3) Erosion Control - to protect public facilities and reduce downstream sedimentation; 4) Flood Control - to reduce flood potentials.
Eligible Applicants: Federal agencies, municipalities and non-profits
Estimated Application Deadline: Rolling
Average Grant Size: Varies
Average # of Grants: Varies
FY 2011 Spending: $461,000
Contact: Kevin P. Mooney, (781) 740-1600 x103

Massachusetts Environmental Trust
Through the Executive Office of Energy and Environmental Affairs (EEA) the Trust supports cooperative efforts to restore, protect, and improve water and water-related resources of the Commonwealth. Grants funds are generated through the sale of environment themed license plates.
Website: http://www.mass.gov/eea/met
Eligible Applicants: Eligible organizations generally include 501(c)(3) nonprofit organizations and municipalities. Unincorporated organizations may apply provided that they have an eligible fiscal sponsor.
Estimated Application Deadline: October
Estimated FY 2012 Spending: $1,500,000
Average Grant Size: $5,000-$50,000
Average # of Grants: 30
FY 2011 Spending: $1,600,000
Contact: Bill Hinkley, (617) 626-1045

Federal Land and Water Conservation Fund

Through the Executive Office of Energy and Environmental Affairs (EEA) the Federal Land & Water Conservation Fund (P.L. 88-578) provides up to 50% of the total project cost for the acquisition, development and renovation of park, recreation or conservation areas.
Website: http://www.mass.gov/eea/dcs-grants
Eligible Applicants: Municipal conservation commissions, park departments, and certain agencies within EEA. Municipalities must have a current open space and recreation plan to apply, and the land must be open to the general public.
Estimated Application Deadline: No grant round in the foreseeable future
Average Grant Size: Average $414,000; Maximum $500,000
Average # of Grants: Typically 5 per year.
FY 2011 Spending: $0
Contact: Melissa Cryan, 617-626-1171

U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER (ERDC) - Dredging Research (CHL-4)
Protection and enhancement of the environment associated with operation and maintenance of navigable U.S. waterway infrastructure through dredging activities is a national priority. Dredging operations and environmental requirements of navigation projects are inseparable. Research is required to predict the time-dependent movement of non-contaminated sand and sand/silt mixtures of dredged materials placed in the near shore zone, and all materials placed in the offshore region. The cost of dredging operations attributable to compliance with environmental windows that are determined to be over-restrictive, inconsistent, or technically unjustified can be reduced. More effective contaminated sediment characterization and management will reduce costs and enhance the reliability of methods associated with the assessment, dredging, placement, and control of sediments from navigation projects. Better instrumentation for dredge and site monitoring is required to implement automated dredge inspection and payment methods, and accurately monitor placement of contaminated materials. Emerging technologies regarding innovative equipment and processes should be expeditiously introduced into the dredging arena. Enhanced ecological risk management for dredging and disposal projects through technically sound approaches for characterizing, managing, and conducting risk-based evaluations are required for expanding options regarding both contaminated and non-contaminated dredged materials.
Contact: Mr. Eddie Wiggins, 601-634-2471; Email: Charles.E.Wiggins@usace.army.mil

Regional and Watershed Sediment Management (CHL-16)
Regional Sediment Management (RSM) research is intended to provide knowledge and tools that the Corps and the Nation need for effective water resource projects. RSM implies the holistic management of sediment within systems or regions to produce environmentally and economically sustainable projects. Goals include improved project design, operation, and maintenance methods, minimized disruption of natural sediment pathways and processes, and mediation of natural processes that have adverse environmental or economic impact. The approach of the Corps research is to produce targeted R&D serving multiple Corps business areas; to employ ongoing projects' experience (including Demonstration Projects) to provide data and lessons learned; to use enabling technologies of local-scale products and tools, including those generated by other R&D programs within and outside the Corps; to generate technologies that integrate the best available knowledge on sediment behavior and regional morphology into management decision support tools for a) regional and basin scale analyses and b) evaluation of the impacts of projects and management decisions on and by long-term, large-scale sedimentation processes. A key element in ERDC research is full coordination with other organizations with sediment management or monitoring expertise.
Contact: Dr. Jeff Waters, 601-634-2020; Email: Jeffrey.P.Waters@usace.army.mil

MassDEP - FFY'13 Section 319 Nonpoint Source Pollution Competitive Grants Program
Section 319 of the Clean Water Act of 1987 established a national program to control nonpoint sources (NPS) of pollution. Each year the Massachusetts DEP issues a Request for Responses (RFR) for competitive projects to be funded through Section 319 grants. This year's RFR is anticipated be issued on or about April 2, 2012. Proposals will be due on or about June 1, 2012. The RFR will be posted at the

Commonwealth's procurement site, http://www.comm-pass.com under Open Solicitations, Department of Environmental Protection, Professional Services.

Upcoming Grant Opportunity

Request for Responses to be issued on or about April 2, 2012

MassDEP - 604b Grant Program Water Quality Management Planning

This grant program is authorized under the federal Clean Water Act Section 604(b) for water quality assessment and management planning. Eligible entities include: regional planning agencies, councils of governments, conservation districts, counties, cities and Citys, and other substate public planning agencies and interstate agencies. No local match is required.

Other Funding Sources Identified

Fund for the Preservation of Wildlife and Natural Areas
Global Green Grants Fund
Heinz Endowment
McCune Charitable Foundation
Mass. Environmental Trust
McKnight Foundation
National Fish and Wildlife Foundation
New England Grassroots Environment Fund
Pew Charitable Trusts
Richard Ivey Foundation
Rockwell Foundation
Rose Foundation for Communities and the Environment
Sweet Water Trust
Weeden Foundation