RCRA Facility Investigation Report

Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Prepared For:

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1.0 Introduction

Capaccio Environmental Engineering, Inc. (CAPACCIO) was retained by Waters Corporation (WATERS) to complete a subsurface investigation at WATERS' facilities located at 34 Maple Street and 5 Technology Drive in Milford, Massachusetts (the Property). These investigation activities were conducted in response to a United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) Facility Assessment Report (RFA) prepared in August 2011 by Mabbett & Associates, Inc. The RFA was initiated in order to close out the WATERS facility as a Treatment, Storage and Disposal Facility in the USEPA's records.

In accordance with USEPA requirements, CAPACCIO is hereby submitting this RCRA Facility Investigation Report (RFI) upon completion of investigation activities as outlined in the June 2012 Quality Assurance Project Plan (QAPP) and Sampling Analysis Plan (SAP). The QAPP/SAP, attached as Appendix 1, was approved by Robert Brackett of the USEPA.

1.1 Objective

This investigation and report have been completed by CAPACCIO according to the requirements of the USEPA and summarizes investigation activities at the Property in order to address the following specific objectives:

- Assess the geologic and hydrogeologic characteristics of the Property
- Use field observations and measurements as well as analytical data to support a conclusion as to whether any conditions exist that are indicative of a hazardous waste release
- Characterize the nature and extent of contamination that may be present at the Property
- Characterize contamination source area(s), migration pathways and potential receptors
- Assess the risk of harm to human health and the environment

1.2 Distribution List

The following have received copies of this RFI:

- Roger Eydenburg, EHS Engineer, Waters Corporation, 508-482-3078
- Anita Taylor, EHS Manager, Waters Corporation, 508-482-2051
- Bob Brackett, USEPA, 617-918-1364

2.0 Background

2.1 Location and Setting

The WATERS facility and land at 34 Maple Street in Milford, Massachusetts is listed by the Town of Milford Assessor's Office as Parcel 45-0-10A and is located geographically at Universal Transverse Mercator coordinates of 4,667,930 meters north and 294,942 meters east. The 34 Maple Street property was purchased by WATERS in September 1994 and has been developed with one slab-on-grade building that operates as WATERS' primary manufacturing and office building, constructed in 1977. The WATERS facility and land at 5 Technology Drive (includes 4 Technology Drive) in Milford, Massachusetts is listed by the Town of Milford Assessor's Office as Parcels 55-0-2A and 55-0-2B and is located geographically at Universal Transverse Mercator coordinates of 4,667,427 meters north and 295,119 meters east. The 5 Technology Drive and 4 Technology Drive properties were purchased by WATERS in June 2004 and July 2008, respectively and have been developed with slab-on-grade buildings that house some of WATERS' manufacturing operations, constructed in 1986. The 34 Maple Street and 5 Technology Drive facilities are collectively referred to as the Property. A Site Location Map is included as Figure 1.

The Property is 62.50 acres, and is located in a mixed industrial and residential area bordered to the east by Interstate Route 495, to the south by undeveloped wooded land, to the west by industrial and residential areas, and to the north by undeveloped and industrial areas. The nearest residential properties are approximately 1,500 feet west of the Property. There are no institutions within 500 feet of the Property.

2.2 Property Utilities

The Property and surrounding properties are serviced by municipal water and sewer provided by the Town of Milford. Water, electrical, and natural gas lines enter the Property from Maple Street.

2.3 Local Natural Resources

A review of Massachusetts Department of Environmental Protection (MassDEP) Priority Resource Maps for the local area indicate that there are no areas designated for drinking water supply, critical environmental concern, wetland or protected open space within 500 feet of the Property. A MassDEP-designated Zone II Wellhead Protection Area is located approximately 1,000 feet northwest of the 34 Maple Street facility.

2.4 Regulatory Status

In May 1983, WATERS filed a Part A Hazardous Waste Permit Application with the USEPA to operate their 34 Maple Street facility as a Treatment, Storage and Disposal Facility. Prior to finalization of this permit, WATERS' waste solvents were

moved to the WATERS facility in Taunton, Massachusetts, rendering this permit unnecessary, changing the facility status to Generator (MAD001047968). In accordance with RCRA regulations, WATERS submitted a closure plan in March 1985 detailing the steps to be taken to close out areas where hazardous wastes were stored at the facility. In accordance with this plan, six underground storage tanks (USTs) were removed. Although closure activities have been conducted, the facility has not been closed with the USEPA and therefore, WATERS was requested to complete a RCRA Facility Assessment Report, which is conducted to assess if a release of hazardous waste or hazardous constituents had occurred from a solid waste management unit (SWMU) and to identify potential areas of concern (AOC) at the facility.

On August 15, 2011, an RFA was prepared on behalf of WATERS by Mabbett & Associates, Inc. This report presented a summary of all identified SWMUs and AOCs at the WATERS facility, including the 5 Technology Drive building, and preliminary determinations regarding releases of concern and the need for further actions. The conclusions included the following:

- Three monitoring wells were identified on the 5 Technology Drive facility, which were installed during an investigation on WATERS's purchase of the property.
- Groundwater was identified at a depth of four to seven feet below grade in the water table aquifer with groundwater flow direction to the southeast
- Groundwater samples collected from the downgradient monitoring wells indicated concentrations of volatile organic compounds below the applicable Massachusetts Department of Environmental Protection Reportable Concentrations
- A 200-feet deep bedrock well, assumed to be a former supply well, was identified on the WATERS property (this well has not been in use since WATERS purchased the land)
- Six SWMUs were identified, for which five were given the recommendation of no further action
- Four AOCs were identified
- Confirmatory sampling was recommended in the following locations:
    - AOC-1 – Two 15,000-gallon USTs containing No. 2 fuel oil located on the 34 Maple Street property currently in use
    - AOC-2B – One 1,000-gallon UST containing No. 2 fuel oil located on the 5 Technology Drive property used from the late 1980s to the present relating to an emergency generator
    - AOC-2C – One 2,000-gallon UST containing No. 2 fuel oil located on the 5 Technology Drive property used from the late 1980s to the present relating to an emergency generator
    - AOC-3A, AOC-3B and AOC-3C – One 1,000-gallon acetone UST, one 3,000-gallon acetone UST and one 1,000-gallon toluene UST located on

the 34 Maple Street facility that were removed in 1985 with no post-excavation soil sampling

- AOC-4 – Roof vents in the 34 Maple Street facility machine shop
- SWMU-5A and SWMU-5B – One 2,000-gallon mixed organic (methanol, toluene, acetone, acetonitrile) UST and one 3,000-gallon aqueous organic/chlorinated solvent and water soluble oils UST located at the 34 Maple Street facility that were removed in 1985 with no post-excavation soil sampling
- SWMU-5C – One 3,000-gallon methylene chloride, 1,1,1-trichloroethane UST located at the 34 Maple Street facility that was removed in 1985 with no post-excavation soil sampling
- SWMU-5D – Former floor drains associated with the above-mentioned AOC-5 USTs

In June 2012, CAPACCIO submitted a QAPP/SAP prior to initiation of proposed investigation activities to be completed at the Property to determine if there was evidence of a hazardous waste release.

3.0 Hydrogeologic Characteristics

3.1 Surface Water

The nearest surface water is an unnamed brook and wetland area associated with the Zone II Wellhead Protection Area located approximately 1,000 feet northwest of the 34 Maple Street facility. This wetland area drains to the northeast into Stall Brook, which flows south to the Charles River. Tributaries to the Charles River are classified by MassDEP's Surface Water Quality regulations as Class A designating them as a public water supply source.

The Property is located at an elevation of approximately 280 feet above sea level (asl) at the 5 Technology Drive facility to approximately 300 feet asl at the 34 Maple Street facility. Topography in the area slopes from a high southwest of the Property at approximately 325 feet asl to the wetland area northwest of the Property at an elevation of approximately 250 feet asl. As such, surface water runoff from the Property follows topography to the on-Property storm drain system.

According to the Federal Emergency Management Agency, the Property is not located in a 100-year flood zone.

3.2 Groundwater

Based on groundwater gauging data (presented in Table 1), groundwater has been recorded at depths of approximately seven to ten feet below grade. Based on this data, groundwater flow is estimated to be to the north at the 34 Maple Street facility and to the south at the 5 Technology Drive facility.

3.3 Overburden Geology

Based on a subsurface investigation by CAPACCIO, unconsolidated sediments were encountered at the Property from the surface to a depth of approximately 15 feet below grade, the maximum drilling depth. Soil boring logs constructed from the completion of seven soil borings are included as Appendix 2. The sediments encountered consisted of medium to fine sand with varying amounts of silt, clay and small- to medium-sized gravel.

3.4 Bedrock Geology

Bedrock was not encountered during subsurface investigations conducted at the Property. According to a USGS Bedrock Geologic Map of Massachusetts, the Property is underlain by igneous intrusive rock of the Milford-Dedham Zone which contains gray to grayish-pink biotite granofels.

4.0 Identification of Applicable Groundwater and Soil Categories

4.1 Overview

As presented in 310 CMR 40.0930, groundwater and soil categories have been developed to characterize groundwater and soil in the Commonwealth of Massachusetts. Standards for each of these categories were established for comparison to concentrations of OHM present in soil and groundwater. The results of this comparison are used to determine whether these concentrations require response actions, or if they indicate a condition of No Significant Risk.

4.2 Identification of Applicable Groundwater Category

Groundwater is classified as one of three categories defined in the MassDEP Massachusetts Contingency Plan (MCP); GW-1, GW-2, and GW-3. Category GW-1 is for groundwater located within any one of the following areas:

- Zone II Water Supply Well Head Protection Area
- Interim Water Supply Well Head Protection Area
- Potentially Productive Aquifer
- Zone A of a Class A surface water body
- Greater than 500 feet from a public water system distribution pipeline
- Less than 500 feet from a private water supply well that was in use at the time of release notification

Groundwater located within 30 feet of an occupied building or structure with an average annual depth of 15 feet below grade or less is also classified as GW-2. All groundwater within Massachusetts is additionally classified as GW-3.

Groundwater categories were defined at the Property based on information from MassDEP's Geographic Information Mapping System of environmental resources and subsurface conditions identified by CAPACCIO. The GW-1 groundwater classification does not apply to the Property. Groundwater located within 30 feet of the Property buildings is categorized as GW-2 because the depth to groundwater is less than 15 feet below grade. Groundwater at the Property is also category as GW-3.

Based on the groundwater category, in order to determine if a condition reportable to the MassDEP exists, the Reportable Concentration (RC) applicable to the Property is RCGW-2.

4.3 Identification of Applicable Soil Category

The MCP classifies soil in three categories, S-1, S-2, or S-3. Soil categories are determined by four factors; frequency of use, intensity of use, accessibility and whether exposure is to adults or children. Following the method of analysis outlined in the MCP, human exposure to soil at the Property is characterized based on the following:

- Frequency of use by adults is high; children are not present
- Intensity of use is low, because routine Property activities do not significantly disturb soil
- Potentially-Impacted soil is located beneath both paved and unpaved areas of the Property

Therefore, the applicable soil exposure categories are S-2 (surficial and unpaved soil) and S-3 (paved).

Based on the soil category, in order to determine if a condition reportable to the MassDEP exists, the RC applicable to the Property is RCS-2.

5.0 Subsurface Investigation and Sampling

5.1 Soil Boring Investigation

On June 26, 2012, Capaccio Environmental Engineering, Inc. (CAPACCIO) oversaw the completion of seven soil borings in the locations shown on Figure 2 (34 Maple Street) and Figure 3 (5 Technology Drive). The selected soil sampling locations are based on the recommendations presented in the August 2011 RFA and were selected to investigate AOC-1, AOC-2, AOC-3/SWMU-5 and AOC-4. With the exception of AOC-4, each of these areas is a location of former USTs. Note that the QAPP specified a total of nine soil borings. However, due to drilling conditions and field observations, it was CAPACCIO's opinion that the seven locations selected were adequate to characterize the potential impact to the subsurface from the former USTs. Each soil boring was installed via the direct-push method.

Referring to Figure 3, four soil borings (SB-1 through SB-4) were advanced in the area of SWMU-5A and SWMU-5B and AOC-3. Although the QAPP specified two-inch-diameter monitoring wells, due to drilling conditions, soil borings SB-1 and SB-2 were completed as one-inch-diameter monitoring wells MW-1 and MW-2. One soil boring (labeled MW-3) was advanced in the presumed downgradient direction from AOC-1. Soil samples collected from this area were labeled as MW-3 although due to drilling refusal this soil boring was not completed as a monitoring well. One soil boring (SB-5) was completed in AOC-5C as one-inch-diameter monitoring well MW-4.

Soil samples were collected continuously during the installation of the soil borings/monitoring wells. These continuous samples were screened with a photoionization detector (PID). Soil boring logs and monitoring well completion reports from June 2012 are included as Appendix 5 and include a summary of PID readings obtained during drilling activities. There was no visual indication of hydrocarbons noted during drilling. Each of the monitoring wells was installed to a depth of approximately 10 feet below grade.

Referring to Figure 4, the monitoring well labeled as MW-5 in AOC-2B was a previously-existing monitoring well installed during a 2004 Phase I site assessment prior to purchase of the property by WATERS. A second monitoring well was installed in 2004 downgradient of AOC-2C. However, this monitoring well was destroyed and therefore, was replaced with monitoring well MW-6 in June 2012.

5.1.1 Soil Analytical

Soil samples were collected continuously during the installation of the soil borings/monitoring wells. These continuous samples were screened with a PID and the sample with the highest PID reading was selected for analysis. If all PID readings were below background concentrations and there was no visual observation of a hazardous material impact, then the soil sample was collected from the soil/water table interface for laboratory analysis. Based on this criterion, one soil sample from each soil boring/monitoring well was selected for analysis.

The samples from monitoring wells MW-1, MW-2, MW-3, MW-4 and MW-6 and from soil borings SB-3 and SB-4 were each analyzed for volatile organic compounds (VOCs) via USEPA Method 8260. Due to their location adjacent to No. 2 fuel oil USTs, soil boring/monitoring well MW-3 and MW-6 were additionally analyzed for volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) with the targeted VOC and polyaromatic hydrocarbon (PAH) compounds via the MassDEP method. The laboratory data report is included as Appendix 3. No compound was detected at a concentration above the laboratory detection limit.

5.2 UST Closure

On July 2 and July 3, 2012, CAPACCIO oversaw the removal of two 15,000-gallon No. 2 fuel oil USTs from AOC-1, as shown on Figure 3. On November 9, 2012, CAPACCIO conducted field observations and screening during removal of one 1,000-gallon fiberglass No. 2 fuel oil UST (AOC-2B) and one 2,000-gallon fiberglass No. 2 fuel oil UST (AOC-2C) located on the eastern side of the facility, as shown on Figure 4. During removal, CAPACCIO documented the condition of the USTs, soil types and the presence and condition of groundwater, and collected soil samples for field screening measurements and analysis. An Underground Storage Tank Closure Assessment Report, prepared by CAPACCIO in accordance with the *Commonwealth of Massachusetts Underground Storage Tank Closure Assessment Manual*, MassDEP Policy #WSC-402-96 and is attached as Appendix 4. This report summarized the following conditions and observations:

- Perched groundwater was present at a depth of approximately 10 feet below grade at AOC-1 and at AOC-2C; no sheen was observed
- The integrity of the USTs and piping was intact and there was no evidence of a release
- PID readings ranged from non-detect to 80 ppmv in AOC-1 where fuel oil drained from the piping into the soil; approximately 22 cubic yards of soil was removed from this area for off-Property disposal
- There were no soil concentrations exceeding the applicable MassDEP RCS-2 Reportable Concentrations
- There is no MassDEP-defined reportable condition associated with the excavation of the two 15,000-gallon, one 1,000-gallon and one 2,000-gallon No. 2 fuel oil USTs removed from the WATERS's facilities at 34 Maple Street and 5 Technology Drive

5.3 Groundwater Sampling

Groundwater samples were collected by Environmental Sampling Technology (EST) from monitoring wells MW-1, MW-2, MW-4, MW-5 and MW-6 on July 12, 2012. The field sampling documentation is presented in Appendix 5. Each monitoring well was sampled via the low flow sampling technique in order to minimize volatilization of VOCs. In accordance with the QAPP, each of the five monitoring wells was analyzed for VOCs. Monitoring wells MW-5 and MW-6, located downgradient of the

USTs on 5 Technology Drive, were additionally analyzed for VPH and EPH with the targeted VOCs and PAHs. The laboratory data package is included in Appendix 6 and the analytical data is summarized in Table 2 (VPH and EPH), Table 3 (VOCs) and Table 4 (PAHs). Low levels of C_9-C_{18} aliphatic and C_{19}-C_{36} aliphatic EPH compounds were detected in monitoring well MW-6 (240 ppm and 280 ppm, respectively). These concentrations are well below the applicable MassDEP RCs of 5,000 ppm and 50,000 ppm, respectively. The remaining VPH and EPH compounds as well as the targeted PAH compounds were not detected. Of the VOCs, only acetone and chloroform were detected. Acetone was detected in monitoring wells MW-2 and MW-6 at concentrations of 10 ppb and 12 ppb, well below the MassDEP RC of 50,000 ppb. Chloroform was detected in monitoring well MW-4 at a concentration of 2 ppb, well below the MassDEP RC of 50 ppb.

Note that both acetone and chloroform are common laboratory contaminants. Per the QAPP, a field blank was to be collected in order to identify and isolate a potential source of VOC contamination introduced in the field or the laboratory. This field blank was inadvertently not collected during the July 2012 sampling event. However, as the concentrations of acetone and chloroform were well below the MassDEP RCs and there are no known sources of these compounds at the WATERS property, it is CAPACCIO's opinion that no further action is required relating to these compounds.

5.4 Roof Drain Sampling

A sample of stormwater discharging from the roof drain from the machine shop was collected by EST on August 15, 2012. The sample was collected at the point where the roof discharges into a stormwater catch basin and analyzed for total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver). The laboratory data package is included in Appendix 7 and a summary of the analytical data is provided as Table 5. Of these compounds, only lead was detected at a concentration of 0.001 ppm, well below the applicable MassDEP RQ.

5.5 Data Usability Assessment

Following the collection of the soil and groundwater samples, each sample was labeled in the field and documented on a chain of custody that identified the sample location, sample date and time, the sample type, the sampler's name and method of preservation used. The samples were held on ice for delivery to the laboratory to maintain a temperature of 4°C. The samples were delivered under a chain of custody to a state-certified laboratory for analysis meeting all measurement ranges, accuracy and precision requirements outlined in the specific standards methodology. Each sample was analyzed within the analytical method hold time, and was disposed of by the laboratory upon expiration of the applicable hold times. Upon receipt of the laboratory analytical data, CAPACCIO completed a quality control (QC) check of the laboratory data to ensure that all laboratory QC checks are within the allowable ranges.

Based on the nature of the subsurface investigation, the collected soil and groundwater samples were determined to be representative of soil conditions at the Property. All field and laboratory data was reviewed in accordance with the Tier I

requirements of Region 1: EPA New England Revised Data Validation Guidance.by CAPACCIO's Project Manager and QA Officer to determine that the data met the objectives of the QAPP/SAP.

6.0 Exposure Potential

6.1 Human Exposure Potential

There are no known documented impacts or exposures of OHM to human receptors at or in the immediate vicinity of the Property. Potential human exposure scenarios involve direct contact ingestion or dermal absorption of the contaminants of concern. Analytical data obtained from the Property do not constitute a condition reportable to the MassDEP. Therefore, it is CAPACCIO's opinion that there is no potential for future human exposure from contaminants of concern at the Property.

6.2 Environmental Exposure Potential

There are no documented impacts or exposures of OHM to environmental receptors and natural resource areas from this Property. Analytical data obtained from the Property do not constitute a condition reportable to the MassDEP. Therefore, it is CAPACCIO's opinion that there is no potential for future environmental exposure from contaminants of concern at the Property.

7.0 Risk Characterization

A risk characterization was performed for the Property in order to evaluate the need for additional remedial actions. The following components of the risk characterization have been presented in previous sections of this report and/or references to previous reports have been made:

- Property physical characteristics
- The extent of contaminants of concern
- Identification of human and environmental receptors
- Identification of Property soil and groundwater categories

No soil or groundwater concentration exceeded the MCP RC or applicable Method 1 standards. The MCP RCs are promulgated in conjunction with Method 1 Soil and Groundwater Standards and represent levels of oil or hazardous materials at which no further remedial response actions would be required based upon the risk of harm posed by these chemicals. The standards are protective of public health, public welfare, and the environment (i.e., represent a condition of "no significant risk"), given the exposures assumed. As no soil or groundwater data has been detected at a concentration that meets or exceeds the applicable RC, it is CAPACCIO's opinion that those contaminants of concern that were detected above laboratory detection limits do not pose a risk to public health, welfare or the environment.

8.0 Conclusions and Findings

Based upon the above information presented above, CAPACCIO has concluded the following:

- Soil samples were collected during the completion of seven soil borings (four of which were completed as monitoring wells) and from the UST graves following removal of two 15,000-gallon USTs from AOC-1, one 1,000-gallon UST and one 2,000-gallon UST from AOC-2
- Groundwater samples were collected from five monitoring wells
- A storm water sample was collected from the machine shop roof drain
- Each of the compounds analyzed for was either not detected above the laboratory detection limit or was recorded at a concentration well below the applicable MassDEP RC
- It is CAPACCIO's opinion that the soil and groundwater samples collected during the course of this investigation are adequate to determine the extent of potential chemical impact from the former USTs at the Property
- As no soil or groundwater analytical data has been detected at a concentration that meets or exceeds the applicable RC, it is CAPACCIO's opinion that those contaminants of concern that were detected above laboratory detection limits do not pose a risk to public health, welfare or the environment

It is CAPACCIO's opinion that this RFI conforms with applicable USEPA guidance and the June 2012 QAPP/SAP. Since no soil or groundwater concentrations exceeded the MassDEP RC, additional response actions for this Property under the MCP or USEPA regulations are not required.

9.0 Limitations

Information obtained from public agencies, Property inspection, limited sampling and laboratory chemical analysis was used to characterize the Property. The accuracy of the conclusions derived from this information is based solely on the accuracy of the information reported. Events occurring on the Site after December 31, 2012 are beyond the scope of this report. If information becomes available concerning the Property, which is not included in this report, it should be made available to CAPACCIO so that conclusions and/or recommendations can be re-examined and modified where applicable.

No attempt was made to determine the compliance of present or former owners or operators of the Property with federal, state, or municipal environmental or land use laws or regulations.

Due to the fact that geological and soil formations are inherently random, variable and indeterminate (heterogeneous) in nature, the professional services and opinions provided by CAPACCIO under this agreement are not guaranteed to be a representation of complete Property conditions, which are subject to change with time as a result of natural or man-made processes. Although the services are extensive, findings and conclusions are limited to and by the information obtained. CAPACCIO makes no expressed or implied representations or warranties regarding any changes in condition of the premises after the date of the on-Property inspection(s).

PID field screening is not as sensitive as laboratory analysis and conclusions drawn from such screening are limited to those contaminants potentially detectable with a 10.2 electron volt PID. No representation regarding the potential results of additional field screening, laboratory testing, or regarding the potential results or tests for materials not tested for is expressed or implied. Any qualitative or quantitative information regarding the Property that was not available to CAPACCIO at the time of this assessment may result in a modification of the representations made in this report.

CAPACCIO has retained a copy of this report. No additions or deletions are permitted without the written consent of CAPACCIO. Use of this report in whole or in part by parties other than those authorized by CAPACCIO and WATERS is prohibited.

TABLES

Table 1

Groundwater Gauging Data
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, MA

Monitoring Well #	Date	Top of PVC Elevation	Depth to Groundwater	Depth to LPH	Groundwater Elevation
MW-1	6/28/02	126.39	12.34	NA	114.05
MW-2	6/28/02	125.66	9.06	NA	116.60
MW-4	6/28/02	130.02	10.08	NA	119.94
MW-5	6/28/02	115.66	11.64	NA	104.02
MW-6	8/17/02	105.13	10.29	NA	94.84

All measurements are in feet
NA = Not Applicable

Table 2

Summary of Groundwater Analytical Data - VPH and EPH
Waters Corporation
5 Technology Drive
Milford, Massachusetts

Boring ID	Sample Date	Laboratory Analytical Method	VPH						EPH					
			C_5-C_8 Aliphatics		C_9-C_{12} Aliphatics		C_9-C_{10} Aromatics		C_9-C_{18} Aliphatics		C_{19}-C_{36} Aliphatics		C_{11}-C_{22} Aromatics	
				RDL		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*
MW-5	7/12/12	MassDEP VPH/EPH	ND	*50*	ND	*50*	ND	*50*	ND	*110*	ND	*110*	ND	*110*
MW-6	7/12/12	MassDEP VPH/EPH	ND	*50*	ND	*50*	ND	*50*	**240**	*200*	**280**	*200*	ND	*200*
MassDEP Reportable Concentrations														
RCGW-2			**3,000**		**5,000**		**7,000**		**5,000**		**50,000**		**5,000**	

VPH: Volatile Petroleum Hydrocarbon
EPH: Extractable Petroleum Hydrocarbon
All results are reported in parts per billion (ppb)
RDL: Detection Limit
ND: Not Detected above laboratory method detection limits
: Applicable Reportable Concentration

Table 3

Summary of Groundwater Analytical Data - VOCs
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Sample Location	Sample Date	Laboratory Analytical Method	Acetone		Benzene		2-Butanone		n-Butyl-benzene		Chloro-ethane*		Chloroform		1,1-Dichloro-ethane		1,2-Dichloro-ethane		1,1-Dichloro-ethene		cis-1,2-Dichloro-ethene		trans-1,2-Dichloro-ethene		1,4-Dioxane		Ethyl-benzene		Methyl tert-butyl ether		Naphthalene		1,1,2,2-Tetra-chloroethane		Tetrachloro-ethene		Toluene		1,1,1-Tri-chloro-ethane		1,1,2-Tri-chloro-ethane		Trichloro-ethene		1,2,4-Trimethyl-benzene		Vinyl Chloride		Total Xylenes	
				RDL		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*
AOC-2B	2004	DNA	**55.2**	*DNA*	***1***	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	**1.4**	*DNA*	DNA	*DNA*	DNA	*DNA*	DNA	*DNA*	**1.1**	*DNA*	DNA	*DNA*	DNA	*DNA*
MW-1*	7/12/12	8260	ND	*10*	ND	*1*	ND	*10*	ND	*1*	ND	*5*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*2*	ND	*100*	ND	*1*	ND	*2*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	*ND*	*1*	ND	*1*	ND	*1*
MW-2*	7/12/12	8260	**10**	*10*	ND	*1*	ND	*10*	ND	*1*	ND	*5*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*2*	ND	*100*	ND	*1*	ND	*2*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	*ND*	*1*	ND	*1*	ND	*1*
MW-4*	7/12/12	8260	ND	*10*	ND	*1*	ND	*10*	ND	*1*	ND	*5*	**2**	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*2*	ND	*100*	ND	*1*	ND	*2*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	*ND*	*1*	ND	*1*	ND	*1*
MW-5	7/12/12	8260	ND	*10*	ND	*1*	ND	*10*	ND	*1*	ND	*5*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*2*	ND	*100*	ND	*1*	ND	*2*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	*ND*	*1*	ND	*1*	ND	*1*
MW-6	7/12/12	8260	**12**	*10*	ND	*1*	ND	*10*	ND	*1*	ND	*5*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*2*	ND	*100*	ND	*1*	ND	*2*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	ND	*1*	*ND*	*1*	ND	*1*	ND	*1*
MassDEP Reportable Concentrations																																																		
RCGW-2			**50,000**		**2,000**		**NA**		**NA**		**NA**		**50**		**1,000**		**5**		**80**		**100**		**90**		**3**		**5,000**		**5,000**		**1,000**		**9**		**50**		**40,000**		**4,000**		**900**		**30**		**NA**		**2**		**5,000**	

VOC: Volatile Organic Compounds
All results are reported in parts per billion (ppb)
RDL: Detection limit
DNA: Data Not Available
*: GW-2 Standards Apply
: Applicable Reportable Concentration

Table 4

Summary of Groundwater Analytical Data - PAHs
Waters Corporation
5 Technology Drive
Milford, Massachusetts

Boring ID	Sample Date	Compound																															
		Acenaphthene		Acenaphthylene		Anthracene		Benzo(a)anth-racene		Benzo(b)fluor-anthene		Benzo(k)fluor-anthene		Benzo(g,h,i)-perylene		Benzo(a)-pyrene		Chrysene		Dibenzo(a,h)-anthracene		Fluoranthene		Fluorene		Indeno(1,2,3-c,d)pyrene		2-Methyl-naphthalene		Naphthalene		Phenanthrene		Pyrene	
			RDL		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*
MW-5	7/12/12	ND	*6*	ND	*6*	ND	*6*	ND	*5*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*	ND	*6*
MW-6	7/12/12	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*	ND	*10*
MassDEP Reportable Concentrations																																			
RCGW-2		**6,000**		**40**		**30**		**1,000**		**400**		**100**		**20**		**500**		**70**		**40**		**200**		**40**		**100**		**2,000**		**1,000**		**10,000**		**20**	

PAH: Polyaromatic Hydrocarbon Compounds
All results are reported in parts per million (ppm)
RDL: Detection Limit
ND: Not detected above laboratory detection limits
: Applicable Reportable Concentration

Table 5

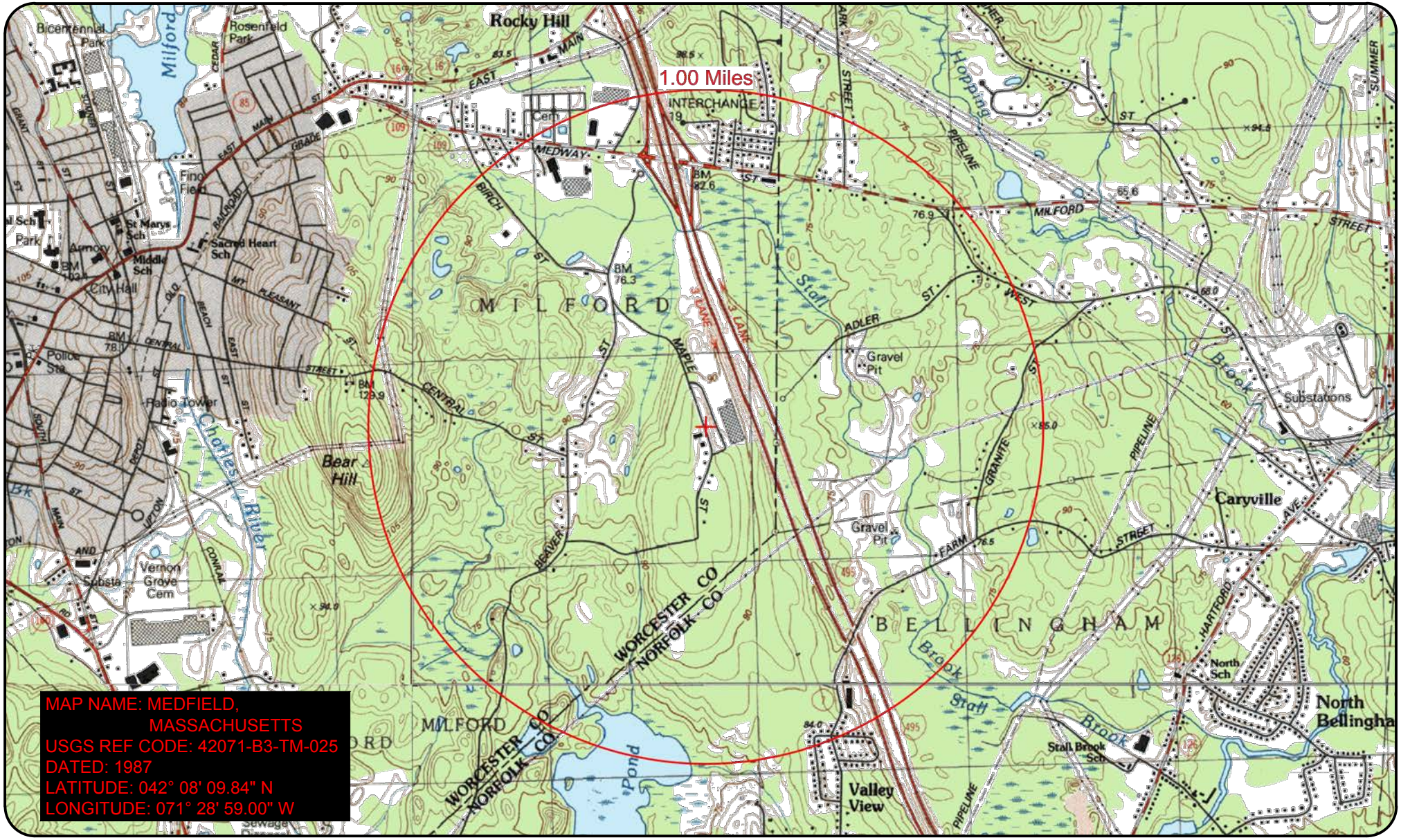
Summary of Roof Drain Analytical Data - Total Metals
Waters Corporation
34 Maple Street
Milford, Massachusetts

Boring ID	Date	Compound															
		Arsenic		Barium		Cadmium		Chromium		Lead		Mercury		Selenium		Silver	
			RDL		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*
Roof Drain	8/15/2012	ND	*0.1*	ND	*0.005*	ND	*0.001*	ND	*0.03*	**0.001**	*0.001*	ND	*0.0005*	ND	*0.002*	*ND*	*0.001*
MassDEP Reportable Concentrations																	
RCGW-2		**0.9**		**50**		**0.004**		**0.3**		**0.01**		**0.02**		**0.1**		**0.007**	

All results are reported in parts per million (ppm)
RDL: Detection limit
ND: Not Detected Above Laboratory Detection Limits.
: Applicable Reportable Concentration

FIGURES

Z:\WATERS 00-046\1 - BASE PLANS\R - RESOURCE\WATERS_34MAPLEST_FIGURE1_REVA.DWG



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			SCALE: 1" = 2083'-0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: Site Location Map	JOB LOCATION: 34 Maple St. / 5 Technology Dr. Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
			DATE: 01-16-13		

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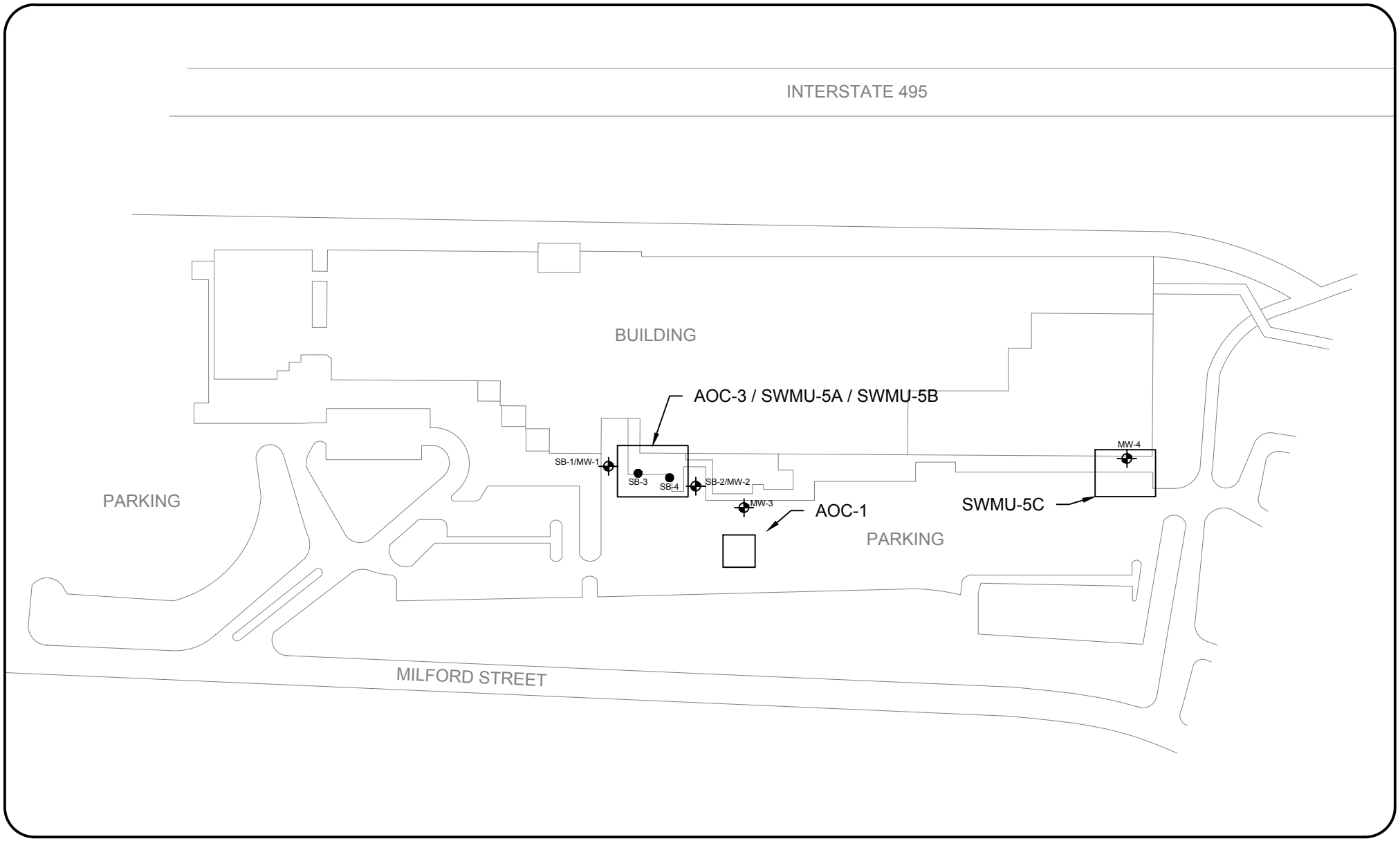

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		293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	SCALE: 1" = 165' 0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: Soil Sample Locations	JOB LOCATION: 34 Maple Street Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
		© Copyright 2013 Capaccio Environmental Engineering, Inc.	DATE: 01-18-13		

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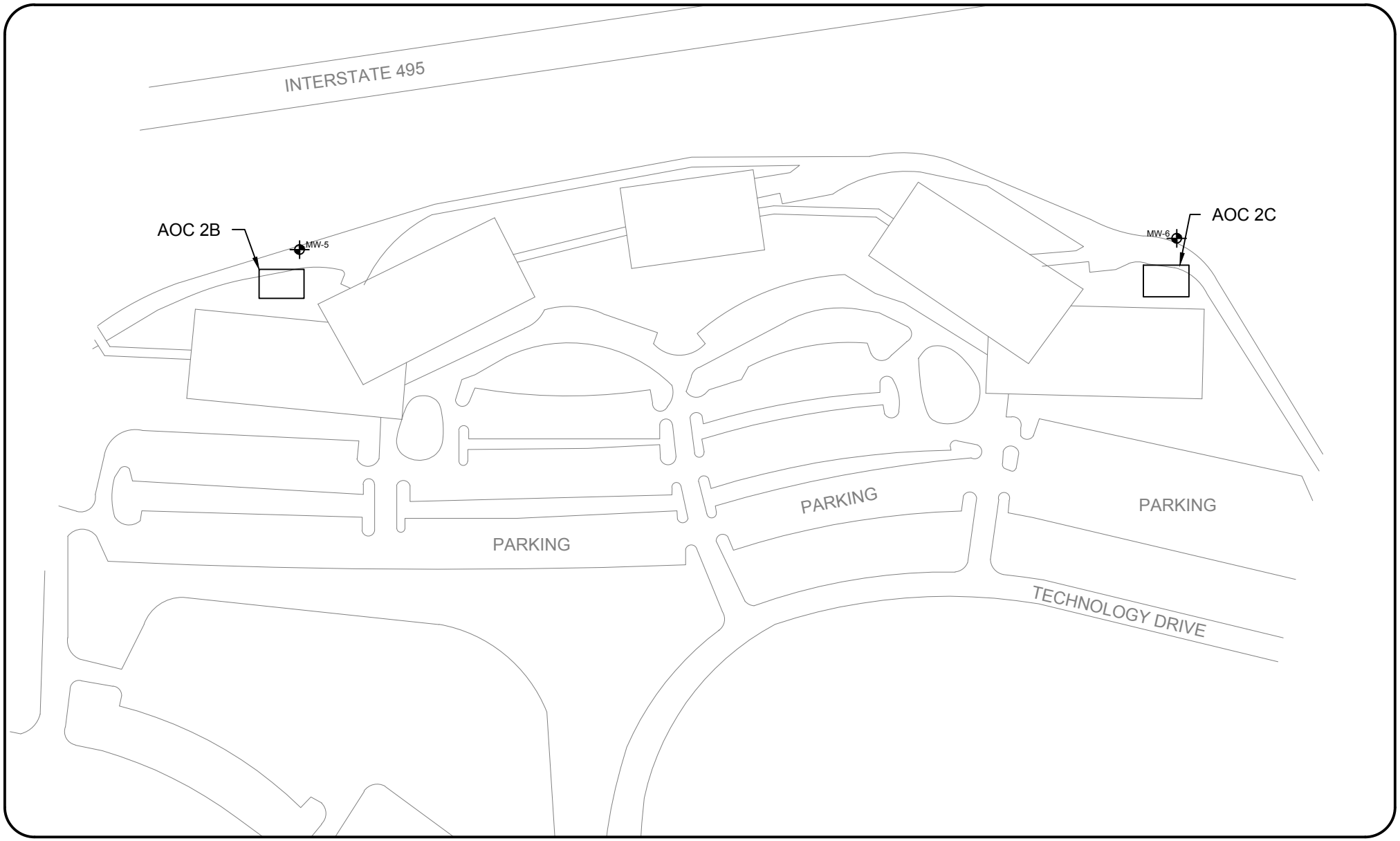

PROJECT TITLE: RFI Report	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc. 293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	JOB NO: 00-046.078	SHEET: Figure 3	
			SCALE: 1" = 165' 0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: Soil Sample Locations	JOB LOCATION: 5 Technology Drive Milford, MA 01757		CHK: DLH	NORTH	SIZE:
			ENG:		
			DATE: 01-18-13		

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APPENDIX 1

Quality Assurance Project Plan/Sampling Analysis Plan

Quality Assurance Project Plan/Sampling Analysis Plan

Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Prepared For:

Mr. Roger Eydenburg
Waters Corporation
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Milford, Massachusetts 01757

Prepared By:

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Title and Approval Page

Waters Corporation, 34 Maple and 5 Technology Drive, Milford, MA

(Project Name)

Waters Corporation

(Responsible Agency)

June 25, 2012

(Date)

Project Manager Signature _____

Name/Date Dawn Horter, PG, LSP/June 25, 2012

Project QA Officer Signature _____

Name/Date Chris Walton, PE/June 25, 2012

USEPA Project Manager Signature _____

Name/Date _____

USEPA QA Officer Signature _____

Name/Date _____

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4 MassDEP Underground Storage Tank Closure Assessment Manual
5 MassDEP Standard References for Monitoring Wells Small Diameter Driven Well Supplement
6 Monitoring Well Completion Record
7 Site-Specific Health and Safety Plan
8 Low Flow Groundwater Sampling Procedures
9 Analytical Hold Times

1.0 Introduction

Capaccio Environmental Engineering, Inc. (CAPACCIO) was retained by Waters Corporation (WATERS) to complete a subsurface investigation in response to a United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) Facility Assessment Report prepared in August 2011 by Mabbett & Associates, Inc. The RFA was initiated in order to close out the WATERS facility as a Treatment, Storage and Disposal Facility in the USEPA's records.

In accordance with USEPA requirements, CAPACCIO is hereby submitting this Quality Assurance Project Plan (QAPP) and Sampling Analysis Plan (SAP) prior to initiation of proposed investigation activities.

2.0 Distribution List

The following have received copies of this QAPP/SAP:

- Roger Eydenburg, EHS Engineer, Waters Corporation, 508-482-3078
- Anita Taylor, EHS Manager, Waters Corporation, 508-482-2051
- Bob Brackett, USEPA, 617-918-1364

3.0 Project/Task Organization

The following is a list of key project personnel and their corresponding responsibilities.

Name	Project Title/Responsibility
Bob Brackett	USEPA Contact
Roger Eydenburg	Project Contact, WATERS
Dawn Horter, PG, LSP	Project Manager, CAPACCIO
Chris Walton, PE, BCEE	QA Officer, CAPACCIO
Josh Fawson, PE	Field/Sampling Leader, CAPACCIO
Technical Drilling Services	Driller
Environmental Sampling Technology	Groundwater Sampler
R.I. Analytical Laboratory	Laboratory Manager

4.0 Problem Definition/Background

4.1 Problem Statement

In May 1983, WATERS filed a Part A Hazardous Waste Permit Application with the United States Environmental Protection Agency (USEPA) to operate their 34 Maple Street facility as a Treatment, Storage and Disposal Facility. Prior to finalization of this permit, WATERS's waste solvents were moved to the WATERS facility in Taunton, Massachusetts, rendering this permit unnecessary, changing the facility status to Generator (MAD001047968). In accordance with RCRA regulations, WATERS submitted a closure plan in March 1985 detailing the steps to be taken to close out areas where hazardous wastes were stored at the facility. In accordance with this plan, six underground storage tanks (USTs) were removed. Although closure activities have been conducted, the facility has not been closed with the USEPA and therefore, WATERS was requested to complete a RCRA Facility Assessment Report, which is conducted to assess if a release of hazardous waste or hazardous constituents had occurred from a solid waste management unit (SWMU) and to identify potential areas of concern (AOC) at the facility.

On August 15, 2011, a RCRA Facility Assessment Report (RFA) was prepared on behalf of WATERS by Mabbett & Associates, Inc. This report presented a summary of all identified SWMUs and AOCs at the WATERS facility, including the 5 Technology Drive building, and preliminary determinations regarding releases of concern and the need for further actions. The conclusions included the following:

Three monitoring wells were identified on the 5 Technology Drive facility, which were installed during an investigation on WATERS's purchase of the property.

- Groundwater was identified at a depth of four to seven feet below grade in the water table aquifer with groundwater flow direction to the southeast
- Groundwater samples collected from the downgradient monitoring wells indicated concentrations of volatile organic compounds below the applicable Massachusetts Department of Environmental Protection Reportable Concentrations
- A 200-feet deep bedrock well, assumed to be a former supply well, was identified on the WATERS property (this well has not been in use since WATERS purchased the land)
- Six SWMUs were identified, for which five were given the recommendation of no further action
- Four AOCs were identified
- Confirmatory sampling was recommended in the following locations:
    - AOC-1 – Two 15,000-gallon USTs containing No. 2 fuel oil located on the 34 Maple Street property currently in use

- AOC-2B – One 1,000-gallon UST containing No. 2 fuel oil located on the 5 Technology Drive property used from the late 1980s to the present relating to an emergency generator
- AOC-2C – One 2,000-gallon UST containing No. 2 fuel oil located on the 5 Technology Drive property used from the late 1980s to the present relating to an emergency generator
- AOC-3A, AOC-3B and AOC-3C – One 1,000-gallon acetone UST, one 3,000-gallon acetone UST and one 1,000-gallon toluene UST located on the 34 Maple Street facility that were removed in 1985 with no post-excavation soil sampling
- AOC-4 – Roof vents in the 34 Maple Street facility machine shop
- SWMU-5A and SWMU-5B – One 2,000-gallon mixed organic (methanol, toluene, acetone, acetonitrile) UST and one 3,000-gallon aqueous organic/chlorinated solvent and water soluble oils UST located at the 34 Maple Street facility that were removed in 1985 with no post-excavation soil sampling
- SWMU-5C – One 3,000-gallon methylene chloride, 1,1,1-trichloroethane UST located at the 34 Maple Street facility that was removed in 1985 with no post-excavation soil sampling
- SWMU-5D – Former floor drains associated with the above-mentioned AOC-5 USTs

4.2 Intended Usage of Data

Field observations and measurements as well as analytical data will be used to support a conclusion as to whether any conditions exist that are indicative of a hazardous waste release.

5.0 Project/Task Description

5.1 General Overview of Project

The goal of the project is to determine if there is evidence of a release of a hazardous waste at the suspect areas of the WATERS property. This will be completed through field observations and measurements obtained during a soil boring and monitoring well installation program as well as soil analytical data. Groundwater and roof vent samples will be collected to evaluate groundwater conditions and further post-excavation soil analytical data will be obtained during excavation of two USTs from AOC-1 and two USTs from AOC-2. Sampling locations are shown on Figures 1 and 2.

5.2 Project Timetable

Activity	Projected Start Date	Anticipated Date of Completion
Soil Boring/Monitoring Well Completion	June 26, 2012	June 26, 2012
Receipt of Soil Analytical Data	July 6, 2012	July 9, 2012
Monitoring Well Surveying, Groundwater Gauging and Collection of Groundwater and Roof Samples	July 9, 2012	July 15, 2012
AOC-1 UST Removal	July 1, 2012	July 6, 2012
AOC-2 UST Removal	August 1, 2012	September 1, 2012
RCRA Facility Investigation Report	September 1, 2012	October 31, 2012

6.0 Measurement Quality Objectives

Soil and groundwater samples will be analyzed for extractable petroleum hydrocarbons (EPH) with targeted polyaromatic hydrocarbon compounds (PAHs), volatile petroleum hydrocarbons (VPH) via the MassDEP-established methodology and/or VOCs via USEPA Method 8260 according to the table included in Section 9.2. Roof drain samples will be analyzed for RCRA metal compounds via USEPA Method 6010.

All collected samples will be submitted to a state-certified laboratory for analysis meeting all measurement ranges, accuracy and precision requirements outlined in the specific standards methodology.

Groundwater samples were collected in 2004 from three monitoring wells installed on the 5 Technology Drive property during an ASTM property assessment. Analytical data indicated concentrations of VOCs below the applicable MassDEP Reportable Concentrations. The groundwater analytical data obtained during this subsurface investigation will be compared to these previous data to evaluate groundwater conditions over time.

Based on the sampling plan, a total of nine soil boring samples and 16 post-excavation soil samples are planned. A site visit and review of subsurface utilities indicates that it is likely that all nine soil boring samples will be collected. However, based on field conditions during UST excavation, the collection of four samples from beneath the USTs may be unable to be collected. It there are no field observations or measurements that indicate evidence of a hazardous material release, the completion of 12 post-excavation soil samples will be considered to be a complete data set. If field observations and/or measurements indicate evidence that a hazardous material release may have occurred, additional measures will be recommended to obtain further samples.

7.0 Training Requirements and Certification

The project manager and field sampling leaders have received the appropriate OSHA 40-hour HAZWOPER training and Supervisor's training. In order to maintain a current status, annual 8-hour refresher classes are completed.

8.0 Documentation and Records

The following is a list of documentation and records that will be maintained during completion of this project:

- Weather conditions
- Soil Boring logs, an example of which is attached as Appendix 1
- Photoionization detector (PID) information
- Continuous PID screening measurements in accordance with MassDEP guidance documentation
- Visual soil observations
- Accurately-labeled soil sample collection jars and completed chain of custody, an example of which is attached as Appendix 2
- Groundwater Field Sampling data form, an example of which is attached as Appendix 3, to be completed by Environmental Sampling Technology upon sample completion
- UST removal permits and UST disposal documentation
- Field notes documenting the condition of the USTs upon excavation as well as observations and PID readings made of soil surrounding the USTs
- Disposal documentation of any excavated soil disposed of off-site
- Disposal documentation of UST contents upon cleaning prior to excavation

All raw documentation will be electronically maintained by CAPACCIO for a period of five years. The data will be summarized in the final RCRA Facility Investigation Report (RFI).

9.0 Sampling Process Design

9.1 Rationale for Selection of Sampling Sites

The selected soil sampling locations are based on the recommendations presented in the August 2011 RFA and were selected to investigate AOC-1, AOC-2, AOC-3/SWMU-5 and AOC-4. With the exception of AOC-4, each of these areas are locations of existing or former USTs. The selection of sample locations for USTs are based on guidance documents for the evaluation of UST locations, attached as Appendix 4. These guidance documents recommend samples from each of the four sidewalls and from beneath the USTs at the base of the UST grave.

Two-inch-diameter polyvinyl chloride (PVC) monitoring wells are to be installed in the presumed downgradient direction of AOC-1 (MW-3), AOC-2 (MW-6) and AOC-3/SWMU-5 (MW-1, MW-2 and MW-4) to detect impact to groundwater from the USTs. For the purposes of this report and as referred to on Figure 2, the existing monitoring well installed in 2004 downgradient of AOC-2B will be referred to as monitoring well MW-5.

The monitoring wells will be installed via the direct-push method as outlined in the MassDEP document *Standard References for Monitoring Wells Small Diameter Driven Well Supplement*, attached as Appendix 5. Each well is expected to be completed to a depth of 10 to 15 feet, depending on the depth to water, with the well screened across the soil/groundwater table interface, grouted and finished with a manhole cover installed flush to grade. A well completion record for each monitoring well will be completed, an example of which is included as Appendix 6.

During completion of the soil borings/monitoring wells, continuous soil samples will be obtained via a 4-feet length of clear PVC liner. The recovered soil will be screened in the field with a PID per the MassDEP guidance document included as Appendix 4. For the purposes of this site investigation, duplicate field samples will not be collected for screening as laboratory analytical data will be obtained to confirm field observations and measurements.

Following monitoring well installation, the wells will be developed via pumping with a peristaltic pump in order to remove sediment and to enhance the hydraulic connection between the well and the aquifer. Each of the monitoring wells will be surveyed for top of casing elevations and groundwater gauging data will be evaluated to determine groundwater flow direction.

All soil samples from the soil boring/monitoring well program will be collected in one day; soil samples from AOC-1 are anticipated to be collected in one day; and soil samples from AOC-2 are anticipated to be collected in one day.

A site-specific Health and Safety Plan that will be used during soil sampling activities is attached as Appendix 7.

9.2 Sample Design Logistics

	Type of Sample/Parameter	Number of Samples	Sampling Frequency	Sampling Period
Physical	Soil type	28	One Time	One Day
Chemical/soil	VOCs	14 to 28	One Time	One Day
Chemical/soil	EPH	9 to 20	One Time	One Day
Chemical/soil	VPH	9 to 20	One Time	One Day
Chemical/groundwater	VOCs	6	One Time	One Day
Chemical/groundwater	EPH	3	One Time	One Day
Chemical/groundwater	VPH	3	One Time	One Day
Chemical/roof	Metals	1	One Time	One Day

Monitoring Well Identification	Soil Analytical Parameters	Groundwater Analytical Parameters	Sampling Frequency	Sampling Period
SB-1/MW-1	VOCs	VOCs	One Time	One Day
SB-2/MW-2	VOCs	VOCs	One Time	One Day
SB-3	VOCs	NA	One Time	One Day
SB-4	VOCs	NA	One Time	One Day
PE-7/MW-3	VOCs, EPH, VPH	VOCs, EPH, VPH	One Time	One Day
SB-5/MW-4	VOCs	VOCs	One Time	One Day
SB-6	VOCs	NA	One Time	One Day
SB-7	VOCs	NA	One Time	One Day
SB-8	VOCs	NA	One Time	One Day
MW-5	VOCs, EPH, VPH	VOCs, EPH, VPH	One Time	One Day

MW-6	VOCs, EPH, VPH	VOCs, EPH, VPH	One Time	One Day
PE-1	VOCs, EPH, VPH	NA	One Time	One Day
PE-2	VOCs, EPH, VPH	NA	One Time	One Day
PE-3	VOCs, EPH, VPH	NA	One Time	One Day
PE-4	VOCs, EPH, VPH	NA	One Time	One Day
PE-5	VOCs, EPH, VPH	NA	One Time	One Day
PE-6	VOCs, EPH, VPH	NA	One Time	One Day
PE-8	VOCs, EPH, VPH	NA	One Time	One Day
PE-9	VOCs, EPH, VPH	NA	One Time	One Day
PE-10	VOCs, EPH, VPH	NA	One Time	One Day
PE-11	VOCs, EPH, VPH	NA	One Time	One Day
PE-12	VOCs, EPH, VPH	NA	One Time	One Day
PE-13	VOCs, EPH, VPH	NA	One Time	One Day
PE-14	VOCs, EPH, VPH	NA	One Time	One Day
PE-15	VOCs, EPH, VPH	NA	One Time	One Day
PE-16	VOCs, EPH, VPH	NA	One Time	One Day
PE-17	VOCs, EPH, VPH	NA	One Time	One Day
PE-18	VOCs, EPH, VPH	NA	One Time	One Day
PE-19	VOCs, EPH, VPH	NA	One Time	One Day

Based on field observations and measurements, selected soil samples may be composited by the laboratory for analysis as allowed by the MassDEP (refer to Appendix 4). Individual soil samples will be held by the laboratory in the event further analysis is warranted.

10.0 Sampling Method Requirements

The following sampling equipment and method will be used for the collection of the samples outlined in Section 9.2. In reference to the soil sampling method, soil samples will be collected continuously during the installation of the soil borings/monitoring wells. These continuous samples will be screened with a PID and the sample with the highest PID reading will be analyzed. If all PID readings are below background concentrations and there are no visual observations of a hazardous material impact, then the soil sample will be collected from the soil/water table interface for laboratory analysis.

Parameter	Sampling Equipment	Sampling Method
Soil vapor	PID 10.2 ev lamp, unpreserved glass jar	Instantaneous in field following MassDEP guidance (see Appendix 4)
VOCs in soil	40-ml glass vials preserved with methanol	Grab samples for soil at 6" interval recording highest PID readings or at soil/water interface
EPH in soil	8 oz amber glass jar, unpreserved	Grab samples for soil at 6" interval recording highest PID readings or at soil/water interface
VPH in soil	40-ml glass vials preserved with methanol	Grab samples for soil at 6" interval recording highest PID readings or at soil/water interface
Metals in water	Unpreserved glass jar	Grab from roof discharge
VOCs in groundwater	40-ml glass vials preserved with HCl	Low flow technique (see Appendix 8) grab sample from each monitoring well
EPH in groundwater	1 liter amber glass jar preserved with HCl	Low flow technique (see Appendix 8) grab sample from each monitoring well
VPH in groundwater	40-ml glass vials preserved with HCl	Low flow technique (see Appendix 8) grab sample from each monitoring well

11.0 Sample Handling and Custody Procedures

Following the collection of the soil and groundwater samples, each sample will be labeled in the field and documented on a chain of custody that will identify the sample location, sample date and time, the sample type, the sampler's name and method of preservation used. The samples will be held on ice for delivery to the laboratory to maintain a temperature of 4°C. The samples will be delivered to the laboratory under a chain of custody documenting the sample information. Each sample will be analyzed within the analytical method hold time, as summarized in Appendix 9, and will be disposed of by the laboratory upon expiration of the applicable hold times.

Based on field observations and measurements, selected soil samples from AOC-1, AOC-2 and/or AOC-5C may be composited by the laboratory for analysis as allowed by the MassDEP (refer to Appendix 4). Individual soil samples will be held by the laboratory in the event further analysis is warranted.

12.0 Analytical Methods Requirements

All VOC samples will be analyzed by the laboratory using the standard USEPA Method 8260. All metal samples will be analyzed by the laboratory using the standard USEPA Method 6010. All EPH and VPH samples will be analyzed by the laboratory using the MassDEP-developed method.

13.0 Quality Control Requirements

13.1 Field QC Checks

A field blank for VOCs will be provided with the groundwater samples to detect analytical problems related to sampling, transport and laboratory analysis processes.

13.2 Laboratory QC Checks

The laboratory selected to perform the soil and groundwater analyses will be a state-certified laboratory that meets all the required instrument/equipment testing, inspection, maintenance and instrument calibration requirements. The laboratory will follow all appropriate QC checks in accordance with the standard analytical method protocols. The laboratory will provide documentation that is compliant with the MassDEP Compendium of Analytical Methods.

13.3 Data Analysis QC Checks

Upon receipt of the laboratory analytical data, CAPACCIO will complete a QC check of the laboratory data to ensure that all laboratory QC checks are within the allowable ranges.

14.0 Inspection/Acceptance Requirements

Clean soil and groundwater sample collection vials and bottles will be provided by the laboratory. All vials containing a preservative will be inspected to ensure that the seals are not broken.

15.0 Data Acquisition Requirements

Topographical data as well as previous groundwater gauging data will be utilized to determine the estimated groundwater flow direction at the property. This will enable the selection of monitoring well locations in the presumed downgradient direction.

16.0 Data Management

Raw field data and laboratory analytical data will be transposed by CAPACCIO personnel in the office into Microsoft Excel tables that are appropriate for inclusion in the final RFI report. Following completion of the data tables, figures, and the report, two levels of technical review are conducted by CAPACCIO personnel to check for errors in data transposition and report writing.

17.0 Assessment and Response Actions

Field observations and measurements will be used to determine if there is an indication of a release of OHM to the environment. During the UST excavation activities, the MassDEP requires that PID readings in excess of 100 parts per million by volume recorded within ten feet of an exterior wall of an UST and greater than two feet below grade be reported to the MassDEP within 72 hours. If there is a condition reportable to the MassDEP during the UST removal activities, this will constitute an Immediate Response Action and further response actions will be conducted in accordance with the MassDEP Massachusetts Contingency Plan.

Soil and groundwater analytical data will be compared to MassDEP soil and groundwater Reportable Concentrations to determine if a condition reportable to the MassDEP is evident.

18.0 Reports

Upon the completion of all field activities, a final RFI report will be submitted. This report is anticipated to be submitted by October 2012, and will be prepared and submitted by CAPACCIO's Project Manager to all parties listed in Section 2.0. The report will include a summary of all field data and observations, analytical data and a comparison of the resultant data to the applicable MassDEP Reportable Concentrations.

If impact by hazardous materials is detected, the report will include a conceptual site model, a determination of the nature and extent of the release to soil and/or groundwater and recommendations for further evaluation as necessary. If impact by a hazardous material is not detected, the data obtained during the subsurface investigation will be presented to support a conclusion that no further action is necessary.

The report will include a data representativeness and usability evaluation where any QA problems will be discussed along with the method of resolution.

19.0 Data Review, Validation and Verification

All field and laboratory data will be reviewed by CAPACCIO's Project Manager and QA Officer to determine that the data meets the objectives of this QAPP/SAP. At a minimum, this review will meet the Tier I requirements of Region 1: EPA New England Revised Data Validation Guidance. Decisions to reject or qualify data are made by CAPACCIO's Project Manager and QA Officer.

20.0 Validation and Verification Methods

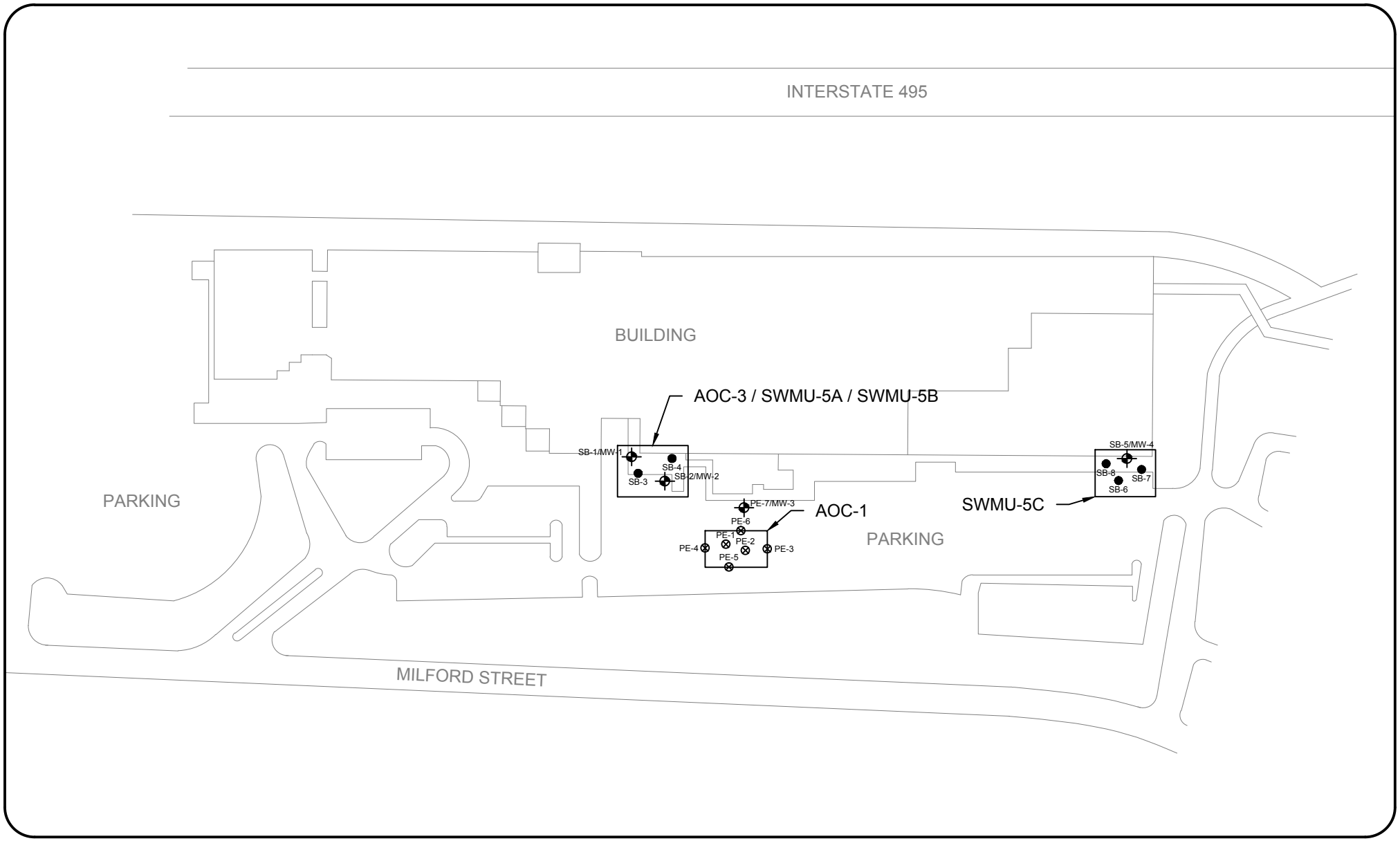
Once field and laboratory data has been entered into tables for inclusion in the final RFI report, the tables will be proofread by CAPACCIO personnel against the original data. Errors in the tables will be corrected prior to the issuance of the final RFI report. Outliers and inconsistencies will be flagged for further review or discarded. Problems with data quality will be discussed in the RFI report.

21.0 Reconciliation with Data Quality Objectives

As soon as possible after each sampling event, calculations and determinations for precision, completeness, and accuracy will be made and corrective action implemented if needed. If data quality indicators do not meet the project's specifications, data may be discarded and re-sampling may occur. The cause of failure will be evaluated. Any limitations on data use will be detailed in the final RFI report.

FIGURES

\\CEE-SBS2011\CAD DRAWINGS\WATERS 00-046\2 - IN PROGRESS\01. UST CLOSURE REPORT\WATERS_078_FIGURE1_REVA.DWG



PROJECT TITLE: UST & RCRA	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc.	JOB NO: 00-046.078	SHEET: Figure 1	
		293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	SCALE: 1" = 165' 0"		
			REV: C		
			DRW: CPC		
DRAWING TITLE: Proposed Soil Sample Locations	JOB LOCATION: 34 Maple Street Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
			DATE: 06-22-12		

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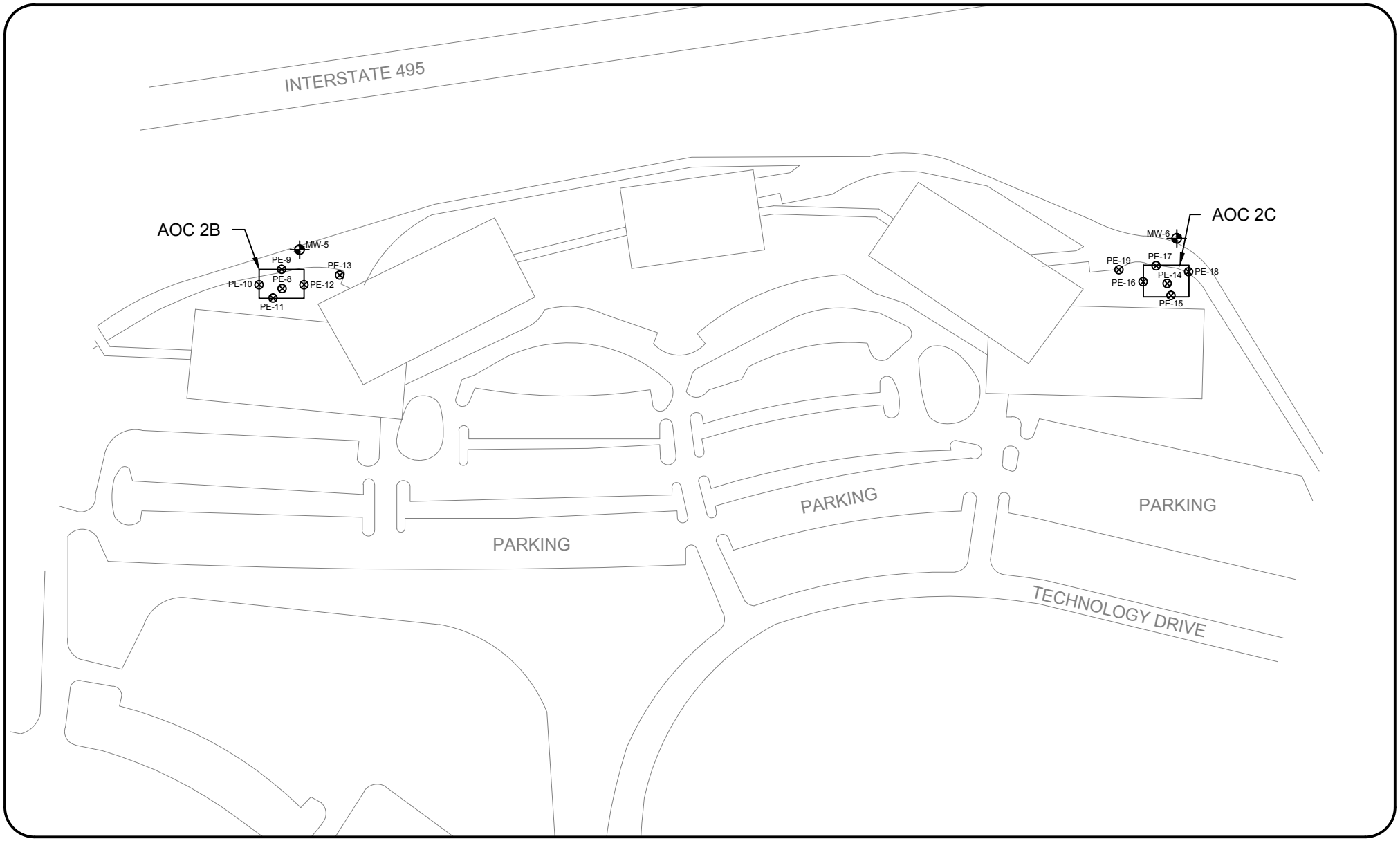
\\CEE-SBS2011\CAD DRAWINGS\WATERS 00-046\2 - IN PROGRESS\01. UST CLOSURE REPORT\WATERS_078_FIGURE2_REVA.DWG



PROJECT TITLE: UST & RCRA	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc. 293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	JOB NO: 00-046.078	SHEET: Figure 2	
			SCALE: 1" = 165' 0"		
			REV: B		
			DRW: CPC		
DRAWING TITLE: Proposed Soil Sample Locations	JOB LOCATION: 5 Technology Drive Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
			DATE: 06-13-12		

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APPENDIX 1

Soil Boring Log Form

GEOLOGIC BORING LOG

BORING NO. SB-

PROJECT NAME _____ LOCATION _____
PROJECT NO. 05-034 COMPLETED _____
CONTRACTOR _____ DRILLER _____
INSPECTOR _____
CHECKED BY _____ DATE _____

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	REMARKS	SAMPLE DESCRIPTION
2						
4						
6						
8						
10						
12						
14						
16						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
_____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

APPENDIX 2

Chain of Custody Form

CHAIN OF CUSTODY RECORD

R.I. Analytical Laboratories, Inc.

41 Illinois Avenue
Warwick, RI 02888-3007
Tel: 800-937-2580
Fax: 401-738-1970

131 Coolidge St, Suite 105
Hudson, MA 01749-1331
Tel: 800-937-2580
Fax: 978-568-0078

06-22-12

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type [C]	Preservation Code [P]	Matrix Code [M]																		

Client Information			
Company Name:	Capaccio Environmental Engineering		
Address:	293 Boston Post Road		
City / State / Zip:	Marlboro MA 01752		
Telephone:	508-970-0033	Fax:	508-970-0028
Contact Person:			

Project Information			
Project Name:			
P.O. Number:		Project Number:	
Report To:		Phone: 508-970-0033	Fax: 508-970-0028
Sampled by:		Email report to these addresses:	
Quote No:			

Relinquished By	Date	Time	Received By	Date	Time

Turn Around Time			
	Normal	X	EMAIL Report
X	5 Business days		
	Rush _____ (business days)		

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

Temp. Upon Receipt °C

Lab Use Only	
	Sample Pick Up Only
	RIAL sampled; attach field hours
	Shipped on ice
Workorder No:	

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc

Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, O=_oil_____

APPENDIX 3

Field Sampling Data Form

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME _____ PROJECT# _____ WELL ID MW-Jd

LOCATION _____

SAMPLING CREW _____ DATE: _____ SAMPLE TIME: _____

PURGING DATA

REFERENCE POINT: PVC Steel Casing PURGING DEVICE: _____

DEPTH TO WATER _____ (FT) WELL DEPTH _____ (FT) Well Diameter _____

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (^{0}C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS

FINAL FIELD DATA

pH: _____ (S.U.) DO: _____ (mg/L) COMMENTS: _____

SPECIFIC CONDUCTANCE: _____ (mS/cm) TURBIDITY: _____ (NTU)

TEMPERATURE: _____ (^{0}C) ORP: _____ (MV)

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: _____

WEATHER CONDITIONS: _____

WELL CONDITION DATA

Protective Casing Present: Y N Concrete pad present: Y N Cap on riser: Y N

Protective Casing Locked: Y N Standing Water: Y N Visible Heaving: Y N

Physical Damage: Y N

If yes, Describe: _____

SAMPLER'S SIGNATURE: _____

APPENDIX 4

MassDEP Underground Storage Tank Closure Assessment Manual

COMMONWEALTH OF
MASSACHUSETTS

WILLIAM F. WELD
Governor
ARGEO PAUL CELLUCCI
Lt. Governor WILLIAM

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108
(617) 292-5500

TRUDY COXE
Secretary
DAVID B. STRUHS
Commissioner

EXECUTIVE OFFICE OF PUBLIC SAFETY
OFFICE OF THE STATE FIRE MARSHAL
1010 COMMONWEALTH AVENUE, BOSTON MA 02215
(617) 351-6010

KATHLEEN M. O'TOOLE
Secretary
STEPHEN D. COAN
State Fire Marshal
THOMAS P. LEONARD
Deputy State Fire Marshal

COMMONWEALTH OF MASSACHUSETTS
UNDERGROUND STORAGE TANK CLOSURE ASSESSMENT MANUAL

This Policy is intended to provide guidance on how to fulfill the requirement to measure for the presence of contamination at the time of a closure of an Underground Storage Tank, pursuant to the Massachusetts Fire Prevention Regulations, 527 CMR 9.00.

James C. Colman	Thomas P. Leonard
Assistant Commissioner	Deputy State Fire Marshal
Department of Environmental Protection	Department of Public Safety
Bureau of Waste Site Cleanup	Office of the Fire Marshal
Date	Date

DEP Policy #WSC-402-96
April 9, 1996

When any Underground Storage Tank (UST) is permanently "closed" (removed or closed-in-place), Massachusetts law requires that the presence of contamination in the environment be assessed. If contamination is found, further assessment and cleanup may be necessary. Although some level of contamination is encountered at many UST closures, it is not always adequately measured for or managed. Discovering contamination as early as possible will enable appropriate actions to be taken sooner, thus improving the chances of limiting the impact to the environment and avoiding increased closure costs, decreased property value, and third party damage claims to the UST owner/operator.

This document is intended to provide guidance on how to measure for contamination at the time of a closure of an UST containing petroleum fuel oils and gasoline. It is not intended to be used for closures of USTs containing non-petroleum hazardous materials and waste crankcase oil. Procedures for closure assessments at residential fuel oil USTs are provided in a separate guidance document.

This document contains two major sections:

Section I contains background information including:

- The responsibilities of the different parties involved in the UST closure, i.e., the UST owner/operator, local fire department, tank removal contractor, and Licensed Site Professional;
- A description of applicable regulatory authorities; and
- Recommendations for documenting assessment findings and the appropriate material to include in the UST Closure File.

Section II contains instructions for performing a closure assessment.

This guidance document is intended primarily for parties who are performing the assessment at the time of the UST closure as required by 527 CMR 9.00. These parties may be tank removal contractors or, if the activities required are beyond the expertise of that contractor, environmental consultants, Licensed Site Professionals, or other qualified professionals. However, all parties who are involved in the UST removal (fire department officials, UST owners/operators) are encouraged to become familiar with the content of this document in order to gain a better understanding of what to expect during an UST closure assessment.

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I. Background Information

1.0 Background and Purpose

State regulations require that an assessment be performed at the time of an UST closure to look for possible leaks from the UST and associated piping to and contamination of the environment *(see Figure 1)*. Specifically, the Massachusetts Board of Fire Prevention Regulations (527 CMR 9.07(K)(4) requires that:

> **Within 24 hours after the removal of underground tanks and/or underground piping the owner/operator shall measure for the presence of a release of oil or hazardous materials to the environment where contamination is most likely to be present on the site. If contamination is found the owner/operator shall immediately notify the head of the fire department as well as the Department of Environmental Protection Bureau of Waste Site Cleanup.**

This requirement to measure for contamination also applies to UST closures-in-place **before the permanent closure is completed** [see 527 CMR 9.07(J)(1)].

This document is intended to assist the user in planning and executing a successful UST closure assessment by clarifying state requirements and providing guidance related to measuring for contamination at the time of the UST closure.

The information contained in this document is intended solely for guidance. This document does not create any substantive or procedural right, and is not enforceable by any party in any administrative proceeding with the Commonwealth. The regulations related to UST closures contain both specific and general requirements. In addition to summarizing specific requirements, this document also provides guidance on what measures the Department of Environmental Protection (DEP) and the Department of Public Safety (DPS) consider acceptable for meeting the general requirements set forth in the Massachusetts Board of Fire Prevention Regulations and the Massachusetts Contingency Plan. Parties using this guidance should be aware that there may be acceptable alternatives to this guidance for achieving compliance with such general regulatory requirements.

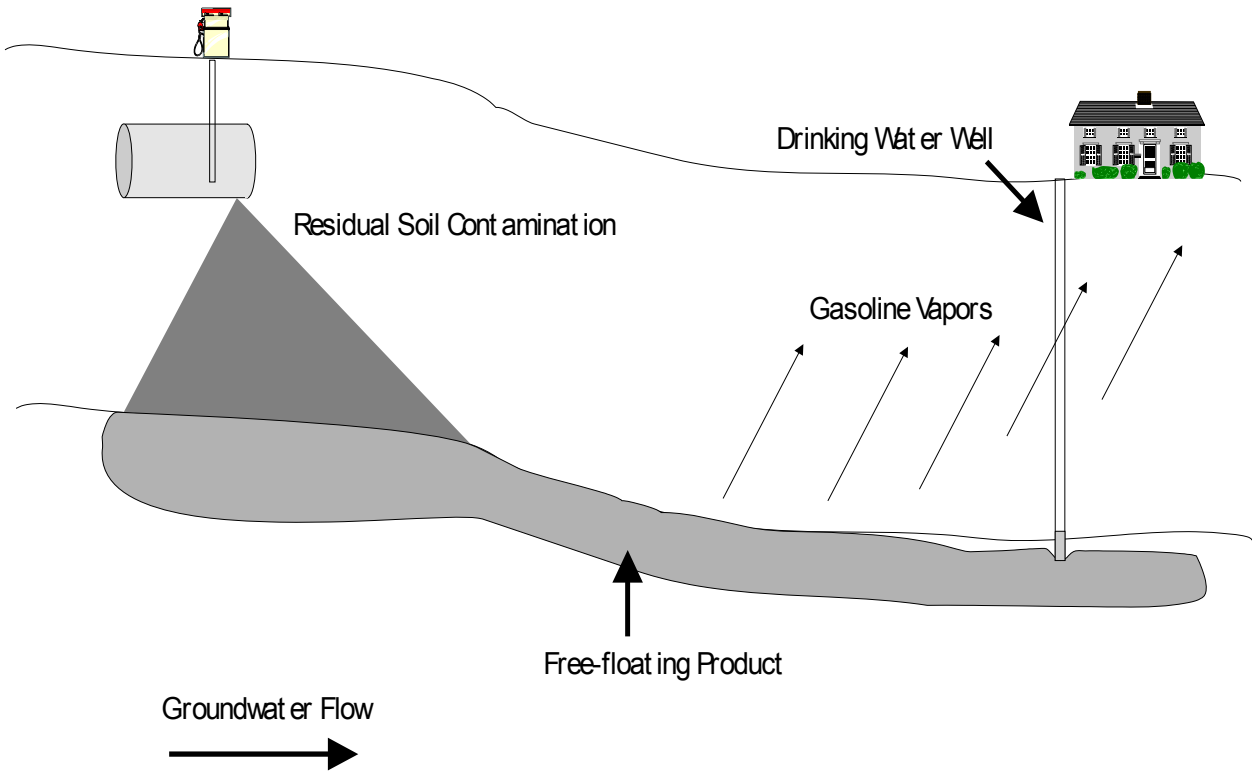
Additional copies of this document may be obtained by calling the DEP InfoLine at (617) 338-2255 or 1-800-462-0444, DEP Service Centers, or the State Fire Marshal (617) 351-6010.

2.0 Applicability

The guidance in this manual pertains to closing and assessing any **nonresidential UST containing petroleum fuel oils and gasoline** in Massachusetts. It is not intended to be used for closures of USTs containing non-petroleum hazardous materials or waste crankcase oil. Procedures for closure assessments at residential fuel oil USTs are addressed in a separate guidance document. The guidance in this document is intended primarily for the tank removal contractor, environmental consultant, Licensed Site Professional, or other qualified

professional who is performing the assessment at the time of the UST Closure as required by 527 CMR 9.00.

Figure 1: Petroleum Leakage and Contamination



This figure depicts the fate and transport of a petroleum UST leak and potential exposure pathways.

3.0 Regulatory Authorities

USTs are subject to several sets of regulations implemented primarily by two state agencies, as described below:

The Department of Public Safety (DPS) regulates the installation, maintenance, and removal of USTs pursuant to M.G.L c. 148 and the Board of Fire Prevention Regulations, 527 CMR 9.00. As part of the DPS, **local fire departments** are the primary regulators of UST removals. Specifically, fire departments determine whether it is safe to pull and transport the UST, provide necessary permits, and respond to emergency situations involving threats of fire, explosion, or other public safety hazards.

The Department of Environmental Protection (DEP) regulates notification of and cleanup of releases and threats of releases of oil and/or hazardous materials to the environment from USTs and other sources pursuant to M.G.L. c. 21E and the Massachusetts Contingency Plan (MCP) [310 CMR 40.0000]. If contamination is measured at or above thresholds specified in the MCP at the time of the UST closure, then the UST owner/operator is required to notify DEP. Any additional investigation or cleanup that may be needed to address the contamination must be performed in accordance with the MCP and under the oversight of a Licensed Site Professional.

These and other applicable regulatory jurisdictions are outlined in Appendix C.

4.0 Responsibilities at UST Closure

In addition to the regulatory authorities described above and in Appendix C, other parties who play a role in an UST closure include the UST owner/operator, the contractor who is removing the UST, and, if contamination is encountered above reporting levels, a Licensed Site Professional. Understanding the extent of each party's responsibilities is beneficial in planning a successful UST closure. In particular, it is important for persons who have experience in measuring and documenting conditions of contamination to be involved **at the time of the actual UST removal or closure-in-place** if contamination is suspected or known to be present.

The responsibilities and roles of parties involved in an UST closure are outlined below.

4.1 UST Owner/Operator

The UST owner/operator is generally responsible for financing the UST closure and any subsequent cleanup actions that may be necessary, as well as for remaining in compliance with applicable regulations throughout the closure process. Specifically, he/she is responsible for obtaining the required permits prior to UST closure, hiring qualified professionals to perform the UST closure and to measure for and manage contamination, notifying the appropriate authorities of contamination when necessary, and retaining all documentation pertaining to the UST Closure and any subsequent cleanup actions.

Even though the UST owner/operator is ultimately responsible for the UST closure, many UST owners/operators may not be familiar with all of the requirements that may apply to an UST closure. Therefore, tank removal contractors and local fire officials can play an important role in advising the owner/operator of these responsibilities prior to the actual removal.

4.2 Tank Removal Contractor

The tank removal contractor is hired by the UST owner/operator to perform the UST removal or closure-in-place. This service may include removing and disposing of the UST, excavating and stockpiling soil, replacing the UST and/or backfilling the excavation, and documenting all observations and actions taken during the closure as part of the UST closure

file. In addition to ensuring the safe removal and disposal of the tank, contractors may measure for contamination at the time of closure (as described in Section II of this manual). Contractors who provide this service to their clients should be familiar with the proper protocols for measuring and documenting contamination and be able to identify contamination conditions that require notification to DEP. If the contractor is not familiar with these procedures, then an environmental professional should be on-site to perform these actions.

Tank removal contractors may choose to become certified through the International Fire Code Institute (IFCI) Voluntary Underground Storage Tank Certification Program. The purpose of this program is to provide a nationally recognized examination and credential by which individuals can demonstrate their knowledge of various regulatory codes, standards and practices pertaining to USTs. More information on this program can be obtained from the State Fire Marshals Office at (617) 351-6010.

Please note: Prior to removing the UST, the UST removal contractor should discuss notification obligations with the UST owner/operator and establish the process by which any required notifications would be made (i.e., owner/operator reporting upon receiving recommendation from contractor or contractor reporting on behalf of owner/operator).

4.3 Licensed Site Professional

If an MCP notification requirement is triggered during the closure assessment, the UST owner/operator will have to hire a Licensed Site Professional to oversee assessment and cleanup work. If contamination is suspected (e.g., based on tank tightness test results, inventory loss, vapors or other evidence of a leak) it may be beneficial to have an Licensed Site Professional on site or have arranged for the services of an Licensed Site Professional to commence when and if a notification threshold is triggered. If an Licensed Site Professional is present, he/she can assess the extent of the contamination and oversee cleanup actions concurrently with the UST closure.

5.0 Documenting Assessment Findings

It is critical that the person performing the UST closure assessment adequately documents all findings. The UST owner/operator may need this documentation to demonstrate to the local fire department, DEP, and any potential purchaser of the property that the closure was performed properly and any contamination discovered was managed appropriately.

It is recommended that information documenting the UST closure be incorporated into a single report. This may include the following:

- Results of any investigation performed prior to closure, such as relevant UST and site history information, visual inspection, and characterization results;
- A sketch of the site indicating the location of the UST and associated piping, locations of field screening points and laboratory sample collection, and anything else that may be notable;
- Observations made at the time of closure (e.g., visual, olfactory) with respect to the condition of the UST, piping, soil, and groundwater, including presence/absence of petroleum product (photographs may serve as additional documentation);
- Results of any field screening and/or laboratory analyses (e.g., data reports from lab, chain of custody, etc.);
- Documentation showing how contaminated media (soil, groundwater) were managed, including copies of 21E Bills of Lading or Hazardous Waste Manifests used to transport contaminated media off-site;
- Copy of Form FP 292 (permit for removing UST and for transportation to tank yard);
- Copy of Form FP 290R (change in UST registration); and
- Copy of Form 291 (receipt of the UST at disposal facility, including state license number of facility).

PLEASE NOTE: If notification to DEP is required as a result of encountering contamination, the information outlined above can be incorporated into the required "response action" submittals (i.e., Status Reports, Completion Statements) to meet MCP documentation requirements.

II. Closure Assessment

This section includes the required and recommended procedures for performing an UST closure assessment *(see also Figure 3)*. Activities that are **required** pursuant to 527 CMR 9.00 and/or 310 CMR 40.0000 are noted. **Although many specific activities are not required, this recommended approach satisfies the requirement to measure for contamination [527 CMR 9.07(K)(4)]. Therefore, it is recommended that all procedures be followed.**

The order in which assessment actions are performed will vary somewhat depending on site conditions, complexity of the release, and assessment objectives. This section focuses on determining whether notification and further response actions under the MCP are necessary; however, additional assessment may also be conducted simultaneously with the closure to further delineate the extent of a release or to confirm that any cleanup actions performed have met the MCP standards.

PLEASE NOTE: Once contamination is found that triggers an MCP notification threshold, follow procedures required by the MCP, under the oversight of an Licensed Site Professional, if necessary.

Remember to clearly and thoroughly document all assessment activities and observations.

Before the Closure

1. **(Required)** Prior to closing an UST, the owner/operator must notify the local fire department. The tank removal contractor may make this notification on behalf of the owner/operator.

2. **(Required)** At least **72-hours prior to the excavation**, contact DIGSAFE to obtain information on the underground utilities that may exist on the property. DIGSAFE will provide an ID number necessary for the UST removal permit *(see Step #3 below)*. DIGSAFE can be reached at **1-800-322-4844**.

3. **(Required)** The UST owner/operator (or tank removal contractor on behalf of owner/operator) must obtain Form # FP-292, the permit for the UST removal, from the local fire department [M.G.L. c. 148, Section 38A].

4. **(Required) Within 72 hours of closing the UST**, provide receipt to the local fire department for delivery of UST to the disposal site designated on permit [527 CMR 9.07(K)(1)].

5. **(Required) Within 30 days of removing the UST**, send notice to DPS to change registration information for the UST. The form used to give this notice, FP-290R, is available from the local fire department.
6. Review any available UST records and site history. Information to consider which may suggest the possibility that contamination is likely to exist includes, but is not limited to:

- history of spills
- tank tightness tests resultsUST inventory records and/or any unreconciled discrepancies
- age and size of UST
- type of material UST is made of
- fill material surrounding UST
- maintenance records
- the tank has been relined or taken out of service for no apparent reason
- products stored in the UST
- system design information
- amount of time elapsed since UST was emptied, if applicable
- other contaminants that may be present on the property[1]

7. Prepare a health and safety plan to address the following:

   a. **Worker safety:** Air monitoring should be performed in the work area throughout the UST removal to ensure the safety of workers; including, at a minimum, the measurement of explosive vapor levels in work area using a Combustible Gas Indicator;
   b. **Emergency Response:** Should contamination be encountered, protective measures should be taken immediately to protect health, safety, and the environment by containing or recovering free or escaping product. Initially, the most urgent concerns are fire and explosion and the local fire department will direct responses to this threat; and
   c. **Hazard Communications Plan:** This includes Material Safety Data Sheets (MSDS) for all oil and/or hazardous materials that may be encountered.

   Having a health and safety plan is strongly recommended if contamination is likely to be present.

8. Prepare contingency plans for all of the following activities prior to the UST closure:

   - Notifications and approvals required if contamination is encountered;
   - Mobilizing appropriate personnel when necessary;
   - Segregating and stockpiling of soil/identify a secure location for temporary storage;
   - Managing contaminated soil and groundwater, including disposal/transport of soil; and
   - Sampling plans, including contacting laboratory prior to sampling activities.

[1] In addition to researching the likelihood of a release from the tank, it is also prudent to determine whether contamination is otherwise present at the site where the tank is located. The tank may have been installed in an area that was already contaminated (e.g., located in area where a previous tank leaked, or where the backfill/soil in the vicinity of the tank grave is contaminated). This information is important in terms of planning for management of contaminated media excavated during the closure. While the tank itself may not have leaked, if it is surrounded with contaminated soil or if the groundwater is contaminated from another source and needs to be pumped out of the hole during the closure, knowledge and evaluation of these conditions will be necessary to properly manage the contamination at the time of closure.

9. Characterize site conditions before the tank is to be removed or closed-in-place **if a substantial release is known or suspected or if delays caused by the unanticipated discovery of contamination cannot be tolerated**. Characterization involves collecting information on the quality of soil and groundwater in the area surrounding the UST to determine whether contamination is present and if so, the degree of contamination. Characterizing the site will help determine whether or not groundwater is affected, if free product is present, and the approximate volume of soil that may require off-site management. It is specifically recommended in the following cases:

- **If any available information (site history or prior investigation) suggests the likelihood of significant contamination.**

- **UST removal operations are likely to involve groundwater pumping:** Characterization efforts can confirm the presence or likelihood of groundwater contamination and the depth of the water table. This information will indicate whether free product recovery, tank pit dewatering or measures to prevent buoying of the UST during excavation may be necessary. It will also enable the contractor to secure any necessary water discharge permits prior to closure operations.

Characterization of the site should be performed by a qualified environmental professional (i.e., Licensed Site Professional or environmental consultant).

Measuring for Contamination

10. **(Required) Within 24 hours after the removal of the UST, measure for the presence of contamination at locations where it is most likely to be present, as required by 527 CMR 9.07(K)(4).** Steps 13 through 15 describe DEP and DPS recommendations for fulfilling this requirement.

Visual Inspection of UST and UST Location

11. Visually inspect the area where the UST is located throughout the closure.

    A. **Before the UST is uncovered**, check for broken or patched pavement, stains around fill pipes and pumping islands, free product, sheens, and petroleum odors in nearby storm sewers, drainage ditches, basements, wetlands, etc. If deteriorated pavement, stained soil, or areas of petroleum odors are found, note these areas for future field screening and/or sampling during the UST removal.

    B. **While the UST and its piping are being uncovered**, note any obvious signs of corrosion, breakage, or loose fittings in the system connections. Look for soil staining around the fill pipe where overfills and spills may have occurred. Check pipe joints and UST connections and note the soil or backfill conditions around any areas that are questionable. To the extent possible, brush off and examine the

attached soil for signs of contamination. **When the UST is being removed, place containers and/or sorbent pads under pipe openings or at points where piping is cut to catch any drips and discharges so that any product remaining in the system does not spill and contaminate clean areas**.

C. **After the UST is removed**, clean off any remaining soil adhering to the UST and inspect the USTs surface. Inspect steel USTs for corrosion and staining such as dissolved asphalt coating, and check fiberglass USTs for wear, staining, indentations, or cracks. Because most leaks actually occur in piping and not USTs, it is critical to also check the condition of the piping and fittings. The excavation should also be carefully examined for signs of contamination. If the UST is temporarily stored on the ground surface, place the UST on a polyethylene liner.

D. **Throughout the closure**, look for saturated or discolored soil, especially around the fill pipe and under the drop-tube where the practice of dipsticking over time often weakens or even punctures an older UST. Examine piping trenches carefully, concentrating in areas where fittings or unions were located. Soils that appear gray-green or gray-black in color may be an indication of mineral leaching caused by a petroleum release. As the excavation proceeds, segregate all stained or discolored soils from clean soils and store separately on 6 mil. (or higher gauge) polyethylene liners *(see Step #18)*.

E. Check for a sheen or floating "free" product on any water that appears in the excavation. **The presence of free product represents a health and safety hazard and should be removed immediately using sorbent pads, a vacuum truck or pump. Methods exist for cost effective/removal treatment of contaminated groundwater; consult an Licensed Site Professional or an environmental consultant. Free product also triggers notification of the local fire department and DEP *(see Step #16)*.**

Field Analytical Screening and Laboratory Analyses

12. Perform field analytical screening.

Field screening techniques are fast and economical for gathering large amounts of analytical data. These techniques can be used to: (1) identify areas of contamination and the relative degree of contamination, (2) segregate contaminated soils from clean soils, and (3) select locations for collecting samples for laboratory analysis. Screening results can also be used to limit the number of samples collected for laboratory analysis or, in the case of a "clean closure", eliminate the need for laboratory samples altogether.

The procedures described below focus on the use of the *jar headspace analytical screening method*. Measurements should be made of sample headspace according to the procedure described in Appendix A. While waving the probe of the Photoionization Detector or Flame Ionization Detector over the excavation may be useful for gross identification of

contaminated areas, it is not considered to be a headspace reading for the purposes of measuring contamination and segregating soils. Although other screening methods are not discussed in this document, Appendix B provides a description of some of the commonly used instruments that are available.

Follow one of the screening procedures described below; procedure A for UST removals and procedure B for closures in place:

A. Field screening locations for UST removals:

1. Locations targeted for screening based on sight or smell during visual inspections.

2. **Before Excavation:** Use field instruments in collaboration with knowledge obtained during preclosure activities (i.e., areas where contamination is likely to be encountered) to check nearby areas for signs of contamination. Long term, continuous releases of products such as gasoline- or kerosene-based fuels can cause areas of stressed vegetation, therefore such areas should also be investigated.

3. **During Excavation:** While the UST is being uncovered, take headspace readings from the soil being removed, paying particular attention to screen soil from around the fill pipe. Retrieve soil samples for screening a few inches from the surface of the pipe, from the floor, and all sidewalls of the excavation. Use these readings to segregate contaminated soil from clean soil into discrete stockpiles of soil.

   The decision to collect groundwater samples and the method by which such samples are to be obtained will depend upon variables that are specific to the site. In general, an attempt should be made to obtain a groundwater sample if:

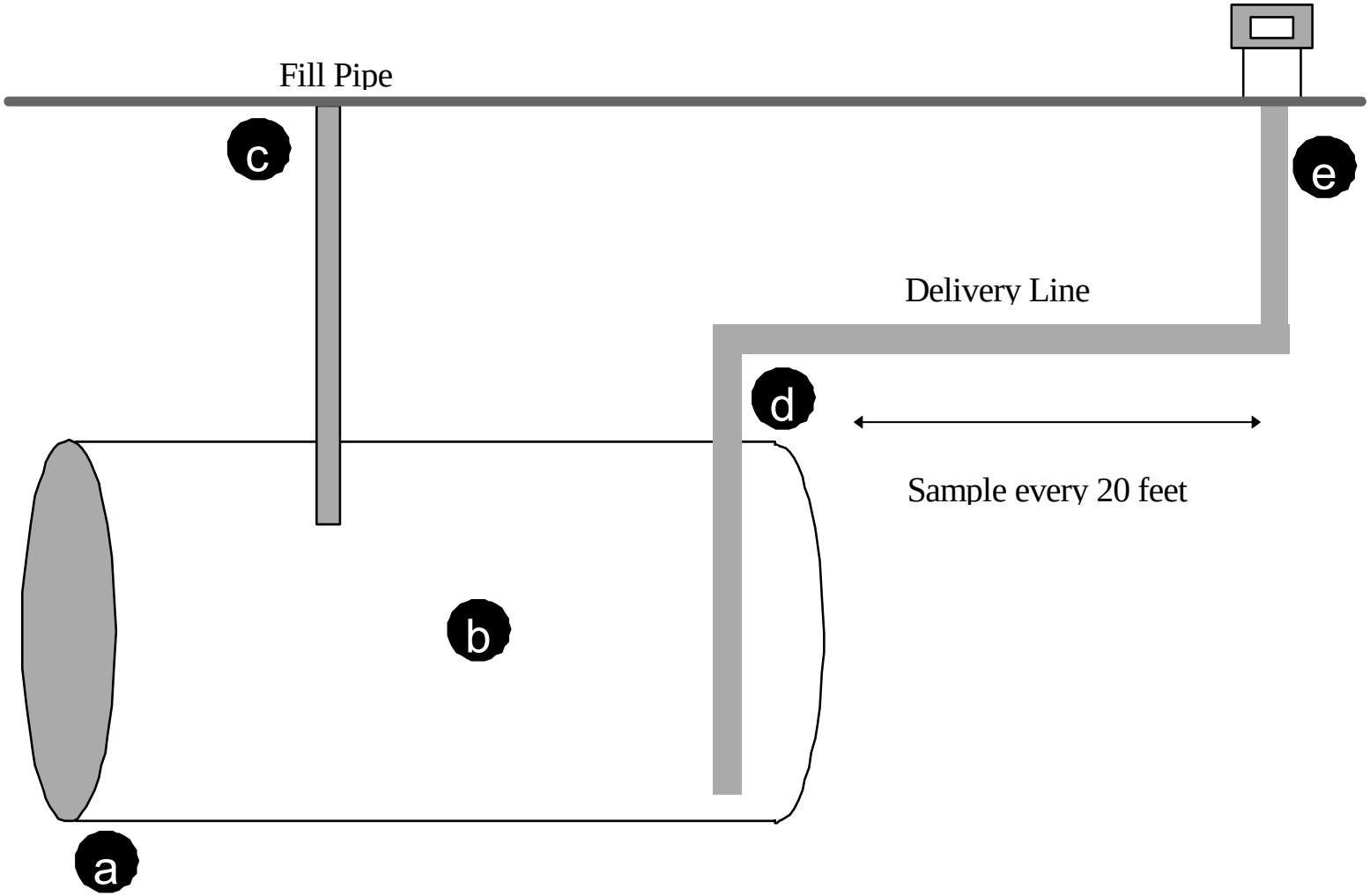
   - Any available information (e.g., the results of the screening of soil samples or the UST and site history) suggests that groundwater contamination may be present;
   - The UST was located near a private drinking water well, public well or reservoir, or wetlands, ponds, or streams; or
   - Groundwater is present in the excavation.

4. **After Excavation:** Screen for contamination beneath the UST bottom, pumping islands, and along piping runs. Additionally, discrete samples from the following locations should be screened in addition to areas where contamination is observed by sight or smell *(see Figure 2)*:

   a. Soil from under each end of the UST and immediately under the drop tube.

b. Soil from each sidewall of the UST.
c. Soil surrounding the fill pipe.
d. Soil along piping runs (at a set interval, e.g., every 20 feet). The piping run samples should be taken from beneath the piping and near elbows and joints, if possible.
e. Soil under each pumping island should be obtained. The pumping island samples should be taken from beneath the supply line side of the islands.
f. If more than one UST is being closed during one excavation and the USTs lie in a series next to each other comprising the same tank grave, only two additional samples per additional UST (one from under each UST and one from around each fill pipe) are recommended.
g. If groundwater is encountered, screen soil samples collected from just above the water table at the ends of each UST, and screen samples of the water itself.

Figure 2: Sampling Locations



B. Field screening locations for Closures-in-Place *(see Figure 4)*

The local fire department determines whether an UST may be closed-in-place. USTs which were NOT used as fuel oil tanks may be closed in place only if the removal jeopardizes a building or another UST in use AND if approved by the local fire department. Fuel oil tanks may be closed in place if approved by the local fire department.

For closures-in-place, the recommended procedure and locations for obtaining field screening samples is as follows:

1. Install a minimum of three soil borings per UST or UST grouping (at each end of the UST and on one side) and collect and screen soil samples from each boring below the UST bottom. If practical, install monitoring wells or use existing wells to collect a groundwater sample for screening. Test pits near and downgradient of the tank excavation can also be used to obtain a groundwater sample.

   Alternately, soil samples from below the UST may be obtained by cutting through top of the UST, cleaning the inside of the UST, and cutting through the UST bottom. **Please Note: This procedure poses an explosive hazard. Make sure that the tank is adequately cleaned to ensure safety.**

2. Install additional borings to allow collection and screening of soil from no more than two feet beneath each pumping island and every 50 feet where piping was located.

3. Where USTs are located within or beneath a structure, install a minimum of three borings downgradient from, but as close to the UST as possible, outside of the building. Borings should be located at each end of the UST and on one side, whenever possible. Collect and screen soil samples at or below the UST bottom.

4. Where gasoline USTs are located within or beneath a structure, install a minimum of three soil gas probes through the floor, with at least one probe located downgradient of the UST.

Collect soil samples for procedure A or B as follows:

1. Collect samples from soil that remains in the excavation sidewalls, not from removed backfill material. Obtain them from the backhoe bucket. **For safety reasons, do not enter the excavation to collect samples.**

2. Because volatilization of exposed soils will occur, take samples at least six inches beneath the exposed surface of the excavation. Scrape away the top few inches of soil in the backhoe bucket and collect the sample from the newly exposed soil.

3. Analyses should be performed as soon as possible after the sample is collected to ensure an accurate reading.

4. For closures-in-place, collect soil samples from soil borings using a Split Spoon or Thin Walled (Shelby) sampler.

13. Perform follow-up based on field screening and visual/olfactory results (also summarized in Table I):

A. **(Required) If headspace readings of soil or groundwater samples indicate total organic vapors equal to or greater than 100 parts per million by volume (ppmv), notify DEP and the local fire department as required by Board of Fire Prevention Regulations and the MCP.**

This notification threshold applies to screening performed during closure on samples taken <u>two feet below</u> the ground surface (to distinguish contamination caused by an UST leak from surficial contamination caused by overfilling incidents). In the event that this threshold is exceeded, notification to DEP must be made by the UST owner/operator and Immediate Response Actions must be performed under the oversight of a Licensed Site Professional.

B. **If headspace readings of soil or groundwater samples indicate total organic vapors less than 100 ppmv but greater than ambient air readings (readings made at locations outside of the area of the excavation and unaffected by a release of oil or hazardous materials), take a minimum of one sample for laboratory analysis.**

If the headspace results indicate the presence of volatile compounds, but at levels below the 72-hour notification threshold, then at a minimum, one sample from the location of the highest headspace reading should be collected for laboratory analysis to determine whether concentrations at that location (while below the headspace trigger) may exceed an applicable MCP Reportable Concentration. If all of the headspace readings are of a comparable level, a composite sample may be collected and submitted to the lab.

C. **If headspace readings do not indicate the presence of volatile compounds or if the readings at the screening locations are equivalent to ambient air readings:**

1. **For UST closures where only gasoline was stored, it may be assumed that no contamination is present (i.e., "clean closure").**

2. **For UST closures where fuel oil was stored, it is recommended that a minimum of one composite sample (from the sidewalls and floor of the excavation) be collected and submitted for laboratory analysis of petroleum constituents *(see Table II)*.** Because fuel oil is comprised of

compounds which would not be detected by a headspace measurement of volatiles, it is prudent to collect a soil sample for laboratory analysis to obtain a measurement of non-volatile or semi-volatile constituents which may be present, especially where visual or olfactory evidence of a release exists.

3. **For UST closures where the tank is located in an area of known contamination (history of past spills, contaminated fill, other), it is recommended that a composite sample from the sidewalls and floor of the excavation be collected and analyzed for those constituents that are known or suspected to be present, based on site history information.** Again, the headspace procedure will not indicate the presence of non-volatile contaminants, such as metals or polychlorinated biphenyls (PCBs). If there is reason to suspect the presence of other contaminants at the site, a minimum of one composite soil sample should be collected and analyzed for the suspected constituents.

Table I: Summary of Follow up Procedures to Headspace Screening

Result	Action	
Readings greater than 100 ppmv	1. Notify DEP within **72 hours** 2. Notify local fire department	
Readings less than 100 ppmv, but greater than ambient air	Obtain a minimum of one sample for laboratory analysis *(see Table II for appropriate analytical methods)*	
Readings less than or equal to ambient	Gasoline only?	Assume "clean"
	Fuel oil only?	Obtain a minimum of one composite sample *(see Table II for appropriate analytical methods)*
	Other contaminants?	Obtain a minimum of one composite sample for known/suspected contaminants

Procedures to further delineate contamination can be found in the ***Policy for the Investigation, Assessment, and Remediation of Petroleum Releases - Interim Site Investigation Protocol Document*** (Policy #WSC-401-91) and any revised versions of that document.

14. Submit samples for laboratory analyses, if appropriate.

A. **A laboratory should be contacted <u>before</u> the date of UST closure to:**

1. Obtain specific laboratory requirements for quantity of sample required for each analysis, sampling containers, necessary preservatives, and other specifications;

2. Inform laboratory of sampling date, quantity of samples, delivery date, etc.;
3. Ensure that the lab can conduct the needed analyses in the required timeframe;
4. Arrange to obtain materials necessary to perform sampling, such as sample jars, labels, and Chain of Custody form.

B. Never submit "spent" samples (soil or groundwater used for field screening) for laboratory analysis as contaminants may have volatilized from the sample during the screening procedure.

C. Samples must be transported in a manner that will maintain their integrity, as well as protect them from leaking or breaking.

1. Label all samples immediately and record date, sample number, and location from which sample was obtained.
2. Store samples, tightly sealed, on ice, and transport to laboratory as soon as possible and within time frame specified by the laboratory based on analyses to be performed and sample medium.
3. To track the handling of samples from collection to the laboratory, include a Chain of Custody form with each sampling shipment. This form can be obtained from the laboratory and should include the sampler's name, the container number, the date and time of collection, sample location, analyses to be performed, dates, times, and signatures of the persons releasing and receiving the sample.

D. Analytical Procedures

Table II describes common methods utilized for identifying contamination. The choice of analytical methods is dependent upon site specific conditions as well as budget.

If other contaminants are likely to be present on the site (PCBs, metals, etc.), collect laboratory samples to be analyzed for those parameters in addition to those listed in Table II.

Table II: Analytical Methods for Petroleum Products

Petroleum Product	**Soil or Water Matrix**	
	Analytes	**Analytical Methods**
Gasoline and Similar Weight Products	VOCs	8020, 8240, 8260, or DEP-VPH method* *(see note below)*

Fuel Oils (No. 2, 4, 5, 6) Diesel, Lubricating Oils and similar weight products	VOCs PAH TPH	8020, 8240, 8260, or DEP-VPH method* 8100, 8270, or DEP-EPH method* GC/FID or 418.1
Unknown Petroleum Product	VOCs PAH TPH	8240, 8260, or DEP-VPH method* 8100, 8270, or DEP-EPH method* GC/FID

* The DEP has designed two methods for determining the concentrations of petroleum hydrocarbons in water and soil to complement and support the toxicological approach to evaluate human health hazards that may result from exposure to such compounds. The Method for the Determination of Extractable Petroleum Hydrocarbons (EPH) collectively measures the concentrations of extractable aliphatic and aromatic hydrocarbons, and individual concentrations of PAHs. The Method for the Determination of Volatile Petroleum Hydrocarbons measures collective concentrations of volatile aliphatic and aromatic hydrocarbons, such as BTEX (Benzene, Toluene, Ethylbenzene, Xylene).

Initial Actions if Contamination is Encountered

15. **(Required) If contamination is encountered, immediately take the following steps:**

A. **Ensure the safety of workers and surrounding populations.** The most urgent problem is the presence of free gasoline product and/or gasoline/explosive vapors. The fire department will direct responses to these threats *(See C below)*.

B. **If necessary, contain or recover petroleum liquids that have been released to the environment.** This may include removal of remaining product from the UST,

collection of readily retrievable product (using sorbent pads for sheens/thin layers of product or vacuum trucks for thick layers of product), or containment of release to minimize immediate threat to the public and environment.

C. **Assess the potential impact on safety and determine if conditions require notification to the local fire department. Additionally, determine if a notification threshold under the MCP is triggered and advise UST owner/operator to notify DEP, if appropriate.** *(See Appendix E and F for telephone numbers and addresses for providing notification.)*

D. **Proceed with the UST removal/closure, if appropriate, with proper worker health and safety precautions and/or under the oversight of the local fire department or Licensed Site Professional.**

DEP/DPS Notification Requirements

16. **(Required) If any of the following conditions occur at any time during the UST closure, inform the UST owner/operator immediately and advise of his/her obligation to notify the local fire department and DEP within the appropriate timeframe. PLEASE NOTE: When an MCP notification threshold is triggered, the only response actions that may be performed prior to notifying DEP are emergency containment procedures and the stockpiling of up to 100 cubic yards of contaminated soil.** *(See Table III and IV for summaries of MCP notification thresholds.)*

- A release resulting in vapors in a building, structure, underground utility conduits at concentrations **equal to or greater than 10% of the Lower Explosive Limit** requires notification to DEP **within 2-hours** [310 CMR 40.0321(1)(a)].

- A petroleum release of a quantity that is **equal to or greater than 10 gallons within a 24 hour period** requires notification to DEP **within 2-hours** [see 310 CMR 40.1600].

- A measurement of **equal to or greater than 100 ppmv in the headspace of a soil or groundwater sample obtained greater than 2 feet below the ground surface** [see 310 CMR 40.0313(2)], using the headspace screening method described in Appendix A, requires notification to DEP **within 72-hours**.

- The presence of subsurface free product (also referred to as "non-aqueous phase liquid") having a measured thickness of **equal to or greater than 1/2"** requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(1)].

- Concentrations in groundwater **greater than the applicable Reportable Concentration** *(see Table III of this manual and 310 CMR 40.1600 of the MCP)* within 400 feet of a public water supply or within 500 feet of a private drinking

water supply well requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(3)].

- A measurement within groundwater of concentrations **equal to or greater than 5 mg/L total Volatile Organic Compounds (VOCs)** within 30 feet of a school or an occupied residential structure, and where the groundwater table is less than 15 feet below the ground surface requires notification to DEP **within 72-hours** [see 310 CMR 40.0313(4)].

- The presence of subsurface non-aqueous phase liquid oil and/or hazardous material **less than 1/2" and greater than 1/8"** requires notification to DEP **within 120 days** [see 310 CMR 40.0315(4)].

- Concentrations in soil or groundwater in an amount **equal to or greater than the applicable Reportable Concentration** as listed in Table IV and 310 CMR 40.1600 requires notification to DEP **within 120 days**, unless an Limited Removal Action can be performed *(see Step #17 and 310 CMR 40.0315)*.

- **Failed Tank Tightness Test** is considered to be a Threat of Release [see 310 CMR 40.0314]. To satisfy the requirements of DPS and DEP regulations, the following procedures should be followed in the event that a tank test fails:

  A) If leakage is detected **above 0.05 gallons per hour but below 0.10 gallons per hour, then notification to DEP must be made within 72 hours** [see 310 CMR 40.0314]. Further assessment must be performed to determine if a release has occurred. The assessment may include, but is not limited to, the retesting the tank, soil gas and groundwater monitoring, and sampling in the area of the UST. If UST is retested within 72 hours and the retest confirms that the first test was in error, notification is not required. If a leak is confirmed, the UST must be emptied within 24 hours. If the source of the leak is determined to be from the piping of a particular UST, the UST system must be taken out of service immediately [see 527 CMR 9.00]. The guidance provided in this document for UST closures should be followed in addition to any cleanup actions that may be necessary pursuant to the MCP [310 CMR 40.0000].

  B) If the leakage is detected **above 0.10 gallons per hour, notification must be made to within 72 hours to DEP** <u>and</u> **immediately to the local fire department and the UST must be decommissioned immediately** [527 CMR 9.07(H)]. In addition, all requirements necessary for leakage above 0.05 gallons per hour, as described above, must be performed. The guidance provided in this document for UST closures should be followed in addition to any cleanup actions that may be necessary pursuant to 310 CMR 40.0000.

Table III: Summary of MCP Reportable Conditions and Requirements for

Notification to DEP

Condition	Timeframe
Greater than 10% LEL	2 hours
Release of greater than 10 gallons in 24 hours	2 hours
Headspace greater than 100 ppmv	72 hours
NAPL at greater than or equal to 1/2"	72 hours
Concentrations greater than RCs in groundwater within 400 ft of public water supply or 500 ft of private water supply	72 hours
VOCs in groundwater at 15 ft below ground surface => 5 mg/L within 30 ft of school/occupied residential structure	72 hours
Concentrations in soil greater than RCs*	120 days

* Notification to DEP may not be required if a Limited Removal Action can be taken.

Table IV: MCP Reportable Concentrations for Selected Petroleum Constituents[2]

Analyte	Soil (mg/kg)		Water (mg/L)	
	RCS-1	RCS-2	RCGW-1	RCGW-2
Benzene	10	60	0.005	2
Toluene	90	500	1	6
Ethylbenzene	80	500	0.7	4
Xylenes (total)	500	500	6	6
Total Petroleum	500	2500	1	50

[2] **Please note: This is a partial list of chemical constituents which are commonly measured for and found at a petroleum release. For a complete list of MCP Reportable Concentrations and Quantities, see the MCP [310 CMR 40.0300 and 40.1600].**

Hydrocarbons (TPH)				

When reporting a release, provide as much of the following information as possible:

1. Address of release;
2. Name and telephone number of UST owner/operator;
3. Number, size and contents of USTs removed or found to be leaking;
4. Name of contractor removing USTs, hazardous waste contractor pumping out USTs, and environmental consultant/Licensed Site Professional performing assessment, if any;
5. Actions taken thus far; and
6. Any nearby areas of concern, such as public or private drinking water wells/sources, and environmentally sensitive areas, such as surface waters, shellfish beds, other wetlands

17. Depending on which MCP notification requirements apply, one or more of the following risk reduction measures may need to be initiated:

A. **Limited Removal Actions** [see 310 CMR 40.0318]: When a release or site condition is encountered which would require notification to DEP within 120 days of obtaining knowledge of the release, Limited Removal Actions may be taken to remediate localized areas of contaminated soil. By doing so, notification to DEP that a Reportable Concentration has been exceeded may be avoided. These actions are done voluntarily by the UST owner/operator and, with the exception of the required Licensed Site Professional or DEP certification on the Bill of Lading (BOL) when transporting soil off-site, do not require DEP approval or Licensed Site Professional oversight. With a Limited Removal Action, up to 100 cubic yards of petroleum contaminated soil can be excavated and removed from the site. If the action is successful in removing all contamination above applicable reporting thresholds, notification to DEP is not required. If soil contains hazardous materials in addition to petroleum, then the Limited Removal Action cannot exceed 20 yards of soil. All Limited Removal Actions must be completed within 120 days of obtaining knowledge of a release as described in 310 CMR 40.0315. **PLEASE NOTE: The 21J reimbursement fund only covers costs of work performed after notification to DEP (i.e., after a Release Tracking Number has been assigned). Therefore, Limited Removal Action costs are not eligible for reimbursement from 21J Fund.**

B. **(Required) Immediate Response Actions** [see 310 CMR 40.0410]: When there is a release or site condition which requires reporting to DEP within 2 or 72 hours, Immediate Response Actions are required. **Immediate Response Actions require Licensed Site Professional oversight and prior approval from DEP.**

Management of Contaminated Soil and/or Groundwater

18. **(Required)** Manage contaminated soil and/or groundwater.

A. Managing Contaminated Soil

1. **Do not dig up large volumes of contaminated soil if the UST owner/operator is not prepared to manage and properly dispose of stockpiled soil within 120 days. The costs of managing large volumes of soil can be substantial and should be taken into account before excavating too much too soon.**

2. **Store petroleum contaminated soil at the site of excavation, at another property owned by the same UST owner, or at a facility permitted to store such materials.** All soil being stored must be placed on a base lined with 6 mil. (or higher gauge) polyethylene and be completely and securely covered with the same material. Public access must be minimized, and the soil must be removed from the site within 120 days of initial excavation.

3. **Do not mix clean soil with contaminated soil, or grossly contaminated soil with lesser contaminated soil.** The level of contamination has a direct bearing on the options and associated costs of managing the soil. Provisions should be made for three soil stockpiles:

   a. Soil presumed to be clean;
   b. Soil believed to be contaminated; and
   c. Soil observed to contain significant levels of contamination.

4. **Transport petroleum contaminated soil off-site using either a 21E Bill of Lading or a Massachusetts Hazardous Waste Manifest as a MA01 Hazardous Waste [310 CMR 40.0030 and 310 CMR 30.252(2)].** Petroleum contaminated soil may be transported off-site under a 21E Bill of Lading provided an Licensed Site Professional or, if an emergency situations, DEP has adequately characterized the soil and signed the 21E Bill of Lading. Petroleum contaminated soils transported under a Hazardous Waste manifest are subject to the MA transporter fee and must be shipped by a licensed hazardous waste transporter. An Licensed Site Professional signature is not required for shipping materials under a Hazardous Waste manifest.

5. **The off-site transport of contaminated soil which does not trigger any applicable MCP notification thresholds** does not require prior notification or approval from DEP. These soils may be transported off-site provided that:

   a. The soil is not disposed of or reused at locations where the concentrations of oil or hazardous materials in the soil being reused

would be greater than the applicable notification threshold at the receiving location; and

b. The soil is not disposed or reused at locations where existing concentrations of oil or hazardous materials at the receiving site are significantly lower than the levels of oil or hazardous materials present in the soil being reused or disposed [310 CMR 40.0032(3)].

6. **When backfilling contaminated soil into an excavation**, consider long term cleanup goals. Returning contaminated soil that would contribute to the ongoing migration of the contaminants should be avoided. Specifically, the following should be kept in mind:

a. Dripping or saturated contaminated soil should not be backfilled, unless a liner is placed in the excavation before backfilling. A liner composed of suitable gauge polyethylene can temporarily prevent the continued migration of contaminants to soil and the groundwater. Placement of a liner before backfilling the excavation is recommended when public safety issues warrant backfilling the excavation as quickly as possible, or when the extent of site contamination is unknown and the likely cleanup actions to be taken have not been determined.

b. Contaminated soil containing higher levels of oil and/or hazardous material should not be backfilled into areas with lower levels of contamination.

c. Contaminated soil containing oil or hazardous materials should be backfilled as close as reasonably possible to their point of origin.

d. The backfilling of contaminated soil off-site is prohibited, except as provided for in 310 CMR 40.0032(3).

Procedures for managing petroleum contaminated soil, including storage and reuse/disposal requirements, are found in 310 CMR 40.0030, 310 CMR 30.252(2), and DEP Policies #WSC-94-400 and #BWP-94-037. These documents, as well as other relevant DEP policies, should be consulted for a complete understanding of DEPs requirements and recommendations.

B. Managing Contaminated Groundwater

At an UST closure, groundwater may be encountered in areas where the depth of the tank excavation is below the groundwater table. In such cases, UST excavation dewatering and

possible management of contaminated groundwater may be necessary. An Licensed Site Professional must be hired to oversee the management of contaminated groundwater except for the following situations:

1. When groundwater is determined to contain levels of oil and/or hazardous material below applicable MCP notification thresholds and the discharge is made to the ground within 100 feet of the point of withdrawal;

2. When contaminated groundwater is pumped to a container or other temporary on-site storage container, or into a "vacuum" truck operated by a licensed Massachusetts hazardous waste transporter, with ultimate disposal at an approved off-site location; or

3. When parties performing the UST removal choose to work "in the wet", and do not remove groundwater from the UST excavation.

An Licensed Site Professional is required when contaminated groundwater (above notification thresholds) is discharged to a sewer system, surface water or returned to the ground surface or subsurface. These discharges must be performed in accordance with 310 CMR 40.0040 (portion of MCP related to "remedial discharges"). There are significant penalties for discharging contaminated water to a catch basin, surface water body, sewer, or onto or into the ground when such a discharge is not performed in compliance with 310 CMR 40.0000, and 314 CMR 3.00, 5.00 and 7.00.

Figure 1
UST Closure Assessment Steps

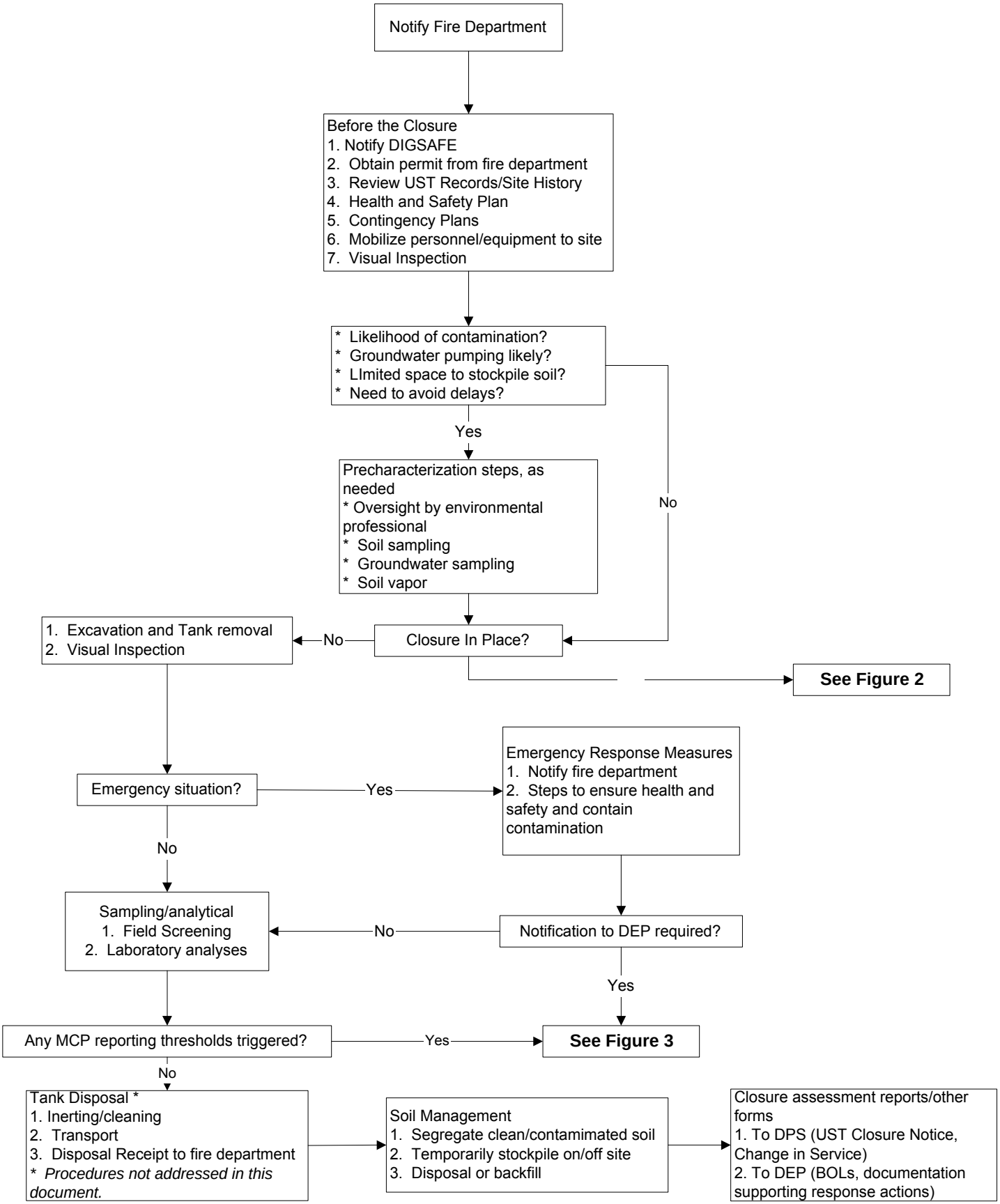


Figure 2
UST Closure In Place Steps

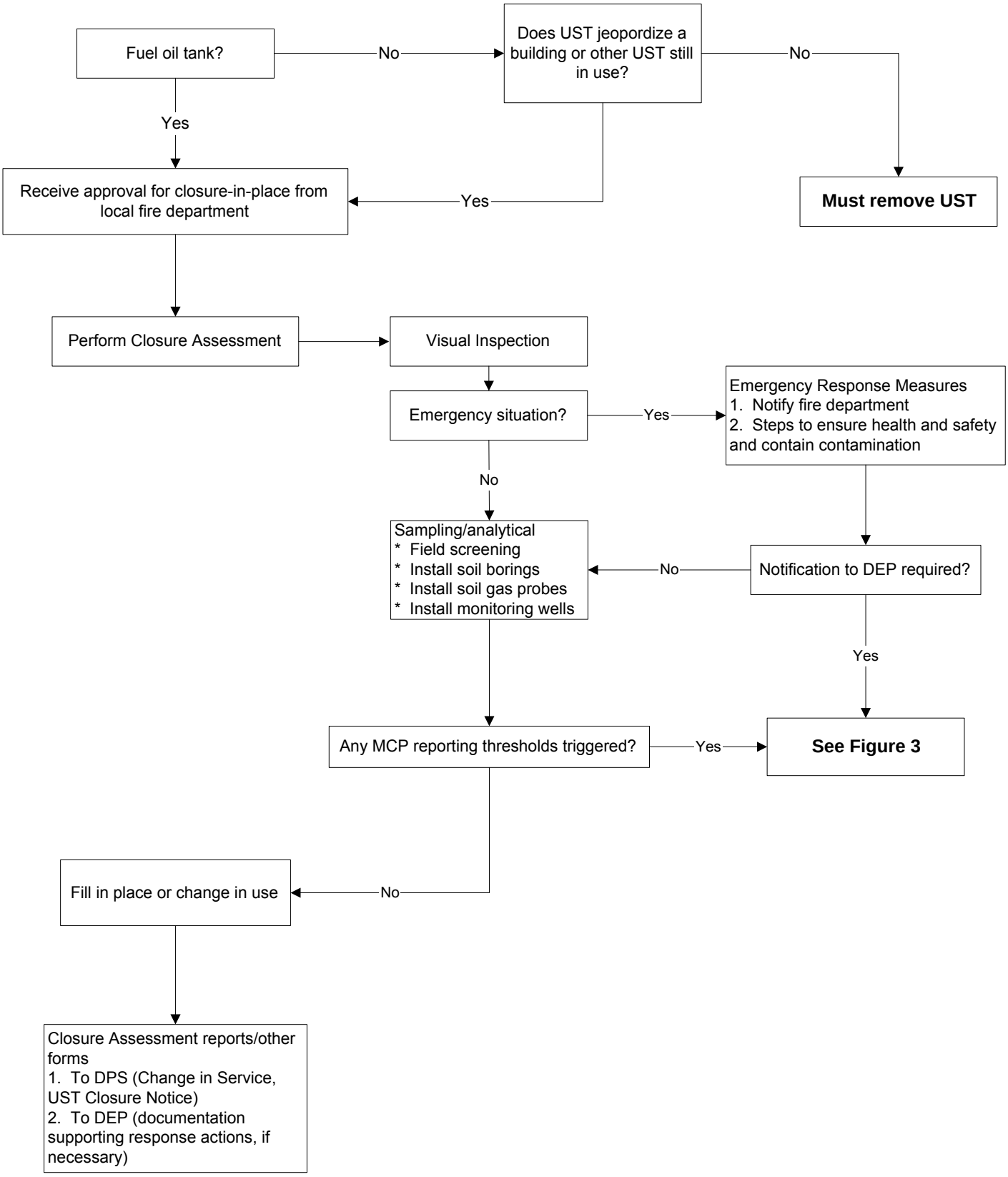
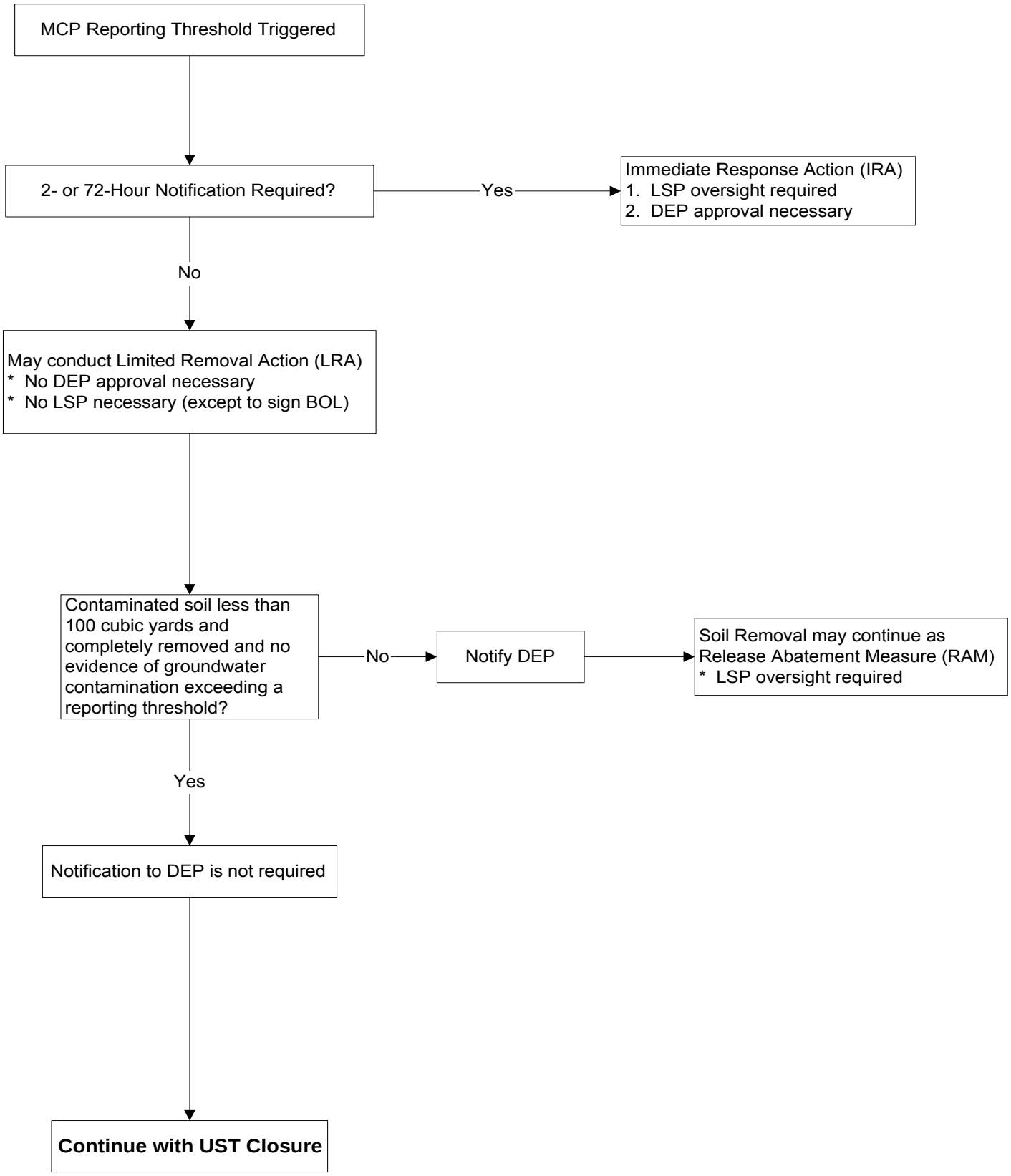


Figure 3
Notifications and Preliminary Response Actions



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Massachusetts Department of Environmental Protection Publications

Regulations:

310 CMR 40.0000 Massachusetts Contingency Plan

Policies/Guidance:

WSC-94-400. Interim Remediation Waste Management Policy for Petroleum Contaminated Soils, April 21, 1994.

WSC-401-91. Policy for the Investigation, Assessment, and Remediation of Petroleum Releases - Interim Site Investigation Protocol Document.

WSC-310-91. Standard References for Monitoring Wells.

Laboratory Guidance Manual for Petroleum Contaminated Media, August 1991.

BWP-94-037. Reuse and Disposal of Contaminated Soils at Landfills, April 26, 1994.

Massachusetts Department of Public Safety Publications:

Regulations:

527 CMR 9.00 Board of Fire Prevention, Tanks and Containers

Guidance:

UST Owner/Operators Tightness Test Guide, September 30, 1994.

UST Owner/Operators Compliance Guide, September 30, 1994.

UST-21J-001. Board Acceptable Site Assessment Policy, Draft, October 1992.

Appendix A Jar Headspace Analytical Screening Procedures

The following is the recommended procedure for conducting analytical screening of contaminated soil or groundwater utilizing a portable Photoionization Detector (PID) or Flame Ionization Detector (FID):

(1) Half-fill two clean glass jars with the sample to be analyzed. Quickly cover each open top with one or two sheets of clean aluminum foil and subsequently apply screw caps to tightly seal the jars. Sixteen ounce (16 oz.; approximately 500 ml) soil or "mason" type jars are preferred; jars less than 8 oz. total capacity (approximately 250 ml), should not be used.

(2) Allow headspace development for at least 10 minutes. Vigorously shake jars for 15 seconds both at the beginning and end of the headspace development period. Where ambient temperatures are below 32 F (0 C), headspace development should be within a heated vehicle or building.

(3) Subsequent to headspace development, remove screw lid/expose foil seal. Quickly puncture foil seal with instrument sampling probe, to a point about one-half of the headspace depth. Exercise care to avoid uptake of water droplets or soil particulate.

As an alternative, syringe withdrawal of a headspace sample with subsequent injection to instrument probe or septum-fitted inlet is acceptable contingent upon verification of methodology accuracy using a test gas standard.

(4) Following probe insertion through foil seal and/or sample injection to the probe, record highest meter response as the jar headspace concentration. Using foil seal/probe insertion method, maximum response should occur between 2 and 5 seconds. Erratic meter response may occur at high organic vapor concentrations or conditions of elevated headspace moisture, in which case headspace data should be discounted.

(5) The headspace screening data from both jar samples should be recorded and compared; generally, replicate values should be consistent to plus or minus 20%.

(6) PID and FID field instruments should be operated and calibrated to yield "total organic vapors" in ppm (v/v) as benzene. PID instruments must be operated with a 10.0 +/- eV lamp source. Operation, maintenance, and calibration should be performed in accordance with the manufacturer's specifications. For jar headspace analysis, instrument calibration should be checked/adjusted no less than once every 10 analyses, or daily, whichever is greater.

(7) Instrumentation with digital (LED/LCD) displays may not be able to discern maximum headspace response unless equipped with a "maximum hold" feature or strip-chart recorder. Deviations, departures and/or additions to the above procedures

should be consistent with 310 CMR 40.0017. In such cases, compelling technical justification must be presented and documented by the methodology proponent.

Appendix B **Field Instruments**

The following are some portable direct reading instruments are available for air monitoring and field screening:

- **Combustible Gas Indicators (CGI)/Oxygen meters:** The CGI is used in field investigations for the purpose of detecting explosive atmospheres. The indicator measures the concentration of a flammable vapor or gas in air, registering the results as a percentage of the lower explosive limit (LEL) of the calibration gas. Oxygen level measurements are taken concurrently with CGI measurements. The normal ambient oxygen concentration is 20.8%.

- **Photoionization Detectors (PIDs):** The PID is a portable gas analyzer designed to detect the presence of vapors on the principle of photoionization. Positive identification of suspect compounds is based on correlation of the known ionization potential of the suspect compound with that of the appropriate probe. A direct-concentration readout provides results in parts per million. The PID is used for on-site headspace analysis as well as general screening of excavated soil. While it is sensitive to a wide range of organic and some inorganic compounds, as a general rule, these instruments are only useful for certain products that have volatile components, such as gasoline, and are less effective for products with lower volatility, such as fuel oil or where the released material has been weathered (i.e., much of volatile fraction has volatilized). PIDs are susceptible to humidity effects and its impact may vary among different manufacturers.

- **Flame Ionization Detectors (FID):** The FID uses ionization as the detection method, much the same as the PID, except that the ionization is caused by a hydrogen flame, rather than by a light source. The flame has sufficient energy to ionize any organic compound with an ionization potential of 15.4 or less. The FID can be used for the same purposes as the PID and possesses similar limitations. Some differences are that the FID detects methane while the PID does not and that the FID is not as susceptible to humidity effects.

- **Colorimetric Indicator Tubes:** Direct-reading colorimetric indicator tubes are useful in quickly identifying a specific chemical. A known volume of air is pulled through the tube and the contaminants in this sample react with the indicator chemical in the tube, producing a color change whose length is proportional to the contaminant concentration in parts per million (ppm). It should also be noted that the "true" concentration versus the "measured" concentration may vary considerably among manufacturers.

- **Gas Chromatograph (GC):** The GC can make quantitative and qualitative field measurements. Advantages include near-laboratory results much faster and cheaper than a laboratory, many contaminants can be identified, and sample degradation during storage time is almost eliminated. The GC is used to analyze light petroleum products, such as gasoline, diesel, and fuel oils. While these instruments are capable

of generating large amounts of data in a relatively short period of time, the quality of data generated by analytical field instruments is dependent upon the experience of the operator and QA/QC methods.

- **Infrared Spectrophotometer (IR):** A modification of EPA Method 418.1 is used to measure TPH concentrations in samples. This method can result in a loss of volatiles and is therefore ineffective for VOC analysis. It is recommended for heavier petroleum fuels and products, such as heating and lube oils. As with the GC, the quality of the data depends on the experience of the operator and QA/QC methods.

- **Immunoassay Soil Test Kits:** These test kits are designed to quantitatively detect the presence of specific compounds in extracts of soil as an indicator of contamination. Test kits for Total Petroleum Hydrocarbons (TPH) allow for the screening of fuels (e.g., home heating oil, gasoline, aviation fuel, diesel fuel, and kerosene) in soil at specified action levels. This screening method can not identify the type of fuel residue that is present. Additionally, the effectiveness of this method decreases when weathering has occurred and for heavier petroleum products. It should be kept in mind that standards are adjusted to read false negatives (5% chance); also there is inconsistency among manufacturers as to what specific TPH compounds their kit is designed to measure.

Appendix C **Regulatory Jurisdictions**

U.S. Environmental Protection Agency (40 CFR 280, 281)

- Requires closure assessment
- Requires notification to appropriate authority if contamination is discovered (notification to DEP fulfills this requirement)

Occupational Safety and Health Administration (29 CFR 1926 and 1910)

The following is a general explanation of the specific citations from the Occupational Safety and Health Administration (OSHA) regulations which are applicable to UST Closures:

- **Excavation Standard (29 CFR 1926.650-652) -** establishes safety requirements for any excavation more than five feet deep.

- **Hazardous Waste Operations Standard (29 CFR 1910.120) -** applies to any involvement with hazardous materials whether removing hazardous sludge from a UST or discovering and responding to a leak that has occurred. It requires a written plan be in place detailing procedures for the work being done, a health and safety plan, emergency response procedures that will be followed, a medical surveillance plan, personal protective equipment, and certified training for the employees at the site.

- **Hazard Communication Standard (29 CFR 1926.59) -** This standard requires that a written hazard communication program be established including Material Safety Data Sheets for all materials that might be encountered. In addition, the standard specifies labeling requirements, training for all workers on their rights to information on the materials on-site, and plans for sharing this information with all other involved contractors and their workers. This standard applies to any materials used during a UST closure including gasoline for the backhoe, hydraulic fluid, sampling equipment cleaning solutions, UST inverting chemicals, etc.

- **Safety Training and Education (29 CFR 1926.21) -** This standard governs the use of equipment, emergency equipment, safety procedures, and risk characterization for all contractor operations. It also includes emergency exit procedures, air testing, and risk characterization whenever a worker enters a confined space. If UST cleaning is to be performed on site, there must be a confined space entry procedure in safety plan.

Massachusetts Department of Public Safety

(1) Board of Fire Prevention (M.G.L. c. 30A, s. 6 and c. 233, s. 75 and 527 CMR 9.00)
(2) State Fire Marshal (M.G.L. c. 148, s. 38A-H and 502 CMR 3.00)

- Primary regulatory authority of USTs (unless contamination is encountered)

- Requires abandoned USTs to be removed from ground
- Requires closure assessment
- Requires permit from local fire department
- Requires that leaks be reported to fire department and DEP/BWSC
- Local fire departments have direct jurisdiction over USTs, explosive vapors, and all matters involving public safety
- Closures in place: can only be performed if a removal will jeopardize a building or another UST in use [527 CMR 9.07(J)]
- Directs procedures for disposal of tanks

<u>UST Petroleum Product Cleanup Fund</u> (M.G.L. c. 21J ("Claims Reimbursement Regulations") and 503 CMR 1.00)

- Provides reimbursement to eligible claimants for allowable costs, expenses, and obligations incurred by taking cleanup actions, meeting claims of third parties, or otherwise incurring expenses, as a result of releases of petroleum products from UST systems. Only cleanup costs incurred after 4/2/91 eligible. This fund and program is overseen by DPS.

<u>DEP/Bureau of Waste Site Cleanup</u> (M.G.L. c.21E and 310 CMR 40.0000)

- Requires notification if contamination above reporting thresholds is found
- Requires notification if leak is detected (during tank test)
- Regulates activities related to assessment and cleanup of contamination

<u>DEP/Bureau of Waste Prevention</u> (M.G.L. c.21C and 310 CMR 30.00)

- Regulates storage, transport, and disposal of hazardous wastes, including certain petroleum wastes generated from tank removals (e.g., sludges, discarded petroleum products, treatment residuals and other waste materials) [see 310 CMR 30.254(6)]

- Petroleum contaminated soils are <u>not</u> subject to the requirements of 310 CMR 30.000 if they are managed in conformance with 310 CMR 30.252(2), 310 CMR 40.0030, and BWSC Policy #WSC-94-4000, "Interim Remediation Waste Management Policy for Petroleum Contaminated Soils". However, note that contaminated soil that did <u>not</u> originate from an UST corrective action may be subject to the provisions of the TCLP rule.

<u>Local Bylaws/Board of Health</u> (MGL c.40 and 40A/MGL c.111)

- Local officials should be contacted to determine if any local bylaws apply to UST closure and/or assessment
- Local Boards of Health have jurisdiction over all matters involving public health.

Appendix D **List of Acronyms**

BOL	Bill of Lading
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
BWSC	Bureau of Waste Site Cleanup
CFR	Federal Register
CGI	Combustible Gas Indicator
CMR	Code of Massachusetts Regulations
DEP	Department of Environmental Protection
DPS	Department of Public Safety
EPH	Extractable Petroleum Hydrocarbons
FID	Flame Ionization Detector
GC	Gas Chromatograph
IR	Infrared Spectrophotometer
IRA	Immediate Response Action
LEL	Lower Explosive Limit
LRA	Limited Removal Action
LSP	Licensed Site Professional
MCP	Massachusetts Contingency Plan
MGL	Massachusetts General Law
NAPL	Nonaqueous Phase Liquid
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PPM	Parts per Million
PPMV	Parts per Million Volume
RAM	Release Abatement Measure
RAO	Response Action Outcome
PID	Photoionization Detector
RC	Reportable Concentration
RQ	Reportable Quantity
TPH	Total Petroleum Hydrocarbons
21E	M.G.L. Chapter 21E
21J	M.G.L. Chapter 21J
UST	Underground Storage Tank
VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbons

Appendix E **DEP Emergency Response Phone Numbers**

Appendix F **Telephone Numbers**

State Agencies

Massachusetts Department of Public Safety

UST Compliance Program ..... (617) 351-6010

24-Hour Response 1-800-682-9229

21J Cleanup Reimbursement Program ..... (617) 727-3200 x628

Massachusetts Department of Environmental Protection (general information - see Appendix D for Emergency/Notification numbers)

Bureau of Waste Site Cleanup, Regional Offices

Headquarters, Boston ..... (617) 292-5851/5852
fax (617) 292-5530
West, Springfield ..... (413) 784-1100
fax (413) 784-1149
Central, Worcester ..... (508) 792-7650
fax (508) 792-7621
Northeast, Woburn ..... (617) 932-7600
fax (617) 932-7615
Southeast, Lakeville ..... (508) 946-2700
fax (508) 947-6557

Bureau of Waste Prevention

Division of Hazardous Waste, Boston ..... (617) 292-5853/5854

For temporary Hazardous Waste Generator I.D. Number
Toll-free in MA 1-800-343-3420
Outside MA (617) 292-5898
Non-business hours ..... (617) 223-7265

Bureau of Resource Protection

Division of Water Pollution Control ..... (617) 292-5673
Division of Water Supply ..... (617) 292-5770
Division of Wetlands and Waterways ..... (617) 292-5694

LSP Board (to obtain list of LSPs) ..... (617) 292-5794

State House Bookstore (to obtain copies of state regulations and select guidance publications)
Boston ..... (617) 727-2834
Springfield..... (413) 784-1378

Federal Agencies

U.S. Environmental Protection Agency
Region 1 Field Office
Westview Street, Lexington, MA 02173
(for emergency NPDES permit)..... (617) 566-4500

U.S. Coast Guard

National Response Center
USCG 400 Seventh Street, SW
Washington, DC 20590
(to report an oil spill) 1-800-424-8802

Marine Safety Division, Boston (24 hours)..... (617) 223-8444
Territory: Salisbury to Manomet Point, Plymouth

Marine Safety Office, Providence (21 hours)..... (401) 528-5335
Territory: Manomet Point, Plymouth to points south, Cape Cod and Islands

Occupational Safety and Health Administration, Regional Office
Technical Support Section..... (617) 565-7164

Federal Bookstore, Boston..... (617) 720-4180

Other

New England Interstate Water Pollution Control Commission, 255 Ballardvale Street, Wilmington, MA 01887..... (508) 658-0500

Petroleum Equipment Institute, P.O. Box 2380, Tulsa, OK 74101..... (918) 743-9941

American Petroleum Institute, 1220 L Street, N.W. Washington, D.C. 20005..... (202) 682-8375

Appendix G Notification for Removal or Closure of Storage Tanks Regulated Under 527 CMR 9.00 (FP-290R)

Appendix H Notification of Storage Tanks Regulated Under 527 CMR 9.00 (FP-290)

APPENDIX 5

MassDEP Standard References for Monitoring Wells Small Diameter Driven Well Supplement

COMMONWEALTH OF MASSACHUSETTS
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
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ROBERT A. DURAND
Secretary

DAVID B. STRUHS
Commissioner

COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD REFERENCES FOR MONITORING WELLS

SMALL DIAMETER DRIVEN WELL SUPPLEMENT

JANUARY 1999

Published by William Francis Galvin, Secretary of the Commonwealth

This information is available in alternate format by calling our ADA Coordinator at (617) 574-6872.

DEP on the World Wide Web: http://www.magnet.state.ma.us/dep

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ROBERT A. DURAND
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DAVID B. STRUHS
Commissioner

January 1999

Dear Reader:

Standard References for Monitoring Wells (WSC-310-91) was published in April, 1991 to provide guidance on locating, drilling, installing, sampling and decommissioning monitoring wells. The primary objectives of this volume are to help ensure that monitoring wells are installed properly, and that sampling data obtained from them is valid and can be interpreted consistently.

As anticipated, numerous technological advancements have occurred in the field of groundwater monitoring since the initial publication of Standard References for Monitoring Wells. Specifically, Small Diameter Driven Well (SDDW) technology has evolved to the point where it can be used as a cost effective complement to conventional monitoring wells. In many situations, SDDWs can also be used independently for purposes of site assessment or site remediation.

The Department has noted an increasing demand for this type of technology over the past few years. As a result, we have developed a Supplement to Standard References for Monitoring Wells specifically for Small Diameter Driven Wells. As with Standard References for Monitoring Wells, many people both inside and outside DEP were involved in developing these revisions. Their contributions are greatly appreciated.

This SDDW Supplement represents the DEP's current understanding of this ever-changing technology. It should be noted that we have deliberately chosen not to include certain types of technologies that could foreseeably fall under the heading of "Small Diameter Driven Wells," (e.g. cone penetrometers).

We welcome suggestions for future updates to Standard References for Monitoring Wells and welcome comments on this Supplement on Small Diameter Driven Wells. We hope that you find this Supplement a valuable tool.

Very truly yours,

Deirdre C. Menoyo
Assistant Commissioner
Bureau of Waste Site Cleanup

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ACKNOWLEDGMENTS

The Massachusetts Department of Environmental Protection (DEP), Bureau of Waste Site Clean-up (BWSC), Policy and Program Development would like to thank all the individuals who assisted in the development of this supplement to Standard References for Monitoring Wells (Publication No. WSC-310-91). The Small Diameter Driven Well (SDDW) Supplement was reviewed and commented upon by individuals both within DEP and in the private sector.

Experienced field staff from the DEP regional offices were culled together to form a workgroup which provided extensive technical review of this document. The workgroup worked with TRC, DEP's contractor, to prepare this Supplement. The most significant contributors to the technical review process included: Mark Baldi (DEP Central Region), Paul Giddings (DEP Northeast Region), Chris Gill (formerly of DEP Southeast Region), Larry Immerman (DEP Northeast Region), and Paul Spano (DEP Central Region). In addition we would like to thank the following DEP reviewers for their invaluable insights: Cathy Chamberlain (DEP BWSC Western Region), John Fitzgerald (DEP BWSC Northeast Region), Steve Hallem (DEP BRP Boston), Jana Leung (DEP BRP Central Region), and Zack Peters (DEP BWSC Northeast Region). The project was coordinated by Sandra Hurlbut (DEP BWSC Boston).

This document was peer reviewed by several firms that use Small Diameter Driven Well technology. These private sector contributors provided valuable comments and supplied additional reference material that improved the quality of the document: Richard Cadwgan (Checkpoint Environmental, Inc.), Matthew Ednie (Zebra Environmental Corp.), Deborah Farnsworth (MykroWaters, Inc.), Benjamin Gregson (Vanasse, Hangen and Brustlin, Inc.), Wesley McCall (Geoprobe Systems), James O'Brien (O'Brien & O'Brien Associates), and John Swallow (Pine & Swallow Associates, Inc.).

SECTION 1.1 FOREWORD (Revised)

1.1-1 Purpose

This Supplement to Standard References for Monitoring Wells (Supplement) covers the technical aspects of locating, installing, sampling and decommissioning Small Diameter Driven Wells (SDDWs). These revisions have been prepared by the Department of Environmental Protection (DEP) to provide guidance to employees of the Department, consultants, well installers, and members of the regulated community.

The use of SDDWs for site assessment and site remediation activities has significantly increased since the initial publication of Standard References for Monitoring Wells (SRs) in 1991. This Supplement was prepared at the request of DEP staff and other interested parties who routinely use SDDWs. Available research indicates that the use of "direct push" technology for site assessment can provide quality sampling data comparable to conventional well installations, often at a lower cost. In addition, SDDWs can be used for site remediation activities such as air sparging and nutrient injection for bioremediation.

As with any type of well installation there are potential problems resulting from improper installation and/or poor sampling procedures. Results from improperly installed wells are not reliable and should not be used for environmental monitoring purposes. SDDW well installers are encouraged to use this guidance document to circumvent potential installation and sampling problems.

1.1-2 Order of Presentation

This Supplement incorporates both revisions to existing SRs and new sections that are pertinent to SDDW technology. Rather than modifying the entire document, placeholders have been used to link sections in this Supplement to sections in the original SRs. These are ***bold italicized*** for ease of use. In addition, similar subjects in this Supplement are cross-referenced to related sections in SRs. Due to the complexity of the subject matter and the format, it is strongly recommended that this Supplement be used in conjunction with Standard References for Monitoring Wells, January 1991.

This Supplement follows the same basic format as Standard References for Monitoring Wells. For editorial simplicity, the figures follow the text rather than being inserted into the section where they are discussed. References for each revised section of the Supplement are found at the very end of the document. Each new subsection has been assigned its own unique number. Each page contains a header with a reference to "SDDW Supplement," the subsection number, the page number, and date of publication.

It should be noted that this Supplement was not intended to be an exhaustive description of current SDDW technology. Instead, the DEP has opted to portray basic SDDW techniques commonly used in the field. Where possible, the Department has chosen to provide figures of "generic" sampling devices.

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SECTION 3.2 DRILLING TECHNIQUES (Revised)

3.2-1 Purpose

Prior to selecting a well installation technique for a specific project, the objectives of the field investigation program must be established. The program objectives may include any or all of the following:

- Soil or rock evaluation - if undisturbed or representative samples are required, the well installation technique must be able to accommodate the appropriate type of sample collection.

- Characterization of hydrogeologic conditions - the well installation technique should allow for the characterization of each stratigraphic zone, water level measurement, and water sample collection.

- Evaluation of soil or groundwater contamination - the well installation technique must provide the appropriate sample collection methods, must not introduce contaminants or otherwise alter the existing soil or groundwater chemistry, and should not result in subsurface cross-contamination during or after installation.

- Installation of monitoring wells - installation method must permit appropriate well construction and minimize the disturbance to the borehole.

Choice of a specific installation technique for an investigation will impact the schedule, cost, and technical quality of a field investigation. The quality and representativeness of the soil and groundwater samples can be significantly affected by the well installation technique employed. Several items must be taken into consideration to determine the most appropriate well installation method. One of the best resources for selecting an appropriate well installation technique is an experienced contractor. Items that should be considered in the selection process include the following:

- Geologic Conditions:

  - unconsolidated or consolidated
  - type of material, including fill material
  - presence of boulders or cobbles
  - depth to bedrock

- Site Access:

  - property ownership
  - terrain and vegetative cover
  - wetlands and surface water
  - size of working area
  - equipment weight and size
  - need for large equipment
  - road access
  - location of water source if using conventional drilling equipment

- Seasonal Conditions Effecting Access:

  - effect of freezing temperatures, mud, and snow on installation progress
  - need to add antifreeze to pumps when in use under freezing conditions
  - high water conditions

- Existence of Contamination

  - utilize decontamination protocols
  - minimize disturbance and cross contamination
  - minimize impact on site chemistry
  - control drilling discharge, if using conventional installation techniques
  - reduce volume of contaminated spoils, if using conventional installation techniques
  - sampling requirements
  - minimize crew's exposure to potential site hazards
  - follow appropriate health and safety procedures (See Section 2.3 Health and Safety Plans in Standard References for Monitoring Wells, January 1991 for more information)

- Required Hole Size and Plumbness:

  - single-level or multiple-level well installations (See Section 4.0 Piezometers, Observation Wells and Monitoring Wells)
  - small diameter driven wells
  - large diameter wells
  - installation of instruments and down-hole equipment
  - availability of well installation equipment
  - for conventional wells and some SDDWs, adequate annular space for well installation
  - use of packers

- Cost of Installation: There are generally two different cost bases used for well installation contracts. One basis is time and materials required for the installation. The other is cost basis (i.e., unit price per foot of soil or rock of well installed).

Cost, or availability of equipment should not be the determining factor in choosing the proper well installation technique. An evaluation should be made of the impact of the well installation method on the integrity of the subsurface soil and groundwater sample to be obtained in the investigation.

Costs for chemical analyses can be high and money should not be wasted on analysis of unrepresentative samples. Also, analyses and remediation based on faulty data from improperly installed wells could ultimately be quite costly, greatly exceeding the cost of a well-conceived field investigation program.

Several well installation techniques that are commonly employed in environmental investigations are described in Standard References for Monitoring Wells, January 1991. Basic installation techniques and their advantages and disadvantages, are described for the following methods:

- Cable Tool

- Drive and Wash
- Spun Casing
- Solid Stem Augers
- Hollow Stem Augers
- Mud Rotary
- Air Rotary/Air Hammer
- ODEX
- Small Diameter Driven Wells **(this supplement)**

Included in Tables 3.2-1 through 3.2-8 and Appendix A in Standard References for Monitoring Wells, January 1991 is some useful information on conventional monitoring wells including standard casing diameters, casing volumes, drill bits and terminology. Additional information pertinent to Small Diameter Driven Wells is included in this Supplement.

(3.2-2 through 3.2-10: See Standard References for Monitoring Wells, January 1991)

3.2-11 Small Diameter Driven Wells (New Section)

3.2-11.1 General Considerations

Small Diameter Driven Wells (SDDWs) can be used for environmental assessment and for remediation of groundwater and soil. Depending upon site conditions, SDDWs may be used alone or in conjunction with conventional monitoring well installations. SDDWs are typically hollow steel rods advanced using a percussive force (a powered hammer) and driven directly into unconsolidated soil or fill. There are two basic types of SDDWs. One is a single rod system and the other is a dual tube or cased system. The single rod system uses a sequence of rods or steel pipes (gas pipe) to advance the drive point or sampler. Driven wells using a single rod system are generally capable of driving 10 foot to 21 foot long sections of piping. Single rod systems are often used for long term monitoring and are rarely extracted from the ground.

The cased system utilizes two sections, an outer drive rod and an inner sampling tube. Depending upon the sampling objectives, the inner sampling tube can be inserted into the drive rods during driving or inserted through the entire length of the drive rods after the desired sample depth has been reached (see Section 6.1 Sampling Techniques). Drive rods used with the dual tube or cased system are usually made from an expensive hi-grade steel alloy and are retracted after sampling. Drive rod lengths for the dual tube system can be obtained in sizes varying from 1 foot to 4 foot.

The type of advancement SDDWs use is commonly referred to as "direct push." Vibration, created from the hammering, mobilizes soil particles around the casing and creates a "thixotropic" or fluidized zone next to it. The resulting fluidized zone has a low bearing capacity that reduces resistance to penetration and allows the drive rods to be advanced relatively easily. Attached to the leading end of the drive rod is a tapered metal "drive point." This drive point is also referred to as a "tip" when used in soil gas sampling. Drive points are commonly advanced using hydraulic percussion equipment. Other percussion installation methods use electric or pneumatic devices.

SDDWs offer several advantages over conventional monitoring wells. One significant advantage is minimal installation time. The soil's reduced resistance to penetration created by the percussive force allows for rapid advancement of the drive point. Penetration rates vary by vendor and geologic

conditions, but typically range between 10 to 50 feet per hour. Penetration depths of over 100 feet may be obtained under ideal conditions.

In addition, SDDW well development is generally not as intensive as conventional well development. Most commercially available SDDWs do not use drilling fluids or produce drill cuttings. As a result, time and money spent on management of drilling waste is negligible. Most SDDWs installed for sampling purposes do not create an annular space that would require the use of a seal or filter pack. These features reduce installation time and allow a greater number of SDDWs to be installed and sampled per day in comparison to conventional monitoring wells. Available information indicates between 6 and 12 wells consisting of total of 200 to 300 feet of pipe can be installed per day. However, installation rates vary depending upon the specific SDDW technique used, staff resources, and geological conditions.

Another advantage of using SDDWs is mobility. Specially outfitted trucks, vans, all terrain vehicles (ATVs) or utility vehicles provide greater mobility than conventional drilling rigs. Such vehicles can access remote locations and their compact size minimizes site disturbance. ATVs or similar utility vehicles are capable of functioning in rough terrain. This style of vehicle is well suited for exploration in soft ground or wetland areas. Hand-held installation techniques, such as vibratory drills or rotary hammer drills, are portable and can be used inside buildings or other confined locations which may be inaccessible to vehicles.

The material used for drive rods is typically carbon steel. Drive rods can also consist of stainless steel, galvanized steel, PVC (rarely) or other suitable and compatible materials. SDDWs have an inside diameter generally ranging between 0.5 and 1.5 inches, although larger inside diameters are currently available. The size of the SDDW is usually determined by its use. For example, smaller inside diameters are often used for soil gas sampling or piezometers. Larger inside diameter SDDWs may be used for soil sampling or groundwater monitoring wells.

Depending upon site assessment goals, SDDWs can be installed for long term monitoring or as temporary sampling points. SDDWs can be used to collect samples from groundwater, soil or soil gas using several types of specialized sampling tools. Groundwater sampling in the single rod system is accomplished using a slotted wellpoint section. Groundwater samples are obtained by lowering a sampling device down the rods and collecting a sample near the slotted wellpoint. The dual tube system may use a screened drive point sampler which is driven to the desired sampling point and then exposed to groundwater by lifting the outer sleeve or jacking the casing back. The dual tube system may also be used to install long term monitoring wells using prepacked well screen. Figures 3.2-15 and 3.2-16 illustrate some types of groundwater sampling devices.

Representative soil samples can be obtained by advancing either an open tube sampler or a closed piston sampler. Soil gas samples can be obtained using specialized probes or slotted pipe and a vacuum pump. Figures 3.2-17 and 3.2-18 depict a closed piston soil sampler and typical soil gas sampling tools.

SDDWs can also be used as air sparging points, vacuum pressure monitoring points, and heat injection monitoring points. When used for air sparging, SDDWs may be equipped with specialized implants or screens used as conduits to pump air into the saturated zone either below or within the contaminated area. The injected air strips the volatile organic compounds (VOCs) from the groundwater allowing them to migrate into the vadose zone where the contaminants are usually drawn into a soil vapor extraction system.

SDDWs can be used to monitor subsurface vacuum or pressure by advancing a predetermined screen interval to the desired depth and placing an air-tight surface seal around the piping. A cap or plug with tubing is then installed into the top of the SDDW to allow pressure monitoring.

When used for heat injection, SDDWs are advanced to the desired depth and completed with an air-tight surface seal. The SDDW is used as a conduit to inject heat into the subsurface. Either steam or hot air can be injected into the subsurface through an injection point. Due to the potential for corrosion, stainless steel construction should be considered for SDDWs used for heat injection and air sparging applications.

There are potential limitations when using SDDWs. SDDW methods can be ineffective or technically infeasible in areas where the overburden consists of very dense till, silt, clay, coarse gravel or boulders. All of these materials may affect sampling ability. Current SDDW technology does not allow confirmation of bedrock by coring. As with any monitoring well installation, SDDW advancement through confined or semi-confined aquifers may create a pathway for contaminant migration. Potential contaminant migration must be addressed using proper installation and decommissioning techniques.

3.2-11.2 Methodology

3.2-11.2.1 Advancement Techniques

As previously described, SDDWs are typically advanced using a percussive force to hammer rods or piping into the ground. This type of advancement is commonly referred to as direct push. The vibration resulting from the hammering mobilizes soil particles creating a fluidized zone around the rods. This fluidized zone has a low bearing capacity. Resistance to penetration is reduced and the well can be advanced relatively easily.

There are 4 basic types of direct push advancement. The most common is a hydraulic vibratory hammer. Others include an electric or pneumatic powered impact driver (hammer) and manually driven "slam bars." With the exception of the manually driven tools, all advancement equipment is generally available as a tower unit or as a hand held hammer drill. However, there are some basic differences in their application. Pneumatic and hydraulic hammers tend to be more powerful than electric hammers. Hand-held hammer drills and manual "slam bars" are more portable than tower units.

Hydraulic installation equipment uses a collapsible tower unit that is mounted on a vehicle. Typically the vehicle is a pick-up truck although vans, ATVs, and utility vehicles are also used. All hydraulic units are powered by either an auxiliary engine or by the vehicle engine. All use a drive-hammer as the percussive force to advance the rods. One vendor has a hydraulic system that uses both the dynamic force of the hammer as well as the static force of the vehicle's weight to advance the rods.

The electric vibratory technique is also used with a vehicle mounted tower. The drive hammer, attached to the top of the collapsible tower, applies percussion and high frequency vibrations to advance the SDDW. The electrical vibratory technique needs an electrical source or generator. Electric hammers are not as powerful as hydraulic and pneumatic techniques.

Pneumatic installation units are also vehicle mounted. This technique is similar to the electric vibratory method except the drive hammer is operated

by an air compressor and the drill tower is typically operated with an electric motor. Disadvantages of the pneumatic technique are longer set-up time and the need for additional equipment such as an air compressor and generator.

In some situations, the use of a hand-held rotary hammer drill may be preferred. Rotary hammers are usually electric but hydraulic and pneumatic drills are also available. Hammer drills are much smaller than tower mounted units and are typically used inside buildings or where space is limited. Hand-held hammer drills can also be used in areas not readily accessible by vehicles. Their small size facilitates manual operation but also creates some limitations. Advancement or retrieval of rods at depths greater than a few feet may be difficult.

Similarly, manually driven slam bars provide many of the same conveniences as hand-held hammer drills. They are portable and can be used in tight or confined locations. No power source is needed for their operation. Slam bars also have limitations. Depths greater than a few feet may be difficult to achieve. Likewise, extraction of the rods may be difficult.

One commercially available SDDW application is installed using a direct push method of advancement but the well is completed using conventional monitoring well techniques (see Figure 3.2-16). Individuals employing such installations should refer to Section 3.2-6 in Standard References for Monitoring Wells, January 1991 for guidance on well completion techniques.

3.2-11.3 Advantages and Disadvantages

3.2-11.3.1 Advantages

- Drilling fluids are usually not required.
- No drill cuttings are produced.
- In favorable geologic conditions, advancement rates are typically faster than conventional drilling techniques.
- Representative groundwater samples can be collected at discrete or sequential intervals.
- Hand-held equipment provides accessibility to locations where site conditions limit vehicle and/or equipment size.
- SDDW methods allow for sampling of soil, groundwater, or soil vapor.

3.2-11.3.2 Disadvantages

- Difficult to use in dense geologic conditions or coarse gravel with cobbles and boulders.
- Groundwater sampling may be affected by fouling of screen openings.
- During installation, SDDWs may be deflected by subsurface obstacles and drift from vertical.
- Cannot confirm bedrock refusal by coring.

- Poor recharge of soil vapor or groundwater may result from tight soil formations.
- Potential for cross contamination or introduction of a preferential migration pathway exists if installed improperly.

3.2-11.4 Problems and Possible Solutions

3.2-11.4.1 Subsurface Obstacles

When installing SDDWs in areas with difficult subsurface conditions, obstacles may impede well advancement. For areas where obstructions are encountered, installation should be attempted at a location close to the original sampling point that meets sampling requirements. Alternatively, a larger diameter SDDW and a more powerful hammer may facilitate well installation where subsurface obstacles are found.

3.2-11.4.2 Surface Seals

Surface seals may be needed on SDDWs to reduce the possibility of well contamination. SDDWs can be contaminated by surface water run-off into open drive rods which can effect sample quality. Similarly, ambient air can dilute soil gas samples by "short circuiting," the mixing of air in the contaminated zone with aboveground air. Surface seals may be used to avoid well contamination by surface water run-off and help to minimize the introduction of above ground air into the well during soil gas sampling. To avoid the possible introduction of other volatile contaminants, surface seals should be prepared using bentonite or non-VOC containing materials.

3.2-11.4.3 Chemical Interference in Small Diameter Driven Wells

There is evidence that groundwater quality measurements may be impacted by steel used for well construction. Stainless steel may be a possible source of elevated nickel and/or chromium concentrations when installed in acidic (pH less than 4.0) groundwater. A thorough job of well purging should minimize this effect.

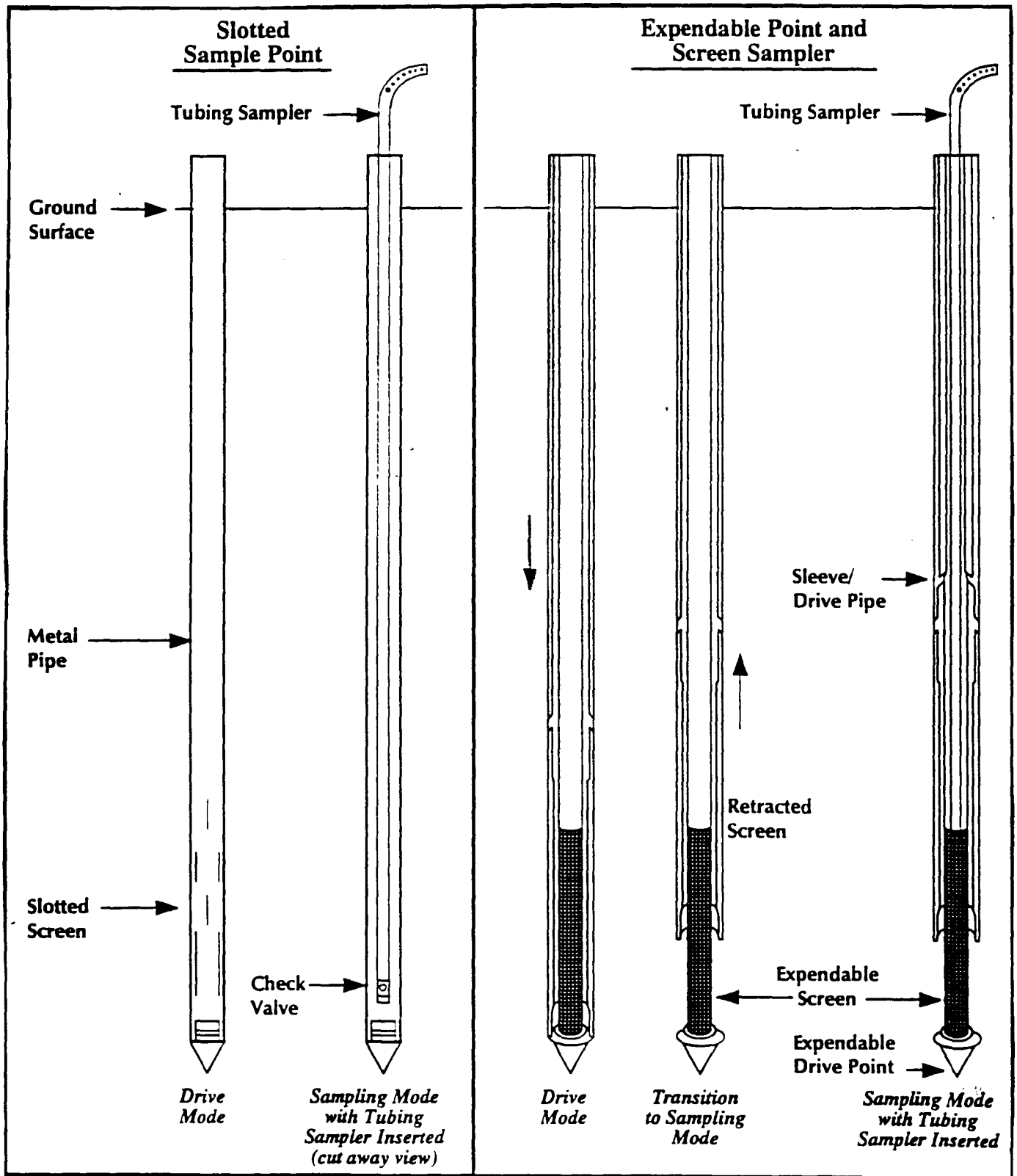
PVC has also been a source of debate for chemical interference. In some cases PVC has been shown to adsorb and desorb low levels of organic compounds. There is also concern that PVC may react with some ketones, aldehydes, and chlorinated solvents which may limit its durability. To minimize possible interference with these chemicals, only PVC that is listed by National Sanitation Foundation (NSF) should be used. NSF-listed PVC is essentially free of readily leachable plasticizers and does not exceed the National Interim Primary Drinking Water Standards in leach tests.

3.2-11.4.4 Failure of Groundwater Sampling Equipment

Inertial check valves may jam when trying to obtain a groundwater sample from an SDDW. This is caused by small particles that are able to pass through the slots of the screen. Failure may be avoided by cleaning the check valve more frequently.

3.2-11.4.5 Vertical Drift

As with conventional drilling techniques, SDDWs may drift from vertical during installation. Vertical drift may occur if the well point encounters a rock that cannot be fractured and compensates by deflecting the SDDW. As the diameter and rigidity of the drive rod decreases, vertical drift is more likely to occur. The use of larger diameter SDDWs and more powerful drive hammers may reduce the occurrence of vertical drift.



Sampler may be driven using various methods. See Section 3.2-11.2.

Ground Water sample may be obtained using various methods. See Section 6.2-3.5. Tubing sampler shown here as example only.

Not to Scale

Source: After Geoprobe Systems (1995)

Figure 3.2-15

Schematic of SDDW Groundwater Samplers.

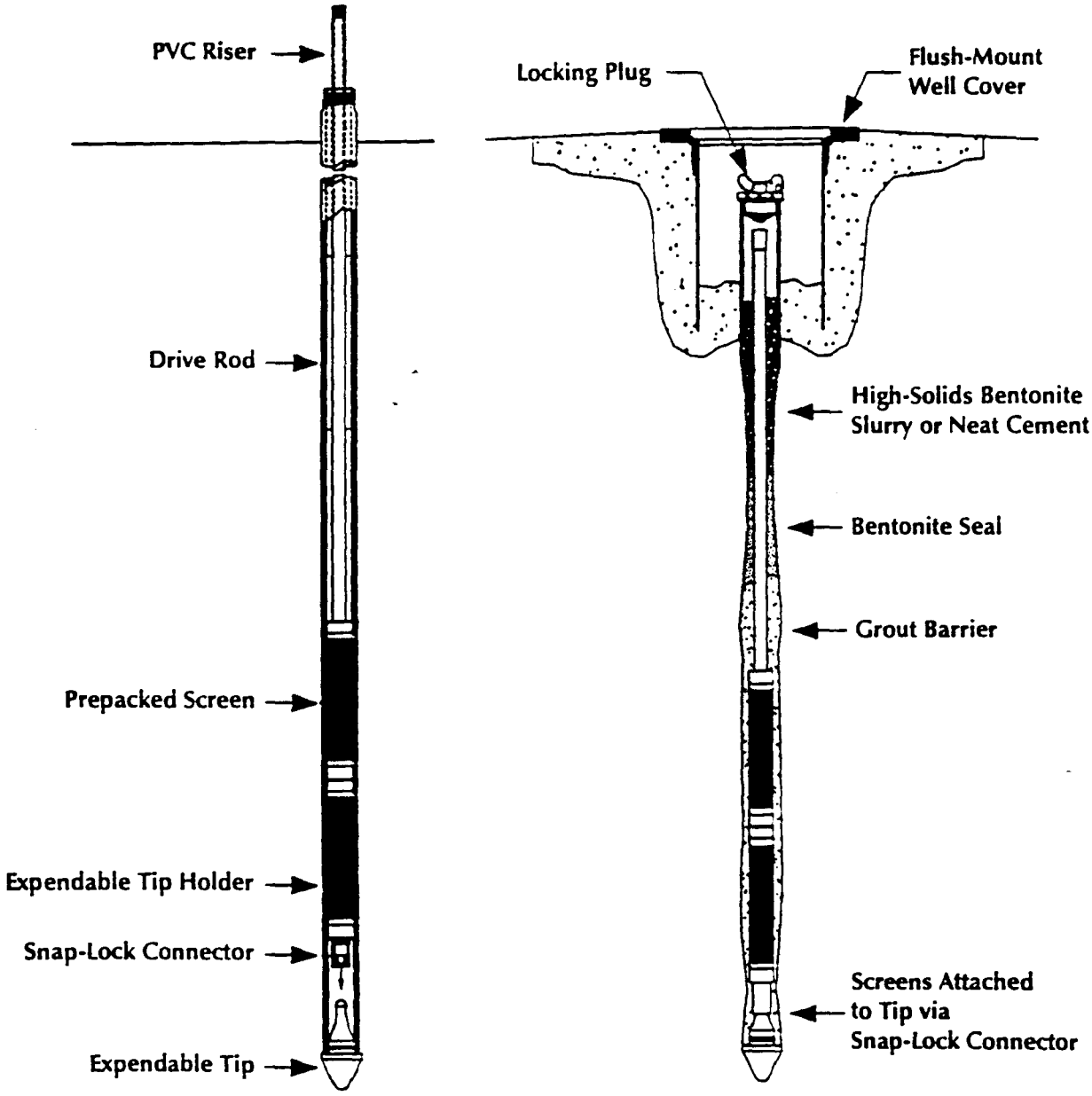
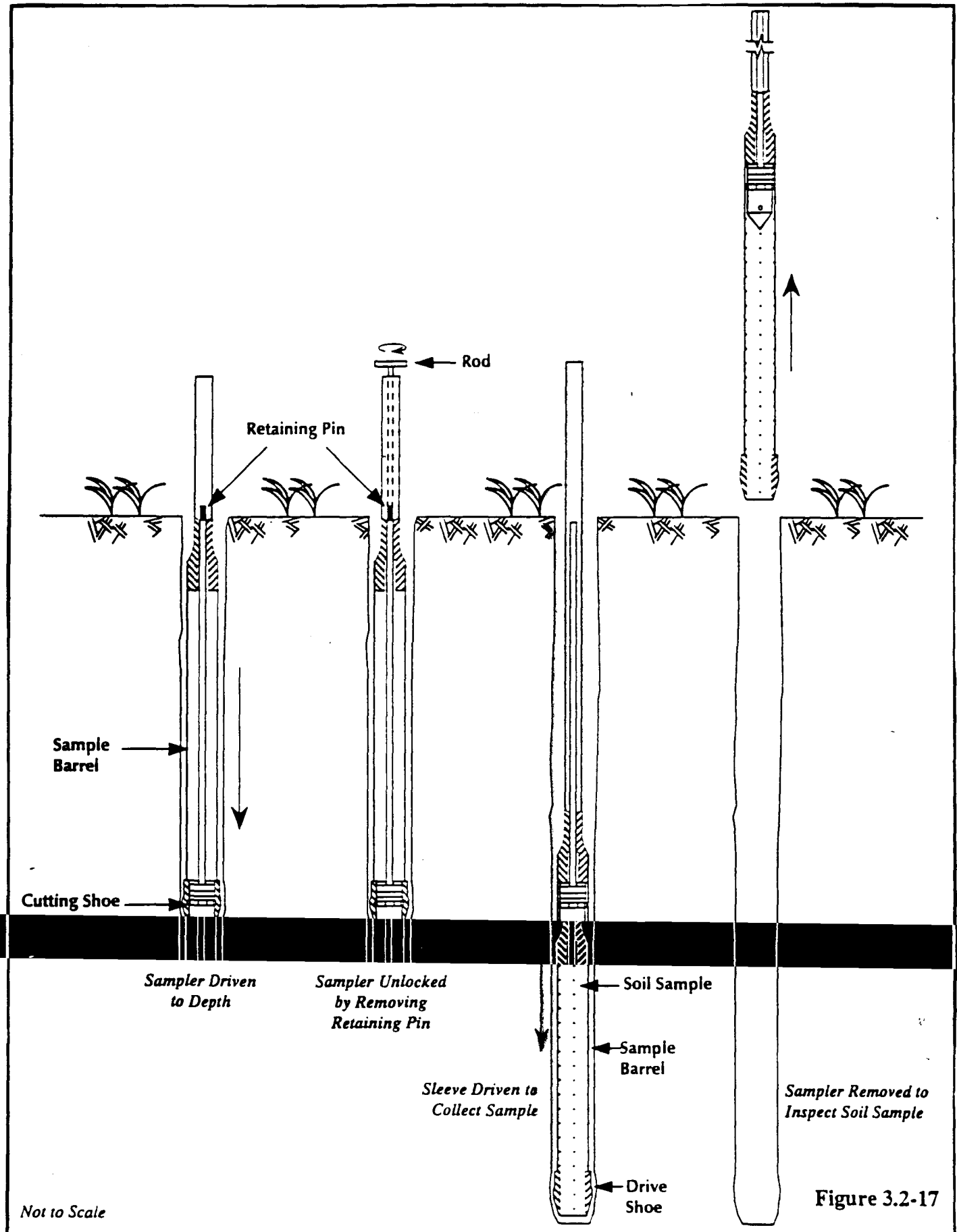


Figure 3.2-16

Schematic of Dual Tube System with Permanent Sampling Assembly.

Not to Scale

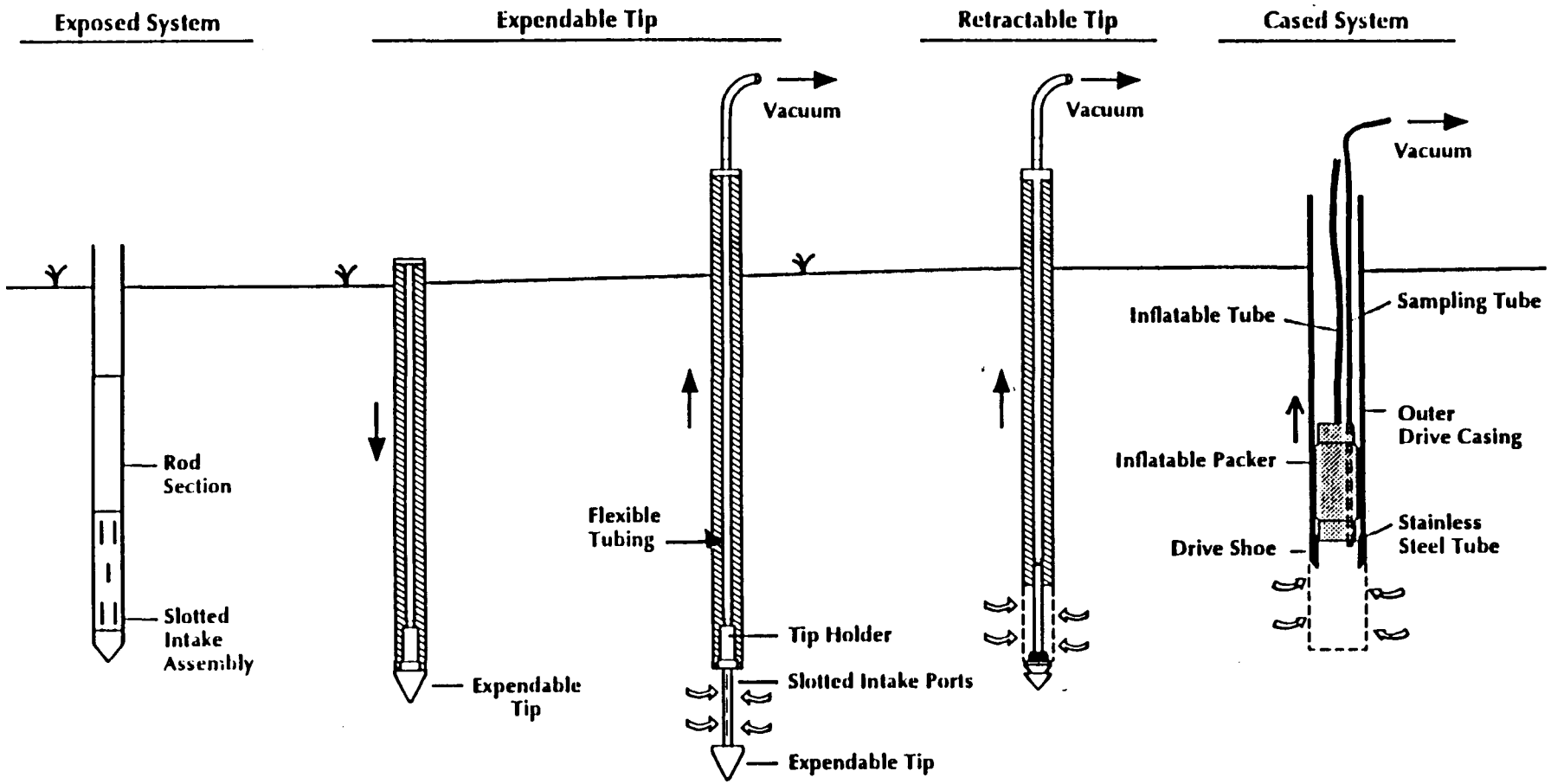
Source: After Geoprobe Systems (1996)



Source: After Geoprobe Systems (1995)

Figure 3.2-17

Schematic of SDDW Soil Sampler.



Soil-gas samples are collected through slotted intake ports at the base of tip and up through rods.

Sampler equipped with expendable tip pushed to target depth.

Sampler withdrawn to expose target internal. Soil-gas sample collected through intake ports of expendable tip and through tubing.

Soil-gas samples are collected through rods. Tip is removed with rods.

Soil-gas samples are collected through small-diameter tubing.

Not to Scale

Source: After Geoprobe Systems (1995); EPA (1997); and KVA Analytical Systems (1990)

Figure 3.2-18

Types of Soil Gas Sampling Tools.

SECTION 3.3 BORINGS IN CONTAMINATED AREAS (Revised)

3.3-1 Purpose

A fundamental aspect of most contamination investigations is the delineation of the extent of contamination in soil and groundwater. Both the horizontal (areal) and vertical distribution of the contamination must be defined. Geologic heterogeneities, variations in hydraulic conductivity, and contaminant characteristics will significantly influence the subsurface distribution of the contaminants. Accurate evaluation of contaminant migration and distribution requires the isolation and sampling of specific zones within an aquifer. To ensure the collection of representative samples and to prevent cross-contamination of soils and groundwater, special installation techniques may be required. In some cases, additional precautions must be taken during well installation to prevent contamination of nearby existing or potential water supplies. Protection of the health and safety of workers at contaminated waste sites is discussed in Section 2.3, Health and Safety Plans in Standard References for Monitoring Wells, January 1991.

For the purpose of this Supplement, "contaminated areas" are defined as highly contaminated source areas (i.e., oil and hazardous materials spills, landfills, waste lagoons, or zones of highly contaminated groundwater). The contamination may occur in either the saturated or unsaturated zones or both, depending on the location of the source and length of time since the release occurred. In these areas, well installation may alter or mask the existing distribution of contaminants by bridging contamination between aquifers. Some well installation techniques are better suited than others for investigations in contaminated areas. Conventional well installation methods using mud-rotary and air-rotary drilling techniques are undesirable in contaminated areas, due to the problem of inadequate control of fluids and cuttings in the borehole and at the surface (see Section 3.2 in Standard References for Monitoring Wells, January 1991). The more suitable conventional well installation methods for contaminated areas employ casing, either in single or multiple, to seal off the overlying strata during drilling. Small Diameter Driven Wells (SDDWs) use a percussive force that reduces the potential for introducing a preferential migration pathway when compared to conventional monitoring wells because the vibration created during the well installation forms an effective seal around the drive rods. However, the potential to puncture an aquitard may be increased if continuous or frequent soil sampling is being performed. The basic considerations for selecting an appropriate well installation method at a contaminated site are as follows:

- To prevent cross-contamination or migration of contaminants
- To obtain accurate and representative samples of formation materials and contaminants.
- To introduce a minimum amount of water or fluid into the aquifer, preferably none at all.
- To minimize the potential for introducing a contaminant migration pathway when a monitoring well is installed.
- To minimize safety hazards to the work crew, field personnel, workers at the site and residents of abutting properties.

3.3-2 Recommended Drilling Methods

Because each site is unique in terms of geologic material, groundwater characteristics, and types and properties of potential contaminants, the development of the subsurface exploration program may require modification of standard, generally accepted, well installation methods. It is always advisable to plan a well installation program so that the installation progresses from the cleaner areas to the more contaminated areas. Methods generally recommended for application in contaminated subsurface conditions are briefly described in the subsections below.

(3.3-2.1 and 3.3-2.2: See Standard References for Monitoring Wells, January 1991)

3.3-2.3 Small Diameter Driven Well Applications (New Section)

Small Diameter Driven Well methods can be utilized when obtaining subsurface soil, soil gas, or groundwater samples in contaminated areas. The risk of exposure to subsurface contaminants by on-site workers is diminished since spoils are not created or brought to the surface during the well installation process. Due to the small well diameter, the quantity of fluids generated during well development and purging requiring special handling and disposal is less than the quantity generated during development or purging of standard monitoring wells. Reductions in fluid volume and handling may provide significant cost savings when compared to conventional well installation techniques.

Advantages

- No drill cuttings.
- Drilling fluids are usually not required.
- Limited fluids generated during development and purging.
- Limited waste disposal costs.
- Can be used for site characterization or post remedial confirmatory sampling.
- Can be used for some remedial actions including air sparging.
- Reduced potential for cross contamination within the well since vibration during installation creates an effective seal around the drive rods.
- Small diameter driven well installations can reach depths similar to hollow stem augers.

Disadvantages

- Difficult to advance when cobbles and boulders are present.
- Potential depth limitations based on site geology, installation technique, and well size.
- Vertical drift may occur if drive point gets deflected.

(3.3-3 and 3.3-4: See Standard References for Monitoring Wells, January 1991)

SECTION 4.1 MONITORING WELL NETWORK DESIGN (Revised)

4.1-1 Purpose

The following section presents guidelines for the design of monitoring well networks. Monitoring wells are installed for a variety of reasons including:

- To determine horizontal and vertical hydraulic gradients that influence the direction of groundwater flow.
- To monitor changes in water quality over time.
- To define the two- or three-dimensional distribution of contamination in an aquifer.
- To evaluate the effectiveness of remedial measures.

Frequently, not enough attention is given to the design of well networks during the development of a field investigation program. If the network is not properly designed, important features relating to both the hydrogeology and chemical composition of the water within an aquifer may not be identified. If this occurs, one might reach erroneous conclusions about conditions at the site. This could result in inadequate definition of potential receptors and improper design of remedial measures.

The design of a monitoring well network is site-specific. It is important to understand that the conditions at each site are unique and, therefore, site-specific factors affecting groundwater flow and contaminant migration must be considered when designing an appropriate monitoring well network. It also makes a difference whether the network is being designed to define a plume of contamination migrating from a known source or to identify a source from a downgradient point or area of contamination. Design of a network requires input from experienced individuals familiar with the interrelationships of geology, hydrology, and groundwater chemistry, as well as the suitability of various well installation methods.

This section will focus on designing small diameter driven well networks. Guidance on the design of pump test monitoring systems for conventional monitoring wells is available from the DEP, Bureau of Resource Protection, Drinking Water Program.

(4.1-2 through 4.1-3: See Standard References for Monitoring Wells, January 1991)

4.1-4 Methodology

Designing a monitoring well network involves synthesizing information about site geology, hydrology, groundwater and contaminant chemistry, and human activities affecting the area being investigated. Monitoring well network design requires that the following steps be carried out:

- Compilation of available background data.
- Profiling all areas.
- Determination of the number and location of the wells.

- Determination of the most suitable well type, size and construction materials.

Many innovative small diameter driven well installation techniques have been developed over the past few years as a result of the large number of site investigations being undertaken. Well installation technology is continually improving. One of the best resources for deciding on the feasibility of a specific well design is an experienced well installation contractor. Often an experienced contractor can make helpful suggestions on modifications to a design that will improve the quality of well installation.

(4.1-4.1 through 4.1-4.2: See Standard References for Monitoring Wells, January 1991)

4.1-4.3 Selection of Well Type

(4.1-4.3.1 through 4.1-4.3.3: See Standard References for Monitoring Wells, January 1991)

4.1-4.3.4 Small Diameter Driven Well Network Design (New Section)

The term Small Diameter Driven Well (SDDW) is used to describe a temporary or permanent groundwater sampling point, usually up to 1.5 inches in inside diameter, that is installed using one of several direct push techniques. These points can be used to obtain samples of groundwater, measure water-levels, or serve as injection points for air sparging and/or nutrient injection for in-situ bioremediation. SDDWs can be completed to obtain groundwater samples from discrete intervals or used to obtain sequential samples to determine the vertical distribution of contaminants. They can also augment existing monitoring well networks to complement contaminant delineation efforts.

Selection of a SDDW method should be based on the requirements of the project, purpose of the investigation, and data quality objectives. In selecting the most appropriate SDDW applications for a characterization or monitoring program, one must balance the benefits of temporary vs. permanent SDDWs and discrete sampling vs. vertical profiling data.

Also, selection of well diameter must be based upon the site assessment goals. Smaller diameter driven wells may limit accessibility of more sophisticated electronic measuring equipment requiring installers to use measurement techniques like oil paste on wire to measure NAPL. Typically, SDDWs with outside diameters less than 0.5 inch are used for soil gas sampling or as piezometers. Larger outside diameter SDDWs (.82 to 1.5 inches) are used for soil sampling or groundwater monitoring.

Entire monitoring networks of SDDWs can be installed as a cost effective approach to delineate a groundwater plume. SDDW networks also allow delineation of non-aqueous phase liquids (NAPL).

Advantages

- Can be a cost-effective alternative to conventional monitoring wells under favorable geologic conditions.

- Allows network installation in sensitive areas (e.g., wetlands) with minimal impact.

- Representative groundwater samples can be immediately collected from discrete or sequential intervals in the aquifer.
- Ability to perform vertical profiling to define distribution of contamination.
- Generates fewer spoils, no soil cuttings and less purge water.
- Advancement rates are typically faster than conventional techniques in favorable geologic conditions.

Disadvantages

- SDDWs may have diameters which may be too small to allow the use of some equipment, such as electronic interface probes and submersible pumps.
- Absence of a filter pack on SDDWs may result in groundwater samples with elevated turbidity.
- Smearing of well screens when advancing through silts and clays may limit water flow into SDDW and affect groundwater sample quality.

SECTION 4.2 SELECTION OF WELL CONSTRUCTION MATERIALS (Revised)

4.2-1 Purpose

One purpose of this Standard Reference Supplement is to provide guidance on selecting the most economical and chemically inert small diameter monitoring well construction materials. While there are many similarities with the process of selecting materials for water wells and conventional monitoring wells, there are also differences which may be significant, especially in a highly contaminated environment. Monitoring well casing, SDDW drive rods and well construction materials should be selected to meet the following criteria:

- The materials should be resistant to deterioration resulting from long-term exposure to natural or synthetic chemical constituents in the groundwater at the site.
- The materials must have sufficient strength to ensure the structural integrity of the well during installation and long-term monitoring.
- The materials should be selected to minimize their interference with the measurement of the specific chemical parameters expected to be found at the site.
- The rod diameter should be large enough to accommodate commercially available down-hole instrumentation or sampling equipment (e.g. oil/water interface probe).
- The rods should be water-tight.
- The well must be able to be secured against vandalism, leakage, and inadvertent damage.
- The screen and filter pack, if used, must be appropriately sized to provide representative data on hydraulic conductivity and groundwater quality.

This section provides guidance for the selection of materials commonly used in monitoring well installations and discusses the advantages and disadvantages of each. The selection of well construction materials should be site specific. Proper selection requires consideration of project objectives, compliance with regulatory requirements, available data about the site geology, water chemistry, and the project budget. New well materials, filter packs and sealants are continually being developed. Individuals involved in well design and installation should be aware of recent developments in monitoring well technology.

4.2-2 Casing Materials

4.2-2.1 Composition

There are a number of commercially available well casing materials. The advantages and disadvantages of only a few of the most commonly used materials are described below. For conventional monitoring wells, it is possible to combine different materials as long as they are compatible. There is considerable debate over the significance of the adsorption and desorption potential of many well casing materials. However, adequate purging of the well prior to sampling reduces or eliminates the potential for this to have a

significant impact on sample chemistry. If in doubt about the suitability of a particular casing material for the intended application, it is advisable to consult chemical compatibility charts or the equipment manufacturer for additional information. The significance of adsorption-desorption must be evaluated based upon monitoring well program objectives, sampling and analytical requirements, and the contaminant concentrations one is trying to measure.

4.2-2.1.1 Polyvinyl Chloride (PVC)

Polyvinyl chloride (PVC) is the most common well casing material used in conventional monitoring well construction. PVC is used to a much lesser extent in SDDW well installations. A limited number of SDDW installers use PVC for screens or riser (casing material). Such wells are usually constructed in the same manner as conventional wells but they are smaller in diameter; generally ranging 1.0-1.5" OD. SDDWs may also use PVC with piezometers for stream gauging and wetlands monitoring. In this type of application, PVC casing material is usually driven 2-5 feet into the soft ground with slam bars.

PVC is the thermoplastically molded casing composed of rigid, unplasticized polymer. PVC casing material offers a combination of chemical resistance, durability, availability, and low cost. There is considerable debate over the reaction of PVC well casing with some ketones, aldehydes, and chlorinated solvents. In some cases, PVC has been shown to adsorb and desorb low levels of organic compounds.

Flush-threaded or coupled PVC casing materials should be used for monitoring well construction. If flush-threaded casing is used, ASTM thread specifications should be used. Under NO circumstances should solvent cement be used to join casing sections together. PVC solvent cements have been shown to contribute significant quantities of organic contaminants to water samples collected from cemented PVC wells. Generally flush-threaded casing is preferred due to the ease of installation and because, if properly joined, it provides a water tight seal.

For all monitoring well applications where PVC is selected, only PVC well casing listed with the National Sanitation Foundation (NSF) should be used. These products are essentially free of readily leachable plasticizers and do not exceed the National Interim Primary Drinking Water Standards in leach tests.

Advantages

- Excellent chemical resistance to weak alkalies, alcohols, aliphatic hydrocarbons, oil and grease.
- Good chemical resistance to strong mineral acids, strong oxidizing acids, and strong alkalies.
- Readily available.
- Lightweight.
- Inexpensive.
- Two wall thickness’ commonly available (Schedule 40 and 80) provide a choice of strengths.

Disadvantages

- May adsorb and desorb low levels of some organic constituents from the groundwater. This may not be a problem if the well is adequately purged prior to sampling.
- Poor chemical resistance to concentrated ketones, esters, and some aromatic hydrocarbons.
- Weaker, less rigid, and more temperature-sensitive than metallic casing materials.

4.2-2.1.2 Stainless Steel

Stainless steel provides an excellent casing material where corrosion resistance and strength are important. The strength provided by stainless steel may be essential when installing conventional wells in deep boreholes (over 300 feet deep) due to the potential for other casing materials with lower strengths to collapse. Similarly, the use of stainless casing material or drive rods in Small Diameter Driven Well (SDDW) applications may be preferred when driving in difficult geologic conditions.

Stainless steel is resistant to most chemicals and is suited for monitoring many types of contaminants. Long periods of exposure to highly corrosive groundwater conditions may result in leaching of chromium or nickel from stainless steel well casing. Therefore, if the pH of the groundwater is low (4 or less), stainless steel is not recommended for long-term monitoring of inorganic constituents. Stainless steel is available in a variety of types, each with a slightly different composition. The basic composition and suggested applications for various types of stainless steel and other metals for well casing and screens is presented in Table 4.2-1 in Standard References for Monitoring Wells, January 1991. As with PVC, stainless steel casing should have threaded, flush joints to assure watertight connections.

Two types of stainless steel alloys are available for SDDW construction: 304 and 316. Both alloys resist corrosion and oxidation. There is little to no performance difference between SDDWs constructed from 304 or 316 stainless steel alloy. SDDWs constructed from stainless steel are typically constructed from the 304 alloy since it is significantly less expensive than the 316 alloy.

Advantages

- Excellent resistance to corrosion and oxidation; will not adsorb or desorb organic contaminants.
- High strength, rigidity.
- Suitable for wide range of temperatures.
- Readily available.

Disadvantages

- Susceptible to galvanic and electrochemical corrosion.
- Heavy; larger diameter casings used in conventional wells may require additional equipment to lower down borehole.

- May leach chromium and/or nickel in acidic waters.
- Moderate to high cost.

(4.2-2.1.3: See Standard References for Monitoring Wells, January 1991)

4.2-2.1.4 Carbon Steel (New Section)

Carbon steel (gas pipe) construction is a common SDDW construction material due to its relatively low cost, excellent durability, and chemical resistance. Carbon steel is stronger than stainless steel and therefore is preferred in applications in difficult geologic conditions. Due to the potential for corrosion, carbon steel may not be appropriate in long-term monitoring, vadose zone, or sparging/injection applications.

Advantages

- more rigid than stainless steel
- inexpensive compared to stainless steel

Disadvantages

- potential for corrosion in vadose zone or sparging/injection applications

4.2-2.1.5 Galvanized Steel (New Section)

Galvanized steel is not commonly used as a SDDW material. However, galvanized steel was formerly used in hand-driven well points at a time when the selection and availability of materials was not as diverse. SDDWs constructed from galvanized steel may still be available from some vendors.

Advantages

- Inexpensive
- High strength

Disadvantages

- Susceptible to corrosion

4.2-2.1.6 Joining Casing Materials and Drive Rods (New Section)

SDDWs are advanced into the ground by joining individual drive rods or sections of casing materials. The sections are joined by either threading, crimping, or welding. Threaded joint connections are a common joining method for direct push applications. Threaded drive rods are joined by screwing two drive rods together. Care must be taken during installation since the threaded

portion may be thinner than the rest of the drive rod and may bend or break under extreme stress or if deflected.

SDDW drive rods can also be connected by crimping. Two drive rods are connected together by a external steel sleeve. The sleeve is secured in place by pinching with a hydraulic crimper. The integrity of the seal can be increased by crimping the sleeve in several locations.

Welding is another technique that can be used to join drive rods. In this technique, the ends of two drive rods are connected by a metal sleeve that is welded in place. The welding technique requires additional time and equipment on-site but provides a strong joint which can facilitate SDDW advancement in deep or difficult areas. All SDDW joints should be visually inspected in the field to ensure proper joining.

(4.2-2.2: See Standard References for Monitoring Wells, January 1991)

4.2-2.2.1 Size Selection for Small Diameter Driven Wells (New Section)

When constructing a Small Diameter Driven Well, both the wall thickness and the inside diameter (ID) of the drive rods or casing material must be considered. The wall thickness determines the strength of the casing material. The thicker the casing, the stronger the drive rod. Selection of SDDW diameter is typically limited by the materials available to the well installation contractor. However, the following factors should be considered in selecting a SDDW diameter.

- Subsurface conditions may limit the ability to drive smaller diameter SDDWs. Difficult driving conditions may impede or break smaller diameter SDDWs.
- Groundwater sampling will require a SDDW with a diameter large enough to accommodate the desired sampling equipment.
- For groundwater elevation or product thickness measurement, the SDDW should be of sufficient size to allow insertion of the required measurement equipment.
- Larger diameter drive rods or thicker casing materials provide greater strength and are more resistant to deflection.
- Smaller SDDWs are less costly and easier to handle in remote locations.
- For remedial applications, SDDWs should be sized to allow for the needed flow requirements.

(4.2-3 through 4.2-6: See Standard References for Monitoring Wells, January 1991)

4.2-7 Protective casings (Revised)

A protective well casing is recommended for all SDDWs used as monitoring wells to protect it from damage, leakage, tampering, or vandalism. Protec tive well casings are generally constructed of steel and have a locking cap. Two basic types of protective casings are used in all monitoring well in stallations: an above-ground casing and a flush-mount casing, or road box (see Figures 4.2-4 through 4.2-5 in Standard References for Monitoring Wells, January 1991).

Selection of the protective casing is based on the physical conditions of the area. In areas of vehicular or pedestrian traffic, it may be desirable to conceal the SDDW by using a flush mounted completion and roadbox. Flush mounted completion construction is slightly more expensive than stickup construction since it involves the addition of a roadbox. Above-ground and flush-mounted casing constructions should be sealed at the surface (See Section 4.3-5.2.3 in Standard References for Monitoring Wells, January 1991).

4.2-7.1 Above-ground Protective Casing

Above-ground SDDW completions are typically constructed using a portion of the SDDW rod as the protective casing. This type of protective casing is constructed by welding or crimping a metal tab to the top of the SDDW drive rod. A locking cap is then inserted over the top of the SDDW and locked through the metal tab to secure the well. The primary purpose of this construction is to ensure the integrity of the SDDW.

4.2-7.2 Flush-mount or Road-box Casing (Revised)

Flush-mount protective casings for SDDWs must be completed flush or slightly below ground surface. They are primarily used in high traffic areas such as roadways, parking lots, and sidewalks. Typically, flush mount construction uses a roadbox, of which many standard varieties are commercially available. Individual vendors may also offer customized roadboxes which might vary in diameter or depth. Flush-mounted SDDWs can also be constructed utilizing manhole covers. In order to avoid infiltration of surface water into the SDDW, roadboxes or manhole covers usually include a rubber gasket. Water tight caps are placed on the top of the SDDW rod. Granular material is usually placed inside the roadbox or manhole cover system to enable drainage of water that may have entered.

SECTION 4.3 WELL INSTALLATION PROCEDURES (Revised)

4.3-1 Purpose

The proper installation of monitoring wells is an essential part of all hydrogeologic investigations. The proper installation depends upon good communication and cooperation between the well installer and field personnel. Quality well installations require thoughtful consideration of several interrelated topics including the objective(s) of the well installation program, selection of the appropriate installation method, network design, and well construction materials. Information and technical guidance on these aspects of monitoring well construction are contained in other sections of Standard References for Monitoring Wells, January 1991 (SRs) and in this Supplement on Small Diameter Driven Wells (SDDW). Specific sections on construction include: Section 3.2 Drilling Techniques, Section 4.1 Network Design and Section 4.2 Selection of Well Construction Materials. The reader should refer to these sections in both Standard References for Monitoring Wells, January 1991 and this Supplement prior to specifying well materials and installation procedures.

The techniques described in the following subsections are some of the common and effective methods that can be used to install SDDWs. Other methods may be utilized provided that the performance and integrity of the well components are maintained. A contractor experienced in monitoring well installation can offer many helpful suggestions on both standard and innovative well installation methods. Discussions of a proposed well installation program with a contractor prior to undertaking the field program is strongly recommended.

Improperly installed monitoring wells can have serious consequences. Data obtained from such wells can be incorrect and/or misleading, resulting in erroneous interpretations and conclusions concerning potentiometric head conditions, extent of contamination, contaminant concentrations, and the source or receptor of contamination. Adequate attention must be given to the proper preparation and installation of monitoring well seals. Inadequately sealed wells can serve as conduits for the vertical movement of contaminants into uncontaminated portions of an aquifer or into a confined aquifer. A detailed discussion of the preparation and installation of monitoring well seals is contained in Standard References for Monitoring Wells, January 1991 and revisions contained within this document.

4.3-2 Components of the Installation

See Standard References for Monitoring Wells, January 1991, for conventional monitoring well installation components.

4.3-2.1 Components of SDDW Installation (New Section)

SDDWs are driven with percussive force directly into unconsolidated formations. SDDWs may be used as permanent or temporary monitoring points of soil, groundwater, and soil gas. At this time, SDDW technology is not capable of installation into consolidated bedrock.

The two primary types of SDDWs are the single rod system consisting of a drive point and slotted screen with riser pipe or rods and the dual tube or cased

system consisting of removable drive casing with interior sampling assembly. The following system components are discussed within this Supplement:

- Single Rod with Slotted Screen
- Drive Casing with Retractable Screen Sampler
- Drive Casing with Permanent Sampling Assembly
- SDDW Soil Sampler

A surface seal, road box, and/or protective casing may be included if any of the above systems are constructed as permanent sampling points for soil gas or groundwater.

4.3-2.1.1 Single Rod with Slotted Screen

Components of a single rod SDDW with an exposed or mill slotted well screen include:

- Drive Point
- Mill Slotted Screen
- Drive Rods or Riser Pipe

This is the simplest and most common SDDW installation for groundwater and soil gas sampling (see Figures 3.2-15-"Slotted Sample Point" and 3.2-18-"Exposed System"). The single rod system is driven to the desired depth and samples of groundwater or soil gas are drawn through the exposed screen and collected at the ground surface.

Vertical profiling of groundwater and soil gas may be conducted by driving the exposed screen assembly to the intended depth, collecting a sample of groundwater or soil gas, and then advancing the SDDW to subsequent sampling depths. Care must be taken to avoid cross-contamination of samples. Over-pumping or excessive purging of the well is perhaps the most convenient method to avoid cross-contamination and obtain a representative sample (see Section 4.5-2.1 in Standard References for Monitoring Wells, January 1991).

Single rod SDDWs are generally constructed of readily available and affordable materials such as carbon steel. This type of single rod SDDW is rarely removed and is generally infeasible to extract even when long-term monitoring is not anticipated. More expensive drive rods such as stainless steel and hardened steel alloys are typically used when the SDDW is to be retrieved.

Due to the inability of this well installation method to retrieve soil samples for examination, caution must be exercised not to perforate confining layers. When installing a single rod SDDW system in contaminated areas, it may be useful to obtain soil samples to determine soil stratigraphy using an alternative method (see Section 3.2-6 in Standard References for Monitoring Wells, January 1991).

If constructed as a permanent monitoring point or remedial well such as a vapor extraction well or sparging point, a surface seal, road box, or other protective casing should be constructed after driving the SDDW to the desired depth.

4.3-2.1.2 Drive Casing with Retractable Screen Sampler

Components of a retractable screen sampler assembly include:

- Drive Casing

- Extension Rod
- Piston Rod
- Expendable Drive Point
- Retractable Screen

The SDDW retractable screen sampler is used as a temporary sampling point for groundwater and soil gas sampling (see Groundwater Figure 3.2-15-"Expendable Point and Screen Sampler" and Soil Gas Figures 3.2-18-"Retractable Tip"). The assembly consists of an expendable drive point and retractable screen which is connected to extension rods and a piston rod within the drive casing. Once the sampler is advanced to the desired sampling depth, the leading end of the drive casing is retracted while the extension rod holds the exposed screen in place. Groundwater or soil gas samples are drawn through the screen section and collected at the ground surface. The SDDW assembly is then retrieved from the subsurface for further use. The expendable drive point is left behind after retrieval of the assembly. Decontamination of the retractable screen sampler assembly is necessary before reuse.

4.3-2.1.3 Dual Tube or Cased System with Permanent Sampling Assembly

A dual tube or cased system SDDW installed as a permanent groundwater sampling assembly is a more recent advancement in small diameter well technology. Wells installed using this technique are driven to the desired sampling depth but well completion involves using conventional monitoring well methods including the addition of grout and sand (see Figure 3.2-16-"Schematic of Dual Tube System with Permanent Sampling Assembly").

Components of the drive casing with permanent sampling assembly include:

- Dual Tube Drive Casing
- Expendable Tip
- Prepacked Screen Sections
- PVC Riser
- Bentonite Seal
- Protective Well Cover

The objective of this procedure is to install a permanent small diameter groundwater monitoring well that can be used to collect water quality samples, conduct hydrologic and pressure measurements, or perform any other sampling event that does not require large amounts of water at any given time.

To install a permanent sampling assembly SDDW, the drive casing and expendable tip is advanced to a desired depth. Once the drive casing is set at depth, the prepacked screens are lowered through the drive casing as additional PVC riser is added to the well assembly. The prepacked screens are attached to an expendable anchor point by a locking connector threaded to the bottom of the prepacked screens. When the prepacked screens are locked into the anchor point the drive rods are retracted. As the rods are retracted above the screens, either the natural formation collapses or a fine-grain sand is introduced to form a barrier above the prepacked screens. This sand or natural formation barrier prevents bentonite grout from penetrating into the screened interval. Granular bentonite or a bentonite slurry is then installed in the annular space to form a well seal. A protective well cover is then installed at the ground surface to complete the SDDW permanent sampling assembly.

4.3-2.1.4 SDDW Soil Sampler

The SDDW Soil Sampler is used to obtain discrete, stratigraphic soil samples. Components of a SDDW Soil sampler include:

- Drive Casing
- Extension Rod
- Piston Rod
- Sampler Tube, Sampler Sleeve, or Sampler Barrel
- Cutting Shoe
- Drive Point

The SDDW Soil Sampler is driven to a point above the desired sample depth. Extension rods are inserted within the drive casing to engage the piston rod by unlocking a retaining pin. The sample barrel is driven into the undisturbed soil beneath the drive point and the soil sample is retrieved from the borehole (see Figure 3.2-17-"Schematic of SDDW Soil Sampler").

(4.3-3 through 4.3-4: See Standard References for Monitoring Wells, January 1991)

4.3-5 Seals

(4.3-5.1: See Standard References for Monitoring Wells, January 1991)

4.3-5.2 Types of Well Seals

(4.3-5.2.1 through 4.3-5.2.2: See Standard References for Monitoring Wells, January 1991)

4.3-5.2.3 Surface Seals

4.3-5.2.3.1 Surface Seals for SDDWs (New Section)

Above-ground and flush-mounted casing constructions should be sealed at the surface to prevent surface water from entering the SDDW and to prevent short-circuiting of air in soil gas sampling applications.

In general, sealing of the SDDW involves hand grading of the area to eliminate collection of standing water around the SDDW. Bentonite or concrete seals are installed in an excavation around the base of above-ground stickup or roadbox. The surface of the seal should be contoured to divert surface water runoff away from the SDDW. Care should be taken to avoid inadvertent spillage of seal material into the SDDW during installation. A surface seal is not required if the SDDW is fitted with a locking cap.

(4.3-5.3 through 4.3-5.3.2(c): See Standard References for Monitoring Wells, January 1991)

4.3-6 Protective Casing and Surface Seal (Revised)

4.3-6.1 General Considerations

The purpose of a protective well casing is to provide a water-tight, tamper-resistant sleeve around the monitoring well to protect it from accidental damage, infiltration, and vandalism. Protective well casings are generally constructed of steel or cast iron and have a locking cap. The two basic types of protective casings used in monitoring well installations are the above-ground casing and the flush-mount casing or road box. For information on selection of the appropriate protective casing see Section 4.2-7 Selection of Well Materials - Protective Casings in Standard References for Monitoring Wells, 1991.

Important elements in the installation of a protective casing are the inside diameter of the protective casing, the depth of the pro tective casing, and the installation of a concrete surface seal.

Permanent SDDWs are also completed with above-ground and road-box protective casings, similar to conventional monitoring wells. For some steel SDDWs, the well casing may be used as the protective casing, provided a locking cap is present. For other SDDW installations, the inside diameter of the protective casing should be sufficiently large to permit easy access to the SDDW and removal of any caps or plugs.

(4.3-6.1.1 through 4.3-7.7: See Standard References for Monitoring Wells, January 1991)

SECTION 4.4 AS-BUILT NOTES AND RECORDS

4.4-1 Purpose

The purpose of an As-built record is to compile permanent information about the actual location and construction of a specific monitoring well, including the subsurface geology at the well location. There are several reasons for compiling such information:

- To ensure that the minimum construction standards have been met, and that the installation is suitable for the site conditions.
- To provide a historical database of information on existing monitoring wells, subsurface materials, and water quality.
- To enable others to assess the integrity of the well installation so as to be able to evaluate the validity of the environmental data obtained from the well.
- To meet the requirements for well drillers by Massachusetts General Law Chapter 21 Section 16 and the Department of Environmental Management regulations 313 CMR 3.00.

(4.4-2 through 4.4-3: See Standard References for Monitoring Wells, January 1991)

4.4-4 Small Diameter Driven Well Completion Report Information (New Section)

For the installation of any SDDW, a report documenting the completion and results should be prepared. At a minimum, the following information is recommended:

(1) Project name and Client;
(2) Site/well location description;
(3) Well/boring number;
(4) Drilling contractor and equipment;
(5) Site supervisor/geologist;
(6) Drilling method, SDDW development equipment, and sampler description;
(7) Total depth and water table depth;
(8) Start date and finish date;
(9) Screen and riser type, length, depth, and SDDW diameter;
(10) Soil classification (Section 3.5) or sample description, if appropriate;
(11) Field testing results; and
(12) SDDW abandonment description, if appropriate.
(13) Advancement rate (ft/min)
(14) Well development

A separate form should be completed for each SDDW installation or application. Examples of well completion reports and as-built forms can be found at the end of Section 4.4 in Standard References for Monitoring Wells, January 1991.

Readers should note that the Department of Environmental Management (DEM) revised regulations on "Registration of Well Drillers and Filing of Well Completion Reports" (313 CMR 3.00) in May of 1997. The new regulations have several requirements related to the installation of nonproductive (i.e.

monitoring wells) including the completion and filing of "Well Completion Report Forms" (see Figure 4.4-1). A copy of the DEM "Manual on Well Driller Registration and Filing of Monitoring Well Completion Reports" can be found in the Appendix of this Supplement.

Department of Environmental Management/Division of Water Resources

WELL COMPLETION REPORT

WELL LOCATION

Address _____

City/Town _____

Well owner _____

Address _____

Board of Health permit obtained: yes ☐ no ☐

GEOGRAPHIC DESCRIPTION

_____ (feet) N S E W of (circle)

_____ (road)

_____ (mi. in tenths) N S E W of (circle)

intersect. w/ _____ (road)

WELL USE

Domestic ☐ Public ☐ Industrial ☐

Monitoring ☐ Other _____

Method drilled _____

Date drilled _____

CASING

Type _____

Length _____ ft. Dia(I.D.) _____ in.

Length into bedrock _____ ft.

Protective well seal:

Grout ☐ Other _____

WELL DATA

Total well depth _____ ft.

Depth to bedrock _____ ft.

Water-bearing rock/unconsolidated material:

Description _____

Water-bearing zones:

1) From _____ To _____

2) From _____ To _____

3) From _____ To _____

Gravel pack well: dia. _____

dia. _____

Screen:

Slot# _____ length _____ from _____ to _____

STATIC WATER LEVEL (all wells)

Static water level below land surface _____ ft. Date _____

WELL TEST (production wells)

Drawdown _____ ft. after pumping _____ hr. _____ min. at _____ gpm

How measured _____ Recovery _____ ft. after _____ hr. _____ min.

LOG of FORMATIONS

Materials	From	To

COMMENTS

Driller _____

Firm _____

Address _____

City/Town _____

Supervising Driller Reg.# _____

Signature of supervising registered well driller

Office use only

Please print firmly

DRILLER COPY

Signature of supervising registered well driller

Office use only

Please print firmly

BOARD OF HEALTH COPY

Signature of supervising registered well driller

Office use only

Please print firmly

STATE COPY

Figure 4.4-1

Well Completion Report Form.

Source: MA Department of Environmental Management

SECTION 4.5 WELL DEVELOPMENT (Revised)

4.5-1 Purpose

Well development is a necessary step in the completion of most groundwater monitoring well installations. Development of a monitoring well helps to remove sediment and enhance the hydraulic connection between the well and the aquifer. Regardless of which conventional well installation method is used, all cause some alteration or rearrangement of the fill or natural soil or rock material in which the well screen is installed. Such alteration or rearrangement is minimal when Small Diameter Driven Well (SDDW) techniques are used. Since monitoring wells are installed to collect physical and chemical data indicative of in-situ aquifer conditions, the methods of drilling and installing wells should minimize the disturbance of aquifer materials which adversely impact the quality of the data collected. Wells not intended for sampling, such as piezometers and observation wells, may not require development.

The objective of well development is to enhance the hydraulic connection between the well screen and the natural formation or fill by removing fine soil materials or drill cuttings and subsequently rearranging the natural or artificial sand filter pack around the well. Well development may increase the hydraulic conductivity in the vicinity of the well screen. This should be considered when in-situ hydraulic conductivity tests are planned. Appropriate mechanical rearrangement of the sand or gravel pack (i.e. development) will allow the groundwater to move through the sand pack more easily and reduce the amount of fines that enter the well. Since groundwater in most New England aquifers travels at velocities too low to retain suspended material, any turbidity associated with monitoring wells is likely to be an artifact of the well installation process. Well development can reduce this turbidity and, therefore, reduce the chance of chemical alteration of groundwater samples caused by suspended sediments. In addition, it can remove fluids introduced during drilling or installation. In this discussion, well development involves preparation of the well for collection of hydrologic and chemical data. If samples are collected for chemical analysis, the well must be purged prior to sample collection (See Section 6.0 Sampling of Monitoring Wells in Standard References for Monitoring Wells, January 1991).

In this discussion, well development involves preparation of the well for collection of hydrologic and chemical data. In order to obtain hydrologic and chemical data that is representative of the aquifer, the hydrologic conditions in the vicinity of the well screen should be restored to their natural state as much as possible. If samples are collected for chemical analysis, the well must be purged prior to sample collection (See Section 6.0 Sampling of Monitoring Wells in Standard References for Monitoring Wells, January 1991).

Use of development methods that introduce additional water into the formation or that cause significant alteration of the natural materials in the vicinity of the screen may be undesirable for some groundwater monitoring applications. If additional water is introduced during development to flush the screen, this volume of water must be removed as part of the development process and may require storage and disposal as a hazardous waste.

The purposes of well development are:

- to reduce the amount of fine grained material entering the well from the surrounding formation; and

- to improve the hydraulic connection between the well and surrounding formation

The following section on well development methodology will specifically address the development techniques for SDDWs. Aquifer conditions and constraints, especially permeability and depth to water table, will dictate the specific applicability of any of these methods. It is expected that variations and combinations of these methods will probably be required at some sites. It should be noted that all equipment placed in a monitoring well for development, purging or sampling should be decontaminated. Decontamination methods are presented in Section 3.3 and Section 6.5 of Standard References for Monitoring Wells, January 1991.

4.5-2 Methodology

SDDWs can use many of the same well development techniques that conventional monitoring wells use. However, SDDWs are usually designed and installed to obtain samples of formation groundwater without introducing fluids during drilling or disturbing subsurface conditions. These sampling points usually require minimal development. As with conventional wells, the primary reasons to develop a SDDW are to remove fine grained sediments and increase water flow. The well development methods usually employed for SDDW development include:

- Over-pumping
- Mechanical surging
- Water jetting
- Purging

Bailing is a technique that is not recommended for well development because it is slow and ineffective in adequately removing suspended sediment. Bailing is generally used for groundwater sampling and often for purging wells prior to sampling.

4.5-2.1 Over-pumping (Revised)

Over-pumping a well involves pumping at a rate faster than the well would normally be pumped or purged for sample collection. This is one of the easiest and most common methods of well development.

Over-pumping increases the hydraulic gradient near the well by drawing the water level down. The steepened hydraulic gradient increases the velocity of the groundwater moving through the screen into the well. The increased velocity entrains fines into the well and clears the screen of this material. Care must be taken not to introduce air into the formation around the screen during development.

Over-pumping is best suited to aquifers comprised of sands and gravels with shallow water tables. The suction line, pump or check valve is lowered into the well and water is removed. If the permeability of the formation is sufficiently high, repositioning of the intake line within the screen may pull material into the well.

Typical problems encountered using this method are the lack of pumping devices that will fit within smaller diameter (less than 2") monitoring wells and produce satisfactory pumping rates. Above-ground peristaltic or centrifugal pumps are effective when the water level is less than 25 feet from the ground

surface. If the groundwater contains hazardous constituents, pumping large volumes of contaminated water may pose disposal problems.

4.5-2.1.1 Advantages and Disadvantages

(a) Advantages

- Useful in wells with shallow water-levels (less than 25 feet deep) where a suction line can be used.
- Relatively simple procedure.

(b) Disadvantages

- If the permeability is quite high or quite variable, only a section of the screened zone may actually be developed. This is especially true of wells with long screens.
- Over-pumping may compact fine sediments in the formation around the well screen, restricting groundwater flow into the screen.
- Over-pumping may produce a large volume of contaminated water that must be disposed of as a hazardous waste.

(4.5-2.2: See Standard References for Monitoring Wells, January 1991)

4.5-2.3 Mechanical Surging

Another method which can be used to develop SDDWs is surging. This technique employs a tool called a surge block. This device forces water in the well through the well screen and out into the formation, and then pulls the water back through the screen into the well along with fine soil or rock particles. A typical surge block construction detail and application can be found in Figures 4.5-1 and 4.5-2 in Standard References for Monitoring Wells, January 1991.

The surge block is typically attached to a drill rod, drill stem, or line that has sufficient weight to allow the surge block to rapidly drop through the water column. The surging action should start at a slow pace, near the water level within the well and progress to a faster pace near the well screen. Surging action can be carried out within the well screen if adequate measures are taken to clean out accumulated silt or material prior to surging. Otherwise, the fines may be forced out through the well screen into the surrounding formation. Accumulated material may also bind or lock the surge block in place if precleaning is not performed. Periodic bailing or pumping of the soil or rock particles is necessary regardless of the location of the surging within the well.

A typical surge block has a small clearance between the flexible leather or rubber discs and the inside of the well casing. Violent or too rapid surging in a well situated in a low permeability formation may damage the well. Variations in surge block construction involve the addition of flap valves to allow some water and silts to pass through the block rather than between the block and wall of the well. Additionally, check valves can be added to the surge block to allow removal of development water and associated silts. After surging, additional development can be performed, if desired, using the

rawhiding or backflushing technique described in Section 4.5-2.2 in Standard References for Monitoring Well, 1991.

4.5-2.3.1 Advantages and Disadvantages

(a) Advantages

- Gentle surging combined with gentle pumping through the center of the surge block has been very successful for development in formation containing a considerable amount of fine material.
- Inexpensive and relatively simple tool.
- Effective in wells installed in highly permeable homogenous formations.
- Does not require the addition or withdrawal of substantial volumes of discharge water except for flushing.

(b) Disadvantages

- Vigorous surging may damage non-metallic well screens.
- May cause the formation around the screen to become clogged by pushing fines back into the formation, reducing flow into the well.
- If the surge block fits the well too tightly it can damage the well screen.
- May remove sufficient formation material outside and above the well screen causing the seal to collapse, resulting in infiltration of overlying aquifer material.

(4.5-2.4: See Standard References for Monitoring Wells, January 1991)

4.5-2.5 Water Jetting

High velocity water jetting is a rarely used but effective technique for development of conventional monitoring wells and, in even rarer instances, Small Diameter Driven Wells. Jetting consists of the discharge around the well screen of horizontal jets of water under high pressure. The water jets act to dislodge soil particles near the well screen and break up any dense soil resulting from installation. Unless removed, this layer can alter the natural permeability of the aquifer. In order to be effective in developing the well, water jetting must be accompanied by pumping to remove the fines. This development method should be used with caution to avoid damaging the screen or developing voids in the filter pack surrounding the screen.

4.5-2.5.1 Advantages and Disadvantages

(a) Advantages

- Effective in highly stratified, unconsolidated formations.
- Entire section of screened zone can be developed.

(b) Disadvantages

- Introduces water into the formation.
- Requires equipment which may not fit SDDWs.
- More time consuming than other methods.

4.5-2.6 Purging (New Section)

In addition to well development, which is typically conducted at the time of installation, SDDWs are purged immediately prior to obtaining groundwater samples. Purging is the process of removing water from within the SDDW and from the aquifer around the SDDW. Well purging is typically conducted using sample collection tools such as check valves and peristaltic or centrifugal pumps. Purging assures that the water to be sampled is a true representation of current conditions of the local groundwater. This is important since groundwater at the sampling site may not be representative of the overall groundwater due to variable environmental conditions, such as oxidation/reduction near the well, which may differ from conditions in the surrounding water-bearing formation.

As with conventional monitoring wells, the length of time required to adequately purge the SDDW is dependent on many factors including the characteristics of the SDDW, hydrogeologic nature of the aquifer, type of sampling equipment used, and parameters being sampled. It is recommended that the SDDW be purged until the groundwater has cleared of most fine sediment or at least 3 well volumes have been removed.

4.5-2.6.1 Advantages and Disadvantages

Advantages

- Ensures samples are representative of groundwater at the sampling site.

Disadvantages

- Requires additional time during sampling.
- Creates purge water which may require handling as a hazardous waste.

SECTION 4.6 DECOMMISSIONING OF MONITORING WELLS (Revised)

4.6-1 Purpose

Any monitoring well that is no longer in use or that is unfit for its intended purposes should be decommissioned. Plugging the well and surface restoration are the central features of the decommissioning process. For conventional monitoring wells, plugging consists of constructing a low permeability cylinder or plug within that portion of the subsurface occupied by the well and its annulus, including both the uncased portion of bedrock well and the cased portion. For Small Diameter Driven Wells (SDDWs), bentonite grout pumped into the drive rods will provide an adequate plug. Surface restoration consists of the removal of the upper three to four feet of the well and backfilling the area with an effective seal. An abandoned monitoring well is defined in Standard References for Monitoring Wells, January 1991 (SR) as "a well whose use has been permanently discontinued;" as used in this Supplement it includes any Small Diameter Driven Well that is no longer suitable or needed for its original intended purpose such as for water-level measurements, water quality sampling, soil sampling or soil gas sampling.

Proper plugging of such wells will:

- Eliminate physical hazards
- Prevent groundwater contamination
- Conserve the yield and hydrostatic head of confined aquifers
- Prevent the intermingling of potable and non-potable groundwater, and,
- Prevent the migration of contamination through a confining layer separating aquifers.

It should be noted that the objective in Massachusetts differs markedly from the goal established by the American Water Works Association and the statutes, regulations, or guidelines of most other states. Many documents contain the following language: "The basic concept of proper sealing of abandoned wells is restoration, as far as feasible, of the controlling hydrogeological conditions that existed before the well was drilled and constructed. If this restoration can be accomplished, all the objectives of plugging wells will be adequately fulfilled." To accomplish this goal some states have suggested the placement of sand and gravel opposite the more permeable subsurface zones and clay opposite the less permeable zones. While that goal is an admirable one, it is also one which, in DEP's opinion, may be unattainable in practice. In order to meet the objectives of proper decommissioning, DEP has tried to develop a simple, workable approach that will solve the existing and potential problems from unsafe abandoned wells.

Some examples of the types of unsafe wells that may cause problems include:

- Buried uncapped wells: contaminants may enter the well through the buried top of the casing, travel down the well casing, and enter the aquifer through the well screen and wall of the annulus;
- Wells with cracked or corroded casing: surface water may enter the well;

- Improperly constructed wells: an unsealed or improperly sealed annular space around the outside of a well casing or between an inner and outer casing may serve as a channel for surface water to migrate into an aquifer and/or groundwater may be transferred from one aquifer to another;

- Open hole wells in bedrock: may serve to interconnect aquifers in different formations;

- Unplugged abandoned flowing artesian wells: this can result in loss of water, reduction of regional artesian head and localized surface flooding; and

- Uncovered and unplugged abandoned wells with large inside diameter: these may represent a physical hazard to human beings and animals, as well as a disposal receptacle for contaminants, waste and debris.

(4.6-2: See Standard References for Monitoring Wells, January 1991)

4.6-3 Plugging the Well

(4.6-3.1 through 4.6-3.3: See Standard References for Monitoring Wells, January 1991)

4.6-3.4 Decommissioning Small Diameter Driven Wells (New Section)

Small Diameter Driven Wells can be decommissioned by extracting the casing material or, if feasible, by in-place abandonment. If the SDDW needs to be extracted, extra care should be taken to ensure that the remaining hole is completely filled and sealed with grout. Plastic tubing may be used to pump grout into the hole as the SDDW is removed.

If the SDDW is to be abandoned in-place, grout should be pumped into the drive rod or casing material to plug it. As with conventional well decommissioning, if the SDDW is removed, care must be taken to reduce the possibility of borehole collapse, voids, and contaminant migration through a preferential pathway.

Abandonment of SDDWs should be conducted using general protocols outlined for conventional monitoring wells presented in Sections 4.6-2.1 through 4.6-3.3 in Standard References for Monitoring Wells, January 1991.

SECTION 6.2 SAMPLING TECHNIQUES (Revised)

(6.2-1 through 6.2-3.4: See Standard References for Monitoring Wells, January 1991)

6.2-3.5 Sampling Techniques for SDDWs (New Section)

6.2-3.5.1 Groundwater Sampling Methods and Equipment

Groundwater samples can be collected at any desired depth in the aquifer through the screened interval of the SDDW as it is being advanced or withdrawn. SDDWs should be purged prior to sampling to reduce turbidity and obtain more representative samples of groundwater. SDDWs advanced to obtain samples at increasingly greater depths should be purged between sampling intervals to remove stagnant water in the well.

There are generally two approaches used to obtain groundwater samples while advancing the SDDW (Figure 3.2-15). Groundwater samples can be obtained through slotted screen at the lead end of the SDDW or through a screened groundwater sampler with a retractable sleeve. Regardless of whether slotted screen or a screened retractable sleeve SDDWs are used, groundwater sampling can be accomplished using either a small diameter bailer, peristaltic pump, or an inertial pump system. Sampling with bailers and peristaltic pumps is discussed in Sections 6.2-3.1 and 6.2-3.3 of Standard References for Monitoring Wells, January 1991.

Inertial pump techniques use a check valve assembly attached to the bottom of a tubing section that is lowered through the water column (Figure 6.2-3.1 in Standard References for Monitoring Wells, January 1991). When the tubing is pushed in a downward motion, water is allowed to enter into the check valve, pushing the ball up and away from the bottom of the check valve. When the tubing is moved in an upward motion, the ball is forced to the bottom of the check valve where it forms a water tight seal. In higher yielding formations, an oscillating up and down motion can be used to pump groundwater and sustain flow at the surface. In subsurface soil with low permeability, the inertial sampler can also be used as a bailer and retrieved to the surface to obtain the sample. Some advantages and disadvantages of the inertial tubing system are listed below.

Advantages

- Tubing and check valve assemblies are commercially available in various material types for any size SDDW.
- Inertial sampler is easily assembled and used in the field.
- Inertial sampler may be dedicated and stored inside a permanent SDDW for subsequent reuse eliminating the need for decontamination.
- New or dedicated sampling equipment minimizes potential for cross-contamination.

Disadvantages

- Fine-grained sediment can clog the check valve assembly causing the ball to stick and reducing or eliminating flow.
- Not economically feasible to reuse tubing.
- In low yielding formations air can enter the tubing which may purge VOCs from groundwater.

6.2-3.5.2 Soil Sampling Methods and Equipment

For soil sampling applications, either an open tube or closed piston sampler is used at the lead end of the SDDW equipment. The open tube sampler is used in stable, compact or cohesive soils and the piston sampler is used in loose soil conditions.

To obtain an open tube soil sample, a SDDW drive point or preprobe is driven to desired sampling depth and subsequently withdrawn. The drive point is removed and the open tube sampling device is attached to the drive rods. The drive rods are then reinserted into the existing hole to obtain a soil sample. Open tube sampling devices are typically used in compact soil which can be retained within the tube. Excessive penetration of the sampler under the weight of the rods may occur in very soft or loose materials and prevent accurate measurement of penetration depth. Excessive penetration may also disturb underlying material. Sample loss is possible upon retraction of the sample tube.

Advantages

- Simple to use.
- Commonly available.
- Easy to decontaminate sampler.
- Short amount of time required for sampling.

Disadvantages

- Disturbed and intermixed soil materials from the bottom and sides of the borehole may enter the tube as it is lowered into position.
- Total or partial sample recovery is difficult without a supplemental retention system. Catchers are available for some samplers.
- Hydrostatic pressure may disturb the sample during penetration and interfere with collection of a complete sample.

A closed piston sampler is typically used in areas where the subsurface soils are unstable and may collapse as the probe is withdrawn. The closed piston sampler is designed so that the piston tip of the sampler fits into the drive shoe of the SDDW equipment. The drive point or preprobe is driven to depth immediately above the desired sampling interval and then withdrawn. An open hole remains after withdrawal and the closed piston sampler is reinserted. Extension rods are inserted down the drive rods or casing to unlock the piston tip and lift it to the upper portion of the piston sampler. The sample barrel is then driven deeper into the soil while the piston point remains stationary.

The tight seal on the piston creates a vacuum which aids in sample retention (see Figure 3.2-17).

Advantages

- Sample device is sealed during installation preventing contaminated soil and water from entering and corrupting analytical results.
- Reduced potential for sample disturbance in comparison to open tube sampling.
- Improved sample recovery in unstable soils.
- Application commonly available.

Disadvantages

- More mechanically complex than open tube sampling.
- Piston requires maintenance of o-rings or leaks may result.
- Requires more time to sample than open tube sampling.
- More parts to decontaminate.

6.2-3.5.3 Soil Gas Sampling Methods and Equipment

SDDWs can be used for obtaining soil gas samples by advancing the SDDW into the vadose zone below the ground surface. Soil gas samples are obtained by creating an air-tight surface seal around the SDDW and applying a negative pressure or vacuum to promote movement of soil gas to the ground surface for sample collection. Four of the more common soil gas sampling methodologies are illustrated in Figure 3.2-18. These soil gas sampling tools include: an exposed screen sampler, an expendable tip sampler, a retractable tip sampler and a packer or cased system.

When taking soil gas samples, the use of probe tips with a larger diameter than the SDDW rods is discouraged. Larger tips may increase the likelihood of "short circuiting," the mixing of surface air with the contaminated atmosphere, which could dilute soil gas contaminant concentrations.

6.2-3.5.3.1 Exposed Screen Samplers

The exposed screen sampler is the simplest form of soil gas sampling equipment. It consists of a drive point, a slotted intake assembly and drive rods. The drive point is attached to the lead end of the slotted intake assembly which is in turn connected to a series of drive rods. The device is driven to the desired sampling depth and a soil gas sample is collected through the slotted intake ports using negative pressure. The slotted intake ports allow the passage of soil gas into the drive rods for sample collection at the ground surface.

Advantages

- Allows rapid sampling of multiple intervals.
- Minimal equipment required.

Disadvantages

- Screen is exposed to contaminants as SDDW is advanced into the subsurface.
- Screen may become smeared or clogged with fine grain soil during advancement.
- Decontamination is required after each use.
- Soil gas may be collected from intervals other than the targeted zone if the rod joints are not air-tight.
- Extraction of rods using a retrieval jack can be difficult and time consuming.

6.2-3.5.3.2 Expendable Tip Samplers

Expendable tip samplers use a steel or aluminum tip that is held in place by a tip holder as the soil gas assembly is advanced. Flexible tubing for sample collection runs the entire length of the drive rods and is attached to the tip. Slotted intake ports are found at the base of the tip. The assembly is driven into the ground until the desired sampling depth is reached. The drive rods are then retracted and the tip is separated from the tip holder, exposing the soil interval for sampling. Soil gas is drawn in through slotted intake ports at the base of the drive point and up through the flexible tubing. The tubing is typically 3/16-inch O.D. and is made of polyethylene, silicon or Teflon.

If long-term monitoring is required, the well should be completed using conventional techniques. Specifically, a permeable packing material such as silica sand or glass beads is recommended to be set in the annular space around the intake ports of the expendable tip. A bentonite seal is set above the packing material to eliminate the potential for drawing air from intervals other than the targeted zone. The remaining annular space around the flexible tubing should be backfilled and compacted with native soil. A surface seal is also necessary for long-term monitoring.

Advantages

- Screened intake ports are protected while probe assembly is advanced, eliminating the potential for soil clogging.
- When properly completed the likelihood of drawing air from areas other than the targeted interval is minimal.
- Purging volume and sampling time are reduced.

Disadvantages

- More equipment required.
- More expensive.
- More time consuming.

6.2-3.5.3.3 Retractable Tip Samplers

Retractable tip samplers are similar to expendable tip samplers except that the tip is attached to a screen which is held in the tip holder during advancement. As with the expendable tip sampler, the retractable sampler is advanced to the desired depth and the drive rod is retracted to expose the screen. Unlike the expendable tip assembly, soil gas samples are collected directly though the drive rods when a vacuum is applied. When sample collection is completed, the tip is retrieved along with the drive rods.

Advantages

- Retractable screen sampler is not exposed to soil during advancement, eliminating potential for soil clogging.
- Easy sampling of sequential intervals.

Disadvantages

- Does not allow grouting of borehole during retraction.

6.2-3.5.3.4 Cased Samplers

Cased sampling devices for SDDWs are seldom used in Massachusetts. Cased samplers use an inflatable packing device to establish an air-tight seal within the well casing. The SDDW is driven to depth and the packing device is lowered into the casing for soil gas sampling. Flexible tubing runs down the casing, next to the inflatable packer, and protrudes past the end of the packing device. Soil gas samples are collected through the flexible tubing using a vacuum.

Advantages

- Results in less compaction of the soils
- Enables multiple level sampling

Disadvantages

- Slower than exposed rod SDDW soil gas samplers.

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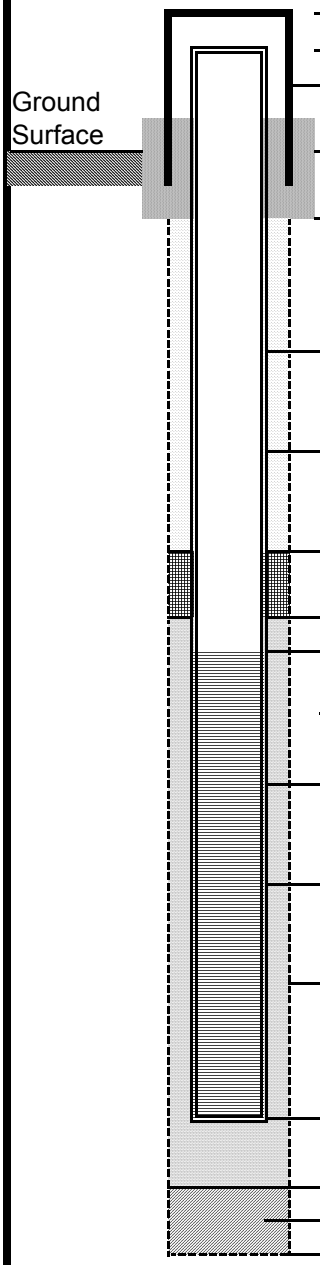
APPENDIX 6

Monitoring Well Completion Record

MONITORING WELL LOG

MW-

PROJECT NAME		LOCATION	
PROJECT NO.		STARTED/FINISHED	
CONTRACTOR		DRILLER	
INSPECTOR		BORING	
CHECKED BY		DATE	



Casing stickup	
Riser pipe stickup	
Casing type and diameter	
Type of surface seal	
Depth to bottom of seal from ground surface	
Type of backfill	
Type of riser and diameter	
Depth to top of bentonite chip seal	
Depth to top of filter pack	
Depth to top of screen	
Type of screen and diameter	
Slot size	
Type of filter pack	
Depth to bottom of well	
Depth to bottom of filter pack	
Type of backfill	
Depth to bottom of boring	

APPENDIX 7

Site-Specific Health and Safety Plan

HEALTH AND SAFETY PLAN FORM **Capaccio Environmental Engineering, Inc.**

PROJECT DOCUMENT #:

PROJECT NAME Site Investigation

PROJECT # 00-046.078

JOBSITE ADDRESS 34 Maple Street and 5 Technology Drive
Milford, MA

CLIENT Waters Corporation

CLIENT CONTACT Roger Eydenburg

CLIENT CONTACT PHONE # 508-482-3078

( ) AMENDMENT TO EXISTING APPROVED H&SP?

( ) DATE EXISTING APPROVED H&SP _____

OBJECTIVES OF FIELD WORK:

Drill soil borings, collect soil samples and install several monitoring wells

TYPE: *Check as many as applicable*

Active	(X)	Landfill	( )	Unknown	( )
Inactive	( )	Uncontrolled	( )	Military	( )
Secure	( )	Industrial	( )	Other (specify) vacant resident	
Unsecure	(X)	Recovery	( )	Commercial	(X)
Enclosed space	( )	Well Field	( )		

DESCRIPTION AND FEATURES: *Include principal operations and unusual features (containers, buildings, dikes, power lines, hills, slopes, rivers,etc.)*

Operating Facility Parking Lot on 34 Maple Street. Access road pavement at 5 Technology Drive.

SURROUNDING POPULATION: ( ) Residential (X) Industrial ( ) Rural ( ) Urban OTHER:

THIS PAGE RESERVED FOR MAP *(Show Exclusion, Contamination Reduction, and Support Zones. Indicate evacuation and reassembly points.)*

EXLCUSION ZONE: 10 FOOT RADIUS AROUND EACH DRILLING LOCATION.

CONTAMINANT REDUCTION ZONE: NONE.

SUPPORT ZONE: AREA OUTSIDE OF EXCLUSION ZONE.

HEALTH AND SAFETY PLAN FORM **Capaccio Environmental Engineering, Inc.**

HISTORY: *Summarize below. Nature of site and include complaints from public, previous agency actions, known exposures or injuries, etc.*

There are no known releases at the property. Subsurface investigation is to be performed to evaluate if a release condition exists.

WASTE TYPES: (X) Liquid (X) Solid ( ) Sludge ( ) Gas ( ) Unknown ( ) Other, specify:

WASTE CHARACTERISTICS: *Check as many as applicable.*

( ) Corrosive ( ) Flammable ( ) Radioactive

( ) Toxic (X) Volatile ( ) Reactive

( ) Inert Gas ( ) Unknown ( ) Other, specify:

WORK ZONES: *Describe the Exclusion, Contamination Reduction, and Support Zone in terms on-site personnel will recognize*

Exclusion Zone = 10 foot radius around bore hole.
Support Zone = area outside exclusion zone.
Contaminant Reduction Zone = none.

HAZARDS OF CONCERN:

( ) Heat Stress *attach guidelines*
( ) Cold Stress *attach guidelines*
( ) Explosive/Flammable
( ) Oxygen Deficient
( ) Radiological
( ) Biological
( ) Other - specify

(X) Noise
( ) Inorganic Chemicals
(X) Organic Chemicals
(X) Motorized Traffic
(X) Heavy Machinery
(X) Slips, Trips, & Falls

FACILITY'S DISPOSAL METHODS: *Summarize below.*

Dumpsters

HEALTH AND SAFETY PLAN FORM **Capaccio Environmental Engineering, Inc.**

HAZARDOUS MATERIAL SUMMARY: *Circle waste type and estimate amounts by category.*

CHEMICALS: *Amount/Units:*	**SOLIDS:** *Amount/Units:*	**SLUDGES:** *Amount/Units:*	**SOLVENTS:** *Amount/Units:*	**OILS:** *Amount/Units:*	**OTHER:** *Amount/Units:*
Acids	Flyash	Paints	Halogenated (chloro, bromo) Solvents	Oily Wastes	Laboratory
Pickling Liquors	Milling/Mine Tailings	Pigments		Gasoline	Pharmaceutical
Caustics	Asbestos	Metals Sludges	Hydrocarbons	Diesel Oil	Hospital
Pesticides					
Dyes/Inks	Ferrous Smelter	POTW Sludge	Alcohols	Lubricants	Radiological
Cyanides	Non-Ferrous Smelter	Aluminum	Ketones	PCBs	Municipal
Phenols					
Halogens	Metals	Distillation Bottoms	Esters	Polynuclear Aromatics	Construction
PCBs	Other *specify:*	Other *specify:*	Ethers	Other *specify:* No. 2	Munitions
Metals					
Dioxins			Other *specify:*		Other *specify:*
Other *specify:*					

OVERALL HAZARD EVALUATION: ( ) High ( ) Medium () Low (X) Unknown *(Where tasks have different hazards, evaluate each.)*

JUSTIFICATION:

FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

BACKGROUND REVIEW: (X) Complete () Incomplete

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION *(specify units and media)*	PEL/TLV *ppm or mg/m3 (specify)*	IDLH *ppm or mg/m3 (specify)*	WARNING CONCENTRATION *(in ppm)*	SYMPTOMS/EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL
Petroleum distillates	None	500 ppm	10,000 ppm	250 ppm	diz, drous, naus.	NA
Benzene	None	10 ppm	-	5 ppm	irr e/e/n; headache	9.25
Toluene	None	200 ppm	2000 ppm	100 ppm	diz, headache	8.82
Xylenes	None	100 ppm	1000 ppm	50 ppm	diz; irr e/e/n	8.56
Ethylbenzene	None	100 ppm	2000 ppm	50 ppm	diz; irr e/e/n	8.76
Acetone	None	1,000 ppm	2,500 ppm	500 pm	irr e/e/n; headache	9.69
Methanol	None	200 ppm	6,000 ppm	100 ppm	irr e/e/n; headache	10.6-11.7
Acetonitrile	None	40 ppm	500 ppm	20 ppm	irr e/e/n; headache	12.2
Methylene Chloride	None	25 ppm	2,300 ppm	12.5 ppm	irr e/e/n; headache	11.32
TCA	None	350 ppm	700 ppm	175 ppm	diz, headache, dizziness	11

NA = Not Available **NE = None Established** **U = Unknown**

S = Soil	SW = Surface Water	T = Tailings	W = Waste	TK = Tanks	SD = Sediment
A = Air	GW = Ground Water	SL = Sludge	D = Drums	L = Lagoons	OFF = Off-Site

HEALTH AND SAFETY PLAN FORM — **Capaccio Environmental Engineering, Inc.**

TASK DESCRIPTION/SPECIFIC TECHNIQUE/SITE LOCATION *(attach additional sheets as necessary)*	Type	Primary	Contingency	HAZARD & SCHEDULE
1 Drilling, soil sampling	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low
2	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low
3	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low
4	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low
5	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low
6	Intrusive / Non-intrusive	A B C D / Modified	A B C D / Exit Area	Hi Med Low

PERSONNEL AND RESPONSIBILITIES

NAME	FIRM	RESPONSIBILITIES	On Site?
Dawn Horter	Capaccio	Project Manager	1-2-3-4
Josh Fawson	Capaccio	Site Health & Safety Coordinator	1-2-3-4
	Technical Drilling Services	Driller	1-2-3-4
			1-2-3-4
			1-2-3-4
			1-2-3-4

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

LEVEL: A - B - C - D - Modified

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:
(X) Hard Hat:
( ) Other:

Boots: ( ) Not needed
(X) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
(X) Other: work clothes

Gloves: ( ) Not needed
(X) Undergloves:
( ) Gloves:
( ) Overgloves:
( ) Workgloves:

Other: specify below
( ) :

BLOCK B

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below

EXIT AREA***

BLOCK C

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below

BLOCK D

TASKS: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10

Respiratory: ( ) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed
( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:
( ) Hard Hat:
( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather
( ) Overboots:

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall
( ) Saranex Coverall
( ) Cloth Coverall:
( ) Other:

Gloves: ( ) Not needed
( ) Undergloves:
( ) Gloves:
( ) Overgloves:

Other: specify below

HEALTH AND SAFETY PLAN FORM **Capaccio Environmental Engineering, Inc.**

MONITORING EQUIPMENT: *Specify by task. Indicate type as necessary. Attach additional sheets if needed.*

INSTRUMENT	TASK	ACTION GUIDELINES		COMMENTS *(When and how will you use the monitor?)*
Combustible Gas Indicator	1-2-3-4-5-6-7-8	0-10% LEL 10-25% LEL >25% LEL 21.0% O2 <21.0% O2 <19.5% O2	*No explosion hazard* *Potential explosion hazard; notify SHSC* *Explosion hazard; interrupt task/evacuate* *Oxygen normal* *Oxygen deficient; notify SHSC* *Interrupt task/evacuate*	(X) Not Needed
Radiation Survey Meter	1-2-3-4-5-6-7-8	3 x Background: >2mR/hr:	*Notify HSM* *Establish REZ*	(X) Not Needed
Photoionization Detector _10.6__eV Lamp Type	1-2-3-4-5-6-7-8	*Specify:* Exit area when total VOCs in breathing zone equals or exceeds 5 ppm.		( ) Not Needed During drilling
Flame Ionization Detector Type	1-2-3-4-5-6-7-8	*Specify:*		(X) Not Needed
Detector Tubes/ Monitox Type_____ Type	1-2-3-4-5-6-7-8	*Specify:*		(X) Not Needed
Respirable Dust Monitor Type_____ Type	1-2-3-4-5-6-7-8	*Specify:*		(X) Not Needed
Other *Specify:*	1-2-3-4-5-6-7-8	*Specify:*		

HEALTH AND SAFETY PLAN FORM		Capaccio Environmental Engineering, Inc.
DECONTAMINATION PROCEDURES		
ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, AND SUPPORT ZONES		
Personnel Decontamination *Summarize below or attach diagram;* Gloves, paper towels, soap and water etc. ( ) Not Needed	**Sampling Equipment Decontamination** *Summarize below or attach diagram;* Dispose of sampling tubes in trash ( ) Not Needed	**Heavy Equipment Decontamination** *Summarize below or attach diagram;* Steam clean drilling equipment as necessary ( ) Not Needed
Containment and Disposal Method Dispose of in regular trash	**Containment and Disposal Method** Wash water can be discharged to ground	**Containment and Disposal Method** Wash water can be discharged to ground.

HEALTH AND SAFETY PLAN FORM	Capaccio Environmental Engineering, Inc.

CONTINGENCY PLANS: *Summarize below*

EXIT AREA IF TOTAL VOCs IN BREATHING ZONE EXCEEDS 5 PPM (ACTION LEVEL FOR BENZENE). CONTACT PROJECT MANAGER.

FOR FACILITY EVACUATIONS, STOP WORK AND EXIT SITE. MEET AT MAPLE STREET

EMERGENCY CONTACTS	NAME	PHONE
Project Manager	D, Horter	508 970 0033
Site Safety Coordinator	J. Fawson	508 970 0033
Client Contact	Roger Eydenburg	508-482-3078
Other *(specify)*		
Environmental Agency		
State Spill Number	DEP	888-304-1133
Fire Department	Milford	911
Police Department	Milford	911
State Police		
Health Department		
Poison Control Center		800 682 9211

MEDICAL EMERGENCY		PHONE
Hospital Name:	Milford Whitinsville Regional	508-473-6663
Hospital Address:	14 Propspect Street, Milford	
Name of Contact at Hospital:		
Name of 24-Hour Ambulance:		
Route to Hospital:	See Attached	

HEALTH AND SAFETY PLAN APPROVALS

Prepared by D. Horter Date 6/18/2012

Approved by Date

Distance to Hospital 4 miles

Attach map with route to hospital

HEALTH AND SAFETY PLAN SIGNATURE FORM

INSTRUCTIONS: Field personnel are required to receive a copy of the final health and safety plan (HSP), and to read, understand, and agree to the provisions of the plan. The Project Manager (PM) is responsible to distribute the HSP to personnel as they are assigned to the project. Personnel are required to sign this form indicating receipt of the HSP. The original of this form is maintained by the PM, and becomes part of the permanent project files.

SITE NAME: Waters Corporation

LOCATION: Milford, MA

I have received a copy, read, understood, and agree to comply with the provisions of the above referenced HSP for work activities on this project.

PRINTED NAME	SIGNATURE	DATE

bing Maps

A **34 Maple St, Milford, MA 01757**

B **14 Prospect St, Milford, MA**
Milford Whitinsville Regl Hosp (508) 473-6663

Route: **4.0 mi, 12 min**

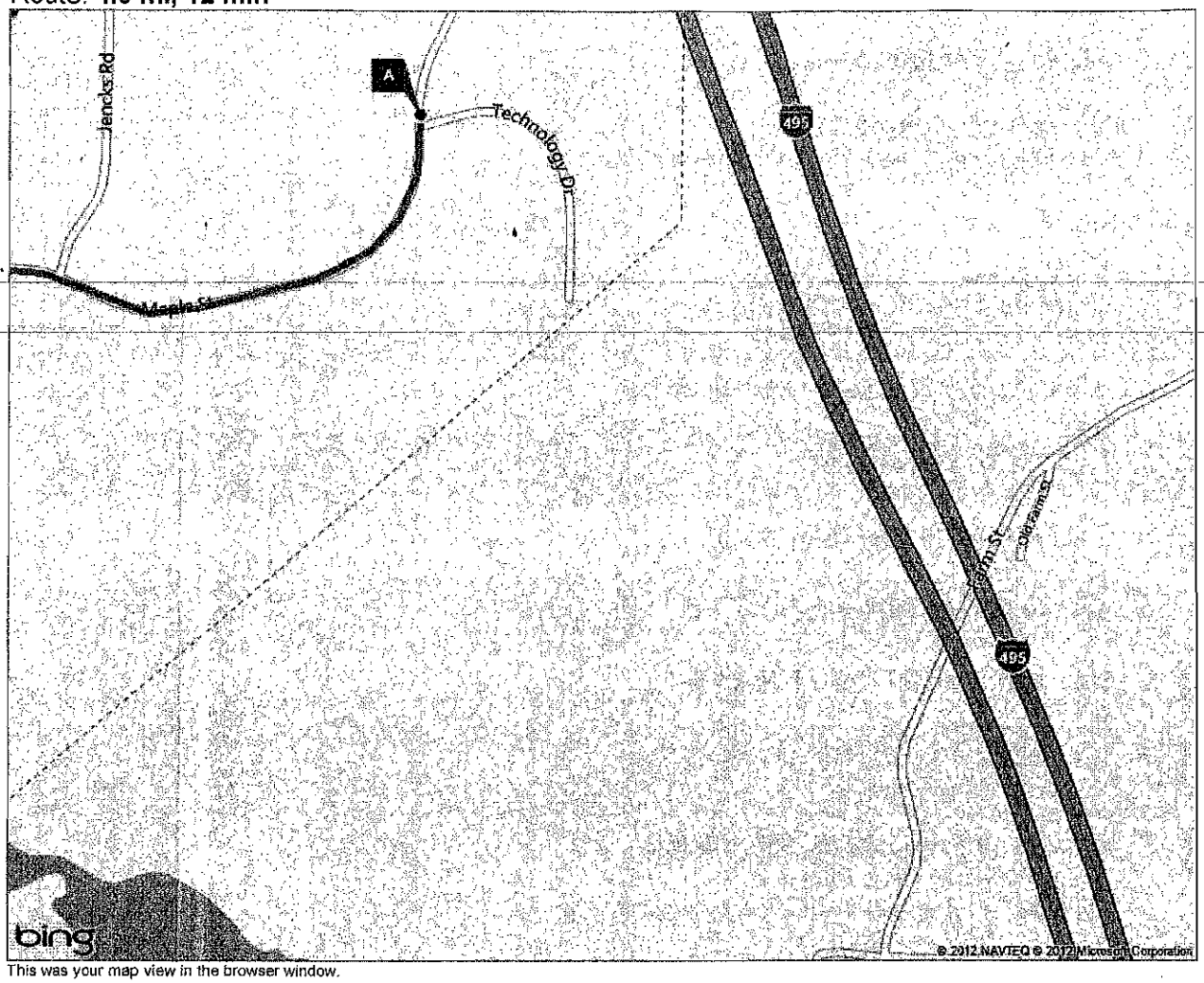
My Notes

On the go? Use **m.bing.com** to find maps, directions, businesses, and more

A	**34 Maple St, Milford, MA 01757**	**A–B: 4.0 mi** 12 min
	1. Depart **Maple St** toward Technology Dr	0.5 mi
	2. Turn **left** onto **Beaver St**	0.8 mi
	3. Road name changes to **Grove St**	0.2 mi
	4. Bear **right** onto **Mellen St**	0.7 mi
	5. Turn **right** onto **RT-140 / S Main St**	1.1 mi
	6. Keep **left** to stay on **RT-140 / Cape Rd** *McDonald's on the corner*	0.7 mi
B	7. Arrive at **14 Prospect St, Milford, MA** *The last intersection is Prospect Ct* *If you reach Prospect Heights, you've gone too far*	

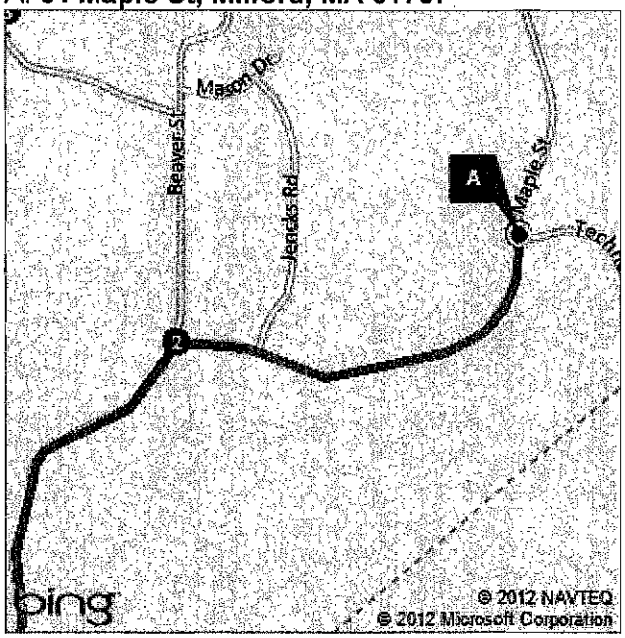
These directions are subject to the Microsoft®: Service Agreement and for informational purposes only. No guarantee is made regarding their completeness or accuracy. Construction projects, traffic, or other events may cause actual conditions to differ from these results. Map and traffic data © 2010 NAVTEQ™.

Route: **4.0 mi, 12 min**

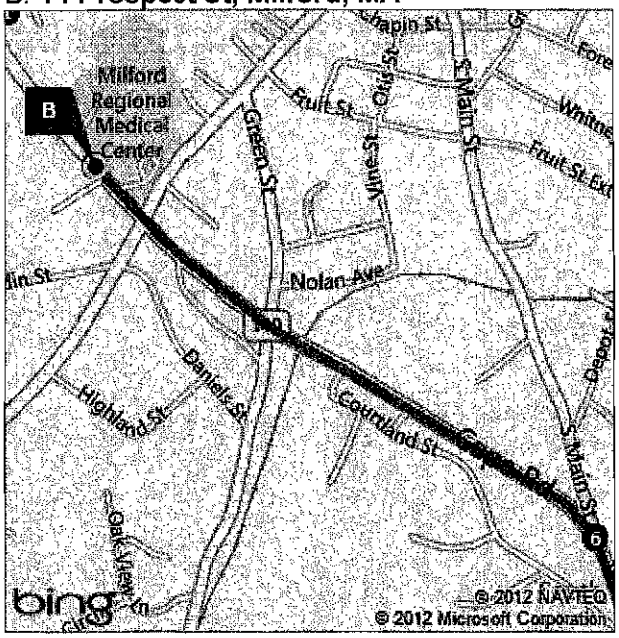


This was your map view in the browser window.

A: **34 Maple St, Milford, MA 01757**



B: **14 Prospect St, Milford, MA**



APPENDIX 8

Low Flow Groundwater Sampling Procedures

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION I

LOW STRESS (low flow) PURGING AND SAMPLING PROCEDURE FOR THE COLLECTION OF GROUNDWATER SAMPLES FROM MONITORING WELLS

Quality Assurance Unit
U.S. Environmental Protection Agency – Region 1
11 Technology Drive
North Chelmsford, MA 01863

The controlled version of this document is the electronic version viewed on-line only. If this is a printed copy of the document, it is an uncontrolled version and may or may not be the version currently in use.

This document contains direction developed solely to provide guidance to U.S. Environmental Protection Agency (EPA) personnel. EPA retains the discretion to adopt approaches that differ from these procedures on a case-by-case basis. The procedures set forth do not create any rights, substantive or procedural, enforceable at law by party to litigation with EPA or the United States.

Prepared by: Charles Porfert 1/19/10
(Charles Porfert, Quality Assurance Unit) Date

Approved by: Gerard Sotolongo 1-19-10
(Gerard Sotolongo, Quality Assurance Unit) Date

Revision Page

Date	Rev #	Summary of changes	Sections
7/30/96	2	Finalized	
01/19/10	3	Updated	All sections

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USE OF TERMS

Equipment blank: The equipment blank shall include the pump and the pump's tubing. If tubing is dedicated to the well, the equipment blank needs only to include the pump in subsequent sampling rounds. If the pump and tubing are dedicated to the well, the equipment blank is collected prior to its placement in the well. If the pump and tubing will be used to sample multiple wells, the equipment blank is normally collected after sampling from contaminated wells and not after background wells.

Field duplicates: Field duplicates are collected to determine precision of the sampling procedure. For this procedure, collect duplicate for each analyte group in consecutive order (VOC original, VOC duplicate, SVOC original, SVOC duplicate, etc.).

Indicator field parameters: This SOP uses field measurements of turbidity, dissolved oxygen, specific conductance, temperature, pH, and oxidation/reduction potential (ORP) as indicators of when purging operations are sufficient and sample collection may begin.

Matrix Spike/Matrix Spike Duplicates: Used by the laboratory in its quality assurance program. Consult the laboratory for the sample volume to be collected.

Poteniometric Surface: The level to which water rises in a tightly cased well constructed in a confined aquifer. In an unconfined aquifer, the potentiometric surface is the water table.

QAPP: Quality Assurance Project Plan

SAP: Sampling and Analysis Plan

SOP: Standard operating procedure

Stabilization: A condition that is achieved when all indicator field parameter measurements are sufficiently stable (as described in the "Monitoring Indicator Field Parameters" section) to allow sample collection to begin.

Temperature blank: A temperature blank is added to each sample cooler. The blank is measured upon receipt at the laboratory to assess whether the samples were properly cooled during transit.

Trip blank (VOCs): Trip blank is a sample of analyte-free water taken to the sampling site and returned to the laboratory. The trip blanks (one pair) are added to each sample cooler that contains VOC samples.

SCOPE & APPLICATION

The goal of this groundwater sampling procedure is to collect water samples that reflect the total mobile organic and inorganic loads (dissolved and colloidal sized fractions) transported through the subsurface under ambient flow conditions, with minimal physical and chemical alterations from sampling operations. This standard operating procedure (SOP) for collecting groundwater samples will help ensure that the project's data quality objectives (DQOs) are met under certain low-flow conditions.

The SOP emphasizes the need to minimize hydraulic stress at the well-aquifer interface by maintaining low water-level drawdowns, and by using low pumping rates during purging and sampling operations. Indicator field parameters (e.g., dissolved oxygen, pH, etc.) are monitored during purging in order to determine when sample collection may begin. Samples properly collected using this SOP are suitable for analysis of groundwater contaminants (volatile and semi-volatile organic analytes, dissolved gases, pesticides, PCBs, metals and other inorganics), or naturally occurring analytes. This SOP is based on Puls, and Barcelona (1996).

This procedure is designed for monitoring wells with an inside diameter (1.5-inches or greater) that can accommodate a positive lift pump with a screen length or open interval ten feet or less and with a water level above the top of the screen or open interval (Hereafter, the "screen or open interval" will be referred to only as "screen interval"). This SOP is not applicable to other well-sampling conditions.

While the use of dedicated sampling equipment is not mandatory, dedicated pumps and tubing can reduce sampling costs significantly by streamlining sampling activities and thereby reducing the overall field costs.

The goal of this procedure is to emphasize the need for consistency in deploying and operating equipment while purging and sampling monitoring wells during each sampling event. This will help to minimize sampling variability.

This procedure describes a general framework for groundwater sampling. Other site specific information (hydrogeological context, conceptual site model (CSM), DQOs, etc.) coupled with systematic planning must be added to the procedure in order to develop an appropriate site specific SAP/QAPP. In addition, the site specific SAP/QAPP must identify the specific equipment that will be used to collect the groundwater samples.

This procedure does not address the collection of water or free product samples from wells containing free phase LNAPLs and/or DNAPLs (light or dense non-aqueous phase

liquids). For this type of situation, the reader may wish to check: Cohen, and Mercer (1993) or other pertinent documents.

This SOP is to be used when collecting groundwater samples from monitoring wells at all Superfund, Federal Facility and RCRA sites in Region 1 under the conditions described herein. Request for modification of this SOP, in order to better address specific situations at individual wells, must include adequate technical justification for proposed changes. All changes and modifications must be approved and included in a revised SAP/QAPP before implementation in field.

BACKGROUND FOR IMPLEMENTATION

It is expected that the monitoring well screen has been properly located (both laterally and vertically) to intercept existing contaminant plume(s) or along flow paths of potential contaminant migration. Problems with inappropriate monitoring well placement or faulty/improper well installation cannot be overcome by even the best water sampling procedures. This SOP presumes that the analytes of interest are moving (or will potentially move) primarily through the more permeable zones intercepted by the screen interval.

Proper well construction, development, and operation and maintenance cannot be overemphasized. The use of installation techniques that are appropriate to the hydrogeologic setting of the site often prevent "problem well" situations from occurring. During well development, or redevelopment, tests should be conducted to determine the hydraulic characteristics of the monitoring well. The data can then be used to set the purging/sampling rate, and provide a baseline for evaluating changes in well performance and the potential need for well rehabilitation. Note: if this installation data or well history (construction and sampling) is not available or discoverable, for all wells to be sampled, efforts to build a sampling history should commence with the next sampling event.

The pump intake should be located within the screen interval and at a depth that will remain under water at all times. It is recommended that the intake depth and pumping rate remain the same for all sampling events. The mid-point or the lowest historical midpoint of the saturated screen length is often used as the location of the pump intake. For new wells, or for wells without pump intake depth information, the site's SAP/QAPP must provide clear reasons and instructions on how the pump intake depth(s) will be selected, and reason(s) for the depth(s) selected. If the depths to top and bottom of the well screen are not known, the SAP/QAPP will need to describe how the sampling depth will be determined and how the data can be used.

Stabilization of indicator field parameters is used to indicate that conditions are suitable for sampling to begin. Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. Sample collection

may still take place provided the indicator field parameter criteria in this procedure are met. If after 2 hours of purging indicator field parameters have not stabilized, one of three optional courses of action may be taken: a) continue purging until stabilization is achieved, b) discontinue purging, do not collect any samples, and record in log book that stabilization could not be achieved (documentation must describe attempts to achieve stabilization), c) discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization (note: there is a risk that the analytical data obtained, especially metals and strongly hydrophobic organic analytes, may reflect a sampling bias and therefore, the data may not meet the data quality objectives of the sampling event).

It is recommended that low-flow sampling be conducted when the air temperature is above 32°F (0°C). If the procedure is used below 32°F, special precautions will need to be taken to prevent the groundwater from freezing in the equipment. Because sampling during freezing temperatures may adversely impact the data quality objectives, the need for water sample collection during months when these conditions are likely to occur should be evaluated during site planning and special sampling measures may need to be developed. Ice formation in the flow-through-cell will cause the monitoring probes to act erratically. A transparent flow-through-cell needs to be used to observe if ice is forming in the cell. If ice starts to form on the other pieces of the sampling equipment, additional problems may occur.

HEALTH & SAFETY

When working on-site, comply with all applicable OSHA requirements and the site's health/safety procedures. All proper personal protection clothing and equipment are to be worn. Some samples may contain biological and chemical hazards. These samples should be handled with suitable protection to skin, eyes, etc.

CAUTIONS

The following cautions need to be considered when planning to collect groundwater samples when the below conditions occur.

If the groundwater degasses during purging of the monitoring well, dissolved gases and VOCs will be lost. When this happens, the groundwater data for dissolved gases (e.g., methane, ethene, ethane, dissolved oxygen, etc.) and VOCs will need to be qualified. Some conditions that can promote degassing are the use of a vacuum pump (e.g., peristaltic pumps), changes in aperture along the sampling tubing, and squeezing/pinching the pump's tubing which results in a pressure change.

When collecting the samples for dissolved gases and VOCs analyses, avoid aerating the groundwater in the pump's tubing. This can cause loss of the dissolved gases and VOCs in

the groundwater. Having the pump's tubing completely filled prior to sampling will avoid this problem when using a centrifugal pump or peristaltic pump.

Direct sun light and hot ambient air temperatures may cause the groundwater in the tubing and flow-through-cell to heat up. This may cause the groundwater to degas which will result in loss of VOCs and dissolved gases. When sampling under these conditions, the sampler will need to shade the equipment from the sunlight (e.g., umbrella, tent, etc.). If possible, sampling on hot days, or during the hottest time of the day, should be avoided. The tubing exiting the monitoring well should be kept as short as possible to avoid the sun light or ambient air from heating up the groundwater.

Thermal currents in the monitoring well may cause vertical mixing of water in the well bore. When the air temperature is colder than the groundwater temperature, it can cool the top of the water column. Colder water which is denser than warm water sinks to the bottom of the well and the warmer water at the bottom of the well rises, setting up a convention cell. "During low-flow sampling, the pumped water may be a mixture of convecting water from within the well casing and aquifer water moving inward through the screen. This mixing of water during low-flow sampling can substantially increase equilibration times, can cause false stabilization of indicator parameters, can give false indication of redox state, and can provide biological data that are not representative of the aquifer conditions" (Vroblesky 2007).

Failure to calibrate or perform proper maintenance on the sampling equipment and measurement instruments (e.g., dissolved oxygen meter, etc.) can result in faulty data being collected.

Interferences may result from using contaminated equipment, cleaning materials, sample containers, or uncontrolled ambient/surrounding air conditions (e.g., truck/vehicle exhaust nearby).

Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment and/or proper planning to avoid ambient air interferences. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

Clean and decontaminate all sampling equipment prior to use. All sampling equipment needs to be routinely checked to be free from contaminants and equipment blanks collected to ensure that the equipment is free of contaminants. Check the previous equipment blank data for the site (if they exist) to determine if the previous cleaning procedure removed the contaminants. If contaminants were detected and they are a concern, then a more vigorous cleaning procedure will be needed.

PERSONNEL QUALIFICATIONS

All field samplers working at sites containing hazardous waste must meet the requirements of the OSHA regulations. OSHA regulations may require the sampler to take the 40 hour OSHA health and safety training course and a refresher course prior to engaging in any field activities, depending upon the site and field conditions.

The field samplers must be trained prior to the use of the sampling equipment, field instruments, and procedures. Training is to be conducted by an experienced sampler before initiating any sampling procedure.

The entire sampling team needs to read, and be familiar with, the site Health and Safety Plan, all relevant SOPs, and SAP/QAPP (and the most recent amendments) before going onsite for the sampling event. It is recommended that the field sampling leader attest to the understanding of these site documents and that it is recorded.

EQUIPMENT AND SUPPLIES

A. Informational materials for sampling event

A copy of the current Health and Safety Plan, SAP/QAPP, monitoring well construction data, location map(s), field data from last sampling event, manuals for sampling, and the monitoring instruments' operation, maintenance, and calibration manuals should be brought to the site.

B. Well keys.

C. Extraction device

Adjustable rate, submersible pumps (e.g., centrifugal, bladder, etc.) which are constructed of stainless steel or Teflon are preferred. Note: if extraction devices constructed of other materials are to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

If bladder pumps are selected for the collection of VOCs and dissolved gases, the pump setting should be set so that one pulse will deliver a water volume that is sufficient to fill a 40 mL VOC vial. This is not mandatory, but is considered a "best practice". For the proper operation, the bladder pump will need a minimum amount of water above the pump; consult the manufacturer for the recommended submergence. The pump's recommended submergence value should be determined during the planning stage, since it may influence well construction and placement of dedicated pumps where water-level fluctuations are significant.

Adjustable rate, peristaltic pumps (suction) are to be used with caution when collecting samples for VOCs and dissolved gases (e.g., methane, carbon dioxide, etc.) analyses. Additional information on the use of peristaltic pumps can be found in Appendix A. If peristaltic pumps are used, the inside diameter of the rotor head tubing needs to match the inside diameter of the tubing installed in the monitoring well.

Inertial pumping devices (motor driven or manual) are not recommended. These devices frequently cause greater disturbance during purging and sampling, and are less easily controlled than submersible pumps (potentially increasing turbidity and sampling variability, etc.). This can lead to sampling results that are adversely affected by purging and sampling operations, and a higher degree of data variability.

D. Tubing

Teflon or Teflon-lined polyethylene tubing are preferred when sampling is to include VOCs, SVOCs, pesticides, PCBs and inorganics. Note: if tubing constructed of other materials is to be used, adequate information must be provided to show that the substituted materials do not leach contaminants nor cause interferences to the analytical procedures to be used. Acceptance of these materials must be obtained before the sampling event.

PVC, polypropylene or polyethylene tubing may be used when collecting samples for metal and other inorganics analyses.

The use of 1/4 inch or 3/8 inch (inside diameter) tubing is recommended. This will help ensure that the tubing remains liquid filled when operating at very low pumping rates when using centrifugal and peristaltic pumps.

Silastic tubing should be used for the section around the rotor head of a peristaltic pump. It should be less than a foot in length. The inside diameter of the tubing used at the pump rotor head must be the same as the inside diameter of tubing placed in the well. A tubing connector is used to connect the pump rotor head tubing to the well tubing. Alternatively, the two pieces of tubing can be connected to each other by placing the one end of the tubing inside the end of the other tubing. The tubing must not be reused.

E. The water level measuring device

Electronic "tape", pressure transducer, water level sounder/level indicator, etc. should be capable of measuring to 0.01 foot accuracy. Recording pressure transducers, mounted above the pump, are especially helpful in tracking water levels during pumping operations, but their use must include check measurements with a water level "tape" at the start and end of each sampling event.

F. Flow measurement supplies

Graduated cylinder (size according to flow rate) and stopwatch usually will suffice.

Large graduated bucket used to record total water purged from the well.

G. Interface probe

To be used to check on the presence of free phase liquids (LNAPL, or DNAPL) before purging begins (as needed).

H. Power source (generator, nitrogen tank, battery, etc.)

When a gasoline generator is used, locate it downwind and at least 30 feet from the well so that the exhaust fumes do not contaminate samples.

I. Indicator field parameter monitoring instruments

Use of a multi-parameter instrument capable of measuring pH, oxidation/reduction potential (ORP), dissolved oxygen (DO), specific conductance, temperature, and coupled with a flow-through-cell is required when measuring all indicator field parameters, except turbidity. Turbidity is collected using a separate instrument. Record equipment/instrument identification (manufacturer, and model number).

Transparent, small volume flow-through-cells (e.g., 250 mLs or less) are preferred. This allows observation of air bubbles and sediment buildup in the cell, which can interfere with the operation of the monitoring instrument probes, to be easily detected. A small volume cell facilitates rapid turnover of water in the cell between measurements of the indicator field parameters.

It is recommended to use a flow-through-cell and monitoring probes from the same manufacturer and model to avoid incompatibility between the probes and flow-through-cell.

Turbidity samples are collected before the flow-through-cell. A "T" connector coupled with a valve is connected between the pump's tubing and flow-through-cell. When a turbidity measurement is required, the valve is opened to allow the groundwater to flow into a container. The valve is closed and the container sample is then placed in the turbidimeter.

Standards are necessary to perform field calibration of instruments. A minimum of two standards are needed to bracket the instrument measurement range for all parameters except ORP which use a Zobell solution as a standard. For dissolved oxygen, a wet sponge used for the 100% saturation and a zero dissolved oxygen solution are used for the calibration.

Barometer (used in the calibration of the Dissolved Oxygen probe) and the conversion formula to convert the barometric pressure into the units of measure used by the Dissolved Oxygen meter are needed.

J. Decontamination supplies

Includes (for example) non-phosphate detergent, distilled/deionized water, isopropyl alcohol, etc.

K. Record keeping supplies

Logbook(s), well purging forms, chain-of-custody forms, field instrument calibration forms, etc.

L. Sample bottles

M. Sample preservation supplies (as required by the analytical methods)

N. Sample tags or labels

O. PID or FID instrument

If appropriate, to detect VOCs for health and safety purposes, and provide qualitative field evaluations.

P. Miscellaneous Equipment

Equipment to keep the sampling apparatus shaded in the summer (e.g., umbrella) and from freezing in the winter. If the pump's tubing is allowed to heat up in the warm weather, the cold groundwater may degas as it is warmed in the tubing.

EQUIPMENT/INSTRUMENT CALIBRATION

Prior to the sampling event, perform maintenance checks on the equipment and instruments according to the manufacturer's manual and/or applicable SOP. This will ensure that the equipment/instruments are working properly before they are used in the field.

Prior to sampling, the monitoring instruments must be calibrated and the calibration documented. The instruments are calibrated using U.S Environmental Protection Agency Region 1 *Calibration of Field Instruments (temperature, pH, dissolved oxygen, conductivity/specific conductance, oxidation/reduction [ORP], and turbidity),* January 19, 2010, or latest version or from one of the methods listed in 40CFR136, 40CFR141 and SW-846.

The instruments shall be calibrated at the beginning of each day. If the field measurement falls outside the calibration range, the instrument must be re-calibrated so that all measurements fall within the calibration range. At the end of each day, a calibration check is performed to verify that instruments remained in calibration throughout the day. This check is performed while the instrument is in measurement mode, not calibration mode. If the field instruments are being used to monitor the natural attenuation parameters, then a calibration check at mid-day is highly recommended to ensure that the instruments did not drift out of calibration. Note: during the day if the instrument reads zero or a negative number for dissolved oxygen, pH, specific conductance, or turbidity (negative value only), this indicates that the instrument drifted out of calibration or the instrument is malfunctioning. If this situation occurs the data from this instrument will need to be qualified or rejected.

PRELIMINARY SITE ACTIVITIES (as applicable)

Check the well for security (damage, evidence of tampering, missing lock, etc.) and record pertinent observations (include photograph as warranted).

If needed lay out sheet of clean polyethylene for monitoring and sampling equipment, unless equipment is elevated above the ground (e.g., on a table, etc.).

Remove well cap and if appropriate measure VOCs at the rim of the well with a PID or FID instrument and record reading in field logbook or on the well purge form.

If the well casing does not have an established reference point (usually a V-cut or indelible mark in the well casing), make one. Describe its location and record the date of the mark in the logbook (consider a photographic record as well). All water level measurements must be recorded relative to this reference point (and the altitude of this point should be determined using techniques that are appropriate to site's DQOs.

If water-table or potentiometric surface map(s) are to be constructed for the sampling event, perform synoptic water level measurement round (in the shortest possible time) before any purging and sampling activities begin. If possible, measure water level depth (to 0.01 ft.) and total well depth (to 0.1 ft.) the day before sampling begins, in order to allow for re-settlement of any particulates in the water column. This is especially important for those wells that have not been recently sampled because sediment buildup in the well may require the well to be redeveloped. If measurement of total well depth is not made the day before, it should be measured after sampling of the well is complete. All measurements must be taken from the established referenced point. Care should be taken to minimize water column disturbance.

Check newly constructed wells for the presence of LNAPLs or DNAPLs before the initial sampling round. If none are encountered, subsequent check measurements with an interface probe may not be necessary unless analytical data or field analysis signal a worsening situation. This SOP cannot be used in the presence of LNAPLs or DNAPLs. If NAPLs are present, the project team must decide upon an alternate sampling method. All project modifications must be approved and documented prior to implementation.

If available check intake depth and drawdown information from previous sampling event(s) for each well. Duplicate, to the extent practicable, the intake depth and extraction rate (use final pump dial setting information) from previous event(s). If changes are made in the intake depth or extraction rate(s) used during previous sampling event(s), for either portable or dedicated extraction devices, record new values, and explain reasons for the changes in the field logbook.

PURGING AND SAMPLING PROCEDURE

Purging and sampling wells in order of increasing chemical concentrations (known or anticipated) are preferred.

The use of dedicated pumps is recommended to minimize artificial mobilization and entrainment of particulates each time the well is sampled. Note that the use of dedicated sampling equipment can also significantly reduce the time needed to complete each

sampling event, will promote consistency in the sampling, and may reduce sampling bias by having the pump's intake at a constant depth.

A. Initial Water Level

Measure the water level in the well before installing the pump if a non-dedicated pump is being used. The initial water level is recorded on the purge form or in the field logbook.

B. Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the appropriate depth (may not be the mid-point of the screen/open interval). The Sampling and Analysis Plan/Quality Assurance Project Plan should specify the sampling depth (used previously), or provide criteria for selection of intake depth for each new well. If possible keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures. Heating may cause the groundwater to degas, which is unacceptable for the collection of samples for VOC and dissolved gases analyses.

C. Measure Water Level

Before starting pump, measure water level. Install recording pressure transducer, if used to track drawdowns, to initialize starting condition.

D. Purge Well

From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Check equipment for water leaks and if present fix or replace the affected equipment. Try to match pumping rate used during previous sampling event(s). Otherwise, adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" somewhat as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. If the initial water level is above the top of the screen do not allow the water level to fall into the well screen. The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Avoid the use of constriction devices on the tubing to decrease the flow rate because the constrictor will cause a pressure difference in the water column. This will cause the groundwater to degas and result in a loss of VOCs and dissolved gasses in the groundwater samples.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (e.g., bladder, peristaltic), and/or the use of dedicated equipment. For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP. If this type of problematic situation persists in a well, then water sample collection should be changed to a passive or no-purge method, if consistent with the site's DQOs, or have a new well installed.

E. Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow-through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell, in order to minimize particulate buildup in the cell (This is a judgment call made by the sampler). Water level drawdown measurements should be made as usual. If possible, the pump may be installed the day before purging to allow particulates that were disturbed during pump insertion to settle.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
Specific Conductance (3%),
Temperature (3%),
pH (± 0.1 unit),
Oxidation/Reduction Potential (±10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Samples for turbidity measurements are obtained before water enters the flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities. Record start and stop times and give a brief description of cleaning activities.

The flow-through-cell must be designed in a way that prevents gas bubble entrapment in the cell. Placing the flow-through-cell at a 45 degree angle with the port facing upward can help remove bubbles from the flow-through-cell (see Appendix B Low-Flow Setup Diagram). All during the measurement process, the flow-through-cell must remain free of any gas bubbles. Otherwise, the monitoring probes may act erratically. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

F. Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve.

VOC samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

If the pump's flow rate is too high to collect the VOC/dissolved gases samples, collect the other samples first. Lower the pump's flow rate to a reasonable rate and collect the VOC/dissolved gases samples and record the new flow rate.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help insure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

For bladder pumps that will be used to collect VOC or dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods (e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter (transparent housing preferred) is required, and the filter size (0.45 μm is commonly used) should be based on the sampling objective. Pre-rinse the filter with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Preserve the filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in groundwater for human health or ecological risk calculations.

Label each sample as collected. Samples requiring cooling will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

G. Post Sampling Activities

If a recording pressure transducer is used to track drawdown, re-measure water level with tape.

After collection of samples, the pump tubing may be dedicated to the well for re-sampling (by hanging the tubing inside the well), decontaminated, or properly discarded.

Before securing the well, measure and record the well depth (to 0.1 ft.), if not measured the day before purging began. Note: measurement of total well depth annually is usually sufficient after the initial low stress sampling event. However, a greater frequency may be needed if the well has a "silting" problem or if confirmation of well identity is needed.

Secure the well.

DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well and then following sampling of each well. Pumps should not be removed between purging and sampling operations. The pump, tubing, support cable and electrical wires which were in contact with the well should be decontaminated by one of the procedures listed below.

The use of dedicated pumps and tubing will reduce the amount of time spent on decontamination of the equipment. If dedicated pumps and tubing are used, only the initial sampling event will require decontamination of the pump and tubing.

Note if the previous equipment blank data showed that contaminant(s) were present after using the below procedure or the one described in the SAP/QAPP, a more vigorous procedure may be needed.

Procedure 1

Decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump and tubing. The pump may be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

Flush the equipment/pump with potable water.

Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

Optional - flush with isopropyl alcohol (pesticide grade; must be free of ketones {e.g., acetone}) or with methanol. This step may be required if the well is highly contaminated or if the equipment blank data from the previous sampling event show that the level of contaminants is significant.

Flush with distilled/deionized water. This step must remove all traces of alcohol (if used) from the equipment. The final water rinse must not be recycled.

Procedure 2

Steam clean the outside of the submersible pump.

Pump hot potable water from the steam cleaner through the inside of the pump. This can be accomplished by placing the pump inside a three or four inch diameter PVC pipe with end cap. Hot water from the steam cleaner jet will be directed inside the PVC pipe and the pump exterior will be cleaned. The hot water from the steam cleaner will then be pumped from the PVC pipe through the pump and collected into another container. Note: additives or solutions should not be added to the steam cleaner.

Pump non-phosphate detergent solution through the inside of the pump. If the solution is recycled, the solution must be changed periodically.

Pump potable water through the inside of the pump to remove all of the detergent solution. If the solution is recycled, the solution must be changed periodically.

Pump distilled/deionized water through the pump. The final water rinse must not be recycled.

FIELD QUALITY CONTROL

Quality control samples are required to verify that the sample collection and handling process has not compromised the quality of the groundwater samples. All field quality control samples must be prepared the same as regular investigation samples with regard to sample volume, containers, and preservation. Quality control samples include field duplicates, equipment blanks, matrix spike/matrix spike duplicates, trip blanks (VOCs), and temperature blanks.

FIELD LOGBOOK

A field log shall be kept to document all groundwater field monitoring activities (see Appendix C, example table), and record the following for each well:

Site name, municipality, state.

Well identifier, latitude-longitude or state grid coordinates.

Measuring point description (e.g., north side of PVC pipe).

Well depth, and measurement technique.

Well screen length.

Pump depth.

Static water level depth, date, time and measurement technique.

Presence and thickness of immiscible liquid (NAPL) layers and detection method.

Pumping rate, drawdown, indicator parameters values, calculated or measured total volume pumped, and clock time of each set of measurements.

Type of tubing used and its length.

Type of pump used.

Clock time of start and end of purging and sampling activity.

Types of sample bottles used and sample identification numbers.

Preservatives used.

Parameters requested for analyses.

Field observations during sampling event.

Name of sample collector(s).

Weather conditions, including approximate ambient air temperature.

QA/QC data for field instruments.

Any problems encountered should be highlighted.

Description of all sampling/monitoring equipment used, including trade names, model number, instrument identification number, diameters, material composition, etc.

DATA REPORT

Data reports are to include laboratory analytical results, QA/QC information, field indicator parameters measured during purging, field instrument calibration information, and whatever other field logbook information is needed to allow for a full evaluation of data usability.

Note: the use of trade, product, or firm names in this sampling procedure is for descriptive purposes only and does not constitute endorsement by the U.S. EPA.

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APPENDIX A
PERISTALTIC PUMPS

Before selecting a peristaltic pump to collect groundwater samples for VOCs and/or dissolved gases (e.g., methane, carbon dioxide, etc.) consideration should be given to the following:

- The decision of whether or not to use a peristaltic pump is dependent on the intended use of the data.
- If the additional sampling error that may be introduced by this device is NOT of concern for the VOC/dissolved gases data's intended use, then this device may be acceptable.
- If minor differences in the groundwater concentrations could effect the decision, such as to continue or terminate groundwater cleanup or whether the cleanup goals have been reached, then this device should NOT be used for VOC/dissolved gases sampling. In these cases, centrifugal or bladder pumps are a better choice for more accurate results.

EPA and USGS have documented their concerns with the use of the peristaltic pumps to collect water sample in the below documents.

- "Suction Pumps are not recommended because they may cause degassing, pH modification, and loss of volatile compounds" *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001, December 1987.
- "The agency does not recommend the use of peristaltic pumps to sample ground water particularly for volatile organic analytes" *RCRA Ground-Water Monitoring Draft Technical Guidance*, EPA Office of Solid Waste, November 1992.
- "The peristaltic pump is limited to shallow applications and can cause degassing resulting in alteration of pH, alkalinity, and volatiles loss", *Low-flow (Minimal drawdown) Ground-Water Sampling Procedures*, by Robert Puls & Michael Barcelona, April 1996, EPA/540/S-95/504.
- "Suction-lift pumps, such as peristaltic pumps, can operate at a very low pumping rate; however, using negative pressure to lift the sample can result in the loss of volatile analytes", USGS Book 9 Techniques of Water-Resources Investigation, Chapter A4. (Version 2.0, 9/2006).

APPENDIX B

SUMMARY OF SAMPLING INSTRUCTIONS

These instructions are for using an adjustable rate, submersible pump or a peristaltic pump with the pump's intake placed at the midpoint of a 10 foot or less well screen or an open interval. The water level in the monitoring well is above the top of the well screen or open interval, the ambient temperature is above 32°F, and the equipment is not dedicated. Field instruments are already calibrated. The equipment is setup according to the diagram at the end of these instructions.

1. Review well installation information. Record well depth, length of screen or open interval, and depth to top of the well screen. Determine the pump's intake depth (e.g., mid-point of screen/open interval).

2. On the day of sampling, check security of the well casing, perform any safety checks needed for the site, lay out a sheet of polyethylene around the well (if necessary), and setup the equipment. If necessary a canopy or an equivalent item can be setup to shade the pump's tubing and flow-through-cell from the sun light to prevent the sun light from heating the groundwater.

3. Check well casing for a reference mark. If missing, make a reference mark. Measure the water level (initial) to 0.01 ft. and record this information.

4. Install the pump's intake to the appropriate depth (e.g., midpoint) of the well screen or open interval. Do not turn-on the pump at this time.

5. Measure water level and record this information.

6. Turn-on the pump and discharge the groundwater into a graduated waste bucket. Slowly increase the flow rate until the water level starts to drop. Reduce the flow rate slightly so the water level stabilizes. Record the pump's settings. Calculate the flow rate using a graduated container and a stop watch. Record the flow rate. Do not let the water level drop below the top of the well screen.

If the groundwater is highly turbid or colored, continue to discharge the water into the bucket until the water clears (visual observation); this usually takes a few minutes. The turbid or colored water is usually from the well being disturbed during the pump installation. If the water does not clear, then you need to make a choice whether to continue purging the well (hoping that it will clear after a reasonable time) or continue to

the next step. Note, it is sometimes helpful to install the pump the day before the sampling event so that the disturbed materials in the well can settle out.

If the water level drops to the top of the well screen during the purging of the well, stop purging the well, and do the following:

- Wait for the well to recharge to a sufficient volume so samples can be collected. This may take awhile (pump maybe removed from well, if turbidity is not a problem). The project manager will need to make the decision when samples should be collected and the reasons recorded in the site's log book. A water level measurement needs to be performed and recorded before samples are collected. When samples are being collected, the water level must not drop below the top of the screen or open interval. Collect the samples from the pump's tubing. Always collect the VOCs and dissolved gases samples first. Normally, the samples requiring a small volume are collected before the large volume samples are collected just in case there is not sufficient water in the well to fill all the sample containers. All samples must be collected, preserved, and stored according to the analytical method. Remove the pump from the well and decontaminate the sampling equipment.

If the water level has dropped 0.3 feet or less from the initial water level (water level measure before the pump was installed); proceed to Step 7. If the water level has dropped more than 0.3 feet, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are be collected.

7. Attach the pump's tubing to the "T" connector with a valve (or a three-way stop cock). The pump's tubing from the well casing to the "T" connector must be as short as possible to prevent the groundwater in the tubing from heating up from the sun light or from the ambient air. Attach a short piece of tubing to the other end of the end of the "T" connector to serve as a sampling port for the turbidity samples. Attach the remaining end of the "T" connector to a short piece of tubing and connect the tubing to the flow-through-cell bottom port. To the top port, attach a small piece of tubing to direct the water into a calibrated waste bucket. Fill the cell with the groundwater and remove all gas bubbles from the cell. Position the flow-through-cell in such a way that if gas bubbles enter the cell they can easily exit the cell. If the ports are on the same side of the cell and the cell is cylindrical shape, the cell can be placed at a 45-degree angle with the ports facing upwards; this position should keep any gas bubbles entering the cell away from the monitoring probes and allow the gas bubbles to exit the cell easily (see Low-Flow Setup Diagram). Note,

make sure there are no gas bubbles caught in the probes' protective guard; you may need to shake the cell to remove these bubbles.

8. Turn-on the monitoring probes and turbidity meter.

9. Record the temperature, pH, dissolved oxygen, specific conductance, and oxidation/reduction potential measurements. Open the valve on the "T" connector to collect a sample for the turbidity measurement, close the valve, do the measurement, and record this measurement. Calculate the pump's flow rate from the water exiting the flow-through-cell using a graduated container and a stop watch, and record the measurement. Measure and record the water level. Check flow-through-cell for gas bubbles and sediment; if present, remove them.

10. Repeat Step 9 every 5 minutes or as appropriate until monitoring parameters stabilized. Note at least one flow-through-cell volume must be exchanged between readings. If not, the time interval between readings will need to be increased. Stabilization is achieved when three consecutive measurements are within the following limits:

Turbidity (10% for values greater than 5 NTUs; if three Turbidity values are less than 5 NTUs, consider the values as stabilized),
Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
Specific Conductance (3%),
Temperature (3%),
pH (± 0.1 unit),
Oxidation/Reduction Potential (±10 millivolts).

If these stabilization requirements do not stabilize in a reasonable time, the probes may have been coated from the materials in the groundwater, from a buildup of sediment in the flow-through-cell, or a gas bubble is lodged in the probe. The cell and the probes will need to be cleaned. Turn-off the probes (not the pump), disconnect the cell from the "T" connector and continue to purge the well. Disassemble the cell, remove the sediment, and clean the probes according to the manufacturer's instructions. Reassemble the cell and connect the cell to the "T" connector. Remove all gas bubbles from the cell, turn-on the probes, and continue the measurements. Record that the time the cell was cleaned.

11. When it is time to collect the groundwater samples, turn-off the monitoring probes, and disconnect the pump's tubing from the "T" connector. If you are using a centrifugal or peristaltic pump check the pump's tubing to determine if the tubing is completely filled with water (no air space).

All samples must be collected and preserved according to the analytical method. VOCs and dissolved gases samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.

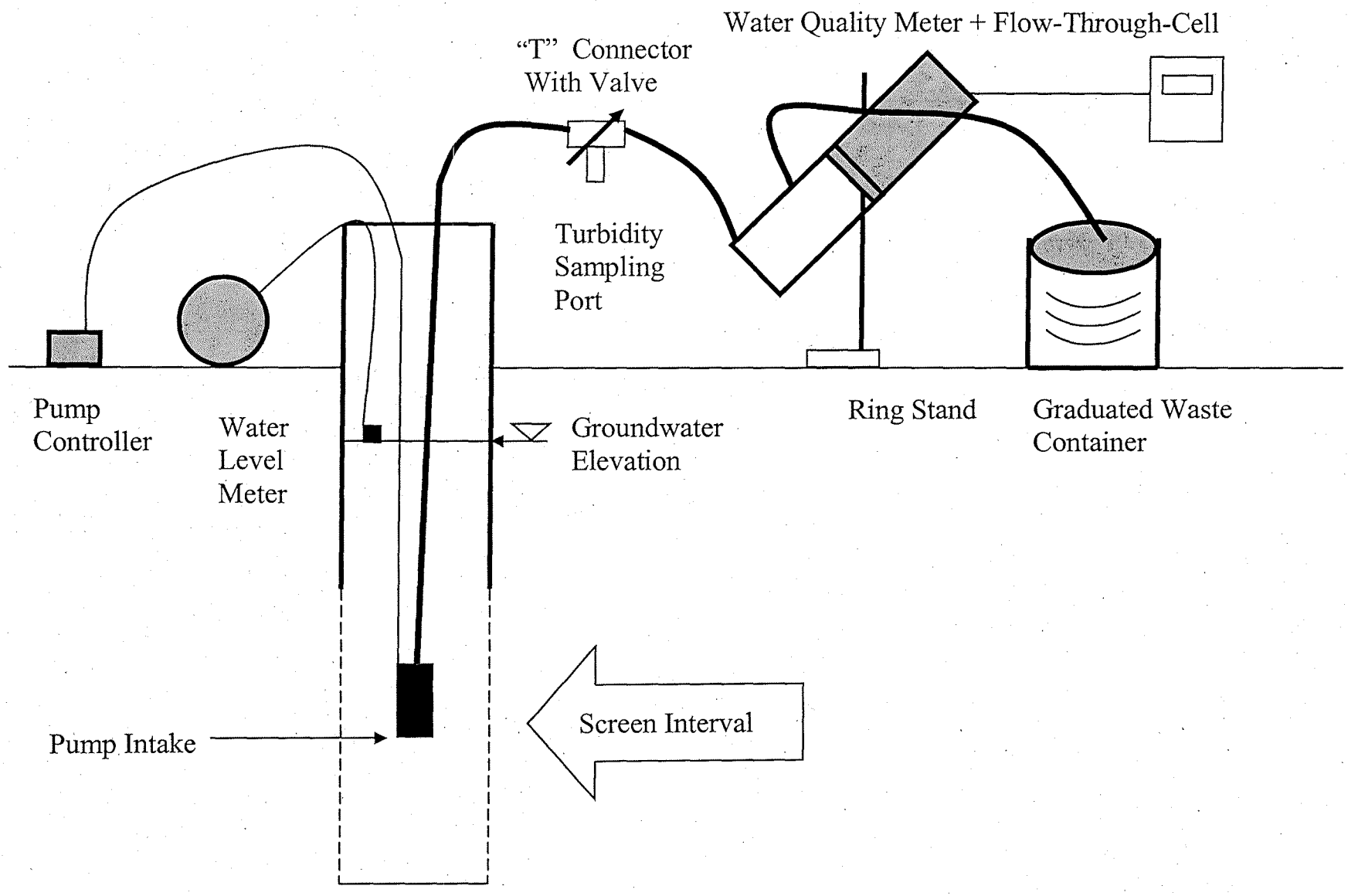
If the pump's tubing is not completely filled with water and the samples are being collected for VOCs and/or dissolved gases analyses using a centrifugal or peristaltic pump, do the following:

> All samples must be collected and preserved according to the analytical method. The VOCs and the dissolved gases (e.g., methane, ethane, ethene, and carbon dioxide) samples are collected last. When it becomes time to collect these samples increase the pump's flow rate until the tubing is completely filled. Collect the samples and record the new flow rate.

12. Store the samples according to the analytical method.

13. Record the total purged volume (graduated waste bucket). Remove the pump from the well and decontaminate the sampling equipment.

Low-Flow Setup Diagram



APPENDIX C
EXAMPLE (Minimum Requirements)
WELL PURGING-FIELD WATER QUALITY MEASUREMENTS FORM

Location (Site/Facility Name)_____
Well Number_____ Date_____
Field Personnel_____
Sampling Organization_____
Identify MP_____

Depth to _____/_____ of screen
(below MP) top bottom
Pump Intake at (ft. below MP)_____
Purging Device; (pump type)_____
Total Volume Purged _____

Clock Time 24 HR	Water Depth below MP ft	Pump Dial[1]	Purge Rate ml/min	Cum. Volume Purged liters	Temp. °C	Spec. Cond.[2] µS/cm	pH	ORP[3] mv	DO mg/L	Turb-idity NTU	Comments
Stabilization Criteria					3%	3%	±0.1	± 10 mv	10%	10%	

1. Pump dial setting (for example: hertz, cycles/min, etc).
2. µSiemens per cm(same as µmhos/cm)at 25°C.
3. Oxidation reduction potential (ORP)

APPENDIX 9

Analytical Hold Times

Method, Sample Container, Preservative, and Holding Time Table

Analysis	Matrix	Method	Sample Size/ Container	Preservative*	Holding Time (Days) Extraction	Analysis
INORGANICS						
Alkalinity	W/WW	310.2	500 mL/P	Cool, 4°C		14
Ammonia	W/WW	220.3	500 mL/P	Cool, 4°C, H_2SO_4, pH < 2		28
Biochemical Oxygen Demand (BOD)	W/WW	405.1	500 mL/P	Cool, 4°C		2
Chloride	W/WW	300	500 mL/P	Cool, 4°C		28
	S/SW					
Chemical Oxygen Demand (COD)	W/WW	410.4	500 mL/P	Cool, 4°C, H_2SO_4, pH < 2		28
Conductivity	W/WW	120.1	500 mL/P	Cool, 4°C		28
Corrosivity	W/WW	1110	250 mL/P	Cool, 4°C		7
	S/SW		4 oz/P			
Cyanide	W/WW	335.3 9010A	1 L/P	NaOH, pH > 12		14
	S/SW		4 oz/P			
Fluoride	W/WW	340.2	500 mL/P	Cool, 4°C		28
Hardness	W/WW	130.2	500 mL/P	Cool, 4°C		180
Hexavalent Chromium	W/WW	7196A	500 mL/P	Cool, 4°C		1
	S/SW		4 oz/P			
Ignitability	W/WW	1010	500 mL/G	None		7
	S/SW		4 oz/G			
Mercury	W/WW	245.1/245.5 7470/7471	250 mL/P/G	HNO_3, pH < 2		28
	S/SW		4 oz/P/G			
Metals ICP/GFAA/AA Including Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, Tl, V, Zn	W/WW	200 Series 6010B 6020 7000 Series	500 mL/P	HNO_3, pH < 2		180
	S/SW	6010B 6020 7000 Series	4 oz/P			
TCLP Metals (except Hg)	W/WW	1311	1 L/P	Cool, 4°C	180	180
	S/SW					
Nitrate	W/WW	353.2	250 mL/P	Cool, 4°C		2
Nitrate + Nitrite	W/WW	353.2	250 mL/P	Cool, 4°C, H_2SO_4, pH < 2		28
Nitrite	W/WW	353.2 Mod	125 mL/P	Cool, 4°C		2

Analysis	Matrix	Method	Sample Size/ Container	Preservative*	Holding Time (Days) Extraction	Analysis
Oil & Grease	W/WW	413.2	1 L/AG	Cool, 4°C, H_2SO_4, pH < 2		28
	S/SW		8 oz/AG			
Ortho-Phosphorus	W/WW	365.1	125 mL/P	Cool, 4°C, Filter Immediately		2
pH	W/WW	150.1	500 mL/P	Cool, 4°C		ASAP
	S/SW	9040B	4 oz/P			
Phenolics	W/WW	420.2	1 L/AG	Cool, 4°C, H_2SO_4, pH < 2		28
	S/SW	9066	6 oz/G			
Reactive Cyanide	W/WW	7.3.3.2	500 mL/P	Cool, 4°C		7
	S/SW		4 oz/P			
Reactive Sulfide	W/WW	7.3.4.2	500 mL/P	Cool, 4°C		7
			4 oz/P			
Sulfide	W/WW	376.1	500 mL/P	Cool, 4°C, Zn Acetate/NaOH, pH > 9		7
	S/SW	9030A	4 oz/P			
Sulfate	W/WW	375.2	500 mL/P	Cool, 4°C		28
	S/SW	9036	4 oz/P			
Total Kjeldahl Nitrogen	W/WW	351.2	1 L/P	Cool, 4°C, H_2SO_4, pH < 2		28
Total Dissolved Solids	W/WW	160.1	500 mL/P	Cool, 4°C		7
Total Organic Carbon (TOC)	W/WW	415.1	250 mL/G	Cool, 4°C, H_2SO_4, pH < 2		28
	S/SW	9060	4 oz/G			
Total Phosphorus	W/WW	SM4500	125 mL/P	Cool, 4°C, H_2SO_4, pH < 2		28
Total Recoverable Petroleum Hydrocarbons (TRPH)	W/WW	418.1	1L/AG	Cool, 4°C, H_2SO_4, pH < 2		28
Total Solids Moisture	W/WW	160.3	500 mL/P	Cool, 4°C		7
	S/SW		4 oz/G			
Total Suspended Solids	W/WW	160.2	500 mL/P	Cool, 4°C		7
Total Volatile Solids	W/WW	160.4	250 mL/P	Cool, 4°C		7
Turbidity	W/WW	180.1	250 mL/P	Cool, 4°C		2
ORGANICS						
BTEX and VOCs in Water	W/WW	8260B	4 x 40 mL/G	Cool, 4°C, HCl, pH < 2		14
BTEX and VOCs in Soil	S/SW	8260B	Soils Kit	Cool, 4°C, Methanol		14
Herbicides	W/WW	8151A	1 L/AG	Cool, 4°C	7	40
	S/SW		6 oz/AG		14	40

Analysis	Matrix	Method	Sample Size/ Container	Preservative*	Holding Time (Days) Extraction	Analysis
Organochlorine Pesticides	W/WW	8081	1 L/AG	Cool, 4°C, pH 5-9	7	40
	S/SW		6 oz/AG		14	40
Organophosphorus Pesticides	W/WW	8141A	1 L/AG	Cool, 4°C, pH 5-9	7	40
	S/SW		6 oz/AG		14	40
PCBs	W/WW	8082	1 L/AG	Cool, 4°C	7	40
			6 oz/AG		14	40
Polynuclear Aromatics (PNAs)	W/WW	8270	1 L/AG	Cool, 4°C	7	40
	S/SW		6 oz/AG		14	40
Semivolatile Organics	W/WW	8270	1 L/AG	Cool, 4°C	7	40
	S/SW		6 oz/AG		14	40
TCLP Semivolatiles, Pesticides, and Herbicides	W/WW	1311	6 oz/G	Cool, 4°C	7	40
	S/SW				14 (leach) 7 (extract)	40
TCLP Volatiles	W/WW	1311	6 oz/G	Cool, 4°C		14
	S/SW				14 (leach) 7 (extract)	14

***Chemical Preservative on W/WW matrix only.**

Abbreviations used in the previous table follow:

Matrix		Container		Preservatives	
W	**Water**	**P**	**Plastic (HDPE)**	**HCl**	**Hydrochloric Acid**
WW	**Wastewater**	**AG**	**Amber Glass**	**HNO_3**	**Nitric Acid**
S	**Soil/Sediment**	**G**	**Glass**	**NaOH**	**Sodium Hydroxide**
SW	**Solid Waste**			**H_2SO_4**	**Sulfuric Acid**

NOTES:

1. Sample preservation should be performed during sample collection.

2. Soil samples can be collected in either glass jars (for organics) or plastic jars (for metals and inorganics).

3. Extraction holding times are from the date of sampling, and analysis holding times are from the date of extraction.

4. If analyzing for dissolved metals, the sample shall be field-filtered through a 0.45-µm filter immediately (within 15 minutes) after sample collection and prior to preservation.

5. Provide twice the number of containers listed when matrix spike, matrix duplicate, and matrix spike duplicate analyses are requested for the sample. Minimum frequency is one per 20 field samples.

6. This table includes the requirements of the U.S. Environmental Protection Agency, as published in the Code of Federal Regulations, Volume 49, Number 209, 40 CFR 136 dated October 26, 1984, page 43260.

Table 3-1: Sample Collection, Preservation, and Holding Times

Method	Matrix	Container	Preservation	Holding Time
VPH	Aqueous	40 mL VOC vial w/Teflon-lined septa screw caps; fill completely to zero headspace	pH <2 (add 3-4 drops of 1:1 HCl); cool to 4°C. Where MtBE is of concern, use 0.40– 0.44 grams TSP to raise pH > 11 (see Appendix 1)	14 days
	Soil	VOC vial or container; add 15g to 40mL vial; 25g to 60 mL vial	1 mL methanol per 1g soil (+/- 25%); cool to 4°C	28 days
EPH	Aqueous	1-Liter amber glass bottle with Teflon-lined screw cap	pH<2 (add 5 mL of 1:1 HCl); cool to 4°C	Extract within 14 days; analyze extract within 40 days
	Soil	4-oz (120 mL) +/- widemouth amber glass jar with Teflon-lined screw cap	cool to 4°C	Extract within 7 days; analyze extract within 40 days

APPENDIX 2

Soil Boring Logs and Well Completion Reports

GEOLOGIC BORING LOG

BORING NO. SB-1/MW-1

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
						0-3" topsoil
						sandy loam
4					0	
						brown medium to fine SAND, some medium to small gravel, trace silt
8					0	brown medium to fine SAND and medium to small gravel, trace silt
						brown sandy CLAY, some (-) small gravel
12					0.1	
						brown silty CLAY and GRAVEL, little (-) large gravel
					1	brown sandy GRAVEL, trace (+) silt
16						
						brown sandy GRAVEL, some clay, little (-) large gravel
20					0	
24					0	
						end of boring
28						
32						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER

PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL

REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER

____ INTERFACE

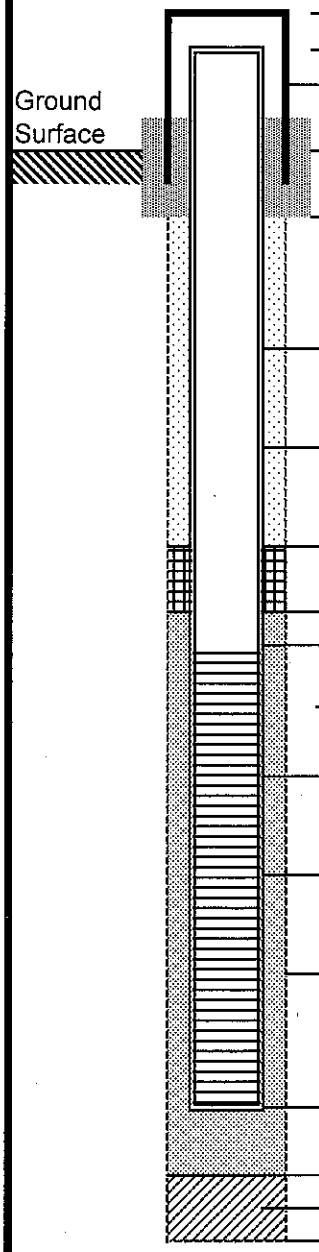
____ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

MONITORING WELL LOG

MW-1

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	STARTED/FINISHED	6/29/2012
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	
INSPECTOR		BORING	SB-1/MW-1
CHECKED BY	D. Horter	DATE	7/15/2012



Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	NA
Type of surface seal	Bentonite/concrete
Depth to bottom of seal from ground surface	2 IN
Type of backfill	Bentonite Chips
Type of riser and diameter	1 IN SCHED 40 PVC
Depth to top of bentonite chip seal	4'
Depth to top of filter pack	4.5'
Depth to top of screen	5'
Type of screen and diameter	1 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	#1 Well Sand
Depth to bottom of well	22'
Depth to bottom of filter pack	
Type of backfill	
Depth to bottom of boring	22'

GEOLOGIC BORING LOG

BORING NO. SB-2/MW-2

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
4					0	0-6" asphalt and fill brown sandy GRAVEL, some clay
8					0	3" CLAY, 3" sandy CLAY brown sandy CLAY, some medium to small gravel
12					no sample	brown sandy CLAY
16					no sample	brown coarse SAND, some medium to small gravel 4" fine SAND brown sandy CLAY
20					no sample	end of boring
24						
28						
32						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER

PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL

REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER

____ INTERFACE

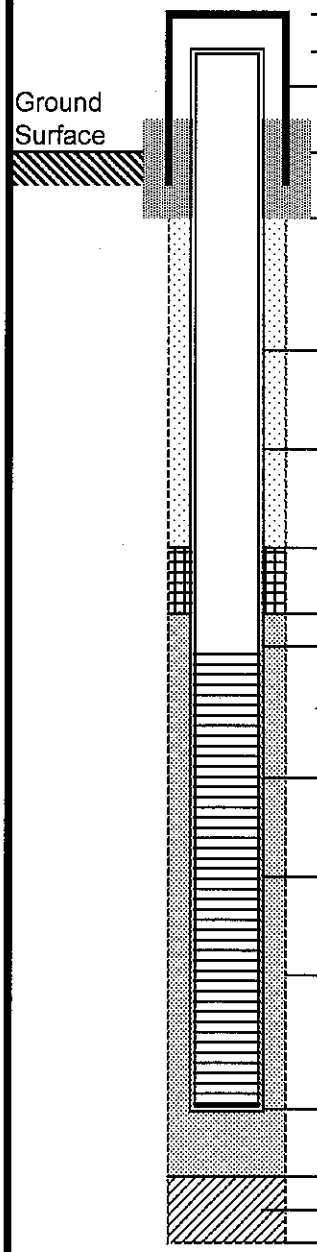
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

MONITORING WELL LOG

MW-2

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	STARTED/FINISHED	6/29/2012
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	
INSPECTOR		BORING	SB-2/MW-2
CHECKED BY	D. Horter	DATE	7/15/2012



Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	NA
Type of surface seal	Bentonite/concrete
Depth to bottom of seal from ground surface	2 IN
Type of backfill	Bentonite Chips
Type of riser and diameter	1 IN SCHED 40 PVC
Depth to top of bentonite chip seal	2'
Depth to top of filter pack	2.5'
Depth to top of screen	3'
Type of screen and diameter	1 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	#1 Well Sand
Depth to bottom of well	20'
Depth to bottom of filter pack	
Type of backfill	
Depth to bottom of boring	20'

GEOLOGIC BORING LOG

BORING NO. SB-3

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
2					0	0-6" asphalt and fill
4					0	dark brown SAND, some (+) medium to small gravel, trace silt
6						
8						refusal, end of boring
10						
12						
14						
16						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
____ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG

BORING NO. SB-4

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
4					0	0-6" asphalt and fill brown fine SAND, little (-) silt
8					0	brown sandy GRAVEL, some clay brown coarse SAND, trace silt
12					0	brown sandy CLAY, some (-) medium to small gravel brown coarse SAND, trace silt brown sandy CLAY, little (+) medium to small gravel
16					0	brown coarse SAND, trace silt
20					0	brown sandy CLAY, little medium to small gravel brown CLAY, some (+) sand end of boring
24						
28						
32						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG

BORING NO. PE-7/MW-3

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
						0-2" asphalt and fill
2					0	brown sandy GRAVEL, some clay
4					0	
						brown SAND and medium to small GRAVEL, trace silt
6					0	
8					0	brown CLAY
10					0	brown sandy/silty CLAY, areas of small gravel
12					0	
14					0	
16						refusal, end of boring

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER

PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL

REC - RECOVERY LENGTH OF SAMPLE

V - GROUNDWATER

____ INTERFACE

____ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

GEOLOGIC BORING LOG

BORING NO. MW-4

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	SAMPLE BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
4					0	0-1.5' topsoil and fill brown sandy GRAVEL, some organic material brown silty SAND, some medium to small gravel brown SAND, some silt and medium to small gravel
8					0	brown sandy/silty CLAY
12					0	brown silty CLAY brown sandy/silty CLAY
16					0	brown silty CLAY, some coarse sand dark brown silty CLAY, some organic material and sand brown sandy CLAY, some medium to small gravel
20					0	end of boring
24						
28						
32						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

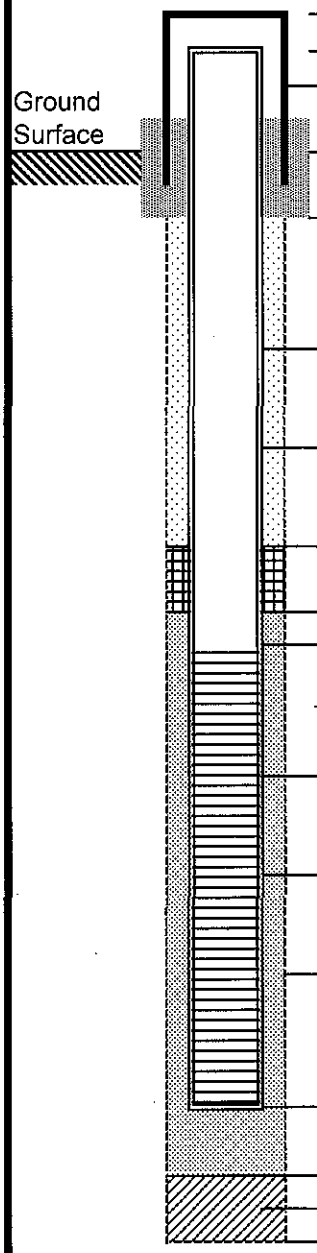
V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

MONITORING WELL LOG

MW-4

PROJECT NAME	Waters Corporation	LOCATION	34 Maple Street, Milford, MA
PROJECT NO.	00-046.078	STARTED/FINISHED	6/29/2012
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	
INSPECTOR		BORING	MW-4
CHECKED BY	D. Horter	DATE	7/15/2012



Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	NA
Type of surface seal	Bentonite/concrete
Depth to bottom of seal from ground surface	2 IN
Type of backfill	Bentonite Chips
Type of riser and diameter	1 IN SCHED 40 PVC
Depth to top of bentonite chip seal	4'
Depth to top of filter pack	4.5'
Depth to top of screen	5'
Type of screen and diameter	1 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	#1 Well Sand
Depth to bottom of well	18'
Depth to bottom of filter pack	
Type of backfill	
Depth to bottom of boring	18'

GEOLOGIC BORING LOG

BORING NO. MW-6

PROJECT NAME	Waters Corporation	LOCATION	5 Technology Drive, Milford, MA
PROJECT NO.	00-046.078	COMPLETED	6/26/2012
CONTRACTOR	TDS	DRILLER	
INSPECTOR			
CHECKED BY	DH	DATE	7/15/2012

DEPTH FT.	SAMPLE NO.	BLOWS	PEN. IN.	REC. IN.	PID (ppmv)	SAMPLE DESCRIPTION
4					0	0-2' asphalt and fill brown to grey sandy CLAY, some medium to small gravel
8					0	brown sandy GRAVEL, little silt dark sandy CLAY with organic material
12					0	brown medium to fine SAND, some clay/silt brown sandy/silty GRAVEL
16					0	brown coarse SAND, some medium to small gravel and silt brown sandy CLAY brown silty/sandy CLAY brown coarse SAND, some medium to small gravel and silt
20					0	brown coarse SAND and CLAY brown sandy/silty CLAY end of boring
24						
28						
32						

BLOWS - PER 6 INCH WITH 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2.0 INCH O.D. SPLIT SPOON SAMPLER
PEN - PENETRATION LENGTH OF SAMPLER OR CORE BARREL
REC - RECOVERY LENGTH OF SAMPLE

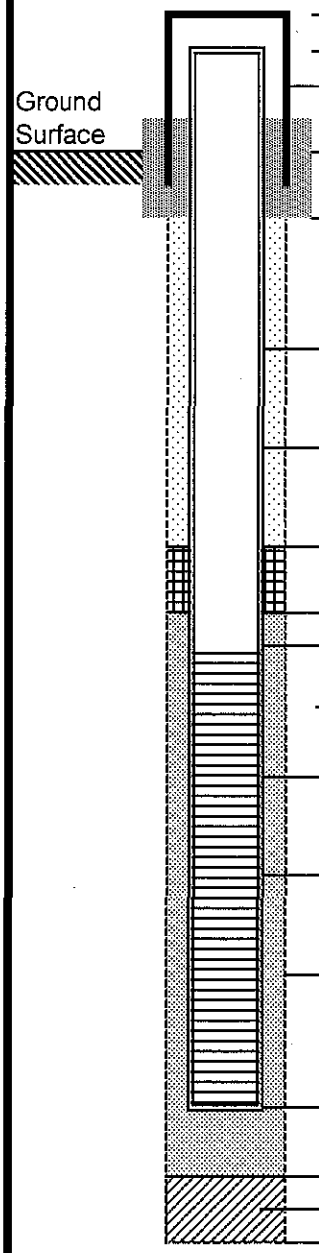
V - GROUNDWATER
____ INTERFACE
_ _ _ _ APPROX. INTERFACE

Capaccio Environmental Engineering, Inc.

MONITORING WELL LOG

MW-6

PROJECT NAME	Waters Corporation	LOCATION	5 Technology Drive, Milford, MA
PROJECT NO.	00-046.078	STARTED/FINISHED	6/29/2012
CONTRACTOR	Technical Drilling Services, Inc.	DRILLER	
INSPECTOR		BORING	MW-6
CHECKED BY	D. Horter	DATE	7/15/2012



Casing stickup	0 FT
Riser pipe stickup	0 FT
Casing type and diameter	NA
Type of surface seal	Bentonite/concrete
Depth to bottom of seal from ground surface	2 IN
Type of backfill	Bentonite Chips
Type of riser and diameter	1 IN SCHED 40 PVC
Depth to top of bentonite chip seal	4'
Depth to top of filter pack	4.5'
Depth to top of screen	5'
Type of screen and diameter	1 IN SCHED 40 PVC
Slot size	0.010 IN
Type of filter pack	#1 Well Sand
Depth to bottom of well	19'
Depth to bottom of filter pack	
Type of backfill	
Depth to bottom of boring	19'

APPENDIX 3

Soil Analytical Data Package

R.I. ANALYTICAL

Specialists in Environmental Services

41 Illinois Avenue
Warwick, RI 02888
Telephone: 401-737-8500
Fax: 401-738-1970

FACSIMILE TRANSMITTAL FORM

TO: Dawn Archer

DATE: 7/6 TIME: 2:00 # OF PAGES (INCLUDING TRANSMITTAL): _____

FAX #: 508-970-0028 PH #: _____

COMMENT/S:

Note: This message is intended only for the use of the individual or entity name/s above and may contain information that is privileged, confidential, and exempt from disclosure under the applicable law. If you are not the intended recipient or the employee or agent responsible for delivering the message to the intended recipient please notify us immediately by telephone and return the original to us by postal service at the address note on this stationary. Any dissemination, distribution, or copying of this communication by anyone other than the intended recipient is strictly prohibited. Thank you!

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 6/27/12
Date Reported: 7/6/12
P.O. #:
Work Order #: 1206-13061

DESCRIPTION: WATERS MILFORD

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<2.5	2.5	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	101		70-130%	5035/8260B	7/6/12	KAC
Moisture	9		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<4.4	4.4	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	91		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	91		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	94		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	93		70-130%	5035/8260B	7/6/12	KAC
Moisture	9		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.08	0.08	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.08	0.08	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<3.9	3.9	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	100		70-130%	5035/8260B	7/6/12	KAC
Moisture	7		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<5.1	5.1	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	97		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	95		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	101		70-130%	5035/8260B	7/6/12	KAC
Moisture	13		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<5.1	5.1	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	98		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	103		70-130%	5035/8260B	7/6/12	KAC
Moisture	16		%	SM2540 G.	6/28/12	KF

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/2/12	EC
Benzene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Toluene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Ethylbenzene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
m,p-Xylene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
o-Xylene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Naphthalene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Adjusted C5-C8 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Adjusted C9-C12 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
C9-C10 Aromatics(PID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Moisture	8		%	SM2540 G.	6/28/12	KF
Surrogate			RANGE		7/2/12	EC
2,5-Dibromotoluene(PID)	96		70-130%	MADEP	7/2/12	EC
2,5-Dibromotoluene(FID)	97		70-130%	MADEP	7/2/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
Target PAH Analytes					6/29/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Moisture	8		%	SM2540 G.	6/28/12	KF
Extraction Surrogates			RANGE		6/29/12	TCL
Chloro-octadecane	65		40-140%	MADEP	6/29/12	TCL
Ortho-terphenyl	73		40-140%	MADEP	6/29/12	TCL
Fractionation Surrogates			RANGE		6/29/12	TCL
2-Fluorobiphenyl	86		40-140%	MADEP	6/29/12	TCL
2-Bromonaphthalene	74		40-140%	MADEP	6/29/12	TCL
Extraction date	Extracted			MADEP	6/28/12	THP
Volatile Organic Compounds						
Acetone	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<4.7	4.7	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC
Dibromofluoromethane	100		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	103		70-130%	5035/8260B	7/6/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

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Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/2/12	EC
Benzene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Toluene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Ethylbenzene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
m,p-Xylene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
o-Xylene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Naphthalene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Adjusted C5-C8 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Adjusted C9-C12 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
C9-C10 Aromatics(PID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Moisture	9		%	SM2540 G.	6/28/12	KF
Surrogate			RANGE		7/2/12	EC
2,5-Dibromotoluene(PID)	90		70-130%	MADEP	7/2/12	EC
2,5-Dibromotoluene(FID)	92		70-130%	MADEP	7/2/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
Target PAH Analytes					6/29/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	7/5/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL

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Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Moisture	9		%	SM2540 G.	6/28/12	KF
Extraction Surrogates			RANGE		6/29/12	TCL
Chloro-octadecane	54		40-140%	MADEP	6/29/12	TCL
Ortho-terphenyl	66		40-140%	MADEP	6/29/12	TCL
Fractionation Surrogates			RANGE		6/29/12	TCL
2-Fluorobiphenyl	81		40-140%	MADEP	6/29/12	TCL
2-Bromonaphthalene	75		40-140%	MADEP	6/29/12	TCL
Extraction date	Extracted			MADEP	6/28/12	THP
Volatile Organic Compounds						
Acetone	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<2.6	2.6	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.06	0.06	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC
Dibromofluoromethane	99		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	94		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	102		70-130%	5035/8260B	7/6/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

Customer Name : Capaccio Environmental Eng.

W.O. Number 1206-13061

MassDEP Analytical Protocol Certification Form

Laboratory Name: R.I. Analytical Laboratories Work Order No: 1206-13061

Project / Location: WATERS MILFORD RTN :

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):

1206-13061-001 through 1206-13061-007

Matrices: ☐ Groundwater/Surface Water ☒ Soil / Sediment ☐ Drinking Water ☐ Air ☐ Other

CAM Protocol (check all that apply below)

8260 VOC CAM II A ☒	7470/7471 Hg CAM III B ☐	MassDEP VPH CAM IV A ☒	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

Data User Note: *Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were all QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature: Position: QA/QC Director

Printed Name: Mike Hobin Date: 7/6/12

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)			
C9-C18 Aliphatics	mg/kg dry	<20	6/29/2012
C19-C36 Aliphatics	mg/kg dry	<20	6/29/2012
C11-C22 Aromatics	mg/kg dry	<20	6/29/2012
Target PAH Analytes			6/29/2012
Naphthalene	mg/kg dry	<0.4	6/29/2012
2-Methylnaphthalene	mg/kg dry	<0.4	6/29/2012
Acenaphthylene	mg/kg dry	<0.4	6/29/2012
Acenaphthene	mg/kg dry	<0.4	6/29/2012
Fluorene	mg/kg dry	<0.4	6/29/2012
Phenanthrene	mg/kg dry	<0.4	6/29/2012
Anthracene	mg/kg dry	<0.4	6/29/2012
Fluoranthene	mg/kg dry	<0.4	7/2/2012
Pyrene	mg/kg dry	<0.4	6/29/2012
Benzo(a)anthracene	mg/kg dry	<0.4	6/29/2012
Chrysene	mg/kg dry	<0.4	6/29/2012
Benzo(b)fluoranthene	mg/kg dry	<0.4	6/29/2012
Benzo(k)fluoranthene	mg/kg dry	<0.4	6/29/2012
Benzo(a)pyrene	mg/kg dry	<0.4	6/29/2012
Indeno(1,2,3-cd)pyrene	mg/kg dry	<0.4	6/29/2012
Dibenzo(a,h)anthracene	mg/kg dry	<0.4	6/29/2012
Benzo(g,h,i)perylene	mg/kg dry	<0.4	6/29/2012
Extraction Surrogates	**RANGE**		6/29/2012
Chloro-octadecane	40-140%	66	6/29/2012
Ortho-terphenyl	40-140%	72	6/29/2012
Fractionation Surrogates	**RANGE**		6/29/2012
2-Fluorobiphenyl	40-140%	75	6/29/2012
2-Bromonaphthalene	40-140%	69	6/29/2012
Volatile Petroleum Hydrocarbons (Soil)			
Unadj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
Unadj C9-C12 Aliphatic(FID)	mg/kg dry	<2.5	7/2/2012
Methyl-tert-butylether	mg/kg dry	<0.10	7/2/2012
Benzene	mg/kg dry	<0.25	7/2/2012
Toluene	mg/kg dry	<0.25	7/2/2012
Ethylbenzene	mg/kg dry	<0.25	7/2/2012
m,p-Xylene	mg/kg dry	<0.25	7/2/2012
o-Xylene	mg/kg dry	<0.25	7/2/2012
Naphthalene	mg/kg dry	<0.25	7/2/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Volatile Petroleum Hydrocarbons (Soil) (cont'd)			
Adj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
Adj C9-C12 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
C9-C10 Aromatics(PID)	mg/kg dry	<2.5	7/2/2012
Surrogate	**RANGE**		7/2/2012
2,5-Dibromotoluene(PID)	70-130%	110	7/2/2012
2,5-Dibromotoluene(FID)	70-130%	110	7/2/2012
5035(Soil)			
Acetone	mg/kg dry	<0.50	7/6/2012
Tertiary Amyl Methyl Ether	mg/kg dry	<0.25	7/6/2012
Benzene	mg/kg dry	<0.05	7/6/2012
Bromobenzene	mg/kg dry	<0.05	7/6/2012
Bromochloromethane	mg/kg dry	<0.05	7/6/2012
Bromodichloromethane	mg/kg dry	<0.05	7/6/2012
Bromoform	mg/kg dry	<0.05	7/6/2012
Bromomethane	mg/kg dry	<0.25	7/6/2012
Sec-butylbenzene	mg/kg dry	<0.05	7/6/2012
n-Butylbenzene	mg/kg dry	<0.05	7/6/2012
tert-Butylbenzene	mg/kg dry	<0.05	7/6/2012
Carbon Disulfide	mg/kg dry	<0.25	7/6/2012
Carbon Tetrachloride	mg/kg dry	<0.05	7/6/2012
Chlorobenzene	mg/kg dry	<0.05	7/6/2012
Dibromochloromethane	mg/kg dry	<0.05	7/6/2012
Chloroethane	mg/kg dry	<0.25	7/6/2012
Chloroform	mg/kg dry	<0.05	7/6/2012
Chloromethane	mg/kg dry	<0.25	7/6/2012
2-Chlorotoluene	mg/kg dry	<0.05	7/6/2012
4-Chlorotoluene	mg/kg dry	<0.05	7/6/2012
1,2-Dibromo-3-Chloropropane	mg/kg dry	<0.10	7/6/2012
1,2-Dibromoethane(EDB)	mg/kg dry	<0.05	7/6/2012
Dibromomethane	mg/kg dry	<0.10	7/6/2012
1,3-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,2-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,4-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
n-Propylbenzene	mg/kg dry	<0.05	7/6/2012
Dichlorodifluoromethane	mg/kg dry	<0.25	7/6/2012
1,1-Dichloroethane	mg/kg dry	<0.05	7/6/2012
1,2-Dichloroethane	mg/kg dry	<0.05	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
1,1-Dichloroethene	mg/kg dry	<0.05	7/6/2012
cis-1,2-Dichloroethene	mg/kg dry	<0.05	7/6/2012
trans-1,2-Dichloroethylene	mg/kg dry	<0.05	7/6/2012
1,2-Dichloropropane	mg/kg dry	<0.05	7/6/2012
1,3-Dichloropropane	mg/kg dry	<0.05	7/6/2012
2,2-Dichloropropane	mg/kg dry	<0.05	7/6/2012
1,1-Dichloropropene	mg/kg dry	<0.05	7/6/2012
cis-1,3-Dichloropropene	mg/kg dry	<0.05	7/6/2012
trans-1,3-Dichloropropylene	mg/kg dry	<0.05	7/6/2012
Diethyl ether	mg/kg dry	<0.25	7/6/2012
Diisopropyl ether (DIPE)	mg/kg dry	<0.25	7/6/2012
1,4-Dioxane	mg/kg dry	<5.0	7/6/2012
Ethyl Tertiary Butyl Ether	mg/kg dry	<0.25	7/6/2012
Ethylbenzene	mg/kg dry	<0.05	7/6/2012
Hexachlorobutadiene	mg/kg dry	<0.05	7/6/2012
2-Hexanone	mg/kg dry	<0.50	7/6/2012
Isopropylbenzene	mg/kg dry	<0.05	7/6/2012
p-Isopropyltoluene	mg/kg dry	<0.05	7/6/2012
2-Butanone(MEK)	mg/kg dry	<0.50	7/6/2012
4-Methyl-2-pentanone(MIBK)	mg/kg dry	<0.50	7/6/2012
MTBE	mg/kg dry	<0.05	7/6/2012
Methylene Chloride	mg/kg dry	<0.05	7/6/2012
Naphthalene	mg/kg dry	<0.05	7/6/2012
1,1,2-Trichloroethane	mg/kg dry	<0.05	7/6/2012
Styrene	mg/kg dry	<0.05	7/6/2012
1,1,1,2-Tetrachloroethane	mg/kg dry	<0.05	7/6/2012
1,1,2,2-Tetrachloroethane	mg/kg dry	<0.05	7/6/2012
Tetrachloroethene	mg/kg dry	<0.05	7/6/2012
Tetrahydrofuran	mg/kg dry	<0.50	7/6/2012
Toluene	mg/kg dry	<0.05	7/6/2012
1,2,4-Trichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,2,3-Trichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,1,1-Trichloroethane	mg/kg dry	<0.05	7/6/2012
Trichloroethene	mg/kg dry	<0.05	7/6/2012
Trichlorofluoromethane	mg/kg dry	<0.05	7/6/2012
1,2,3-Trichloropropane	mg/kg dry	<0.05	7/6/2012
1,2,4-Trimethylbenzene	mg/kg dry	<0.05	7/6/2012
1,3,5-Trimethylbenzene	mg/kg dry	<0.05	7/6/2012
Vinyl Chloride	mg/kg dry	<0.05	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
o-Xylene	mg/kg dry	<0.05	7/6/2012
m,p-Xylene	mg/kg dry	<0.05	7/6/2012
Surrogates	**RANGE**		7/6/2012
Toluene-d8	70-130%	96	7/6/2012
Dibromofluoromethane	70-130%	100	7/6/2012
1,2 Dichloroethane-d4	70-130%	102	7/6/2012
4-Bromofluorobenzene	70-130%	92	7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)								
C9-C18 Aliphatics		20	12.8	64	12.5	63	2	6/29/2012
C19-C36 Aliphatics		27	22.7	84	22.1	82	3	6/29/2012
C11-C22 Aromatics		57	49.7	87	42.7	75	15	6/29/2012
Target PAH Analytes								
Naphthalene		3.33	2.15	65	1.87	56	14	6/29/2012
2-Methylnaphthalene		3.33	2.28	68	1.92	58	17	6/29/2012
Acenaphthylene		3.33	2.42	73	2.05	62	17	6/29/2012
Acenaphthene		3.33	2.47	74	2.14	64	14	6/29/2012
Fluorene		3.33	2.78	83	2.37	71	16	6/29/2012
Phenanthrene		3.33	2.98	89	2.58	77	14	6/29/2012
Anthracene		3.33	3.10	93	2.60	78	18	6/29/2012
Fluoranthene		3.33	3.41	102	3.10	93	10	7/5/2012
Pyrene		3.33	3.10	93	2.60	78	18	6/29/2012
Benzo(a)anthracene		3.33	3.18	95	2.68	80	17	6/29/2012
Chrysene		3.33	3.18	95	2.69	81	17	6/29/2012
Benzo(b)fluoranthene		3.33	2.88	86	2.64	79	9	6/29/2012
Benzo(k)fluoranthene		3.33	3.10	93	2.72	82	13	6/29/2012
Benzo(a)pyrene		3.33	3.18	95	2.69	81	17	6/29/2012
Indeno(1,2,3-cd)pyrene		3.33	2.88	86	2.51	75	14	6/29/2012
Dibenzo(a,h)anthracene		3.33	3.46	104	2.81	84	21	6/29/2012
Benzo(g,h,i)perylene		3.33	3.15	95	2.67	80	16	6/29/2012
Extraction Surrogates								
Chloro-octadecane			74		65			
Ortho-terphenyl			89		73			
Fractionation Surrogates								
2-Fluorobiphenyl			86		74			
2-Bromonaphthalene			77		65			
Volatile Petroleum Hydrocarbons (Soil)								
Methyl-tert-butylether		2.5	3.03	121	3.02	121	0	7/2/2012
Benzene		2.5	2.33	93	2.29	92	2	7/2/2012
Toluene		2.5	2.49	100	2.50	100	0	7/2/2012
Ethylbenzene		2.5	2.64	106	2.66	106	1	7/2/2012
m,p-Xylene		5.0	5.50	110	5.55	111	1	7/2/2012
o-Xylene		2.5	2.66	106	2.67	107	0	7/2/2012
Naphthalene		2.5	2.77	111	2.86	114	3	7/2/2012
Adj C5-C8 Aliphatics(FID)		7.5	7.68	102	7.17	96	7	7/2/2012
Adj C9-C12 Aliphatics(FID)		5.0	4.42	88	4.50	90	2	7/2/2012
C9-C10 Aromatics(PID)		2.5	2.69	108	2.67	107	1	7/2/2012
Surrogate								
2,5-Dibromotoluene(PID)			81		100			
2,5-Dibromotoluene(FID)			83		99			
5035(Soil)								
Acetone		25	28	112	25	100	11	7/6/2012
Tertiary Amyl Methyl Ether		2.5	2.6	104	2.4	96	8	7/6/2012
Benzene		2.5	2.7	108	2.5	100	8	7/6/2012
Bromobenzene		2.5	2.6	104	2.3	92	12	7/6/2012
Bromochloromethane		2.5	2.7	108	2.4	96	12	7/6/2012
Bromodichloromethane		2.5	2.9	116	2.5	100	15	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
Bromoform		2.5	2.7	108	2.5	100	8	7/6/2012
Bromomethane		2.5	2.5	100	2.7	108	8	7/6/2012
Sec-butylbenzene		2.5	2.8	112	2.5	100	11	7/6/2012
n-Butylbenzene		2.5	2.6	104	2.5	100	4	7/6/2012
tert-Butylbenzene		2.5	2.6	104	2.6	104	0	7/6/2012
Carbon Disulfide		2.5	2.7	108	2.5	100	8	7/6/2012
Carbon Tetrachloride		2.5	3.1	124	2.6	104	18	7/6/2012
Chlorobenzene		2.5	2.6	104	2.5	100	4	7/6/2012
Dibromochloromethane		2.5	2.9	116	2.5	100	15	7/6/2012
Chloroethane		2.5	2.8	112	2.6	104	7	7/6/2012
Chloroform		2.5	2.8	112	2.4	96	15	7/6/2012
Chloromethane		2.5	2.5	100	2.2	88	13	7/6/2012
2-Chlorotoluene		2.5	2.9	116	2.6	104	11	7/6/2012
4-Chlorotoluene		2.5	2.7	108	2.4	96	12	7/6/2012
1,2-Dibromo-3-Chloropropane		2.5	2.5	100	2.6	104	4	7/6/2012
1,2-Dibromoethane(EDB)		2.5	2.7	108	2.4	96	12	7/6/2012
Dibromomethane		2.5	2.4	96	2.4	96	0	7/6/2012
1,3-Dichlorobenzene		2.5	2.5	100	2.5	100	0	7/6/2012
1,2-Dichlorobenzene		2.5	2.5	100	2.5	100	0	7/6/2012
1,4-Dichlorobenzene		2.5	2.5	100	2.4	96	4	7/6/2012
n-Propylbenzene		2.5	2.8	112	2.5	100	11	7/6/2012
Dichlorodifluoromethane		2.5	2.5	100	2.1	84	17	7/6/2012
1,1-Dichloroethane		2.5	2.8	112	2.5	100	11	7/6/2012
1,2-Dichloroethane		2.5	2.9	116	2.5	100	15	7/6/2012
1,1-Dichloroethene		2.5	2.9	116	2.6	104	11	7/6/2012
cis-1,2-Dichloroethene		2.5	2.9	116	2.5	100	15	7/6/2012
trans-1,2-Dichloroethylene		2.5	2.7	108	2.5	100	8	7/6/2012
1,2-Dichloropropane		2.5	2.8	112	2.6	104	7	7/6/2012
1,3-Dichloropropane		2.5	2.8	112	2.5	100	11	7/6/2012
2,2-Dichloropropane		2.5	2.6	104	2.2	88	17	7/6/2012
1,1-Dichloropropene		2.5	2.9	116	2.5	100	15	7/6/2012
cis-1,3-Dichloropropene		2.5	2.7	108	2.4	96	12	7/6/2012
trans-1,3-Dichloropropylene		2.5	2.7	108	2.4	96	12	7/6/2012
Diethyl ether		25	26	104	24	96	8	7/6/2012
Diisopropyl ether (DIPE)		2.5	2.6	104	2.5	100	4	7/6/2012
1,4-Dioxane		50	55	110	58	116	5	7/6/2012
Ethyl Tertiary Butyl Ether		2.5	2.8	112	2.5	100	11	7/6/2012
Ethylbenzene		2.5	2.6	104	2.5	100	4	7/6/2012
Hexachlorobutadiene		2.5	2.4	96	2.6	104	8	7/6/2012
2-Hexanone		25	26	104	24	96	8	7/6/2012
Isopropylbenzene		2.5	2.7	108	2.5	100	8	7/6/2012
p-Isopropyltoluene		2.5	2.7	108	2.5	100	8	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
2-Butanone(MEK)		25	24	96	22	88	9	7/6/2012
4-Methyl-2-pentanone(MIBK)		25	26	104	23	92	12	7/6/2012
MTBE		2.5	2.5	100	2.4	96	4	7/6/2012
Methylene Chloride		2.5	3.0	120	2.7	108	11	7/6/2012
Naphthalene		2.5	2.1	84	2.4	96	13	7/6/2012
1,1,2-Trichloroethane		2.5	2.7	108	2.4	96	12	7/6/2012
Styrene		2.5	2.7	108	2.6	104	4	7/6/2012
1,1,1,2-Tetrachloroethane		2.5	2.7	108	2.5	100	8	7/6/2012
1,1,2,2-Tetrachloroethane		2.5	2.5	100	2.4	96	4	7/6/2012
Tetrachloroethene		2.5	2.9	116	2.5	100	15	7/6/2012
Tetrahydrofuran		25	25	100	23	92	8	7/6/2012
Toluene		2.5	2.7	108	2.5	100	8	7/6/2012
1,2,4-Trichlorobenzene		2.5	2.5	100	2.7	108	8	7/6/2012
1,2,3-Trichlorobenzene		2.5	2.2	88	2.6	104	17	7/6/2012
1,1,1-Trichloroethane		2.5	2.9	116	2.5	100	15	7/6/2012
Trichloroethene		2.5	2.8	112	2.5	100	11	7/6/2012
Trichlorofluoromethane		2.5	3.0	120	2.5	100	18	7/6/2012
1,2,3-Trichloropropane		2.5	2.7	108	2.4	96	12	7/6/2012
1,2,4-Trimethylbenzene		2.5	2.7	108	2.5	100	8	7/6/2012
1,3,5-Trimethylbenzene		2.5	2.7	108	2.4	96	12	7/6/2012
Vinyl Chloride		2.5	2.7	108	2.6	104	4	7/6/2012
o-Xylene		2.5	2.7	108	2.5	100	8	7/6/2012
m,p-Xylene		5.0	5.3	106	5.0	100	6	7/6/2012
Surrogates								
Toluene-d8			103		101			
Dibromofluoromethane			105		100			
1,2 Dichloroethane-d4			99		99			
4-Bromofluorobenzene			105		100			

Case Narrative

Date: 7/6/2012

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Project:

RIAL WO#: 1206-13061

All QA/QC procedures required by the VPH Method were followed. All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated. No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed. All performance/acceptance standards for the required QA/QC procedures were achieved or otherwise stated in this case narrative. A fractionation check was performed on the silica gel lot associated with this sample and found to pass the method criteria unless otherwise stated here. The data reported for this sample was not corrected for instrument/solvent baseline effects. No significant modifications were made to the EPH Method.

There were no exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
QA/QC Director

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	VOC	EPH w/ targets	VPH
6/26	922	MW1	G	2V	M	S	X		
6/26	1015	SB3	G	2V	M	S	X		
6/26	1015	SB4	G	2V	M	S	X		
6/26	1115	MW2	G	2V	M	S	X		
6/26	1115	MW X (Hold)	G	2V	M	S	HOLD		
6/26	245	MW4	G	2V	M	S	X		
6/26	115	MW3	G	4V	M	S	X		X
6/26	115	MW3	G	1G	NP	S		X	
6/26	430	MW6	G	4V	M	S	X		X
6/26	430	MW6	G	1G	NP	S		X	

22 BT

Client Information		Project Information	
Company Name:	Capaccio Env Eng	Project Name:	Waters Milford
Address:	293 Boston Post Road West	P.O. Number:	Project Number:
City / State / Zip:	Marlboro MA 01752	Report To: Dawn Horter	Phone: Fax
Telephone:	508-970-0033 ~~x100~~ Fax:	Sampled By: Josh Fawson	Email report to these addresses: dhorter@capaccio.com
Contact Person:	Dawn Horter	Quote No:	

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
	6-27-12	15:44		6-27-12	15:44
	6-27-12	16:21		6-27-12	16:21
	6/27/12	18:15		6/27/12	18:15

Turn Around Time

X	Normal	X	EMAIL Report
	5 Business days. Possible surcharge		
	Rush – Date Due: ___/___/___		

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, (S-1), S-2, S-3 MCP Data Enhancement QC Package? (Yes) No

12061346

12061362

Temp. Upon Receipt 1.7 °C

Lab Use Only

- ✓ Sample Pick-Up Only
- RIAL sampled; attach field hours
- ✓ Shipped on ice
- Workorder No: 12061361

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

APPENDIX 4

Underground Storage Tank Closure Assessment Report

Via Certified Mail / RRR / 7011 3500 0002 8664 0199

January 18, 2013

Massachusetts Department of Environmental Protection
UST Program
Central Regional Office
627 Main Street
Worcester, MA 01608

RE: **Underground Storage Tank Closure Assessment Report**
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

To Whom It May Concern:

Capaccio Environmental Engineering, Inc. (CAPACCIO) was contracted by the Waters Corporation (WATERS) to oversee the excavation and removal of four underground storage tanks (USTs) from the above-referenced location. This Underground Storage Tank Closure Assessment Report summarizes the activities conducted in accordance with the *Commonwealth of Massachusetts Underground Storage Tank Closure Assessment Manual*, Massachusetts Department of Environmental Protection (MassDEP) Policy #WSC-402-96. A Site Location Map is included as Figure 1.

WATERS maintained two 15,000-gallon No. 2 fuel oil USTs at the 34 Maple Street facility, referred to as Area of Concern (AOC)-1. Additionally, WATERS maintained one 1,000-gallon No. 2 fuel oil UST and one 2,000-gallon No. 2 fuel oil UST at the 5 Technology Drive facility, referred to as AOC-2. Both of the USTs were installed at AOC-2 in the late 1980s and used for operation of the facility's emergency generators.

UST Excavation – AOC-1

On July 2 and 3, 2012, CAPACCIO conducted field observations and screening during removal of two fiberglass 15,000-gallon No. 2 fuel oil USTs located on the western side of the facility, as shown on Figure 2. A detailed layout of the excavation area is included as Figure 3 and photographs are attached as Appendix 1. Approximately 35 feet of piping to the UST was installed on the east side of the USTs, approximately five feet below grade, beneath asphalt. The piping was two-inch-diameter, double-walled fiberglass. The UST vent stack was located east of the USTs and anchored to the building. Per WATERS, there were no known reportable releases from the USTs or piping.

The USTs were removed from service on June 29, 2012. 401 gallons of fuel oil and sludge remaining in the USTs were removed and transported by Western Oil Inc. (WESTERN) to WESTERN's facility in Lincoln, Rhode Island on June 29, 2012. A copy of the Uniform Hazardous Waste Manifest is attached as Appendix 2.

The USTs were excavated by Northeast Tank (NORTHEAST) personnel in accordance with the Commonwealth of Massachusetts, Department of Fire Services – Board of Fire Prevention Application and Permit for storage tank removal and transportation, attached as Appendix 3. When the USTs were uncovered, there were no obvious signs of corrosion, breakage, or loose fittings on the system connections. There was no hydrocarbon staining of soil around the fill pipe or UST connections. As the piping was located beneath asphalt, it was removed via pulling rather than excavation. Upon disconnecting the piping from the USTs, fuel oil remaining in the piping drained into soil adjacent to the USTs. An inspection indicated that the piping appeared to be intact and there was no liquid or staining that was indicative of a release from the piping.

During removal of the USTs, CAPACCIO conducted field screening utilizing a photoionization detector (PID) in accordance with MassDEP protocol. Soil headspace readings were taken from the following locations: soil removed during excavation activities; three to six inches above the surface of the USTs; soil adjacent to the USTs and each of the excavation sidewalls. Note that perched groundwater entered the excavation at a depth of approximately 10 feet and therefore, no screening of soil at the base of the excavation was conducted; there was no hydrocarbon sheen observed on the groundwater. PID readings ranged from background to 80 part per million by volume (ppmv) in soil removed from where fuel oil drained from the piping. Soil recording PID readings above background was stockpiled for off-site disposal.

Following removal, CAPACCIO visually inspected the USTs for corrosion and staining. The USTs were approximately 10 feet in diameter and 29 feet in length. The integrity of the USTs appeared to be intact with no corrosion or pitting. The dimension of the completed excavation was approximately 40 feet by 40 feet to a depth of approximately 10 feet. The Milford Fire Department was on-site to observe removal of the USTs.

The excavation area was backfilled with a combination of clean fill material and excavated soil with no visual or olfactory indication of hydrocarbons and had PID non-detectable PID readings.

UST Excavation – AOC-2

On November 9, 2012, CAPACCIO conducted field observations and screening during removal of one 1,000-gallon fiberglass No. 2 fuel oil UST (AOC-2B) and one 2,000-gallon fiberglass No. 2 fuel oil UST (AOC-2C) located on the eastern side of the facility, as shown on Figure 4. A detailed layout of the excavation area is included as Figure 4 and photographs are attached as Appendix 1. Approximately 30 feet of piping to the UST at AOC-2B was installed on the south side of the UST and approximately 17 feet of piping to the UST at AOC-2C was installed on the north side of the UST, both at a depth of approximately five feet below grade. The piping was steel, two-inch-diameter and double-walled. The UST vent stacks were located north and south of the USTs at AOC-2B and AOC-2C, respectively and anchored to the generator enclosures. Per WATERS, there were no known reportable releases from the USTs or piping.

On November 9, 2012, 88 gallons of fuel oil and sludge remaining in the USTs was removed and transported by WESTERN to WESTERN's facility in Lincoln, Rhode Island. A copy of the Uniform Hazardous Waste Manifest is attached as Appendix 2.

The USTs were excavated by NORTHEAST personnel in accordance with the Commonwealth of Massachusetts, Department of Fire Services – Board of Fire Prevention Application and Permit for storage tank removal and transportation, attached as Appendix 3. When the USTs were uncovered, there were no obvious signs of corrosion, breakage, or loose fittings on the system connections. There was no hydrocarbon staining of soil around the fill pipes or UST connections. As the piping was located adjacent to and/or beneath underground utilities, it was removed via pulling rather than excavation. An inspection indicated that the piping appeared to be intact and there was no liquid or staining that was indicative of a release from the piping.

During removal of the USTs, CAPACCIO conducted field screening utilizing a PID in accordance with MassDEP protocol. Soil headspace readings were taken from the following locations: soil removed during excavation activities; three to six inches above the surface of the USTs; soil adjacent to the USTs; and each of the excavation sidewalls. Note that groundwater entered the excavation of AOC-2C at a depth of approximately 7 to 8 feet below grade and therefore, no screening of soil at the base of the excavation was conducted; there was no hydrocarbon sheen observed on the groundwater. PID readings ranged from background to 7 ppmv in surficial soil adjacent to the fill pipe at AOC-2B.

Following removal, CAPACCIO visually inspected the USTs for corrosion and staining. The USTs were approximately 4 feet in diameter and 12 feet in length (AOC-2B) and 5 feet in diameter and 13 feet in length (AOC-2C). The integrity of the USTs appeared to be intact with no corrosion or pitting. The dimensions of the completed excavations were approximately 20 feet by 18 feet to a depth of approximately 8 feet (AOC-2B) and approximately 24 feet by 12 feet to a depth of approximately 8 feet (AOC-2C). The Milford Fire Department was on-site to observe removal of the USTs.

The excavation area was backfilled with a combination of clean fill material and excavated soil that recorded no visual or olfactory indication of hydrocarbons and had non-detectable PID readings.

Soil Analytical Data – AOC-1

In accordance with MassDEP protocol, if headspace readings do not indicate the presence of volatile compounds or if the readings at the screening locations are equivalent to ambient air readings where fuel oil was stored, it is recommended that a minimum of one composite sample (from the sidewalls and floor of the excavation) be collected and submitted for laboratory analysis for petroleum constituents. Alternatively if headspace readings are above ambient air readings but below the MassDEP reporting threshold of 100 ppmv, a minimum of one sample from the location of the highest headspace reading should be collected and submitted for laboratory analysis for petroleum constituents. Based on this, CAPACCIO collected seven soil samples (PE-1 through PE-7) from the sidewalls of the excavation as shown on Figure 3. Soil sample S-2 was collected from between the USTs in the area near the piping where the highest PID headspace readings were recorded, at a depth of approximately 8 feet below grade. The remaining six soil samples were collected at the base of the sidewalls at a depth of approximately 10 feet and approximately six to twelve inches into the sidewall. No soil samples from beneath the piping run were collected. However, a soil boring (MW-3) was collected on June 26, 2012 adjacent to piping for AOC-1 at a depth of 3 feet below grade.

Each of the samples was submitted to R.I. Analytical Laboratories (MassDEP Certification #M-RI015). Soil boring MW-3 was analyzed for volatile organic compounds (VOCs) via USEPA Method 8260, volatile petroleum hydrocarbons (VPH) and extractable petroleum hydrocarbons (EPH) with the targeted VOC and polyaromatic hydrocarbon (PAH) compounds via the Massachusetts Department of Environmental Protection (MassDEP) method. The analytical data package is attached as Appendix 4. No compound was detected at a concentration above the laboratory detection limit. Based on field measurements, post-excavation soil samples PE-1 and PE-3 through PE-7 were composited at the laboratory for VPH and EPH analysis with the targeted VOCs and PAHs via the MassDEP method as well as VOCs via USEPA Method 8260. In addition, the soil sample collected from post-excavation sample PE-2, located between the two USTs near the bottom of the USTs and recording the highest PID reading was also analyzed for VPH and EPH analysis with the targeted VOCs and PAHs and VOCs. The segregated soil was analyzed for VOCs, semi-VOCs, total metals (arsenic, cadmium, chromium, lead and mercury), total petroleum hydrocarbons, polychlorinated biphenyls, pH, specific conductance, flash point and reactivity (cyanide and sulfide). The analytical data package is included as Appendix 4 and is summarized in Table 1 (VPH and EPH), Table 2 (VOCs), Table 3 (PAHs), Table 4 (Metal Compounds) and Table 5 (Miscellaneous Compounds). Each of the analyzed compounds was either not detected above the laboratory detection limit or detected at a concentration well below the applicable MassDEP Reportable Concentration (RC).

Soil Analytical Data – AOC-2B

As discussed above, if headspace readings are above ambient air readings but below the MassDEP reporting threshold of 100 ppmv, a minimum of one sample from the location of the highest headspace reading should be collected and submitted for laboratory analysis for petroleum constituents. The highest PID reading of 7 ppmv was from a surficial sample collected at the base of the fill pipe. PID readings from the remainder of soil from adjacent to the UST were non-detectable. Based on this, CAPACCIO collected three soil samples from the eastern (Tank 1-1) and western (Tank 1-2) sidewalls of the excavation and from the base of the UST (Tank 1-3) as shown on Figure 4. The sidewall samples were collected at the base of the sidewall at a depth of approximately 8 feet below grade and approximately six to twelve inches into the sidewall. The UST was anchored by a concrete pad. As there was no visual or olfactory indication of fuel oil and PID readings were non-detectable, the concrete pad was not removed and soil sample Tank 1-3 was collected at a depth of approximately 8.5 to 9 feet below grade adjacent to the eastern side of the concrete pad. As the piping was pulled and not excavated and an inspection indicated that the piping appeared to be intact with no liquid or staining that was indicative of a release from the piping, no soil sample from beneath the piping run was collected.

Each of the samples was submitted to R.I. Analytical Laboratories (MassDEP Certification #M-RI015). Based on the PID readings, the three samples were composited by the laboratory into one composite sample. This sample was analyzed for VPH and EPH, both with targeted VOC and PAH compounds, via the MassDEP methods and in accordance with MassDEP recommendations. The laboratory data report is included as Appendix 4. Each of the VPH and EPH carbon fractions and the targeted VOCs and PAHs were non-detectable. Methylene chloride was the only VOC compound detected at a concentration of 0.1 ppm, well below the applicable MassDEP RCS-2 Reportable Concentration.

Soil Analytical Data – AOC-2C

As discussed above, if headspace readings are above ambient air readings but below the MassDEP reporting threshold of 100 ppmv, a minimum of one sample from the location of the highest headspace reading should be collected and submitted for laboratory analysis for petroleum constituents. The highest PID reading of 2 to 6 ppmv was from a sample collected at the soil/groundwater interface at approximately 7 to 8 feet below grade. Note that a groundwater sample collected from monitoring well MW-6, located downgradient of the UST at AOC-2 indicated petroleum hydrocarbon concentrations well below the MCP Reportable Concentrations. Based on this, CAPACCIO collected three soil samples (Tank 2-1, Tank 2-2 and Tank 2-3) from the eastern, southern and western sidewalls of the excavation as shown on Figure 4. Each sample was collected at the base of the sidewalls at a depth of approximately 8 feet and approximately six to twelve inches into the sidewall. As groundwater was present at the base of the excavation, no soil sample was collected from beneath the UST. As the piping was pulled and not excavated and an inspection indicated that the piping appeared to be intact with no liquid or staining that was indicative of a release from the piping, no soil sample from beneath the piping run was collected.

Each of the samples was submitted to R.I. Analytical Laboratories (MassDEP Certification #M-RI015). Based on the PID readings, the three samples collected from the base of the excavation were composited by the laboratory into one composite sample. This sample was analyzed for VPH and EPH, both with targeted VOC and PAH compounds, via the MassDEP methods and in accordance with MassDEP recommendations. The laboratory data report is included as Appendix 4. Each of the VPH and EPH carbon fractions and the targeted VOCs and PAH compounds were non-detectable. Methylene chloride was the only VOC compound detected at a concentration of 0.13 ppm, well below the applicable MassDEP RCS-2 Reportable Concentration.

Disposal Documentation

Based on field measurements and observations, 57,580 pounds (approximately 22 cubic yards) of soil excavated from AOC-1 was disposed of by 21st Century Environmental Management, LLC, of Rhode Island at Northland Environmental, LLC in Providence, Rhode Island. A copy of the Uniform Hazardous Waste Manifest is attached as Appendix 5. Soil removed from the AOC-2 excavation areas was used to backfill the excavation and therefore, no excavated soil was disposed of off-site from this AOC.

Each of the four USTs was transported by WESTERN to Allied Recycling Center, Inc. in Walpole, Massachusetts. Documentation for delivery of the USTs is included as Appendix 6.

Conclusions

PID readings ranged from non-detectable to 80 ppmv in AOC-1 where fuel oil drained from the piping into the soil. Soil containing elevated PID readings was disposed of off-site. There were no visible signs of hydrocarbon impact and no soil concentrations that were above the applicable MassDEP RCS-2 Reportable Concentrations. Based on this, there is no MassDEP-defined reportable condition associated with the excavation of the two 15,000-gallon, one 1,000-gallon and one 2,000-gallon No. 2 fuel oil USTs removed from the WATERS's facilities at 34 Maple Street and 5 Technology Drive.

If you have any questions or require additional information, please contact me at (508) 970-0033, ext. 118.

Sincerely,
Capaccio Environmental Engineering, Inc.
BY:

Dawn Horter

Dawn Horter, CPG, LSP
Senior Hydrogeologist

Enc:	Table 1	Soil Analytical Data Summary – VPH and EPH
	Table 2	Soil Analytical Data Summary – VOCs
	Table 3	Soil Analytical Data Summary - PAHs
	Table 4	Soil Analytical Data Summary – Metal Compounds
	Table 5	Soil Analytical Data Summary – Miscellaneous Compounds
	Figure 1	Site Location Map
	Figure 2	Site Plan, AOC-1
	Figure 3	Soil Sampling Location Plan, AOC-1
	Figure 4	Site Plan and Soil Sampling Location Plan, AOC-2
	Appendix 1	Photographs
	Appendix 2	Fuel Oil Disposal Documentation
	Appendix 3	Tank Removal and Transportation Permit
	Appendix 4	Soil Analytical Data
	Appendix 5	Soil Disposal Documentation
	Appendix 6	Tank Disposal Documentation

C: Roger Eydenburg (WATERS)
Town of Milford Fire Department Via Certified Mail/RRR/7011 3500 0002 8664 0205
MF: 00-046.078 (CAPACCIO)

TABLES

Table 1

Summary of Soil Analytical Data - VPH and EPH
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Sample Location	Sample Date	Sample Depth (ft)	Laboratory Analytical Method	VPH						EPH					
				C_5-C_8 Aliphatics		C_9-C_{12} Aliphatics		C_9-C_{10} Aromatics		C_9-C_{18} Aliphatics		C_{19}-C_{36} Aliphatics		C_{11}-C_{22} Aromatics	
					RDL		*RDL*		*RDL*		*RDL*		*RDL*		*RDL*
PE-1, PE-3 to PE-7	7/2/12-7/3/12	10	MassDEP VPH/EPH	ND	*1.4*	ND	*1.4*	ND	*1.4*	ND	*22*	ND	*22*	ND	*22*
PE-2	7/3/12	10	MassDEP VPH/EPH	ND	*2.8*	ND	*2.8*	ND	*2.8*	ND	*22*	ND	*22*	ND	*22*
Tank 1-1,1-2,1-3	11/9/12	8	MassDEP VPH/EPH	ND	*2.3*	ND	*2.3*	ND	*2.3*	ND	*22*	ND	*22*	ND	*22*
Tank 2-1,2-2,2-3	11/9/12	8	MassDEP VPH/EPH	ND	*2.9*	ND	*2.9*	ND	*2.9*	ND	*24*	ND	*24*	ND	*24*
MassDEP Reportable Concentrations															
RCS-2				**500**		**3,000**		**500**		**3,000**		**5,000**		**3,000**	

VPH: Volatile Petroleum Hydrocarbon
EPH: Extractable Petroleum Hydrocarbon
All results are reported in parts per million (ppm)
RDL: Detection Limit
: Applicable Reportable Concentration

Table 2

Summary of Soil Analytical Data - VOCs
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Sample Location	Sample Date	Sample Depth (ft)	Analytical Method	Compound														
				Benzene		Toluene		Ethylbenzene		Total Xylene		Methylene Chloride		Methyl-tert-butyl-ether		Naphthalene		Total VOCs
					RDL		RDL		RDL		RDL		RDL		RDL		RDL	
PE-1, PE-3 to PE-7	7/2/12-7/3/12	10	8260	ND	*0.02*	ND	*0.02*	ND	*0.02*	ND	*0.02*	**0.06**	*0.02*	ND	*0.02*	ND	*0.02*	ND
PE-2	7/3/12	10	8260	ND	*0.03*	ND	*0.03*	ND	*0.03*	ND	*0.03*	**0.06**	*0.03*	ND	*0.03*	ND	*0.03*	ND
Soil Pile	7/3/12	DNA	8260	ND	*0.03*	ND	*0.03*	ND	*0.03*	ND	*0.03*	**0.05**	*0.03*	ND	*0.03*	ND	*0.03*	ND
Tank 1-1,1-2,1-3	11/9/12	8	8260	ND	*0.03*	ND	*0.03*	ND	*0.03*	ND	*0.03*	**0.10**	*0.03*	ND	*0.03*	ND	*0.03*	0.1
Tank 2-1,2-2,2-3	11/9/12	8	8260	ND	*0.06*	ND	*0.06*	ND	*0.06*	ND	*0.06*	**0.13**	*0.06*	ND	*0.06*	ND	*0.06*	0.13
MassDEP Reportable Concentrations																		
RCS-2				**200**		**1,000**		**1,000**		**300**		**20**		**100**		**40**		**NA**
Unlined Landfill Criteria				**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**4**
Soil Recycling Criteria				**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**NA**		**30 to 1,800**

VOC: Volatile Organic Compounds
All results are reported in parts per million (ppm)
RDL: Detection limit
DNA: Data Not Available

: Applicable Reportable Concentration
Unlined Landfill Criteria per MassDEP COMM 97-001
Soil Recycling Criter per MassDEP WSC-94-400

Table 3

Summary of Soil Analytical Data - PAHs
Waters Corporation
34 Maple Street and 5 Technology Drive
Milford, Massachusetts

Boring ID	Sample Date	Depth (in)	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anth-racene	Benzo(b)fluor-anthene	Benzo(k)fluor-anthene	Benzo(g,h,i)-perylene	Benzo(a)-pyrene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	2-Methyl-naphthalene	Naphthalene	Phenanthrene	Pyrene	Total PAHs (SVOCs)
			Compound																	
PE-1, PE-3 to PE-7	7/2/12-7/3/12	10	ND *0.4*	ND *0.37*	ND *0.4*	**0.4** *0.37*	**0.6** *0.37*	**0.5** *0.37*	ND *0.37*	**0.5** *0.37*	**0.6** *0.4*	ND *0.4*	**1.2** *0.4*	ND *0.4*	ND *0.4*	ND *0.37*	ND *0.4*	ND *0.4*	**0.7** *0.4*	**4.5**
PE-2	7/3/12	10	ND *0.40*	ND *0.4*	ND *0.40*	**0.6** *0.4*	**0.7** *0.4*	**0.8** *0.4*	**0.5** *0.4*	**0.8** *0.4*	**0.8** *0.40*	ND *0.40*	**1.5** *0.40*	ND *0.40*	ND *0.40*	ND *0.4*	ND *0.40*	ND *0.40*	**1.1** *0.40*	**6.8**
Soil Pile	7/3/12	DNA	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND *0.34*	ND
Tank 1-1,1-2,1-3	11/9/12	8	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND
Tank 2-1,2-2,2-3	11/9/12	8	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND *0.40*	ND
MassDEP Reportable Concentrations																				
RCS-2			**3,000**	**10**	**3,000**	**40**	**40**	**400**	**3,000**	**4**	**400**	**4**	**3,000**	**3,000**	**40**	**80**	**40**	**1,000**	**3,000**	**NA**
Unlined Landfill Criteria			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**100**
Soil Recycling Criteria			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
MADEP Background Concentration ("Natural" Soil)			**0.5**	**0.5**	**1**	**2**	**2**	**1**	**1**	**2**	**2**	**0.5**	**4**	**1**	**1**	**0.5**	**0.5**	**3**	**4**	**NA**

PAHs: Polyaromatic Hydrocarbon Compounds
EPA Analytical Method 8270C or MassDEP EPH used
All results are reported in parts per million (ppm)
ND: Not detected above laboratory detection limits
RDL: Detection Limit
DNA: Data Not Available

NA: Not Applicable
: Applicable Reportable Concentration
Unlined Landfill Criteria per MassDEP COMM 97-001
Soil Recycling Criter per MassDEP WSC-94-400

Table 4

Summary of Soil Analytical Data - Metals
Waters Corporation
34 Maple Street
Milford, Massachusetts

Boring ID	Date	Sample Depth (ft)	EPA Method	Arsenic	RDL	Cadmium	RDL	Total Chromium	RDL	Lead	RDL	Mercury*	RDL
Soil Pile	7/3/12	DNA	6010	ND	*2.6*	ND	*0.26*	**4.1**	*1.6*	**4**	*2.1*	ND	*0.099*
MassDEP Reportable Concentrations													
RCS-2				**20**		**30**		**200**		**300**		**30**	
Unlined Landfill Criteria				**40**		**30**		**1,000**		**1,000**		**10**	
Soil Recycling Criteria				**30**		**11 to 30**		**500**		**1,000**		**3 to 10**	
MassDEP Background Concentration ("Natural" Soil)				**20**		**2**		**30**		**100**		**0.3**	

All results are reported in parts per million (ppm)
RDL: Detection limit
ND: Not detected above laboratory detection limits
*: Mercury analyzed via EPA Method SW7471A
NA: Not Applicable

: Applicable Reportable Concentration

Table 5

Summary of Soil Analytical Data - Miscellaneous Compounds

Waters Corporation

34 Maple Street

Milford, Massachusetts

Sample Location	Date	Sample Depth (ft)	Total Petroleum Hydrocarbons			PCBs			Ph			Specific Conductance (umhos/cm)			Flash Point			Reactive Cyanide			Reactive Sulfide		
				RDL	*EPA Method*		*RDL*	*EPA Method*		*RDL*	*EPA Method*		*RDL*	*EPA Method*		*RDL*	*EPA Method*		*RDL*	*EPA Method*		*RDL*	*EPA Method*
Soil Pile	7/3/12	DNA	ND	*10.0*	*8100*	NA	*0.1*	*8082*	**7.7**	*NA*	*9045C*	**4.6**	*1.0*	*2510*	**>200**	*80*	*1010*	ND	*0.1*	*7.3.3*	ND	*2.5*	*7.3.4*
MassDEP Reportable Concentrations																							
RCS-2			**3,000**			**3**			**NA**			**NA**			**NA**			**NA**			**NA**		
Unlined Landfill Criteria			**2,500**			**2**			**NA**			**4,000**			**NA**			**NA**			**NA**		
Soil Recycling Criteria			**5,000 to 60,000**			**2**			**NA**			**4,000**			**NA**			**NA**			**NA**		
MassDEP Background Concentration ("Natural" Soil)			**NA**			**NA**			**NA**			**NA**			**NA**			**NA**			**NA**		

All results are reported in parts per million (ppm) except where indicated

RDL: Detection limit

ND: Not detected above laboratory detection limits.

NA: Not applicable/No Standard Exists

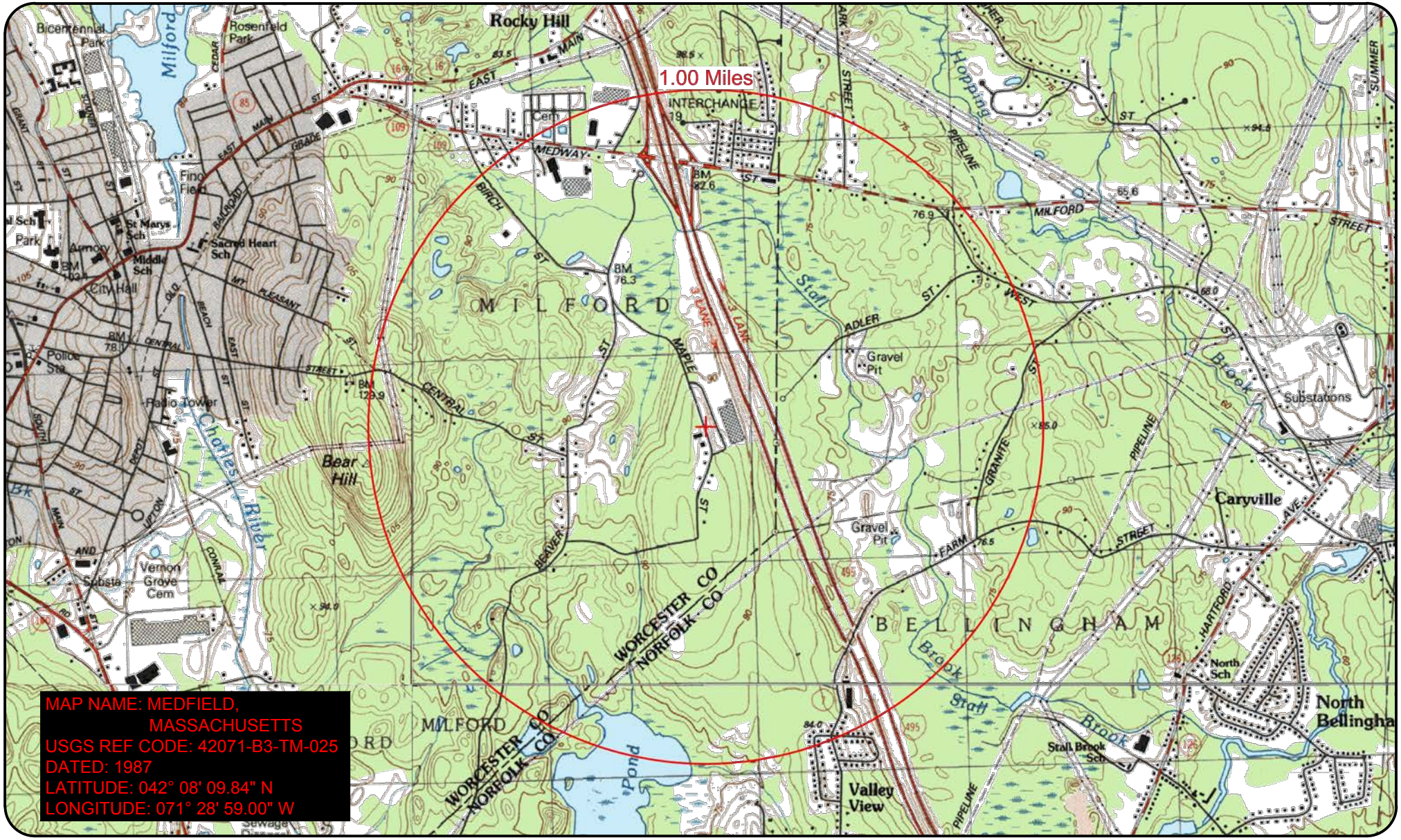
: Applicable Reportable Concentration

Unlined Landfill Criteria per MassDEP COMM 97-001

Soil Recycling Criter per MassDEP WSC-94-400

FIGURES

Z:\WATERS 00-046\1 - BASE PLANS\R - RESOURCE\WATERS_34MAPLEST_FIGURE1_REVA.DWG



PROJECT TITLE: UST Closure	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc. 293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	JOB NO: 00-046.078	SHEET: Figure 1	
			SCALE: 1" = 2083'-0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: Site Location Map	JOB LOCATION: 34 Maple St. / 5 Technology Dr. Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
			DATE: 01-16-13		

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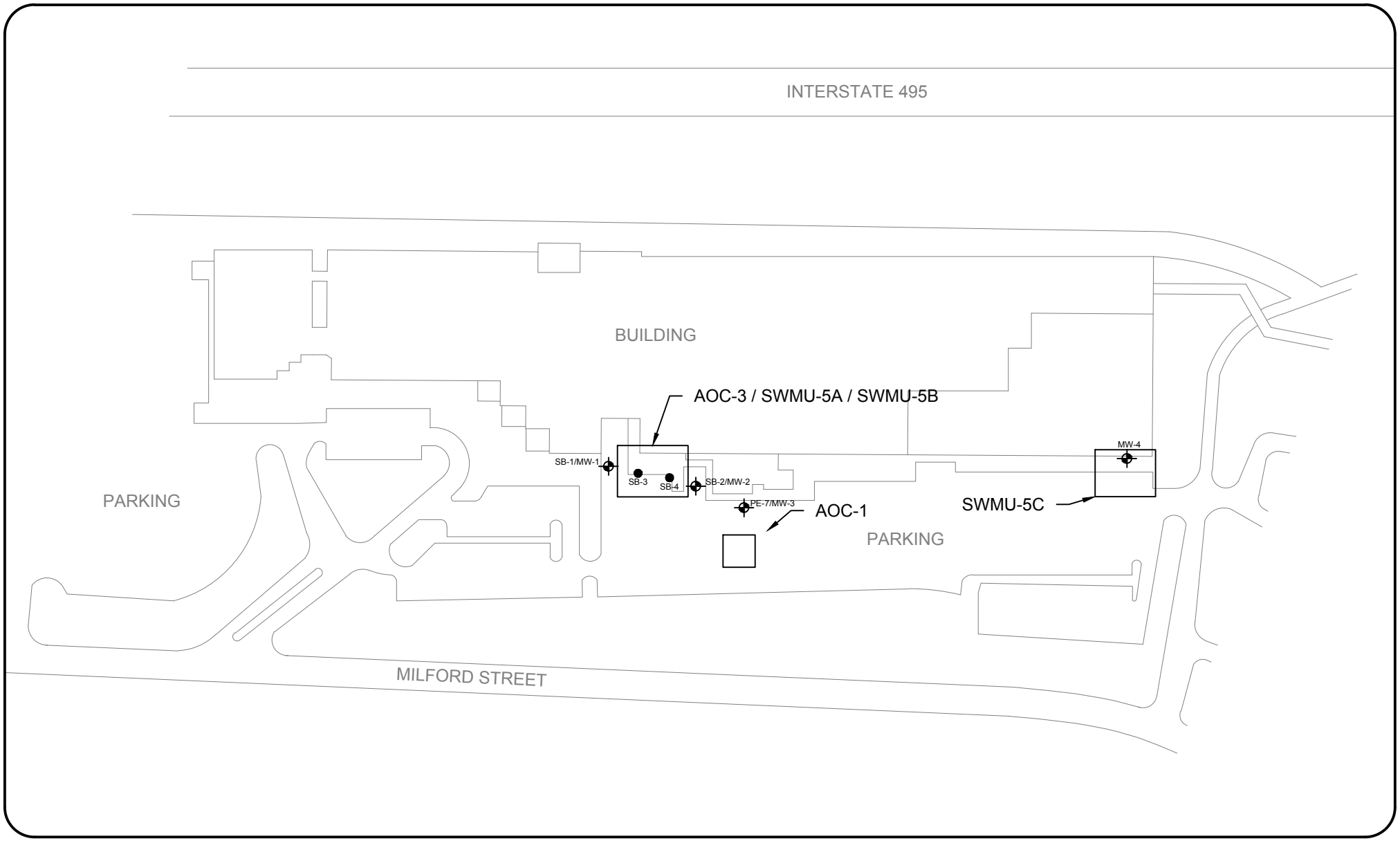

PROJECT TITLE: UST Closure	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc. 293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	JOB NO: 00-046.078	SHEET: Figure 2	
			SCALE: 1" = 165' 0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: AOC-1 Site Plan	JOB LOCATION: 34 Maple Street Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
			DATE: 01-16-13		

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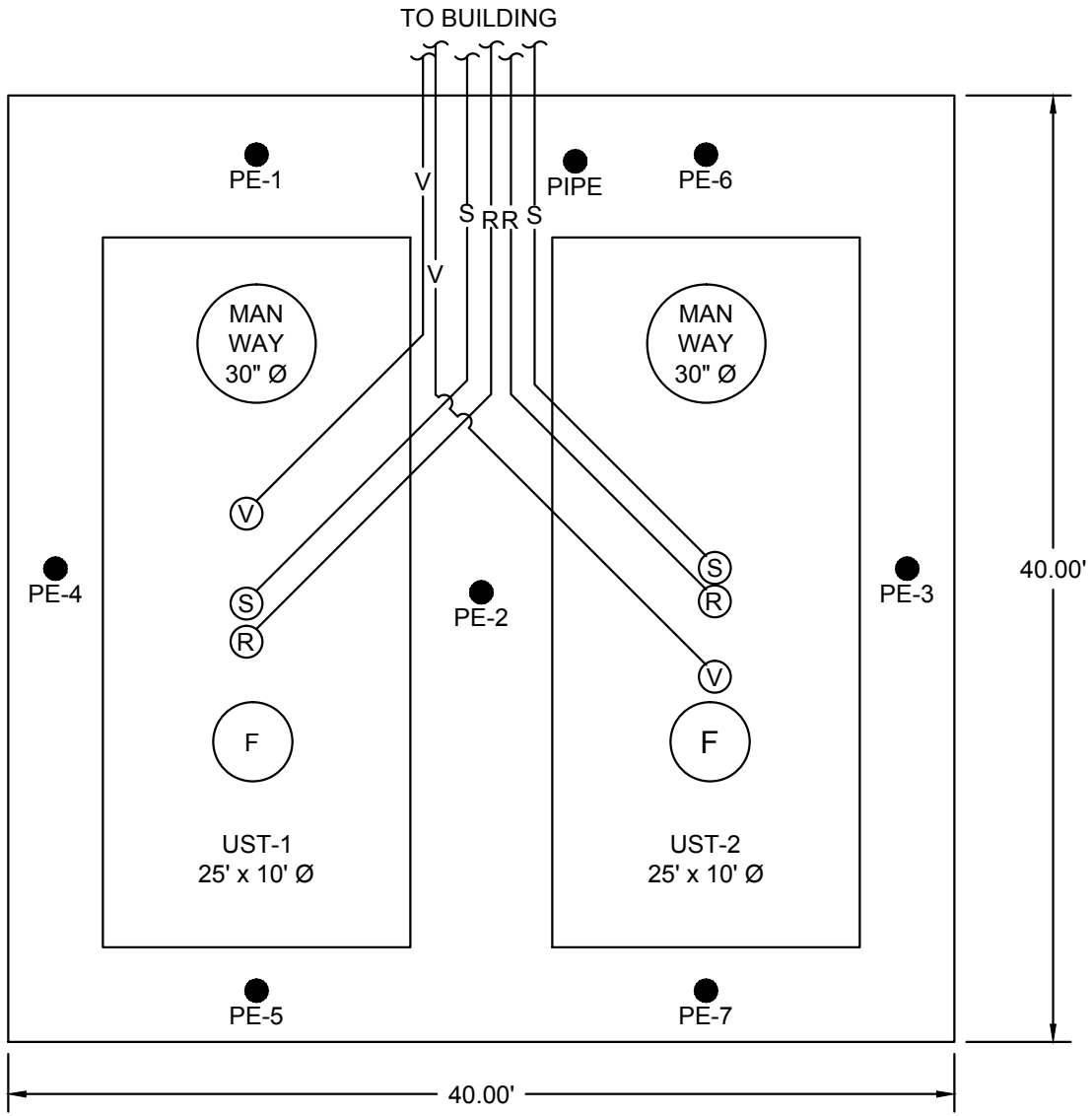
LEGEND

V = VENT PIPING

S = SUPPLY PIPING

R = RETURN PIPING



NOTES

1. ALL PIPE RUNS ARE APPROXIMATE

PROJECT TITLE: UST & RCRA AOC-1	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc. 293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	JOB NO: 00-046.078	SHEET: Figure 3
			SCALE: N.T.S.	
			REV: D	
			DRW: CPC	
DRAWING TITLE: Soil Sample Locations	JOB LOCATION: 34 Maple Street Milford, MA 01757		CHK: JRF	NORTH / SIZE: A
			ENG:	
			DATE: 07-12-12	

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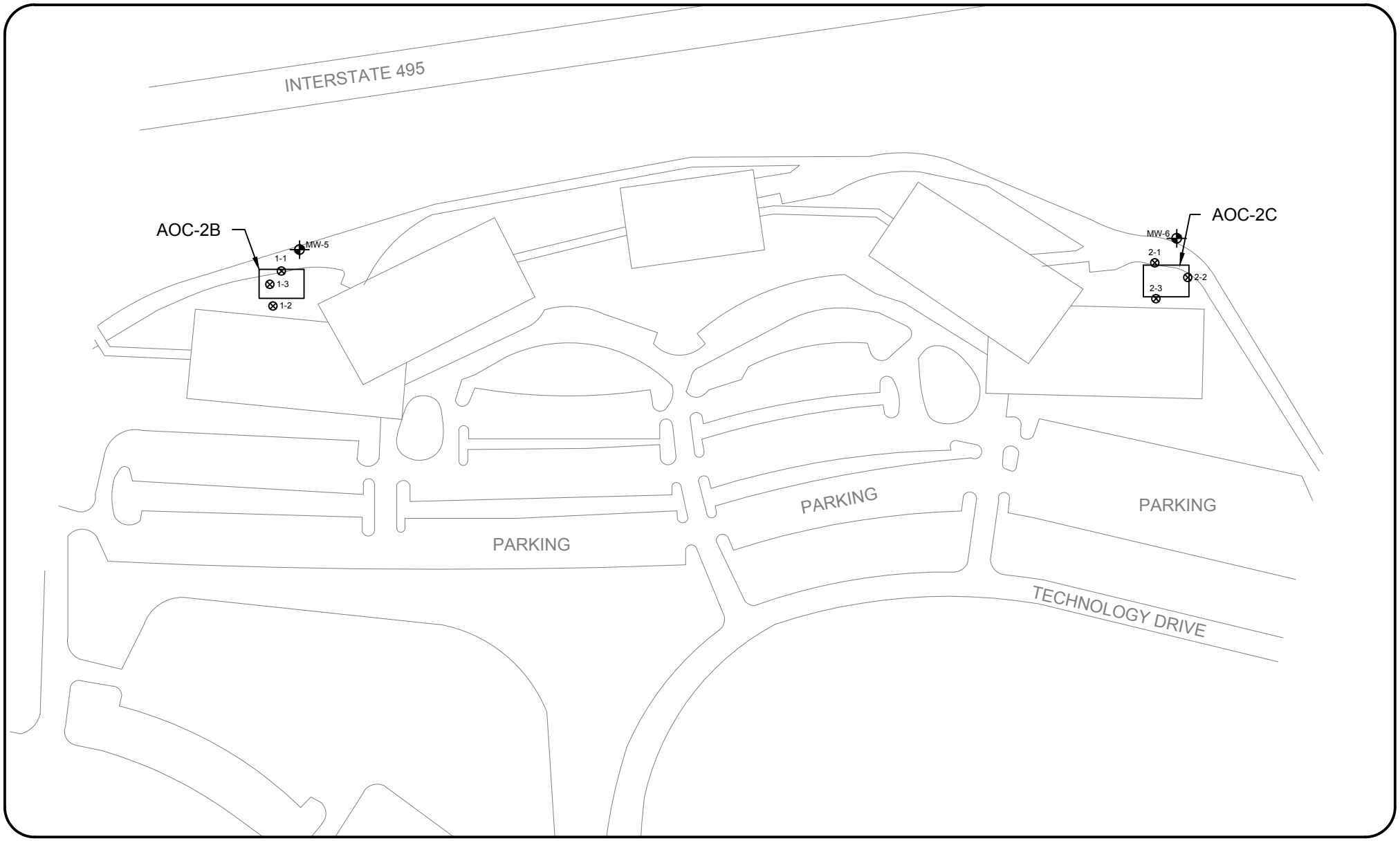

PROJECT TITLE: UST Closure	CLIENT: Waters Corporation	Capaccio Environmental Engineering, Inc.	JOB NO: 00-046.078	SHEET: Figure 4	
		293 Boston Post Road-West Marlborough, MA 01752 (508) 970-0033 * www.capaccio.com "Helping Industry and the Environment Prosper"	SCALE: 1" = 165' 0"		
			REV: A		
			DRW: CPC		
DRAWING TITLE: AOC-2 Site Plan & Soil Sample Locations	JOB LOCATION: 5 Technology Drive Milford, MA 01757		CHK: DLH	NORTH	SIZE: A
			ENG:		
		© Copyright 2013 Capaccio Environmental Engineering, Inc.	DATE: 01-16-13		

APPENDIX 1

Photographs

Photo 1 – AOC-1 15,000-Gallon UST #1

Photo 2 – AOC-1 15,000-Gallon UST #2

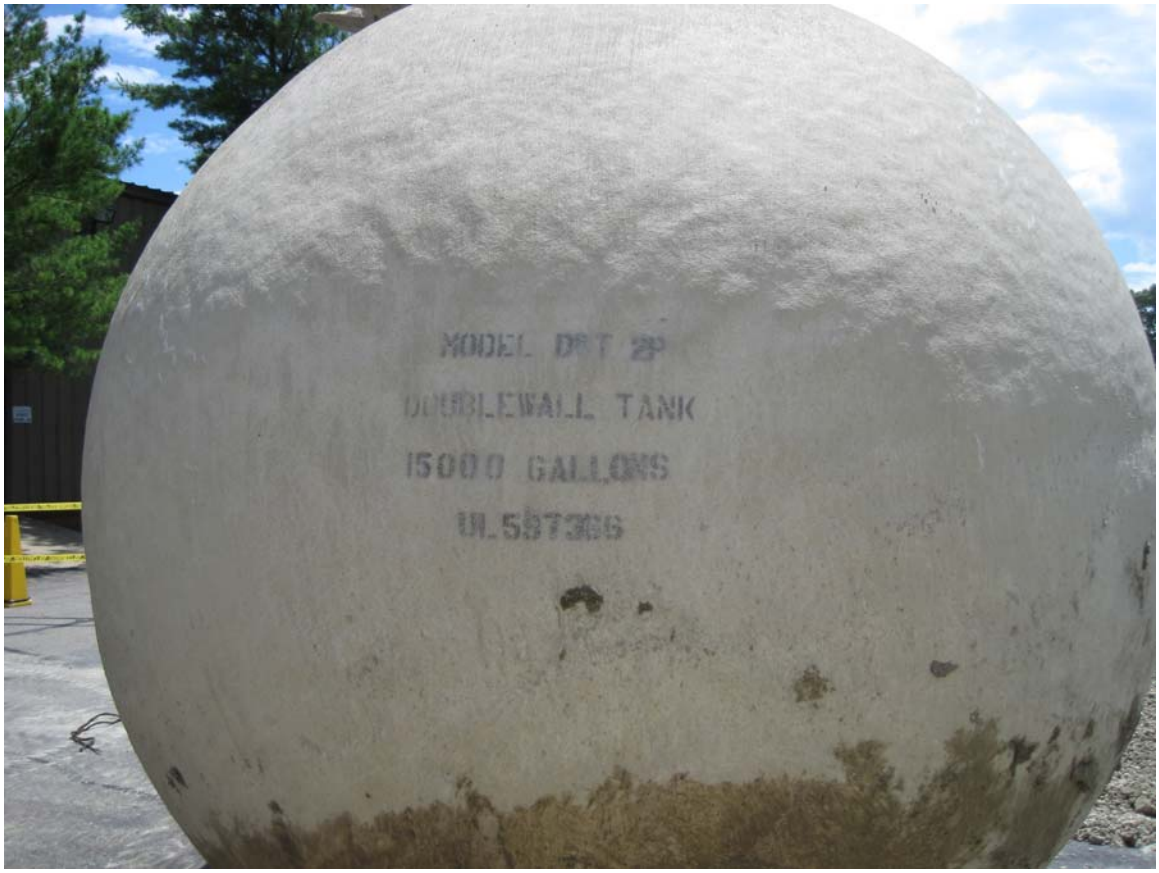

Photo 3 – AOC-1 UST

Photo 4 – AOC-1 UST Excavation

Photo 5 – AOC-1 Piping

Photo 6 – AOC-2B UST

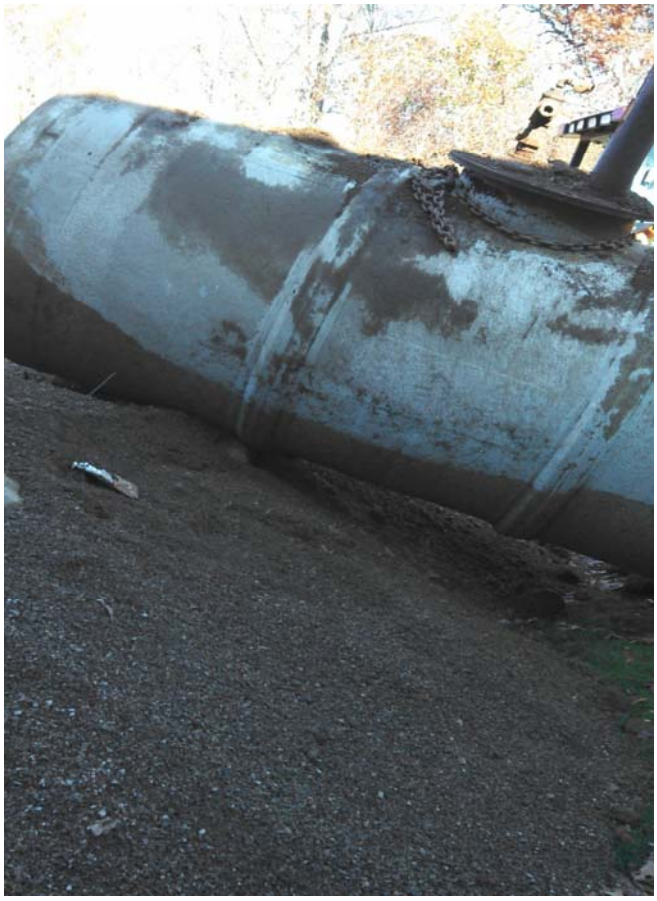

Photo 7 – AOC-2C UST

Photo 8 – AOC-2 Piping

APPENDIX 2

Diesel Fuel Oil Disposal Documentation

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: ~~MP5084037656~~ MAD 001947965
2. Page 1 of 1
3. Emergency Response Phone: 800 240-5540
4. Manifest Tracking Number: 009746816 JJK

5. Generator's Name and Mailing Address
WATERS CORPORATION
34 MAPLE STREET MILFORD MA 01757
Generator's Phone: ~~508 482 3656~~ 508 478 2000

Generator's Site Address (if different than mailing address): SAME

6. Transporter 1 Company Name: WESTERN OIL, INC. — U.S. EPA ID Number: R I R 0 0 0 5 0 0 0 2 5

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
WESTERN OIL
ONE DUCHESS WAY
LINCOLN RI 02865
Facility's Phone: 401 727-8600
U.S. EPA ID Number: R I R 0 0 0 5 0 0 0 2 5

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. COMBUSTIBLE LIQUID, N.O.S. (PETROLEUM OILS), NA 1993, PG III	0 0 1	TT	401	G	MA98	R014	
	2.							
	3.							
	4.							

14. Special Handling Instructions and Additional Information: 1) ERG#128

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Michael Matte — Signature: [signature] — Month 6 Day 29 Year 12

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Brad Morse — Signature: Brad Morse — Month 6 Day 29 Year 12
Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. H061 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in item 18a
Printed/Typed Name: Todd Beaches — Signature: [signature] — Month 6 Day 29 Year 12

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: MAD001047968
2. Page 1 of: 1
3. Emergency Response Phone: 800-241-5540
4. Manifest Tracking Number: 009849006 JJK

5. Generator's Name and Mailing Address
WATERS CORP
34 MAPLE ST, MILFORD MA 01757
Generator's Phone: 508-478-2000

Generator's Site Address (if different than mailing address): SAME

6. Transporter 1 Company Name: WESTERN OIL, INC. — U.S. EPA ID Number: RIR000500025

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
WESTERN OIL, INC.
ONE DUCHESS WAY - LINCOLN, RI 02865
Facility's Phone: (401) 727-8500 — U.S. EPA ID Number: RIR000500025

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. COMBUSTIBLE LIQUID, N.O.S. (PETROLEUM OILS) NA 1993, PG III	0001	TT	88	G	MA99 R014
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
1) ERG# 128

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Roger Espenbeck — Signature: [signature] — Month 11 Day 9 Year 12

INT'L
16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER
17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Brad Morse — Signature: Brad Morse — Month 11 Day 9 Year 12
Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY
18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator) — Month Day Year
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.
20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name: Brian Kilcoyne — Signature: Brian Kilcoyne — Month 11 Day 9 Year 12

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete. **DESIGNATED FACILITY'S COPY**

APPENDIX 3

Tank Removal and Transportation Permit

Make application to local Fire Department
Fire Department retains original application and issues duplicate as Permit

The Commonwealth of Massachusetts

DEPARTMENT OF FIRE SERVICES-BOARD OF FIRE PREVENTION

APPLICATION and PERMIT

Fee: $ 200.00

for storage tank removal and transportation to approved tank disposal yard in accordance with the provisions of M.G.L. Chapter 148, Section 38A, 527 CMR 9.00, application is hereby made by:

Tank Owner

Tank owner name (please print) WATERS CORPORATION X _____ Signature (if applying in person)

Address 34 MAPLE STREET (Street) MILFORD (city) MA (State) 01757 (Zip)

Removal Contractor

Company Name NORTHEAST TANK (Print)

Address 150 TURNPIKE STREET, STOUGHTON (Print)

Signature (if applying for permit)

[X] IFCI Certified Other _____

Contamination Assessment

Co. or individual CAPACCID ENGINEERING (Print)

Address 293 BOSTON POST ROAD, MARLBORO, MA (Print)

Signature (if applying for permit)

[ ] IFCI Certified LSP # _____ Other _____

Tank Information

Tank Location 34 MAPLE STREET (Street Address)

Tank Capacity (gallons) 15,000 #1 Substance last stored #2 FUEL OIL (City)

Tank Dimensions (diameter x length) 120" X 350"

Remarks:

Disposal information

Firm transporting waste WESTERN OIL State Lic. # MA 52

Hazardous waste manifest # 009746816JJK E.P.A # RIR000500025

Approved tank disposal yard ALLIED RECYCLING Tank yard # 015

Type of inert gas DRY ICE Tank yard address 1901 MAIN ST., WALPOLE, MA 02081

Approvals

City or Town **MILFORD, MA** FDID # **27185** Permit # 595

Date of issue 6/27/12 Date of expiration 7/27/2012

Dig safe number **N/A** Dig Safe Toll Free Tel. Number - 800-322-4844

Signature / Title of Officer granting permit John P. Toohey FIRE CHIEF (Title)

After removal(s) send Form FP-290R signed by Local Fire Department to UST Regulatory Compliance Unit, One Ashburton Place, Room 1310, Boston, MA 02108-1618

FORM F.P. 292 (REV. 9/96)

Make application to local Fire Department
Fire Department retains original application and issues duplicate as Permit

The Commonwealth of Massachusetts

DEPARTMENT OF FIRE SERVICES-BOARD OF FIRE PREVENTION

APPLICATION and PERMIT

Fee: $ 200.00

for storage tank removal and transportation to approved tank disposal yard in accordance with the provisions of M.G.L. Chapter 148, Section 38A, 527 CMR 9.00, application is hereby made by:

Tank Owner

Tank owner name (please print) WATERS CORPORATION x _____ Signature (if applying in person)

Address 34 MAPLE STREET (Street) MILFORD (city) MA (State) 01757 (Zip)

Removal Contractor

Company Name NORTHEAST TANK (Print)

Address 150 TURNPIKE STREET, STOUGHTON (Print)

Signature (if applying for permit)

[X] IFCI Certified Other _____

Contamination Assessment

Co. or individual CAPACCID ENGINEERING (Print)

Address 293 BOSTON POST ROAD, MARLBORO, MA (Print)

Signature (if applying for permit)

[ ] IFCI Certified LSP # _____ Other _____

Tank Information

Tank Location 34 MAPLE STREET (Street Address)

Tank Capacity (gallons) 15,000 #2 Substance last stored #2 FUEL OIL (City)

Tank Dimensions (diameter x length) 120" X 350"

Remarks:

Disposal information

Firm transporting waste WESTERN OIL State Lic. # MA 52

Hazardous waste manifest # 009746816JJK E.P.A # RIR000500025

Approved tank disposal yard ALLIED RECYCLING Tank yard # 015

Type of inert gas DRY ICE Tank yard address 1901 MAIN ST., WALPOLE, MA 02081

Approvals

City or Town **MILFORD, MA** FDID # **27185** Permit # 596

Date of issue 6/27/12 Date of expiration 7/27/2012

Dig safe number **N/A** Dig Safe Toll Free Tel. Number - 800-322-4844

Signature / Title of Officer granting permit FIRE CHIEF (Title)

After removal(s) send Form FP-290R signed by Local Fire Department to UST Regulatory Compliance Unit, One Ashburton Place, Room 1310, Boston, MA 02108-1618

FORM F.P. 292 (REV. 9/96)

Fire Department retains original application and issues duplicate as Permit

The Commonwealth of Massachusetts

DEPARTMENT OF FIRE SERVICES-BOARD OF FIRE PREVENTION

APPLICATION and PERMIT

Fee: $ 200.00

for storage tank removal and transportation to approved tank disposal yard in accordance with the provisions of M.G.L. Chapter 148, Section 38A, 527 CMR 9.00, application is hereby made by:

Tank Owner

Tank owner name (please print) WATERS CORPORATION x [signature] Signature (if applying in person)

Address 34 MAPLE STREET (Street) MILFORD (city) MA (State) 01757 (Zip)

Removal Contractor

Company Name NORTHEAST TANK (Print)

Address 150 TURNPIKE STREET, STOUGHTON (Print)

Signature (if applying for permit)

☒ IFCI Certified Other

Contamination Assessment

Co. or individual CAPACCID ENGINEERING (Print)

Address 293 BOSTON POST ROAD, MARLBORO, MA (Print)

Signature (if applying for permit)

☐ IFCI Certified LSP # Other

Tank Information

Tank Location 5 TECHNOLOGY DRIVE (Street Address)

Tank Capacity (gallons) 1,000 GAL Substance last stored #2 FUEL OIL (City)

Tank Dimensions (diameter x length)

Remarks:

Disposal information

Firm transporting waste WESTERN OIL State Lic. # MA 52

Hazardous waste manifest # 010438896JJK E.P.A # RIR000500025

Approved tank disposal yard ALLIED RECYCLING Tank yard # 015

Type of inert gas DRY ICE Tank yard address 1901 MAIN ST., WALPOLE, MA 02081

Approvals

City or Town **MILFORD, MA** FDID # **27185** Permit # 609

Date of Issue 11/02/2012 Date of expiration 12/2/2012

Dig safe number **N/A** Dig Safe Toll Free Tel. Number - 800-322-4844

Signature / Title of Officer granting permit John P. Tourkey FIRE CHIEF (Title)

After removal(s) send Form FP-290R signed by Local Fire Department to UST Regulatory Compliance Unit, One Ashburton Place, Room 1310, Boston, MA 02108-1618

FORM F.P. 292 (REV. 9/96)

Fire Department retains original application and issues duplicate as Permit

The Commonwealth of Massachusetts

DEPARTMENT OF FIRE SERVICES-BOARD OF FIRE PREVENTION

APPLICATION and PERMIT

Fee: $ 200.00

for storage tank removal and transportation to approved tank disposal yard in accordance with the provisions of M.G.L. Chapter 148, Section 38A, 527 CMR 9.00, application is hereby made by:

Tank Owner

Tank owner name (please print) WATERS CORPORATION X _____ Signature (if applying in person)

Address 34 MAPLE STREET (Street) MILFORD (city) MA (State) 01757 (Zip)

Removal Contractor

Company Name NORTHEAST TANK (Print)

Address 150 TURNPIKE STREET, STOUGHTON (Print)

Signature (if applying for permit)

[X] IFCI Certified Other _____

Contamination Assessment

Co. or individual CAPACCID ENGINEERING (Print)

Address 293 BOSTON POST ROAD, MARLBORO, MA (Print)

Signature (if applying for permit)

[ ] IFCI Certified LSP # _____ Other _____

Tank Information

Tank Location 5 TECHNOLOGY DRIVE (Street Address)

Tank Capacity (gallons) 2000 GAL Substance last stored #2 FUEL OIL (City)

Tank Dimensions (diameter x length)

Remarks:

Disposal information

Firm transporting waste WESTERN OIL State Lic. # MA 52

Hazardous waste manifest # 010438896JJK E.P.A # RIR000500025

Approved tank disposal yard ALLIED RECYCLING Tank yard # 015

Type of inert gas DRY ICE Tank yard address 1901 MAIN ST., WALPOLE, MA 02081

Approvals

City or Town **MILFORD, MA** FDID # **27185** Permit # 610

Date of issue 11/02/2012 Date of expiration 12/2/2012

Dig safe number N/A Dig Safe Toll Free Tel. Number - 800-322-4844

Signature / Title of Officer granting permit John P. Tourhey FIRE CHIEF (Title)

After removal(s) send Form FP-290R signed by Local Fire Department to UST Regulatory Compliance Unit, One Ashburton Place, Room 1310, Boston, MA 02108-1618

FORM F.P. 292 (REV. 9/96)

APPENDIX 4

Soil Analytical Data

R.I. ANALYTICAL

Specialists in Environmental Services

41 Illinois Avenue
Warwick, RI 02888
Telephone: 401-737-8500
Fax: 401-738-1970

FACSIMILE TRANSMITTAL FORM

TO: Dawn Archer

DATE: 7/6 TIME: 2:00 # OF PAGES (INCLUDING TRANSMITTAL): _____

FAX #: 508-970-0028 PH #: _____

COMMENT/S:

Note: This message is intended only for the use of the individual or entity name/s above and may contain information that is privileged, confidential, and exempt from disclosure under the applicable law. If you are not the intended recipient or the employee or agent responsible for delivering the message to the intended recipient please notify us immediately by telephone and return the original to us by postal service at the address note on this stationary. Any dissemination, distribution, or copying of this communication by anyone other than the intended recipient is strictly prohibited. Thank you!

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 6/27/12
Date Reported: 7/6/12
P.O. #:
Work Order #: 1206-13061

DESCRIPTION: WATERS MILFORD

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<2.5	2.5	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 001
SAMPLE DESCRIPTION: MW1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 09:22

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	101		70-130%	5035/8260B	7/6/12	KAC
Moisture	9		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<4.4	4.4	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.22	0.22	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.44	0.44	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 002
SAMPLE DESCRIPTION: SB3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	91		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	91		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	94		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	93		70-130%	5035/8260B	7/6/12	KAC
Moisture	9		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.08	0.08	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.08	0.08	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<3.9	3.9	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.19	0.19	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.39	0.39	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.04	0.04	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 003
SAMPLE DESCRIPTION: SB4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	100		70-130%	5035/8260B	7/6/12	KAC
Moisture	7		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<5.1	5.1	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 004
SAMPLE DESCRIPTION: MW2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 11:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	97		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	95		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	101		70-130%	5035/8260B	7/6/12	KAC
Moisture	13		%	SM2540 G.	6/28/12	KF

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.10	0.10	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<5.1	5.1	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.25	0.25	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.51	0.51	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 005
SAMPLE DESCRIPTION: MW4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 14:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	98		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	98		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	103		70-130%	5035/8260B	7/6/12	KAC
Moisture	16		%	SM2540 G.	6/28/12	KF

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/2/12	EC
Benzene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Toluene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Ethylbenzene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
m,p-Xylene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
o-Xylene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Naphthalene	<0.31	0.31	mg/kg dry	MADEP	7/2/12	EC
Adjusted C5-C8 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Adjusted C9-C12 Aliphatics(FID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
C9-C10 Aromatics(PID)	<3.1	3.1	mg/kg dry	MADEP	7/2/12	EC
Moisture	8		%	SM2540 G.	6/28/12	KF
Surrogate			RANGE		7/2/12	EC
2,5-Dibromotoluene(PID)	96		70-130%	MADEP	7/2/12	EC
2,5-Dibromotoluene(FID)	97		70-130%	MADEP	7/2/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
Target PAH Analytes					6/29/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Moisture	8		%	SM2540 G.	6/28/12	KF
Extraction Surrogates			RANGE		6/29/12	TCL
Chloro-octadecane	65		40-140%	MADEP	6/29/12	TCL
Ortho-terphenyl	73		40-140%	MADEP	6/29/12	TCL
Fractionation Surrogates			RANGE		6/29/12	TCL
2-Fluorobiphenyl	86		40-140%	MADEP	6/29/12	TCL
2-Bromonaphthalene	74		40-140%	MADEP	6/29/12	TCL
Extraction date	Extracted			MADEP	6/28/12	THP
Volatile Organic Compounds						
Acetone	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.09	0.09	mg/kg dry	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2,2-Dichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<4.7	4.7	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.24	0.24	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.47	0.47	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

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Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 006
SAMPLE DESCRIPTION: MW3
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 13:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC
Dibromofluoromethane	100		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	93		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	103		70-130%	5035/8260B	7/6/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/2/12	EC
Benzene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Toluene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Ethylbenzene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
m,p-Xylene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
o-Xylene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Naphthalene	<0.13	0.13	mg/kg dry	MADEP	7/2/12	EC
Adjusted C5-C8 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Adjusted C9-C12 Aliphatics(FID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
C9-C10 Aromatics(PID)	<1.3	1.3	mg/kg dry	MADEP	7/2/12	EC
Moisture	9		%	SM2540 G.	6/28/12	KF
Surrogate			RANGE		7/2/12	EC
2,5-Dibromotoluene(PID)	90		70-130%	MADEP	7/2/12	EC
2,5-Dibromotoluene(FID)	92		70-130%	MADEP	7/2/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	6/29/12	TCL
Target PAH Analytes					6/29/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	7/5/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	6/29/12	TCL
Moisture	9		%	SM2540 G.	6/28/12	KF
Extraction Surrogates			RANGE		6/29/12	TCL
Chloro-octadecane	54		40-140%	MADEP	6/29/12	TCL
Ortho-terphenyl	66		40-140%	MADEP	6/29/12	TCL
Fractionation Surrogates			RANGE		6/29/12	TCL
2-Fluorobiphenyl	81		40-140%	MADEP	6/29/12	TCL
2-Bromonaphthalene	75		40-140%	MADEP	6/29/12	TCL
Extraction date	Extracted			MADEP	6/28/12	THP
Volatile Organic Compounds						
Acetone	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Tertiary Amyl Methyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Benzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromodichloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromoform	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Bromomethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Sec-butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
n-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
tert-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Disulfide	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Carbon Tetrachloride	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Chloroform	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Chloromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
2-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
4-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dibromoethane(EDB)	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12
Work Order #: 1206-13061
WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
n-Propylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Dichlorodifluoromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,2-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,2-Dichloroethylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,3-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
cis-1,3-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
trans-1,3-Dichloropropylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Diethyl ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Diisopropyl Ether (DIPE)	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
1,4-Dioxane	<2.6	2.6	mg/kg dry	5035/8260B	7/6/12	KAC
Ethyl Tertiary Butyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/6/12	KAC
Ethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Hexachlorobutadiene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2-Hexanone	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Isopropylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
p-Isopropyltoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
2-Butanone(MEK)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Methylene Chloride	<0.06	0.06	mg/kg dry	5035/8260B	7/6/12	KAC
Naphthalene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Styrene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,2,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrachloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Tetrahydrofuran	<0.26	0.26	mg/kg dry	5035/8260B	7/6/12	KAC
Toluene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 6/27/12

Work Order #: 1206-13061

WATERS MILFORD

Sample # 007
SAMPLE DESCRIPTION: MW6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 6/26/2012 @ 16:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,1,1-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Trichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Trichlorofluoromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,3-Trichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,2,4-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
1,3,5-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Vinyl Chloride	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
o-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
m,p-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/6/12	KAC
Surrogates			RANGE	5035/8260B	7/6/12	KAC
Dibromofluoromethane	99		70-130%	5035/8260B	7/6/12	KAC
Toluene-d8	97		70-130%	5035/8260B	7/6/12	KAC
4-Bromofluorobenzene	94		70-130%	5035/8260B	7/6/12	KAC
1,2 Dichloroethane-d4	102		70-130%	5035/8260B	7/6/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

Customer Name : Capaccio Environmental Eng.

W.O. Number 1206-13061

MassDEP Analytical Protocol Certification Form

Laboratory Name: R.I. Analytical Laboratories Work Order No: 1206-13061

Project / Location: WATERS MILFORD RTN :

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):

1206-13061-001 through 1206-13061-007

Matrices: ☐ Groundwater/Surface Water ☒ Soil / Sediment ☐ Drinking Water ☐ Air ☐ Other

CAM Protocol (check all that apply below)

8260 VOC CAM II A ☒	7470/7471 Hg CAM III B ☐	MassDEP VPH CAM IV A ☒	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM VIII B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

Data User Note: *Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were all QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature: Position: QA/QC Director

Printed Name: Mike Hobin Date: 7/6/12

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)			
C9-C18 Aliphatics	mg/kg dry	<20	6/29/2012
C19-C36 Aliphatics	mg/kg dry	<20	6/29/2012
C11-C22 Aromatics	mg/kg dry	<20	6/29/2012
Target PAH Analytes			6/29/2012
Naphthalene	mg/kg dry	<0.4	6/29/2012
2-Methylnaphthalene	mg/kg dry	<0.4	6/29/2012
Acenaphthylene	mg/kg dry	<0.4	6/29/2012
Acenaphthene	mg/kg dry	<0.4	6/29/2012
Fluorene	mg/kg dry	<0.4	6/29/2012
Phenanthrene	mg/kg dry	<0.4	6/29/2012
Anthracene	mg/kg dry	<0.4	6/29/2012
Fluoranthene	mg/kg dry	<0.4	7/2/2012
Pyrene	mg/kg dry	<0.4	6/29/2012
Benzo(a)anthracene	mg/kg dry	<0.4	6/29/2012
Chrysene	mg/kg dry	<0.4	6/29/2012
Benzo(b)fluoranthene	mg/kg dry	<0.4	6/29/2012
Benzo(k)fluoranthene	mg/kg dry	<0.4	6/29/2012
Benzo(a)pyrene	mg/kg dry	<0.4	6/29/2012
Indeno(1,2,3-cd)pyrene	mg/kg dry	<0.4	6/29/2012
Dibenzo(a,h)anthracene	mg/kg dry	<0.4	6/29/2012
Benzo(g,h,i)perylene	mg/kg dry	<0.4	6/29/2012
Extraction Surrogates	**RANGE**		6/29/2012
Chloro-octadecane	40-140%	66	6/29/2012
Ortho-terphenyl	40-140%	72	6/29/2012
Fractionation Surrogates	**RANGE**		6/29/2012
2-Fluorobiphenyl	40-140%	75	6/29/2012
2-Bromonaphthalene	40-140%	69	6/29/2012
Volatile Petroleum Hydrocarbons (Soil)			
Unadj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
Unadj C9-C12 Aliphatic(FID)	mg/kg dry	<2.5	7/2/2012
Methyl-tert-butylether	mg/kg dry	<0.10	7/2/2012
Benzene	mg/kg dry	<0.25	7/2/2012
Toluene	mg/kg dry	<0.25	7/2/2012
Ethylbenzene	mg/kg dry	<0.25	7/2/2012
m,p-Xylene	mg/kg dry	<0.25	7/2/2012
o-Xylene	mg/kg dry	<0.25	7/2/2012
Naphthalene	mg/kg dry	<0.25	7/2/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Volatile Petroleum Hydrocarbons (Soil) (cont'd)			
Adj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
Adj C9-C12 Aliphatics(FID)	mg/kg dry	<2.5	7/2/2012
C9-C10 Aromatics(PID)	mg/kg dry	<2.5	7/2/2012
Surrogate	**RANGE**		7/2/2012
2,5-Dibromotoluene(PID)	70-130%	110	7/2/2012
2,5-Dibromotoluene(FID)	70-130%	110	7/2/2012
5035(Soil)			
Acetone	mg/kg dry	<0.50	7/6/2012
Tertiary Amyl Methyl Ether	mg/kg dry	<0.25	7/6/2012
Benzene	mg/kg dry	<0.05	7/6/2012
Bromobenzene	mg/kg dry	<0.05	7/6/2012
Bromochloromethane	mg/kg dry	<0.05	7/6/2012
Bromodichloromethane	mg/kg dry	<0.05	7/6/2012
Bromoform	mg/kg dry	<0.05	7/6/2012
Bromomethane	mg/kg dry	<0.25	7/6/2012
Sec-butylbenzene	mg/kg dry	<0.05	7/6/2012
n-Butylbenzene	mg/kg dry	<0.05	7/6/2012
tert-Butylbenzene	mg/kg dry	<0.05	7/6/2012
Carbon Disulfide	mg/kg dry	<0.25	7/6/2012
Carbon Tetrachloride	mg/kg dry	<0.05	7/6/2012
Chlorobenzene	mg/kg dry	<0.05	7/6/2012
Dibromochloromethane	mg/kg dry	<0.05	7/6/2012
Chloroethane	mg/kg dry	<0.25	7/6/2012
Chloroform	mg/kg dry	<0.05	7/6/2012
Chloromethane	mg/kg dry	<0.25	7/6/2012
2-Chlorotoluene	mg/kg dry	<0.05	7/6/2012
4-Chlorotoluene	mg/kg dry	<0.05	7/6/2012
1,2-Dibromo-3-Chloropropane	mg/kg dry	<0.10	7/6/2012
1,2-Dibromoethane(EDB)	mg/kg dry	<0.05	7/6/2012
Dibromomethane	mg/kg dry	<0.10	7/6/2012
1,3-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,2-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,4-Dichlorobenzene	mg/kg dry	<0.05	7/6/2012
n-Propylbenzene	mg/kg dry	<0.05	7/6/2012
Dichlorodifluoromethane	mg/kg dry	<0.25	7/6/2012
1,1-Dichloroethane	mg/kg dry	<0.05	7/6/2012
1,2-Dichloroethane	mg/kg dry	<0.05	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
1,1-Dichloroethene	mg/kg dry	<0.05	7/6/2012
cis-1,2-Dichloroethene	mg/kg dry	<0.05	7/6/2012
trans-1,2-Dichloroethylene	mg/kg dry	<0.05	7/6/2012
1,2-Dichloropropane	mg/kg dry	<0.05	7/6/2012
1,3-Dichloropropane	mg/kg dry	<0.05	7/6/2012
2,2-Dichloropropane	mg/kg dry	<0.05	7/6/2012
1,1-Dichloropropene	mg/kg dry	<0.05	7/6/2012
cis-1,3-Dichloropropene	mg/kg dry	<0.05	7/6/2012
trans-1,3-Dichloropropylene	mg/kg dry	<0.05	7/6/2012
Diethyl ether	mg/kg dry	<0.25	7/6/2012
Diisopropyl ether (DIPE)	mg/kg dry	<0.25	7/6/2012
1,4-Dioxane	mg/kg dry	<5.0	7/6/2012
Ethyl Tertiary Butyl Ether	mg/kg dry	<0.25	7/6/2012
Ethylbenzene	mg/kg dry	<0.05	7/6/2012
Hexachlorobutadiene	mg/kg dry	<0.05	7/6/2012
2-Hexanone	mg/kg dry	<0.50	7/6/2012
Isopropylbenzene	mg/kg dry	<0.05	7/6/2012
p-Isopropyltoluene	mg/kg dry	<0.05	7/6/2012
2-Butanone(MEK)	mg/kg dry	<0.50	7/6/2012
4-Methyl-2-pentanone(MIBK)	mg/kg dry	<0.50	7/6/2012
MTBE	mg/kg dry	<0.05	7/6/2012
Methylene Chloride	mg/kg dry	<0.05	7/6/2012
Naphthalene	mg/kg dry	<0.05	7/6/2012
1,1,2-Trichloroethane	mg/kg dry	<0.05	7/6/2012
Styrene	mg/kg dry	<0.05	7/6/2012
1,1,1,2-Tetrachloroethane	mg/kg dry	<0.05	7/6/2012
1,1,2,2-Tetrachloroethane	mg/kg dry	<0.05	7/6/2012
Tetrachloroethene	mg/kg dry	<0.05	7/6/2012
Tetrahydrofuran	mg/kg dry	<0.50	7/6/2012
Toluene	mg/kg dry	<0.05	7/6/2012
1,2,4-Trichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,2,3-Trichlorobenzene	mg/kg dry	<0.05	7/6/2012
1,1,1-Trichloroethane	mg/kg dry	<0.05	7/6/2012
Trichloroethene	mg/kg dry	<0.05	7/6/2012
Trichlorofluoromethane	mg/kg dry	<0.05	7/6/2012
1,2,3-Trichloropropane	mg/kg dry	<0.05	7/6/2012
1,2,4-Trimethylbenzene	mg/kg dry	<0.05	7/6/2012
1,3,5-Trimethylbenzene	mg/kg dry	<0.05	7/6/2012
Vinyl Chloride	mg/kg dry	<0.05	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
o-Xylene	mg/kg dry	<0.05	7/6/2012
m,p-Xylene	mg/kg dry	<0.05	7/6/2012
Surrogates	**RANGE**		7/6/2012
Toluene-d8	70-130%	96	7/6/2012
Dibromofluoromethane	70-130%	100	7/6/2012
1,2 Dichloroethane-d4	70-130%	102	7/6/2012
4-Bromofluorobenzene	70-130%	92	7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)								
C9-C18 Aliphatics		20	12.8	64	12.5	63	2	6/29/2012
C19-C36 Aliphatics		27	22.7	84	22.1	82	3	6/29/2012
C11-C22 Aromatics		57	49.7	87	42.7	75	15	6/29/2012
Target PAH Analytes								
Naphthalene		3.33	2.15	65	1.87	56	14	6/29/2012
2-Methylnaphthalene		3.33	2.28	68	1.92	58	17	6/29/2012
Acenaphthylene		3.33	2.42	73	2.05	62	17	6/29/2012
Acenaphthene		3.33	2.47	74	2.14	64	14	6/29/2012
Fluorene		3.33	2.78	83	2.37	71	16	6/29/2012
Phenanthrene		3.33	2.98	89	2.58	77	14	6/29/2012
Anthracene		3.33	3.10	93	2.60	78	18	6/29/2012
Fluoranthene		3.33	3.41	102	3.10	93	10	7/5/2012
Pyrene		3.33	3.10	93	2.60	78	18	6/29/2012
Benzo(a)anthracene		3.33	3.18	95	2.68	80	17	6/29/2012
Chrysene		3.33	3.18	95	2.69	81	17	6/29/2012
Benzo(b)fluoranthene		3.33	2.88	86	2.64	79	9	6/29/2012
Benzo(k)fluoranthene		3.33	3.10	93	2.72	82	13	6/29/2012
Benzo(a)pyrene		3.33	3.18	95	2.69	81	17	6/29/2012
Indeno(1,2,3-cd)pyrene		3.33	2.88	86	2.51	75	14	6/29/2012
Dibenzo(a,h)anthracene		3.33	3.46	104	2.81	84	21	6/29/2012
Benzo(g,h,i)perylene		3.33	3.15	95	2.67	80	16	6/29/2012
Extraction Surrogates								
Chloro-octadecane			74		65			
Ortho-terphenyl			89		73			
Fractionation Surrogates								
2-Fluorobiphenyl			86		74			
2-Bromonaphthalene			77		65			
Volatile Petroleum Hydrocarbons (Soil)								
Methyl-tert-butylether		2.5	3.03	121	3.02	121	0	7/2/2012
Benzene		2.5	2.33	93	2.29	92	2	7/2/2012
Toluene		2.5	2.49	100	2.50	100	0	7/2/2012
Ethylbenzene		2.5	2.64	106	2.66	106	1	7/2/2012
m,p-Xylene		5.0	5.50	110	5.55	111	1	7/2/2012
o-Xylene		2.5	2.66	106	2.67	107	0	7/2/2012
Naphthalene		2.5	2.77	111	2.86	114	3	7/2/2012
Adj C5-C8 Aliphatics(FID)		7.5	7.68	102	7.17	96	7	7/2/2012
Adj C9-C12 Aliphatics(FID)		5.0	4.42	88	4.50	90	2	7/2/2012
C9-C10 Aromatics(PID)		2.5	2.69	108	2.67	107	1	7/2/2012
Surrogate								
2,5-Dibromotoluene(PID)			81		100			
2,5-Dibromotoluene(FID)			83		99			
5035(Soil)								
Acetone		25	28	112	25	100	11	7/6/2012
Tertiary Amyl Methyl Ether		2.5	2.6	104	2.4	96	8	7/6/2012
Benzene		2.5	2.7	108	2.5	100	8	7/6/2012
Bromobenzene		2.5	2.6	104	2.3	92	12	7/6/2012
Bromochloromethane		2.5	2.7	108	2.4	96	12	7/6/2012
Bromodichloromethane		2.5	2.9	116	2.5	100	15	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
Bromoform		2.5	2.7	108	2.5	100	8	7/6/2012
Bromomethane		2.5	2.5	100	2.7	108	8	7/6/2012
Sec-butylbenzene		2.5	2.8	112	2.5	100	11	7/6/2012
n-Butylbenzene		2.5	2.6	104	2.5	100	4	7/6/2012
tert-Butylbenzene		2.5	2.6	104	2.6	104	0	7/6/2012
Carbon Disulfide		2.5	2.7	108	2.5	100	8	7/6/2012
Carbon Tetrachloride		2.5	3.1	124	2.6	104	18	7/6/2012
Chlorobenzene		2.5	2.6	104	2.5	100	4	7/6/2012
Dibromochloromethane		2.5	2.9	116	2.5	100	15	7/6/2012
Chloroethane		2.5	2.8	112	2.6	104	7	7/6/2012
Chloroform		2.5	2.8	112	2.4	96	15	7/6/2012
Chloromethane		2.5	2.5	100	2.2	88	13	7/6/2012
2-Chlorotoluene		2.5	2.9	116	2.6	104	11	7/6/2012
4-Chlorotoluene		2.5	2.7	108	2.4	96	12	7/6/2012
1,2-Dibromo-3-Chloropropane		2.5	2.5	100	2.6	104	4	7/6/2012
1,2-Dibromoethane(EDB)		2.5	2.7	108	2.4	96	12	7/6/2012
Dibromomethane		2.5	2.4	96	2.4	96	0	7/6/2012
1,3-Dichlorobenzene		2.5	2.5	100	2.5	100	0	7/6/2012
1,2-Dichlorobenzene		2.5	2.5	100	2.5	100	0	7/6/2012
1,4-Dichlorobenzene		2.5	2.5	100	2.4	96	4	7/6/2012
n-Propylbenzene		2.5	2.8	112	2.5	100	11	7/6/2012
Dichlorodifluoromethane		2.5	2.5	100	2.1	84	17	7/6/2012
1,1-Dichloroethane		2.5	2.8	112	2.5	100	11	7/6/2012
1,2-Dichloroethane		2.5	2.9	116	2.5	100	15	7/6/2012
1,1-Dichloroethene		2.5	2.9	116	2.6	104	11	7/6/2012
cis-1,2-Dichloroethene		2.5	2.9	116	2.5	100	15	7/6/2012
trans-1,2-Dichloroethylene		2.5	2.7	108	2.5	100	8	7/6/2012
1,2-Dichloropropane		2.5	2.8	112	2.6	104	7	7/6/2012
1,3-Dichloropropane		2.5	2.8	112	2.5	100	11	7/6/2012
2,2-Dichloropropane		2.5	2.6	104	2.2	88	17	7/6/2012
1,1-Dichloropropene		2.5	2.9	116	2.5	100	15	7/6/2012
cis-1,3-Dichloropropene		2.5	2.7	108	2.4	96	12	7/6/2012
trans-1,3-Dichloropropylene		2.5	2.7	108	2.4	96	12	7/6/2012
Diethyl ether		25	26	104	24	96	8	7/6/2012
Diisopropyl ether (DIPE)		2.5	2.6	104	2.5	100	4	7/6/2012
1,4-Dioxane		50	55	110	58	116	5	7/6/2012
Ethyl Tertiary Butyl Ether		2.5	2.8	112	2.5	100	11	7/6/2012
Ethylbenzene		2.5	2.6	104	2.5	100	4	7/6/2012
Hexachlorobutadiene		2.5	2.4	96	2.6	104	8	7/6/2012
2-Hexanone		25	26	104	24	96	8	7/6/2012
Isopropylbenzene		2.5	2.7	108	2.5	100	8	7/6/2012
p-Isopropyltoluene		2.5	2.7	108	2.5	100	8	7/6/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1206-13061
Date: 7/6/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
2-Butanone(MEK)		25	24	96	22	88	9	7/6/2012
4-Methyl-2-pentanone(MIBK)		25	26	104	23	92	12	7/6/2012
MTBE		2.5	2.5	100	2.4	96	4	7/6/2012
Methylene Chloride		2.5	3.0	120	2.7	108	11	7/6/2012
Naphthalene		2.5	2.1	84	2.4	96	13	7/6/2012
1,1,2-Trichloroethane		2.5	2.7	108	2.4	96	12	7/6/2012
Styrene		2.5	2.7	108	2.6	104	4	7/6/2012
1,1,1,2-Tetrachloroethane		2.5	2.7	108	2.5	100	8	7/6/2012
1,1,2,2-Tetrachloroethane		2.5	2.5	100	2.4	96	4	7/6/2012
Tetrachloroethene		2.5	2.9	116	2.5	100	15	7/6/2012
Tetrahydrofuran		25	25	100	23	92	8	7/6/2012
Toluene		2.5	2.7	108	2.5	100	8	7/6/2012
1,2,4-Trichlorobenzene		2.5	2.5	100	2.7	108	8	7/6/2012
1,2,3-Trichlorobenzene		2.5	2.2	88	2.6	104	17	7/6/2012
1,1,1-Trichloroethane		2.5	2.9	116	2.5	100	15	7/6/2012
Trichloroethene		2.5	2.8	112	2.5	100	11	7/6/2012
Trichlorofluoromethane		2.5	3.0	120	2.5	100	18	7/6/2012
1,2,3-Trichloropropane		2.5	2.7	108	2.4	96	12	7/6/2012
1,2,4-Trimethylbenzene		2.5	2.7	108	2.5	100	8	7/6/2012
1,3,5-Trimethylbenzene		2.5	2.7	108	2.4	96	12	7/6/2012
Vinyl Chloride		2.5	2.7	108	2.6	104	4	7/6/2012
o-Xylene		2.5	2.7	108	2.5	100	8	7/6/2012
m,p-Xylene		5.0	5.3	106	5.0	100	6	7/6/2012
Surrogates								
Toluene-d8			103		101			
Dibromofluoromethane			105		100			
1,2 Dichloroethane-d4			99		99			
4-Bromofluorobenzene			105		100			

Case Narrative

Date: 7/6/2012

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Project:

RIAL WO#: 1206-13061

All QA/QC procedures required by the VPH Method were followed. All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated. No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed. All performance/acceptance standards for the required QA/QC procedures were achieved or otherwise stated in this case narrative. A fractionation check was performed on the silica gel lot associated with this sample and found to pass the method criteria unless otherwise stated here. The data reported for this sample was not corrected for instrument/solvent baseline effects. No significant modifications were made to the EPH Method.

There were no exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
QA/QC Director

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	VOC	EPH w/ targets	VPH
6/26	922	MW1	G	2V	M	S	X		
6/26	1015	SB3	G	2V	M	S	X		
6/26	1015	SB4	G	2V	M	S	X		
6/26	1115	MW2	G	2V	M	S	X		
6/26	1115	MW X (Hold)	G	2V	M	S	HOLD		
6/26	245	MW4	G	2V	M	S	X		
6/26	115	MW3	G	4V	M	S	X		X
6/26	115	MW3	G	1G	NP	S		X	
6/26	430	MW6	G	4V	M	S	X		X
6/26	430	MW6	G	1G	NP	S		X	

22 BT

Client Information		Project Information	
Company Name:	Capaccio Env Eng	Project Name:	Waters Milford
Address:	293 Boston Post Road West	P.O. Number:	Project Number:
City / State / Zip:	Marlboro MA 01752	Report To: Dawn Horter	Phone: Fax
Telephone:	508-970-0033 ~~x100~~ Fax:	Sampled By: Josh Fawson	Email report to these addresses: dhorter@capaccio.com
Contact Person:	Dawn Horter	Quote No:	

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
	6-27-12	15:44		6-27-12	15:44
	6-27-12	16:21		6-27-12	16:21
	6/27/12	18:15		6/27/12	18:15

Turn Around Time

X	Normal	X	EMAIL Report
	5 Business days. Possible surcharge		
	Rush – Date Due: ___/___/___		

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, (S-1), S-2, S-3 MCP Data Enhancement QC Package? (Yes) No

12061346

12061362

Temp. Upon Receipt 1.7 °C

Lab Use Only

- ✓ Sample Pick-Up Only
- RIAL sampled; attach field hours
- ✓ Shipped on ice
- Workorder No: 12061361

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 7/3/12
Date Reported: 7/12/12
P.O. #:
Work Order #: 1207-13571

DESCRIPTION: WATERS

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12

Work Order #: 1207-13571

WATERS

Sample # 001
SAMPLE DESCRIPTION: PE1, PE3, PE4, PE5, PE6, PE7 LAB COMPOSITE
SAMPLE TYPE: MULTI GRAB/COMPOSITE **SAMPLE DATE/TIME:** 7/02/2012 - 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<1.4	1.4	mg/kg dry	MADEP	7/6/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<1.4	1.4	mg/kg dry	MADEP	7/6/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/6/12	EC
Benzene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
Toluene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
Ethylbenzene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
m,p-Xylene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
o-Xylene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
Naphthalene	<0.14	0.14	mg/kg dry	MADEP	7/6/12	EC
Adjusted C5-C8 Aliphatics(FID)	<1.4	1.4	mg/kg dry	MADEP	7/6/12	EC
Adjusted C9-C12 Aliphatics(FID)	<1.4	1.4	mg/kg dry	MADEP	7/6/12	EC
C9-C10 Aromatics(PID)	<1.4	1.4	mg/kg dry	MADEP	7/6/12	EC
Moisture	9		%	SM2540 G.	7/6/12	RJL
Surrogate			RANGE		7/6/12	EC
2,5-Dibromotoluene(PID)	100		70-130%	MADEP	7/6/12	EC
2,5-Dibromotoluene(FID)	101		70-130%	MADEP	7/6/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
Target PAH Analytes					7/11/12	JEB
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Fluorene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Anthracene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Fluoranthene	1.2	0.4	mg/kg dry	MADEP	7/11/12	JEB
Pyrene	0.7	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(a)anthracene	0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Chrysene	0.6	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(b)fluoranthene	0.6	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(k)fluoranthene	0.5	0.4	mg/kg dry	MADEP	7/11/12	JEB

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 001
SAMPLE DESCRIPTION: PE1, PE3, PE4, PE5, PE6, PE7 LAB COMPOSITE
SAMPLE TYPE: MULTI GRAB/COMPOSITE **SAMPLE DATE/TIME:** 7/02/2012 - 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	0.5	0.4	mg/kg dry	MADEP	7/11/12	JEB
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Moisture	9		%	SM2540 G.	7/6/12	RJL
Extraction Surrogates			RANGE		7/11/12	JEB
Chloro-octadecane	57		40-140%	MADEP	7/11/12	JEB
Ortho-terphenyl	61		40-140%	MADEP	7/11/12	JEB
Fractionation Surrogates			RANGE		7/11/12	JEB
2-Fluorobiphenyl	79		40-140%	MADEP	7/11/12	JEB
2-Bromonaphthalene	76		40-140%	MADEP	7/11/12	JEB
Extraction date	Extracted			MADEP	7/9/12	KF
Volatile Organic Compounds						
Acetone	<0.24	0.24	mg/kg dry	5035/8260B	7/10/12	KAC
Tertiary Amyl Methyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Benzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Bromobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Bromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Bromodichloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Bromoform	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Bromomethane	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Sec-butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
n-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
tert-Butylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Carbon Disulfide	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Carbon Tetrachloride	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Chlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Dibromochloromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Chloroethane	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Chloroform	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Chloromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
2-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
4-Chlorotoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/10/12	KAC
1,2-Dibromoethane(EDB)	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/10/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 001
SAMPLE DESCRIPTION: PE1, PE3, PE4, PE5, PE6, PE7 LAB COMPOSITE
SAMPLE TYPE: MULTI GRAB/COMPOSITE **SAMPLE DATE/TIME:** 7/02/2012 - 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,4-Dichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
n-Propylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Dichlorodifluoromethane	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
1,1-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2-Dichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
cis-1,2-Dichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
trans-1,2-Dichloroethylene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,3-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
2,2-Dichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
cis-1,3-Dichloropropene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
trans-1,3-Dichloropropylene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Diethyl ether	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Diisopropyl Ether (DIPE)	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
1,4-Dioxane	<2.4	2.4	mg/kg dry	5035/8260B	7/10/12	KAC
Ethyl Tertiary Butyl Ether	<0.12	0.12	mg/kg dry	5035/8260B	7/10/12	KAC
Ethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Hexachlorobutadiene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
2-Hexanone	<0.24	0.24	mg/kg dry	5035/8260B	7/10/12	KAC
Isopropylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
p-Isopropyltoluene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
2-Butanone(MEK)	<0.24	0.24	mg/kg dry	5035/8260B	7/10/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.24	0.24	mg/kg dry	5035/8260B	7/10/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Methylene Chloride	0.06	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Naphthalene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1,2-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Styrene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1,1,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1,2,2-Tetrachloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Tetrachloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Tetrahydrofuran	<0.24	0.24	mg/kg dry	5035/8260B	7/10/12	KAC
Toluene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC

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Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 001
SAMPLE DESCRIPTION: PE1, PE3, PE4, PE5, PE6, PE7 LAB COMPOSITE
SAMPLE TYPE: MULTI GRAB/COMPOSITE **SAMPLE DATE/TIME:** 7/02/2012 - 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2,3-Trichlorobenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,1,1-Trichloroethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Trichloroethene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Trichlorofluoromethane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2,3-Trichloropropane	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,2,4-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
1,3,5-Trimethylbenzene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Vinyl Chloride	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
o-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
m,p-Xylene	<0.02	0.02	mg/kg dry	5035/8260B	7/10/12	KAC
Surrogates			RANGE	5035/8260B	7/10/12	KAC
Dibromofluoromethane	111		70-130%	5035/8260B	7/10/12	KAC
Toluene-d8	104		70-130%	5035/8260B	7/10/12	KAC
4-Bromofluorobenzene	108		70-130%	5035/8260B	7/10/12	KAC
1,2 Dichloroethane-d4	104		70-130%	5035/8260B	7/10/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 002
SAMPLE DESCRIPTION: PE2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/03/2012 @ 08:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<2.8	2.8	mg/kg dry	MADEP	7/6/12	EC
Unadjusted C9-C12 Aliphatics (FID)	<2.8	2.8	mg/kg dry	MADEP	7/6/12	EC
Methyl-tert-butylether	<0.10	0.10	mg/kg dry	MADEP	7/6/12	EC
Benzene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
Toluene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
Ethylbenzene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
m,p-Xylene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
o-Xylene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
Naphthalene	<0.29	0.29	mg/kg dry	MADEP	7/6/12	EC
Adjusted C5-C8 Aliphatics(FID)	<2.8	2.8	mg/kg dry	MADEP	7/6/12	EC
Adjusted C9-C12 Aliphatics(FID)	<2.8	2.8	mg/kg dry	MADEP	7/6/12	EC
C9-C10 Aromatics(PID)	<2.8	2.8	mg/kg dry	MADEP	7/6/12	EC
Moisture	9		%	SM2540 G.	7/6/12	RJL
Surrogate			RANGE		7/6/12	EC
2,5-Dibromotoluene(PID)	109		70-130%	MADEP	7/6/12	EC
2,5-Dibromotoluene(FID)	115		70-130%	MADEP	7/6/12	EC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	7/11/12	JEB
Target PAH Analytes					7/11/12	JEB
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Fluorene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Anthracene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Fluoranthene	1.5	0.4	mg/kg dry	MADEP	7/11/12	JEB
Pyrene	1.1	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(a)anthracene	0.6	0.4	mg/kg dry	MADEP	7/11/12	JEB
Chrysene	0.8	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(b)fluoranthene	0.7	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(k)fluoranthene	0.8	0.4	mg/kg dry	MADEP	7/11/12	JEB

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Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 002
SAMPLE DESCRIPTION: PE2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/03/2012 @ 08:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	0.8	0.4	mg/kg dry	MADEP	7/11/12	JEB
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	7/11/12	JEB
Benzo(g,h,i)perylene	0.5	0.4	mg/kg dry	MADEP	7/11/12	JEB
Moisture	9		%	SM2540 G.	7/6/12	RJL
Extraction Surrogates			RANGE		7/11/12	JEB
Chloro-octadecane	68		40-140%	MADEP	7/11/12	JEB
Ortho-terphenyl	68		40-140%	MADEP	7/11/12	JEB
Fractionation Surrogates			RANGE		7/11/12	JEB
2-Fluorobiphenyl	80		40-140%	MADEP	7/11/12	JEB
2-Bromonaphthalene	75		40-140%	MADEP	7/11/12	JEB
Extraction date	Extracted			MADEP	7/9/12	KF
Volatile Organic Compounds						
Acetone	<0.25	0.25	mg/kg dry	5035/8260B	7/11/12	KAC
Tertiary Amyl Methyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Benzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromodichloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromoform	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromomethane	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Sec-butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
n-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
tert-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Carbon Disulfide	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Carbon Tetrachloride	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dibromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chloroethane	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Chloroform	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chloromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
2-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
4-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dibromo-3-Chloropropane	<0.05	0.05	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dibromoethane(EDB)	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dibromomethane	<0.05	0.05	mg/kg dry	5035/8260B	7/11/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 002
SAMPLE DESCRIPTION: PE2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/03/2012 @ 08:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,3-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,4-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
n-Propylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dichlorodifluoromethane	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
cis-1,2-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
trans-1,2-Dichloroethylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,3-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
cis-1,3-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
trans-1,3-Dichloropropylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Diethyl ether	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Diisopropyl Ether (DIPE)	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
1,4-Dioxane	<2.5	2.5	mg/kg dry	5035/8260B	7/10/12	KAC
Ethyl Tertiary Butyl Ether	<0.13	0.13	mg/kg dry	5035/8260B	7/11/12	KAC
Ethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Hexachlorobutadiene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2-Hexanone	<0.25	0.25	mg/kg dry	5035/8260B	7/11/12	KAC
Isopropylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
p-Isopropyltoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2-Butanone(MEK)	<0.25	0.25	mg/kg dry	5035/8260B	7/11/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.25	0.25	mg/kg dry	5035/8260B	7/11/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Methylene Chloride	0.06	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Naphthalene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,2-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Styrene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,1,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,2,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Tetrachloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Tetrahydrofuran	<0.25	0.25	mg/kg dry	5035/8260B	7/11/12	KAC
Toluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 002
SAMPLE DESCRIPTION: PE2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/03/2012 @ 08:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,4-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,3-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,1-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Trichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Trichlorofluoromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,3-Trichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,4-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,3,5-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Vinyl Chloride	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
o-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
m,p-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Surrogates			RANGE	5035/8260B	7/10/12	KAC
Dibromofluoromethane	110		70-130%	5035/8260B	7/11/12	KAC
Toluene-d8	104		70-130%	5035/8260B	7/11/12	KAC
4-Bromofluorobenzene	107		70-130%	5035/8260B	7/11/12	KAC
1,2 Dichloroethane-d4	103		70-130%	5035/8260B	7/11/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
pH	7.7		SU	SW-846 9045C	7/5/12	PTT
Specific conductance	4.6	1.0	uMHOS/CM	SM2510 B	7/10/12	JMM
Flashpoint	>200	80	deg F	SW846 1010	7/6/12	RLL
Reactivity CN & S Soils						
Sulfide reactivity	<2.5	2.5	mg/kg	SW-846 7.3.4	7/10/12	ML
Cyanide Reactivity	<0.10	0.10	mg/kg	SW-846 7.3.3	7/10/12	ML
TPH						
TPH GC/FID	<10	10	mg/kg dry	SW846 8100M	7/12/12	TCL
Moisture	3		%	SM2540 G.	7/6/12	RJL
PCB						
Aroclor-1016	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1221	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1232	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1242	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1248	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1254	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1260	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1262	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Aroclor-1268	<0.1	0.1	mg/kg dry	SW-846 8082	7/11/12	JEB
Surrogate			RANGE	SW-846 8082	7/11/12	JEB
Tetrachloro-m-xylene (TCMX)	70		30-150%	SW-846 8082	7/11/12	JEB
Decachlorobiphenyl	81		30-150%	SW-846 8082	7/11/12	JEB
Extraction date	Extracted			SW846 3546	7/10/12	RJL
Volatile Organic Compounds						
Acetone	<0.29	0.29	mg/kg dry	5035/8260B	7/11/12	KAC
Tertiary Amyl Methyl Ether	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Benzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromodichloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromoform	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Bromomethane	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Sec-butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
n-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
tert-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Carbon Disulfide	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Carbon Tetrachloride	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dibromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chloroethane	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Chloroform	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Chloromethane	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
2-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
4-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dibromo-3-Chloropropane	<0.06	0.06	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dibromoethane(EDB)	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dibromomethane	<0.06	0.06	mg/kg dry	5035/8260B	7/11/12	KAC
1,3-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,4-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
n-Propylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Dichlorodifluoromethane	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
cis-1,2-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
trans-1,2-Dichloroethylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,3-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
cis-1,3-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
trans-1,3-Dichloropropylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Diethyl ether	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Diisopropyl Ether (DIPE)	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
1,4-Dioxane	<2.9	2.9	mg/kg dry	5035/8260B	7/10/12	KAC
Ethyl Tertiary Butyl Ether	<0.15	0.15	mg/kg dry	5035/8260B	7/11/12	KAC
Ethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Hexachlorobutadiene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2-Hexanone	<0.29	0.29	mg/kg dry	5035/8260B	7/11/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Isopropylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
p-Isopropyltoluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
2-Butanone(MEK)	<0.29	0.29	mg/kg dry	5035/8260B	7/11/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.29	0.29	mg/kg dry	5035/8260B	7/11/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Methylene Chloride	0.05	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Naphthalene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,2-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Styrene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,1,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,2,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Tetrachloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Tetrahydrofuran	<0.29	0.29	mg/kg dry	5035/8260B	7/11/12	KAC
Toluene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,4-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,3-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,1,1-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Trichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Trichlorofluoromethane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,3-Trichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,2,4-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
1,3,5-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Vinyl Chloride	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
o-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
m,p-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	7/11/12	KAC
Surrogates			RANGE	5035/8260B	7/10/12	KAC
Dibromofluoromethane	111		70-130%	5035/8260B	7/11/12	KAC
Toluene-d8	104		70-130%	5035/8260B	7/11/12	KAC
4-Bromofluorobenzene	107		70-130%	5035/8260B	7/11/12	KAC
1,2 Dichloroethane-d4	101		70-130%	5035/8260B	7/11/12	KAC
Semi-Volatile Organic Comp.						
Acenaphthene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Acenaphthylene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Anthracene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Benzidine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Benzo(a)anthracene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(b)fluoranthene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Benzo(k)fluoranthene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Benzo(g,h,i)perylene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Benzo(a)pyrene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Bis(2-chloroethyl)ether	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Bis(2-Chloroethoxy)methane	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Bis(2-Chloroisopropyl)Ether	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Bis(2-ethylhexyl)phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
4-Bromophenyl phenyl ether	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Butylbenzyl phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Chloronaphthalene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
4-Chlorophenyl phenyl ether	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Chrysene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Dibenzo(a,h)anthracene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Di-n-butyl phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
1,2-Dichlorobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
1,3-Dichlorobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
1,4-Dichlorobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
3,3'-Dichlorobenzidine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Diethyl phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Dimethyl phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4-Dinitrotoluene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,6-Dinitrotoluene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Di-n-octyl phthalate	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
1,2-Diphenylhydrazine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Fluoranthene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Fluorene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Hexachlorobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Hexachlorobutadiene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Hexachlorocyclopentadiene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Hexachloroethane	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Indeno(1,2,3-cd)pyrene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Isophorone	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Methylnaphthalene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Naphthalene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Nitrobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
N-nitrosodimethylamine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12
Work Order #: 1207-13571
WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
N-nitrosodiphenylamine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
N-nitrosodi-n-propylamine	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Phenanthrene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Pyrene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
1,2,4-Trichlorobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
4-Chloro-3-methylphenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Chlorophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4-Dichlorophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4-Dimethylphenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Methyl-4,6-dinitrophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4-Dinitrophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Nitrophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
4-Nitrophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Pentachlorophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Phenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4,5-Trichlorophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2,4,6-Trichlorophenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
4-Chloroaniline	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Dibenzofuran	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
2-Methyl Phenol	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
3 & 4-Methylphenols	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Aniline	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Acetophenone	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Azobenzene	<0.34	0.34	mg/kg dry	SW-846 8270D	7/11/12	TCL
Surrogates			RANGE	SW-846 8270D	7/11/12	TCL
Phenol-d5	88		30-130%	SW-846 8270D	7/11/12	TCL
2-Fluorophenol	70		30-130%	SW-846 8270D	7/11/12	TCL
2,4,6-Tribromophenol	76		30-130%	SW-846 8270D	7/11/12	TCL
Nitrobenzene-d5	66		30-130%	SW-846 8270D	7/11/12	TCL
2-Fluorobiphenyl	70		30-130%	SW-846 8270D	7/11/12	TCL
P-Terphenyl-d14	120		30-130%	SW-846 8270D	7/11/12	TCL
Extraction date	Extracted			SW846 3546	7/10/12	RJL
Total Metals						
Arsenic	<2.6	2.6	mg/kg dry	SW-846 6010	7/9/12	JEH
Cadmium	<0.26	0.26	mg/kg dry	SW-846 6010	7/9/12	JEH
Chromium	4.1	1.6	mg/kg dry	SW-846 6010	7/9/12	JEH

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/3/12

Work Order #: 1207-13571

WATERS

Sample # 003
SAMPLE DESCRIPTION: PILE
SAMPLE TYPE: COMPOSITE **SAMPLE DATE/TIME:** 7/03/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Lead	4.0	2.1	mg/kg dry	SW-846 6010	7/9/12	JEH
Mercury	<0.099	0.099	mg/kg dry	SW-846 7471A	7/10/12	PJC

Customer Name : Capaccio Environmental Eng.

W.O. Number 1207-13571

MassDEP Analytical Protocol Certification Form

Laboratory Name: R.I. Analytical Laboratories Work Order No: 1207-13571

Project / Location: WATERS RTN :

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):

1207-13571-001 through 1207-13571-003

Matrices: ☐ Groundwater/Surface Water ☒ Soil / Sediment ☐ Drinking Water ☐ Air ☐ Other

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☒	7470/7471 Hg CAM III B ☒	MassDEP VPH CAM IV A ☒	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☒	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☒	6020 Metals CAM III D ☐	8082 PCB CAM V A ☒	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM V111 B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☐ Yes ☒ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes ☒ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature _____ Position: QA/QC Director

Printed Name: Mike Hobin Date: 7/13/02

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
PCB (Soil)			
Aroclor-1016	mg/kg dry	<0.1	7/11/2012
Aroclor-1221	mg/kg dry	<0.1	7/11/2012
Aroclor-1232	mg/kg dry	<0.1	7/11/2012
Aroclor-1242	mg/kg dry	<0.1	7/11/2012
Aroclor-1248	mg/kg dry	<0.1	7/11/2012
Aroclor-1254	mg/kg dry	<0.1	7/11/2012
Aroclor-1262	mg/kg dry	<0.1	7/11/2012
Aroclor-1268	mg/kg dry	<0.1	7/11/2012
Aroclor-1260	mg/kg dry	<0.1	7/11/2012
Surrogate	**RANGE**		7/11/2012
Tetrachloro-m-xylene (TCMX)	30-150%	69	7/11/2012
Decachlorobiphenyl	30-150%	77	7/11/2012
Total Petroleum Hydrocarbons by Method 8100 (Soil)			
TPH GC/FID	mg/kg dry	<10	7/12/2012
Extractable Petroleum Hydrocarbons with PAH (Soil)			
C9-C18 Aliphatics	mg/kg dry	<20	7/11/2012
C19-C36 Aliphatics	mg/kg dry	<20	7/11/2012
C11-C22 Aromatics	mg/kg dry	<20	7/11/2012
Target PAH Analytes			7/11/2012
Naphthalene	mg/kg dry	<0.4	7/11/2012
2-Methylnaphthalene	mg/kg dry	<0.4	7/11/2012
Acenaphthylene	mg/kg dry	<0.4	7/11/2012
Acenaphthene	mg/kg dry	<0.4	7/11/2012
Fluorene	mg/kg dry	<0.4	7/11/2012
Phenanthrene	mg/kg dry	<0.4	7/11/2012
Anthracene	mg/kg dry	<0.4	7/11/2012
Fluoranthene	mg/kg dry	<0.4	7/11/2012
Pyrene	mg/kg dry	<0.4	7/11/2012
Benzo(a)anthracene	mg/kg dry	<0.4	7/11/2012
Chrysene	mg/kg dry	<0.4	7/11/2012
Benzo(b)fluoranthene	mg/kg dry	<0.4	7/11/2012
Benzo(k)fluoranthene	mg/kg dry	<0.4	7/11/2012
Benzo(a)pyrene	mg/kg dry	<0.4	7/11/2012
Indeno(1,2,3-cd)pyrene	mg/kg dry	<0.4	7/11/2012
Dibenzo(a,h)anthracene	mg/kg dry	<0.4	7/11/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil) (cont'd)			
Benzo(g,h,i)perylene	mg/kg dry	<0.4	7/11/2012
Extraction Surrogates	**RANGE**		7/11/2012
Chloro-octadecane	40-140%	77	7/11/2012
Ortho-terphenyl	40-140%	77	7/11/2012
Fractionation Surrogates	**RANGE**		7/11/2012
2-Fluorobiphenyl	40-140%	84	7/11/2012
2-Bromonaphthalene	40-140%	71	7/11/2012
Volatile Petroleum Hydrocarbons (Soil)			
Unadj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/6/2012
Unadj C9-C12 Aliphatic(FID)	mg/kg dry	<2.5	7/6/2012
Methyl-tert-butylether	mg/kg dry	<0.10	7/6/2012
Benzene	mg/kg dry	<0.25	7/6/2012
Toluene	mg/kg dry	<0.25	7/6/2012
Ethylbenzene	mg/kg dry	<0.25	7/6/2012
m,p-Xylene	mg/kg dry	<0.25	7/6/2012
o-Xylene	mg/kg dry	<0.25	7/6/2012
Naphthalene	mg/kg dry	<0.25	7/6/2012
Adj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	7/6/2012
Adj C9-C12 Aliphatics(FID)	mg/kg dry	<2.5	7/6/2012
C9-C10 Aromatics(PID)	mg/kg dry	<2.5	7/6/2012
Surrogate	**RANGE**		7/6/2012
2,5-Dibromotoluene(PID)	70-130%	95	7/6/2012
2,5-Dibromotoluene(FID)	70-130%	97	7/6/2012
5035(Soil)			
Acetone	mg/kg dry	<0.50	7/10/2012
Tertiary Amyl Methyl Ether	mg/kg dry	<0.25	7/10/2012
Benzene	mg/kg dry	<0.05	7/10/2012
Bromobenzene	mg/kg dry	<0.05	7/10/2012
Bromochloromethane	mg/kg dry	<0.05	7/10/2012
Bromodichloromethane	mg/kg dry	<0.05	7/10/2012
Bromoform	mg/kg dry	<0.05	7/10/2012
Bromomethane	mg/kg dry	<0.25	7/10/2012
Sec-butylbenzene	mg/kg dry	<0.05	7/10/2012
n-Butylbenzene	mg/kg dry	<0.05	7/10/2012
tert-Butylbenzene	mg/kg dry	<0.05	7/10/2012
Carbon Disulfide	mg/kg dry	<0.25	7/10/2012

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WO #: 1207-13571
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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
Carbon Tetrachloride	mg/kg dry	<0.05	7/10/2012
Chlorobenzene	mg/kg dry	<0.05	7/10/2012
Dibromochloromethane	mg/kg dry	<0.05	7/10/2012
Chloroethane	mg/kg dry	<0.25	7/10/2012
Chloroform	mg/kg dry	<0.05	7/10/2012
Chloromethane	mg/kg dry	<0.25	7/10/2012
2-Chlorotoluene	mg/kg dry	<0.05	7/10/2012
4-Chlorotoluene	mg/kg dry	<0.05	7/10/2012
1,2-Dibromo-3-Chloropropane	mg/kg dry	<0.10	7/10/2012
1,2-Dibromoethane(EDB)	mg/kg dry	<0.05	7/10/2012
Dibromomethane	mg/kg dry	<0.10	7/10/2012
1,3-Dichlorobenzene	mg/kg dry	<0.05	7/10/2012
1,2-Dichlorobenzene	mg/kg dry	<0.05	7/10/2012
1,4-Dichlorobenzene	mg/kg dry	<0.05	7/10/2012
n-Propylbenzene	mg/kg dry	<0.05	7/10/2012
Dichlorodifluoromethane	mg/kg dry	<0.25	7/10/2012
1,1-Dichloroethane	mg/kg dry	<0.05	7/10/2012
1,2-Dichloroethane	mg/kg dry	<0.05	7/10/2012
1,1-Dichloroethene	mg/kg dry	<0.05	7/10/2012
cis-1,2-Dichloroethene	mg/kg dry	<0.05	7/10/2012
trans-1,2-Dichloroethylene	mg/kg dry	<0.05	7/10/2012
1,2-Dichloropropane	mg/kg dry	<0.05	7/10/2012
1,3-Dichloropropane	mg/kg dry	<0.05	7/10/2012
2,2-Dichloropropane	mg/kg dry	<0.05	7/10/2012
1,1-Dichloropropene	mg/kg dry	<0.05	7/10/2012
cis-1,3-Dichloropropene	mg/kg dry	<0.05	7/10/2012
trans-1,3-Dichloropropylene	mg/kg dry	<0.05	7/10/2012
Diethyl ether	mg/kg dry	<0.25	7/10/2012
Diisopropyl ether (DIPE)	mg/kg dry	<0.25	7/10/2012
1,4-Dioxane	mg/kg dry	<5.0	7/10/2012
Ethyl Tertiary Butyl Ether	mg/kg dry	<0.25	7/10/2012
Ethylbenzene	mg/kg dry	<0.05	7/10/2012
Hexachlorobutadiene	mg/kg dry	<0.05	7/10/2012
2-Hexanone	mg/kg dry	<0.50	7/10/2012
Isopropylbenzene	mg/kg dry	<0.05	7/10/2012
p-Isopropyltoluene	mg/kg dry	<0.05	7/10/2012
2-Butanone(MEK)	mg/kg dry	<0.50	7/10/2012
4-Methyl-2-pentanone(MIBK)	mg/kg dry	<0.50	7/10/2012
MTBE	mg/kg dry	<0.05	7/10/2012

QA/QC Report

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WO #: 1207-13571
Date: 7/12/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
Methylene Chloride	mg/kg dry	<0.05	7/10/2012
Naphthalene	mg/kg dry	<0.05	7/10/2012
1,1,2-Trichloroethane	mg/kg dry	<0.05	7/10/2012
Styrene	mg/kg dry	<0.05	7/10/2012
1,1,1,2-Tetrachloroethane	mg/kg dry	<0.05	7/10/2012
1,1,2,2-Tetrachloroethane	mg/kg dry	<0.05	7/10/2012
Tetrachloroethene	mg/kg dry	<0.05	7/10/2012
Tetrahydrofuran	mg/kg dry	<0.50	7/10/2012
Toluene	mg/kg dry	<0.05	7/10/2012
1,2,4-Trichlorobenzene	mg/kg dry	<0.05	7/10/2012
1,2,3-Trichlorobenzene	mg/kg dry	<0.05	7/10/2012
1,1,1-Trichloroethane	mg/kg dry	<0.05	7/10/2012
Trichloroethene	mg/kg dry	<0.05	7/10/2012
Trichlorofluoromethane	mg/kg dry	<0.05	7/10/2012
1,2,3-Trichloropropane	mg/kg dry	<0.05	7/10/2012
1,2,4-Trimethylbenzene	mg/kg dry	<0.05	7/10/2012
1,3,5-Trimethylbenzene	mg/kg dry	<0.05	7/10/2012
Vinyl Chloride	mg/kg dry	<0.05	7/10/2012
o-Xylene	mg/kg dry	<0.05	7/10/2012
m,p-Xylene	mg/kg dry	<0.05	7/10/2012
Surrogates	**RANGE**		7/10/2012
Toluene-d8	70-130%	99	7/10/2012
Dibromofluoromethane	70-130%	106	7/10/2012
1,2 Dichloroethane-d4	70-130%	99	7/10/2012
4-Bromofluorobenzene	70-130%	101	7/10/2012
Semi-Volatile Organics by Method 8270 (Soil)			
Acenaphthene	mg/kg dry	<0.33	7/11/2012
Acenaphthylene	mg/kg dry	<0.33	7/11/2012
Anthracene	mg/kg dry	<0.33	7/11/2012
Benzidine	mg/kg dry	<0.33	7/11/2012
Benzo(a)anthracene	mg/kg dry	<0.33	7/11/2012
Benzo(b)fluoranthene	mg/kg dry	<0.33	7/11/2012
Benzo(k)fluoranthene	mg/kg dry	<0.33	7/11/2012
Benzo(g,h,i)perylene	mg/kg dry	<0.33	7/11/2012
Benzo(a)pyrene	mg/kg dry	<0.33	7/11/2012
Bis(2-chloroethyl)ether	mg/kg dry	<0.33	7/11/2012
Bis(2-Chloroethoxy)methane	mg/kg dry	<0.33	7/11/2012

QA/QC Report

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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Semi-Volatile Organics by Method 8270 (Soil) (cont'd)			
Bis(2-Chloroisopropyl)Ether	mg/kg dry	<0.33	7/11/2012
Bis(2-ethylhexyl)phthalate	mg/kg dry	<0.33	7/11/2012
4-Bromophenyl phenyl ether	mg/kg dry	<0.33	7/11/2012
Butylbenzyl phthalate	mg/kg dry	<0.33	7/11/2012
2-Chloronaphthalene	mg/kg dry	<0.33	7/11/2012
4-Chlorophenyl phenyl ether	mg/kg dry	<0.33	7/11/2012
Chrysene	mg/kg dry	<0.33	7/11/2012
Dibenzo(a,h)anthracene	mg/kg dry	<0.33	7/11/2012
Di-n-butyl phthalate	mg/kg dry	<0.33	7/11/2012
1,2-Dichlorobenzene	mg/kg dry	<0.33	7/11/2012
1,3-Dichlorobenzene	mg/kg dry	<0.33	7/11/2012
1,4-Dichlorobenzene	mg/kg dry	<0.33	7/11/2012
3,3'-Dichlorobenzidine	mg/kg dry	<0.33	7/11/2012
Diethyl phthalate	mg/kg dry	<0.33	7/11/2012
Dimethyl phthalate	mg/kg dry	<0.33	7/11/2012
2,4-Dinitrotoluene	mg/kg dry	<0.33	7/11/2012
2,6-Dinitrotoluene	mg/kg dry	<0.33	7/11/2012
Di-n-octyl phthalate	mg/kg dry	<0.33	7/11/2012
1,2-Diphenylhydrazine	mg/kg dry	<0.33	7/11/2012
Fluoranthene	mg/kg dry	<0.33	7/11/2012
Fluorene	mg/kg dry	<0.33	7/11/2012
Hexachlorobenzene	mg/kg dry	<0.33	7/11/2012
Hexachlorobutadiene	mg/kg dry	<0.33	7/11/2012
Hexachlorocyclopentadiene	mg/kg dry	<0.33	7/11/2012
Hexachloroethane	mg/kg dry	<0.33	7/11/2012
Indeno(1,2,3-cd)pyrene	mg/kg dry	<0.33	7/11/2012
Isophorone	mg/kg dry	<0.33	7/11/2012
2-Methylnaphthalene	mg/kg dry	<0.33	7/11/2012
Naphthalene	mg/kg dry	<0.33	7/11/2012
Nitrobenzene	mg/kg dry	<0.33	7/11/2012
N-nitrosodimethylamine	mg/kg dry	<0.33	7/11/2012
N-nitrosodiphenylamine	mg/kg dry	<0.33	7/11/2012
N-nitrosodi-n-propylamine	mg/kg dry	<0.33	7/11/2012
Phenanthrene	mg/kg dry	<0.33	7/11/2012
Pyrene	mg/kg dry	<0.33	7/11/2012
1,2,4-Trichlorobenzene	mg/kg dry	<0.33	7/11/2012
4-Chloro-3-methylphenol	mg/kg dry	<0.33	7/11/2012
2-Chlorophenol	mg/kg dry	<0.33	7/11/2012
2,4-Dichlorophenol	mg/kg dry	<0.33	7/11/2012

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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Semi-Volatile Organics by Method 8270 (Soil) (cont'd)			
2,4-Dimethylphenol	mg/kg dry	<0.33	7/11/2012
2-Methyl-4,6-dinitrophenol	mg/kg dry	<0.33	7/11/2012
2,4-Dinitrophenol	mg/kg dry	<0.33	7/11/2012
2-Nitrophenol	mg/kg dry	<0.33	7/11/2012
4-Nitrophenol	mg/kg dry	<0.33	7/11/2012
Pentachlorophenol	mg/kg dry	<0.33	7/11/2012
Phenol	mg/kg dry	<0.33	7/11/2012
2,4,6-Trichlorophenol	mg/kg dry	<0.33	7/11/2012
2,4,5-Trichlorophenol	mg/kg dry	<0.33	7/11/2012
Dibenzofuran	mg/kg dry	<0.33	7/11/2012
2-Methyl Phenol	mg/kg dry	<0.33	7/11/2012
3 & 4-Methylphenols	mg/kg dry	<0.33	7/11/2012
Aniline	mg/kg dry	<0.33	7/11/2012
Acetophenone	mg/kg dry	<0.33	7/11/2012
Azobenzene	mg/kg dry	<0.33	7/11/2012
4-Chloroaniline	mg/kg dry	<0.33	7/11/2012
Surrogates	**RANGE**		7/11/2012
Phenol-d5	30-130%	80	7/11/2012
2-Fluorophenol	30-130%	65	7/11/2012
2,4,6-Tribromophenol	30-130%	65	7/11/2012
Nitrobenzene-d5	30-130%	60	7/11/2012
2-Fluorobiphenyl	30-130%	63	7/11/2012
P-Terphenyl-d14	30-130%	110	7/11/2012
Metals (Soil)			
Arsenic	mg/kg dry	<2.5	7/9/2012
Cadmium	mg/kg dry	<0.25	7/9/2012
Chromium	mg/kg dry	<1.5	7/9/2012
Lead	mg/kg dry	<2.0	7/9/2012
Mercury	mg/kg dry	<0.10	7/10/2012
Reactivity			
Sulfide reactivity	mg/kg	<2.5	7/10/2012
Cyanide Reactivity	mg/kg	<0.10	7/10/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Volatile Petroleum Hydrocarbons (Soil)								
Methyl-tert-butylether		2.5	3.05	122	3.08	123	1	7/6/2012
Benzene		2.5	2.40	96	2.32	93	3	7/6/2012
Toluene		2.5	2.49	100	2.47	99	1	7/6/2012
Ethylbenzene		2.5	2.61	104	2.60	104	0	7/6/2012
m,p-Xylene		5.0	5.42	108	5.40	108	0	7/6/2012
o-Xylene		2.5	2.64	106	2.61	104	1	7/6/2012
Naphthalene		2.5	2.51	100	2.63	105	5	7/6/2012
Adj C5-C8 Aliphatics(FID)		7.5	9.18	122	8.73	116	5	7/6/2012
Adj C9-C12 Aliphatics(FID)		5.0	4.34	87	4.35	87	0	7/6/2012
C9-C10 Aromatics(PID)		2.5	2.65	106	2.60	104	2	7/6/2012
Surrogate								
2,5-Dibromotoluene(PID)			72		86			
2,5-Dibromotoluene(FID)			72		89			
PCB (Soil)								
Aroclor-1016		0.33	0.32	97	0.30	91	6	7/11/2012
Aroclor-1260		0.33	0.30	91	0.28	85	7	7/11/2012
Surrogate								
Tetrachloro-m-xylene (TCMX)			87		81			
Decachlorobiphenyl			96		90			
Total Petroleum Hydrocarbons by Method 8100 (Soil)								
TPH GC/FID		66.7	57.6	86	58.0	87	1	7/12/2012
Extractable Petroleum Hydrocarbons with PAH (Soil)								
C9-C18 Aliphatics		20	12.7	64	14.1	71	10	7/11/2012
C19-C36 Aliphatics		27	23.3	86	24.2	90	4	7/11/2012
C11-C22 Aromatics		57	44.1	77	55.0	96	22	7/11/2012
Target PAH Analytes								
Naphthalene		3.33	1.74	52	2.36	71	30	7/11/2012
2-Methylnaphthalene		3.33	1.95	59	2.56	77	27	7/11/2012
Acenaphthylene		3.33	2.16	65	2.79	84	25	7/11/2012
Acenaphthene		3.33	2.24	67	2.87	86	25	7/11/2012
Fluorene		3.33	2.44	73	3.13	94	25	7/11/2012
Phenanthrene		3.33	2.75	83	3.46	104	23	7/11/2012
Anthracene		3.33	2.74	82	3.34	100	20	7/11/2012
Fluoranthene		3.33	2.93	88	3.67	110	22	7/11/2012
Pyrene		3.33	2.76	83	3.37	101	20	7/11/2012
Benzo(a)anthracene		3.33	2.80	84	3.47	104	21	7/11/2012
Chrysene		3.33	2.80	84	3.48	105	22	7/11/2012
Benzo(b)fluoranthene		3.33	2.96	89	3.45	104	15	7/11/2012
Benzo(k)fluoranthene		3.33	2.82	85	3.44	103	20	7/11/2012
Benzo(a)pyrene		3.33	2.79	84	3.45	104	21	7/11/2012
Indeno(1,2,3-cd)pyrene		3.33	2.82	85	3.61	108	25	7/11/2012
Dibenzo(a,h)anthracene		3.33	2.70	81	3.15	95	15	7/11/2012
Benzo(g,h,i)perylene		3.33	2.75	83	3.40	102	21	7/11/2012
Extraction Surrogates								
Chloro-octadecane			79		78			
Ortho-terphenyl			77		94			
Fractionation Surrogates								
2-Fluorobiphenyl			82		100			

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil) (cont'd)								
2-Bromonaphthalene			61		73			
5035(Soil)								
Acetone		25	26	104	26	104	0	7/10/2012
Tertiary Amyl Methyl Ether		2.5	2.6	104	2.6	104	0	7/10/2012
Benzene		2.5	2.6	104	2.5	100	4	7/10/2012
Bromobenzene		2.5	2.7	108	2.6	104	4	7/10/2012
Bromochloromethane		2.5	2.5	100	2.5	100	0	7/10/2012
Bromodichloromethane		2.5	2.7	108	2.6	104	4	7/10/2012
Bromoform		2.5	2.8	112	2.7	108	4	7/10/2012
Bromomethane		2.5	2.8	112	2.8	112	0	7/10/2012
Sec-butylbenzene		2.5	2.7	108	2.6	104	4	7/10/2012
n-Butylbenzene		2.5	2.7	108	2.7	108	0	7/10/2012
tert-Butylbenzene		2.5	2.6	104	2.8	112	7	7/10/2012
Carbon Disulfide		2.5	2.7	108	2.6	104	4	7/10/2012
Carbon Tetrachloride		2.5	2.9	116	2.8	112	4	7/10/2012
Chlorobenzene		2.5	2.6	104	2.5	100	4	7/10/2012
Dibromochloromethane		2.5	2.8	112	2.7	108	4	7/10/2012
Chloroethane		2.5	2.7	108	2.5	100	8	7/10/2012
Chloroform		2.5	2.6	104	2.5	100	4	7/10/2012
Chloromethane		2.5	2.6	104	2.5	100	4	7/10/2012
2-Chlorotoluene		2.5	2.6	104	2.5	100	4	7/10/2012
4-Chlorotoluene		2.5	2.6	104	2.5	100	4	7/10/2012
1,2-Dibromo-3-Chloropropane		2.5	2.8	112	3.0	120	7	7/10/2012
1,2-Dibromoethane(EDB)		2.5	2.7	108	2.6	104	4	7/10/2012
Dibromomethane		2.5	2.6	104	2.6	104	0	7/10/2012
1,3-Dichlorobenzene		2.5	2.5	100	2.5	100	0	7/10/2012
1,2-Dichlorobenzene		2.5	2.6	104	2.6	104	0	7/10/2012
1,4-Dichlorobenzene		2.5	2.6	104	2.5	100	4	7/10/2012
n-Propylbenzene		2.5	2.7	108	2.6	104	4	7/10/2012
Dichlorodifluoromethane		2.5	2.8	112	2.7	108	4	7/10/2012
1,1-Dichloroethane		2.5	2.6	104	2.6	104	0	7/10/2012
1,2-Dichloroethane		2.5	2.7	108	2.7	108	0	7/10/2012
1,1-Dichloroethene		2.5	2.7	108	2.6	104	4	7/10/2012
cis-1,2-Dichloroethene		2.5	2.7	108	2.6	104	4	7/10/2012
trans-1,2-Dichloroethylene		2.5	2.6	104	2.6	104	0	7/10/2012
1,2-Dichloropropane		2.5	2.6	104	2.5	100	4	7/10/2012
1,3-Dichloropropane		2.5	2.6	104	2.6	104	0	7/10/2012
2,2-Dichloropropane		2.5	2.8	112	2.7	108	4	7/10/2012
1,1-Dichloropropene		2.5	2.8	112	2.7	108	4	7/10/2012
cis-1,3-Dichloropropene		2.5	2.6	104	2.6	104	0	7/10/2012
trans-1,3-Dichloropropylene		2.5	2.7	108	2.6	104	4	7/10/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
Diethyl ether		25	26	104	25	100	4	7/10/2012
Diisopropyl ether (DIPE)		2.5	2.6	104	2.5	100	4	7/10/2012
1,4-Dioxane		50	68	136	120	240	55	7/10/2012
Ethyl Tertiary Butyl Ether		2.5	2.7	108	2.6	104	4	7/10/2012
Ethylbenzene		2.5	2.6	104	2.5	100	4	7/10/2012
Hexachlorobutadiene		2.5	2.7	108	2.7	108	0	7/10/2012
2-Hexanone		25	28	112	28	112	0	7/10/2012
Isopropylbenzene		2.5	2.7	108	2.6	104	4	7/10/2012
p-Isopropyltoluene		2.5	2.7	108	2.6	104	4	7/10/2012
2-Butanone(MEK)		25	26	104	26	104	0	7/10/2012
4-Methyl-2-pentanone(MIBK)		25	27	108	27	108	0	7/10/2012
MTBE		2.5	2.7	108	2.7	108	0	7/10/2012
Methylene Chloride		2.5	2.6	104	2.6	104	0	7/10/2012
Naphthalene		2.5	2.4	96	2.6	104	8	7/10/2012
1,1,2-Trichloroethane		2.5	2.7	108	2.6	104	4	7/10/2012
Styrene		2.5	2.6	104	2.6	104	0	7/10/2012
1,1,1,2-Tetrachloroethane		2.5	2.6	104	2.6	104	0	7/10/2012
1,1,2,2-Tetrachloroethane		2.5	2.6	104	2.6	104	0	7/10/2012
Tetrachloroethene		2.5	2.7	108	2.6	104	4	7/10/2012
Tetrahydrofuran		25	27	108	27	108	0	7/10/2012
Toluene		2.5	2.6	104	2.6	104	0	7/10/2012
1,2,4-Trichlorobenzene		2.5	2.9	116	3.1	124	7	7/10/2012
1,2,3-Trichlorobenzene		2.5	2.5	100	2.8	112	11	7/10/2012
1,1,1-Trichloroethane		2.5	2.8	112	2.7	108	4	7/10/2012
Trichloroethene		2.5	2.7	108	2.6	104	4	7/10/2012
Trichlorofluoromethane		2.5	2.9	116	2.8	112	4	7/10/2012
1,2,3-Trichloropropane		2.5	2.8	112	2.7	108	4	7/10/2012
1,2,4-Trimethylbenzene		2.5	2.7	108	2.6	104	4	7/10/2012
1,3,5-Trimethylbenzene		2.5	2.7	108	2.6	104	4	7/10/2012
Vinyl Chloride		2.5	2.8	112	2.6	104	7	7/10/2012
o-Xylene		2.5	2.6	104	2.6	104	0	7/10/2012
m,p-Xylene		5.0	5.2	104	5.0	100	4	7/10/2012
Surrogates								
Toluene-d8			100		102			
Dibromofluoromethane			101		103			
1,2 Dichloroethane-d4			99		102			
4-Bromofluorobenzene			104		104			
Semi-Volatile Organics by Method 8270 (Soil)								
Acenaphthene		3.3	2.29	69	2.30	70	0	7/11/2012
Acenaphthylene		3.3	2.51	76	2.53	77	1	7/11/2012
Anthracene		3.3	2.40	73	2.43	74	1	7/11/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Semi-Volatile Organics by Method 8270 (Soil) (cont'd)								
Benzidine		3.3	1.05	32	0.918	28	13	7/11/2012
Benzo(a)anthracene		3.3	2.66	81	2.66	81	0	7/11/2012
Benzo(b)fluoranthene		3.3	3.40	103	3.56	108	5	7/11/2012
Benzo(k)fluoranthene		3.3	3.63	110	3.64	110	0	7/11/2012
Benzo(g,h,i)perylene		3.3	2.89	88	2.85	86	1	7/11/2012
Benzo(a)pyrene		3.3	3.43	104	3.37	102	2	7/11/2012
Bis(2-chloroethyl)ether		3.3	1.88	57	2.00	61	6	7/11/2012
Bis(2-Chloroethoxy)methane		3.3	2.01	61	2.03	62	1	7/11/2012
Bis(2-Chloroisopropyl)Ether		3.3	2.01	61	2.12	64	5	7/11/2012
Bis(2-ethylhexyl)phthalate		3.3	2.34	71	2.32	70	1	7/11/2012
4-Bromophenyl phenyl ether		3.3	2.25	68	2.27	69	1	7/11/2012
Butylbenzyl phthalate		3.3	2.40	73	2.36	72	2	7/11/2012
2-Chloronaphthalene		3.3	2.27	69	2.28	69	0	7/11/2012
4-Chlorophenyl phenyl ether		3.3	2.33	71	2.35	71	1	7/11/2012
Chrysene		3.3	2.72	82	2.71	82	0	7/11/2012
Dibenzo(a,h)anthracene		3.3	2.63	80	2.59	78	2	7/11/2012
Di-n-butyl phthalate		3.3	2.24	68	2.24	68	0	7/11/2012
1,2-Dichlorobenzene		3.3	1.97	60	2.12	64	7	7/11/2012
1,3-Dichlorobenzene		3.3	1.95	59	2.12	64	8	7/11/2012
1,4-Dichlorobenzene		3.3	1.96	59	2.10	64	7	7/11/2012
3,3'-Dichlorobenzidine		3.3	2.00	61	1.96	59	2	7/11/2012
Diethyl phthalate		3.3	2.34	71	2.34	71	0	7/11/2012
Dimethyl phthalate		3.3	2.36	72	2.37	72	0	7/11/2012
2,4-Dinitrotoluene		3.3	2.13	65	2.16	65	1	7/11/2012
2,6-Dinitrotoluene		3.3	2.55	77	2.53	77	1	7/11/2012
Di-n-octyl phthalate		3.3	2.20	67	2.15	65	2	7/11/2012
1,2-Diphenylhydrazine		3.3	2.20	67	2.18	66	1	7/11/2012
Fluoranthene		3.3	2.16	65	2.20	67	2	7/11/2012
Fluorene		3.3	2.34	71	2.36	72	1	7/11/2012
Hexachlorobenzene		3.3	2.10	64	2.11	64	0	7/11/2012
Hexachlorobutadiene		3.3	2.02	61	2.13	65	5	7/11/2012
Hexachlorocyclopentadiene		3.3	2.96	90	3.09	94	4	7/11/2012
Hexachloroethane		3.3	1.75	53	1.93	58	10	7/11/2012
Indeno(1,2,3-cd)pyrene		3.3	2.80	85	2.74	83	2	7/11/2012
Isophorone		3.3	2.50	76	2.54	77	2	7/11/2012
2-Methylnaphthalene		3.3	2.01	61	2.04	62	1	7/11/2012
Naphthalene		3.3	2.07	63	2.16	65	4	7/11/2012
Nitrobenzene		3.3	1.99	60	2.07	63	4	7/11/2012
N-nitrosodimethylamine		3.3	2.00	61	2.14	65	7	7/11/2012
N-nitrosodiphenylamine		6.6	4.96	75	4.98	75	0	7/11/2012
N-nitrosodi-n-propylamine		3.3	2.04	62	2.09	63	2	7/11/2012
Phenanthrene		3.3	2.34	71	2.35	71	0	7/11/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-13571
Date: 7/12/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Semi-Volatile Organics by Method 8270 (Soil) (cont'd)								
Pyrene		3.3	2.75	83	2.73	83	1	7/11/2012
1,2,4-Trichlorobenzene		3.3	2.20	67	2.31	70	5	7/11/2012
4-Chloro-3-methylphenol		3.3	2.05	62	2.04	62	0	7/11/2012
2-Chlorophenol		3.3	1.99	60	2.12	64	6	7/11/2012
2,4-Dichlorophenol		3.3	2.09	63	2.10	64	0	7/11/2012
2,4-Dimethylphenol		3.3	2.24	68	2.22	67	1	7/11/2012
2-Methyl-4,6-dinitrophenol		3.3	1.44	44	1.48	45	3	7/11/2012
2,4-Dinitrophenol		3.3	1.09	33	1.11	34	2	7/11/2012
2-Nitrophenol		3.3	1.96	59	2.05	62	4	7/11/2012
4-Nitrophenol		3.3	1.74	53	1.76	53	1	7/11/2012
Pentachlorophenol		3.3	1.50	45	1.53	46	2	7/11/2012
Phenol		3.3	2.10	64	2.21	67	5	7/11/2012
2,4,6-Trichlorophenol		3.3	2.12	64	2.14	65	1	7/11/2012
2,4,5-Trichlorophenol		3.3	2.11	64	2.09	63	1	7/11/2012
Dibenzofuran		3.3	2.18	66	2.18	66	0	7/11/2012
2-Methyl Phenol		3.3	2.07	63	2.15	65	4	7/11/2012
3 & 4-Methylphenols		3.3	2.09	63	2.13	65	2	7/11/2012
Aniline		6.6	4.55	69	4.69	71	3	7/11/2012
Acetophenone		3.3	2.01	61	2.10	64	4	7/11/2012
Azobenzene		3.3	2.20	67	2.18	66	1	7/11/2012
4-Chloroaniline		3.3	2.30	70	2.26	68	2	7/11/2012
Surrogates								
Phenol-d5			89		92			
2-Fluorophenol			68		72			
2,4,6-Tribromophenol			83		84			
Nitrobenzene-d5			65		68			
2-Fluorobiphenyl			70		71			
P-Terphenyl-d14			107		107			
Metals (Soil)								
Arsenic	71-129%	271	280	103	280	103	0	7/9/2012
Cadmium	73-127%	44.3	44	99	44	99	0	7/9/2012
Chromium	70-130%	154	160	104	160	104	0	7/9/2012
Lead	70-130%	90.3	97	107	94	104	3	7/9/2012
Mercury	52-149%	20	20	100	20	100	0	7/10/2012
Reactivity								
Cyanide Reactivity		2.00	0.200	10	0.195	10	3	7/10/2012
Sulfide reactivity		10.00	1.68	0.1	2.17	0.2	67	7/10/2012

Case Narrative

Date: 7/12/2012

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Project:

RIAL WO#: 1207-13571

All QA/QC procedures required by the EPH Method were followed. All performance/acceptance standards for the required QA/QC procedures were achieved or otherwise stated in this case narrative. A fractionation check was performed on the silica gel lot associated with this sample and found to pass the method criteria unless otherwise stated here. The data reported for this sample was not corrected for instrument/solvent baseline effects. No significant modifications were made to the EPH Method.

All QA/QC procedures required by the VPH Method were followed. All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated. No significant modifications were made to the VPH Method.

The following exceptions were noted for this Work Order:

The methods requested for Flashpoint, Sulfide Reactivity, Cyanide Reactivity, Specific Conductance, and TPH GC/FID are not listed in the table of contents for compendium of MCP analytical methods. Therefore, there is no guideline for presumptive certainty.

Volatile Organics by 8260B

Question H - Laboratory control sample (7/10/12) / laboratory control sample duplicate (7/10/12) had analytes outside the 70%-130% QC acceptance limits. Up to 10% of the analytes are allowed to be out. The specific outliers include, (1,4-Dioxane 136%, 240%). These analytes were not detected in the associated samples

Question H - The RPD for (1,4-Dioxane 55%) in the laboratory control sample (7/11/12) / laboratory control sample duplicate (7/11/12) was outside the 20% QC acceptance limits.

Semi Volatile Organics by 8270D

Question H - Laboratory control sample (7/11/12)/ laboratory control sample duplicate (7/11/12) had analytesoutside the 40%-140% for base-neutrals and 30%-130% for acid compounds QC acceptance limits. Up to 10% areallowed to exceed the criteria. The specific outliers include, (Benzidine 32%, 28%). These analytes were not detected in the associated samples.

Extractable Petroleum Hydrocarbons

Question H - The RPD for (Naphthalene 30%) in the laboratory control sample (7/11/12)/ laboratory control sample duplicate (7/11/12) was outside the 25% QC acceptance limits.

There were no additional exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
QA/QC Director

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

09-21-10

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	VOC, 8260	VPH	EPH					
7/2	1245	PE1 lab Composite	G	4V	M	S	X	X						
7/2	1245	PE 1 lab Composite	G	1G	NP	S			X					
7/2	100	PE 4 lab Composite	G	4V	M	S	X	X						
7/2	100	PE 4 lab Composite	G	1G	NP	S			X					
7/2	12:45	PE 5 lab Composite	G	4V	M	S	X	X						
7/2	12:45	PE5 lab Composite	G	1G	NP	S			X					
7/2	10:15	PIPE Hold	G	3	M/NP	S	X	X	X	1G	4V			
7/3	8:30	PE 2	G	4V	M	S	X	X						
7/3	8:30	PE 2	G	1G	NP	S			X					
7/3	1100	PE 6 lab Composite	G	4V	M	S	X	X						
7/3	1100	PE 6 lab Composite	G	1G	NP	S			X					
7/3	1110	PE 3 lab Composite	G	4V	M	S	X	X						
7/3	1110	PE 3 lab Composite	G	1G	NP	S			X					
7/3	11:25	PE 7 lab Composite	G	4V	M	S	X	X						
7/3	11:25	PE 7 lab Composite	G	1G	NP	S			X					

Composite together the following Samples
PE 1, PE 3, PE 4, PE 5
PE 6, PE 7,

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Client Information

Company Name: Capaccio Env Eng
Address: 293 Boston Post Road West
City / State / Zip: Marlboro MA 01752
Telephone: 508-970-0033 Fax:
Contact Person: Dawn Horter

37125

Project Information

Project Name: Waters
P.O. Number: Project Number:
Report To: Dawn Horter Phone: 508 970-0033 Fax
Sampled By: Josh Fawson
Email report to these addresses: Dhorter@capaccio.com
Quote No:

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
Dave Chamberlain	7-3-12	1546	[illegible]	7-3-12	1546
	7/3/12	1720	[illegible]	7/3/12	1720
[illegible]	7/3/12	1840		7/3/12	1840

Turn Around Time

	Normal	EMAIL Report
	5 Business days. Possible surcharge	
	Rush – Date Due: ___/___/___	

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, (S-1), S-2, S-3

MCP Data Enhancement QC Package? (Yes) No

hold: 1207-13570
(1207-13571)

Temp. Upon Receipt 3.4 °C

Lab Use Only

✓	Sample Pick-Up Only
	RIAL sampled; attach field hours
✓	Shipped on ice
	Workorder No: 1207-13571

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

09-21-10

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	As, Cd, Cr, Pb, Hg	Conductivity, pH	Flash, Cyanide*	Sulfide reactivity	TPH, PCB's,	SVOC 8270	VOC 8260			* reactive w/ per Josh Fawson per M. Hobin 7/5/12							
7/3	12:30	PILE	C	3G	NP	S	X	X	X	X	X	X											
7/3	12:30	PILE	C	2V	M	S							X										
				5OP																			

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Client Information		Project Information	
Company Name:	Capaccio	Project Name:	Waters
Address:	293 Boston Post Road West	P.O. Number:	Project Number:
City / State / Zip:	Marlboro, MA	Report To: Dawn Horter	Phone: Fax
Telephone:	508-970-0033 Fax:	Sampled By:	Josh Fawson
Contact Person:	Dawn Horter	Quote No:	Email report to these addresses: Dhorter@capaccio.com

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
Dave Chamberlain	7.3.12	1546		~~7-3~~ 7.3.12	1546
	7/3/12	1720		7/3/12	1720
	7/7/12	1840		7/7/12	1840

Turn Around Time	
Normal	EMAIL Report
5 Business days. Possible surcharge	
Rush – Date Due: ___/___/___	

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, (S-1), S-2, S-3 MCP Data Enhancement QC Package? (Yes) No

b.l.a. 1207-13570

(1207-13571)

Temp. Upon Receipt 3.4°C

Lab Use Only	
✓	Sample Pick-Up Only
	RIAL sampled; attach field hours
✓	Shipped on ice
Workorder No:	1207-13571

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc

Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Mr. Matt Melvin
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 11/12/12
Date Reported: 11/16/12
P.O. #:
Work Order #: 1211-23653

DESCRIPTION: WATERS UST REMOVAL

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 001
SAMPLE DESCRIPTION: TANK 1-1, 1-2, 1-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<2.3	2.3	mg/kg dry	MADEP	11/14/12	KAC
Unadjusted C9-C12 Aliphatics (FID)	<2.3	2.3	mg/kg dry	MADEP	11/14/12	KAC
Methyl-tert-butylether	<0.05		mg/kg dry	MADEP	11/14/12	KAC
Benzene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
Toluene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
Ethylbenzene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
m,p-Xylene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
o-Xylene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
Naphthalene	<0.23	0.23	mg/kg dry	MADEP	11/14/12	KAC
Adjusted C5-C8 Aliphatics(FID)	<2.3	2.3	mg/kg dry	MADEP	11/14/12	KAC
Adjusted C9-C12 Aliphatics(FID)	<2.3	2.3	mg/kg dry	MADEP	11/14/12	KAC
C9-C10 Aromatics(PID)	<2.3	2.3	mg/kg dry	MADEP	11/14/12	KAC
Moisture	9		%	SM2540 G.	11/13/12	RJL
Surrogate			RANGE		11/14/12	KAC
2,5-Dibromotoluene(PID)	109		70-130%	MADEP	11/14/12	KAC
2,5-Dibromotoluene(FID)	111		70-130%	MADEP	11/14/12	KAC
EPH/PAH						
C9-C18 Aliphatics	<22	22	mg/kg dry	MADEP	11/14/12	TCL
C19-C36 Aliphatics	<22	22	mg/kg dry	MADEP	11/14/12	TCL
C11-C22 Aromatics	<22	22	mg/kg dry	MADEP	11/14/12	TCL
Total EPH	<22		mg/kg dry	MADEP	11/14/12	TCL
Target PAH Analytes					11/14/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 001
SAMPLE DESCRIPTION: TANK 1-1, 1-2, 1-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Moisture	9		%	SM2540 G.	11/13/12	RJL
Extraction Surrogates			RANGE		11/14/12	TCL
Chloro-octadecane	57		40-140%	MADEP	11/14/12	TCL
Ortho-terphenyl	72		40-140%	MADEP	11/14/12	TCL
Fractionation Surrogates			RANGE		11/14/12	TCL
2-Fluorobiphenyl	89		40-140%	MADEP	11/14/12	TCL
2-Bromonaphthalene	79		40-140%	MADEP	11/14/12	TCL
Extraction date	Extracted			MADEP	11/13/12	RJL
Volatile Organic Compounds						
Acetone	<0.35	0.35	mg/kg dry	5035/8260B	11/15/12	KAC
Tertiary Amyl Methyl Ether	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Benzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Bromobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Bromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Bromodichloromethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Bromoform	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Bromomethane	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Sec-butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
n-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
tert-Butylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Carbon Disulfide	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Carbon Tetrachloride	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Chlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Dibromochloromethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Chloroethane	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Chloroform	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Chloromethane	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
2-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
4-Chlorotoluene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dibromo-3-Chloropropane	<0.07	0.07	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dibromoethane(EDB)	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 001
SAMPLE DESCRIPTION: TANK 1-1, 1-2, 1-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromomethane	<0.07	0.07	mg/kg dry	5035/8260B	11/15/12	KAC
1,3-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,4-Dichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
n-Propylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Dichlorodifluoromethane	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
cis-1,2-Dichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
trans-1,2-Dichloroethylene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,3-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
2,2-Dichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
cis-1,3-Dichloropropene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
trans-1,3-Dichloropropylene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Diethyl ether	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Diisopropyl Ether (DIPE)	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
1,4-Dioxane	<3.5	3.5	mg/kg dry	5035/8260B	11/15/12	KAC
Ethyl Tertiary Butyl Ether	<0.17	0.17	mg/kg dry	5035/8260B	11/15/12	KAC
Ethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Hexachlorobutadiene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
2-Hexanone	<0.35	0.35	mg/kg dry	5035/8260B	11/15/12	KAC
Isopropylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
p-Isopropyltoluene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
2-Butanone(MEK)	<0.35	0.35	mg/kg dry	5035/8260B	11/15/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.35	0.35	mg/kg dry	5035/8260B	11/15/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Methylene Chloride	0.10	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Naphthalene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,2-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Styrene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,1,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,2,2-Tetrachloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Tetrachloroethene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Tetrahydrofuran	<0.35	0.35	mg/kg dry	5035/8260B	11/15/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 001
SAMPLE DESCRIPTION: TANK 1-1, 1-2, 1-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Toluene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,4-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,3-Trichlorobenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,1-Trichloroethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Trichloroethene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Trichlorofluoromethane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,3-Trichloropropane	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,4-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
1,3,5-Trimethylbenzene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Vinyl Chloride	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
o-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
m,p-Xylene	<0.03	0.03	mg/kg dry	5035/8260B	11/15/12	KAC
Surrogates			RANGE	5035/8260B	11/15/12	KAC
Dibromofluoromethane	98		70-130%	5035/8260B	11/15/12	KAC
Toluene-d8	92		70-130%	5035/8260B	11/15/12	KAC
4-Bromofluorobenzene	95		70-130%	5035/8260B	11/15/12	KAC
1,2 Dichloroethane-d4	95		70-130%	5035/8260B	11/15/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 002
SAMPLE DESCRIPTION: TANK 2-1, 2-2, 2-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<2.9	2.9	mg/kg dry	MADEP	11/14/12	KAC
Unadjusted C9-C12 Aliphatics (FID)	<2.9	2.9	mg/kg dry	MADEP	11/14/12	KAC
Methyl-tert-butylether	<0.06	0.06	mg/kg dry	MADEP	11/14/12	KAC
Benzene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
Toluene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
Ethylbenzene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
m,p-Xylene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
o-Xylene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
Naphthalene	<0.29	0.29	mg/kg dry	MADEP	11/14/12	KAC
Adjusted C5-C8 Aliphatics(FID)	<2.9	2.9	mg/kg dry	MADEP	11/14/12	KAC
Adjusted C9-C12 Aliphatics(FID)	<2.9	2.9	mg/kg dry	MADEP	11/14/12	KAC
C9-C10 Aromatics(PID)	<2.9	2.9	mg/kg dry	MADEP	11/14/12	KAC
Moisture	17		%	SM2540 G.	11/13/12	RJL
Surrogate			RANGE		11/14/12	KAC
2,5-Dibromotoluene(PID)	118		70-130%	MADEP	11/14/12	KAC
2,5-Dibromotoluene(FID)	119		70-130%	MADEP	11/14/12	KAC
EPH/PAH						
C9-C18 Aliphatics	<24	24	mg/kg dry	MADEP	11/14/12	TCL
C19-C36 Aliphatics	<24	24	mg/kg dry	MADEP	11/14/12	TCL
C11-C22 Aromatics	<24	24	mg/kg dry	MADEP	11/14/12	TCL
Total EPH	<24		mg/kg dry	MADEP	11/14/12	TCL
Target PAH Analytes					11/14/12	TCL
Naphthalene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
2-Methylnaphthalene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Acenaphthylene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Acenaphthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Fluorene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Phenanthrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(a)anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Chrysene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(b)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 002
SAMPLE DESCRIPTION: TANK 2-1, 2-2, 2-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(k)fluoranthene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(a)pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Indeno(1,2,3-cd)pyrene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Dibenzo(a,h)anthracene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Benzo(g,h,i)perylene	<0.4	0.4	mg/kg dry	MADEP	11/14/12	TCL
Moisture	17		%	SM2540 G.	11/13/12	RJL
Extraction Surrogates			RANGE		11/14/12	TCL
Chloro-octadecane	48		40-140%	MADEP	11/14/12	TCL
Ortho-terphenyl	69		40-140%	MADEP	11/14/12	TCL
Fractionation Surrogates			RANGE		11/14/12	TCL
2-Fluorobiphenyl	94		40-140%	MADEP	11/14/12	TCL
2-Bromonaphthalene	88		40-140%	MADEP	11/14/12	TCL
Extraction date	Extracted			MADEP	11/13/12	RJL
Volatile Organic Compounds						
Acetone	<0.58	0.58	mg/kg dry	5035/8260B	11/15/12	KAC
Tertiary Amyl Methyl Ether	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Benzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Bromobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Bromochloromethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Bromodichloromethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Bromoform	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Bromomethane	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Sec-butylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
n-Butylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
tert-Butylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Carbon Disulfide	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Carbon Tetrachloride	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Chlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Dibromochloromethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Chloroethane	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Chloroform	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Chloromethane	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
2-Chlorotoluene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
4-Chlorotoluene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dibromo-3-Chloropropane	<0.12	0.12	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dibromoethane(EDB)	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 002
SAMPLE DESCRIPTION: TANK 2-1, 2-2, 2-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromomethane	<0.12	0.12	mg/kg dry	5035/8260B	11/15/12	KAC
1,3-Dichlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,4-Dichlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
n-Propylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Dichlorodifluoromethane	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloroethene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
cis-1,2-Dichloroethene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
trans-1,2-Dichloroethylene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2-Dichloropropane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,3-Dichloropropane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
2,2-Dichloropropane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1-Dichloropropene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
cis-1,3-Dichloropropene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
trans-1,3-Dichloropropylene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Diethyl ether	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Diisopropyl Ether (DIPE)	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
1,4-Dioxane	<5.8	5.8	mg/kg dry	5035/8260B	11/15/12	KAC
Ethyl Tertiary Butyl Ether	<0.29	0.29	mg/kg dry	5035/8260B	11/15/12	KAC
Ethylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Hexachlorobutadiene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
2-Hexanone	<0.58	0.58	mg/kg dry	5035/8260B	11/15/12	KAC
Isopropylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
p-Isopropyltoluene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
2-Butanone(MEK)	<0.58	0.58	mg/kg dry	5035/8260B	11/15/12	KAC
4-Methyl-2-pentanone(MIBK)	<0.58	0.58	mg/kg dry	5035/8260B	11/15/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Methylene Chloride	0.13	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Naphthalene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,2-Trichloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Styrene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,1,2-Tetrachloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,2,2-Tetrachloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Tetrachloroethene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Tetrahydrofuran	<0.58	0.58	mg/kg dry	5035/8260B	11/15/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 11/12/12
Work Order #: 1211-23653
WATERS UST REMOVAL

Sample # 002
SAMPLE DESCRIPTION: TANK 2-1, 2-2, 2-3 COMPOSITE
SAMPLE TYPE: 3-GRAB/COMPOSITE **SAMPLE DATE/TIME:** 11/09/2012

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Toluene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,4-Trichlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,3-Trichlorobenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,1,1-Trichloroethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Trichloroethene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Trichlorofluoromethane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,3-Trichloropropane	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,2,4-Trimethylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
1,3,5-Trimethylbenzene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Vinyl Chloride	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
o-Xylene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
m,p-Xylene	<0.06	0.06	mg/kg dry	5035/8260B	11/15/12	KAC
Surrogates			RANGE	5035/8260B	11/15/12	KAC
Dibromofluoromethane	99		70-130%	5035/8260B	11/15/12	KAC
Toluene-d8	92		70-130%	5035/8260B	11/15/12	KAC
4-Bromofluorobenzene	94		70-130%	5035/8260B	11/15/12	KAC
1,2 Dichloroethane-d4	98		70-130%	5035/8260B	11/15/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

Customer Name : Capaccio Environmental Eng.

W.O. Number 1211-23653

MassDEP Analytical Protocol Certification Form

Laboratory Name: R.I. Analytical Laboratories Work Order No: 1211-23653

Project / Location: WATERS UST REMOVAL RTN :

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):

1211-23653-001 through 1211-23653-002

Matrices: ☐ Groundwater/Surface Water ☒ Soil / Sediment ☐ Drinking Water ☐ Air ☐ Other

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☒	7470/7471 Hg CAM III B ☐	MassDEP VPH CAM IV A ☒	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM V111 B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☐ Yes ☒ No [1]

Data User Note: ***Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.***

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☐ Yes ☒ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature [signature] Position: QA/QC Director

Printed Name: Mike Hobin Date: 11/16/12

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)			
C9-C18 Aliphatics	mg/kg dry	<20	11/14/2012
C19-C36 Aliphatics	mg/kg dry	<20	11/14/2012
C11-C22 Aromatics	mg/kg dry	<20	11/14/2012
Total EPH	mg/kg dry	<20	11/14/2012
Target PAH Analytes			11/14/2012
Naphthalene	mg/kg dry	<0.4	11/14/2012
2-Methylnaphthalene	mg/kg dry	<0.4	11/14/2012
Acenaphthylene	mg/kg dry	<0.4	11/14/2012
Acenaphthene	mg/kg dry	<0.4	11/14/2012
Fluorene	mg/kg dry	<0.4	11/14/2012
Phenanthrene	mg/kg dry	<0.4	11/14/2012
Anthracene	mg/kg dry	<0.4	11/14/2012
Fluoranthene	mg/kg dry	<0.4	11/14/2012
Pyrene	mg/kg dry	<0.4	11/14/2012
Benzo(a)anthracene	mg/kg dry	<0.4	11/14/2012
Chrysene	mg/kg dry	<0.4	11/14/2012
Benzo(b)fluoranthene	mg/kg dry	<0.4	11/14/2012
Benzo(k)fluoranthene	mg/kg dry	<0.4	11/14/2012
Benzo(a)pyrene	mg/kg dry	<0.4	11/14/2012
Indeno(1,2,3-cd)pyrene	mg/kg dry	<0.4	11/14/2012
Dibenzo(a,h)anthracene	mg/kg dry	<0.4	11/14/2012
Benzo(g,h,i)perylene	mg/kg dry	<0.4	11/14/2012
Extraction Surrogates	**RANGE**		11/14/2012
Chloro-octadecane	40-140%	71	11/14/2012
Ortho-terphenyl	40-140%	89	11/14/2012
Fractionation Surrogates	**RANGE**		11/14/2012
2-Fluorobiphenyl	40-140%	93	11/14/2012
2-Bromonaphthalene	40-140%	81	11/14/2012
Volatile Petroleum Hydrocarbons (Soil)			
Unadj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	11/14/2012
Unadj C9-C12 Aliphatic(FID)	mg/kg dry	<2.5	11/14/2012
Methyl-tert-butylether	mg/kg dry	<0.10	11/14/2012
Benzene	mg/kg dry	<0.25	11/14/2012
Toluene	mg/kg dry	<0.25	11/14/2012
Ethylbenzene	mg/kg dry	<0.25	11/14/2012
m,p-Xylene	mg/kg dry	<0.25	11/14/2012
o-Xylene	mg/kg dry	<0.25	11/14/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Volatile Petroleum Hydrocarbons (Soil) (cont'd)			
Naphthalene	mg/kg dry	<0.25	11/14/2012
Adj C5-C8 Aliphatics(FID)	mg/kg dry	<2.5	11/14/2012
Adj C9-C12 Aliphatics(FID)	mg/kg dry	<2.5	11/14/2012
C9-C10 Aromatics(PID)	mg/kg dry	<2.5	11/14/2012
Surrogate	**RANGE**		11/14/2012
2,5-Dibromotoluene(PID)	70-130%	113	11/14/2012
2,5-Dibromotoluene(FID)	70-130%	115	11/14/2012
5035(Soil)			
Acetone	mg/kg dry	<0.50	11/15/2012
Tertiary Amyl Methyl Ether	mg/kg dry	<0.25	11/15/2012
Benzene	mg/kg dry	<0.05	11/15/2012
Bromobenzene	mg/kg dry	<0.05	11/15/2012
Bromochloromethane	mg/kg dry	<0.05	11/15/2012
Bromodichloromethane	mg/kg dry	<0.05	11/15/2012
Bromoform	mg/kg dry	<0.05	11/15/2012
Bromomethane	mg/kg dry	<0.25	11/15/2012
Sec-butylbenzene	mg/kg dry	<0.05	11/15/2012
n-Butylbenzene	mg/kg dry	<0.05	11/15/2012
tert-Butylbenzene	mg/kg dry	<0.05	11/15/2012
Carbon Disulfide	mg/kg dry	<0.25	11/15/2012
Carbon Tetrachloride	mg/kg dry	<0.05	11/15/2012
Chlorobenzene	mg/kg dry	<0.05	11/15/2012
Dibromochloromethane	mg/kg dry	<0.05	11/15/2012
Chloroethane	mg/kg dry	<0.25	11/15/2012
Chloroform	mg/kg dry	<0.05	11/15/2012
Chloromethane	mg/kg dry	<0.25	11/15/2012
2-Chlorotoluene	mg/kg dry	<0.05	11/15/2012
4-Chlorotoluene	mg/kg dry	<0.05	11/15/2012
1,2-Dibromo-3-Chloropropane	mg/kg dry	<0.10	11/15/2012
1,2-Dibromoethane(EDB)	mg/kg dry	<0.05	11/15/2012
Dibromomethane	mg/kg dry	<0.10	11/15/2012
1,3-Dichlorobenzene	mg/kg dry	<0.05	11/15/2012
1,2-Dichlorobenzene	mg/kg dry	<0.05	11/15/2012
1,4-Dichlorobenzene	mg/kg dry	<0.05	11/15/2012
n-Propylbenzene	mg/kg dry	<0.05	11/15/2012
Dichlorodifluoromethane	mg/kg dry	<0.25	11/15/2012
1,1-Dichloroethane	mg/kg dry	<0.05	11/15/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
1,2-Dichloroethane	mg/kg dry	<0.05	11/15/2012
1,1-Dichloroethene	mg/kg dry	<0.05	11/15/2012
cis-1,2-Dichloroethene	mg/kg dry	<0.05	11/15/2012
trans-1,2-Dichloroethylene	mg/kg dry	<0.05	11/15/2012
1,2-Dichloropropane	mg/kg dry	<0.05	11/15/2012
1,3-Dichloropropane	mg/kg dry	<0.05	11/15/2012
2,2-Dichloropropane	mg/kg dry	<0.05	11/15/2012
1,1-Dichloropropene	mg/kg dry	<0.05	11/15/2012
cis-1,3-Dichloropropene	mg/kg dry	<0.05	11/15/2012
trans-1,3-Dichloropropylene	mg/kg dry	<0.05	11/15/2012
Diethyl ether	mg/kg dry	<0.25	11/15/2012
Diisopropyl ether (DIPE)	mg/kg dry	<0.25	11/15/2012
1,4-Dioxane	mg/kg dry	<5.0	11/15/2012
Ethyl Tertiary Butyl Ether	mg/kg dry	<0.25	11/15/2012
Ethylbenzene	mg/kg dry	<0.05	11/15/2012
Hexachlorobutadiene	mg/kg dry	<0.05	11/15/2012
2-Hexanone	mg/kg dry	<0.50	11/15/2012
Isopropylbenzene	mg/kg dry	<0.05	11/15/2012
p-Isopropyltoluene	mg/kg dry	<0.05	11/15/2012
2-Butanone(MEK)	mg/kg dry	<0.50	11/15/2012
4-Methyl-2-pentanone(MIBK)	mg/kg dry	<0.50	11/15/2012
MTBE	mg/kg dry	<0.05	11/15/2012
Methylene Chloride	mg/kg dry	<0.05	11/15/2012
Naphthalene	mg/kg dry	<0.05	11/15/2012
1,1,2-Trichloroethane	mg/kg dry	<0.05	11/15/2012
Styrene	mg/kg dry	<0.05	11/15/2012
1,1,1,2-Tetrachloroethane	mg/kg dry	<0.05	11/15/2012
1,1,2,2-Tetrachloroethane	mg/kg dry	<0.05	11/15/2012
Tetrachloroethene	mg/kg dry	<0.05	11/15/2012
Tetrahydrofuran	mg/kg dry	<0.50	11/15/2012
Toluene	mg/kg dry	<0.05	11/15/2012
1,2,4-Trichlorobenzene	mg/kg dry	<0.05	11/15/2012
1,2,3-Trichlorobenzene	mg/kg dry	<0.05	11/15/2012
1,1,1-Trichloroethane	mg/kg dry	<0.05	11/15/2012
Trichloroethene	mg/kg dry	<0.05	11/15/2012
Trichlorofluoromethane	mg/kg dry	<0.05	11/15/2012
1,2,3-Trichloropropane	mg/kg dry	<0.05	11/15/2012
1,2,4-Trimethylbenzene	mg/kg dry	<0.05	11/15/2012
1,3,5-Trimethylbenzene	mg/kg dry	<0.05	11/15/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
5035(Soil) (cont'd)			
Vinyl Chloride	mg/kg dry	<0.05	11/15/2012
o-Xylene	mg/kg dry	<0.05	11/15/2012
m,p-Xylene	mg/kg dry	<0.05	11/15/2012
Surrogates	**RANGE**		11/15/2012
Toluene-d8	70-130%	91	11/15/2012
Dibromofluoromethane	70-130%	99	11/15/2012
1,2 Dichlorocthane-d4	70-130%	96	11/15/2012
4-Bromofluorobenzene	70-130%	95	11/15/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Soil)								
C9-C18 Aliphatics		20	13.0	65	12.7	64	2	11/14/2012
C19-C36 Aliphatics		27	22.1	82	21.7	80	2	11/14/2012
C11-C22 Aromatics		57	45.9	81	46.6	82	2	11/14/2012
Target PAH Analytes								
Naphthalene		3.33	2.00	60	1.99	60	1	11/14/2012
2-Methylnaphthalene		3.33	2.08	62	2.06	62	1	11/14/2012
Acenaphthylene		3.33	2.28	68	2.24	67	2	11/14/2012
Acenaphthene		3.33	2.27	68	2.23	67	2	11/14/2012
Fluorene		3.33	2.53	76	2.48	74	2	11/14/2012
Phenanthrene		3.33	2.61	78	2.57	77	2	11/14/2012
Anthracene		3.33	3.10	93	3.25	98	5	11/14/2012
Fluoranthene		3.33	2.77	83	2.77	83	0	11/14/2012
Pyrene		3.33	2.78	83	2.79	84	0	11/14/2012
Benzo(a)anthracene		3.33	2.91	87	2.95	89	1	11/14/2012
Chrysene		3.33	2.91	87	2.96	89	2	11/14/2012
Benzo(b)fluoranthene		3.33	2.98	89	3.08	92	3	11/14/2012
Benzo(k)fluoranthene		3.33	3.14	94	3.34	100	6	11/14/2012
Benzo(a)pyrene		3.33	2.92	88	2.99	90	2	11/14/2012
Indeno(1,2,3-cd)pyrene		3.33	2.84	85	2.95	89	4	11/14/2012
Dibenzo(a,h)anthracene		3.33	2.93	88	3.01	90	3	11/14/2012
Benzo(g,h,i)perylene		3.33	2.82	85	2.92	88	3	11/14/2012
Extraction Surrogates								
Chloro-octadecane			60		64			
Ortho-terphenyl			84		91			
Fractionation Surrogates								
2-Fluorobiphenyl			93		90			
2-Bromonaphthalene			83		83			
Volatile Petroleum Hydrocarbons (Soil)								
Methyl-tert-butylether		2.5	2.1	84	2.1	84	0	11/14/2012
Benzene		2.5	2.1	84	2.0	80	5	11/14/2012
Toluene		2.5	2.2	88	2.1	84	5	11/14/2012
Ethylbenzene		2.5	2.2	88	2.1	84	5	11/14/2012
m,p-Xylene		5.0	4.6	92	4.4	88	4	11/14/2012
o-Xylene		2.5	2.2	88	2.1	84	5	11/14/2012
Naphthalene		2.5	2.2	88	2.2	88	0	11/14/2012
Adj C5-C8 Aliphatics(FID)		7.5	6.4	85	6.0	80	6	11/14/2012
Adj C9-C12 Aliphatics(FID)		5.0	3.9	78	3.8	76	3	11/14/2012
C9-C10 Aromatics(PID)		2.5	2.2	88	2.1	84	5	11/14/2012
Surrogate								
2,5-Dibromotoluene(PID)			99		92			
2,5-Dibromotoluene(FID)			98		92			
5035(Soil)								
Acetone		25	30	120	30	120	0	11/15/2012
Tertiary Amyl Methyl Ether		2.5	2.3	92	2.4	96	4	11/15/2012
Benzene		2.5	2.4	96	2.7	108	12	11/15/2012
Bromobenzene		2.5	2.4	96	2.7	108	12	11/15/2012
Bromochloromethane		2.5	2.5	100	2.7	108	8	11/15/2012
Bromodichloromethane		2.5	2.5	100	2.8	112	11	11/15/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
Bromoform		2.5	2.1	84	2.3	92	9	11/15/2012
Bromomethane		2.5	3.2	128	3.6	144	12	11/15/2012
Sec-butylbenzene		2.5	2.3	92	2.6	104	12	11/15/2012
n-Butylbenzene		2.5	2.6	104	2.9	116	11	11/15/2012
tert-Butylbenzene		2.5	2.3	92	2.5	100	8	11/15/2012
Carbon Disulfide		2.5	2.4	96	2.7	108	12	11/15/2012
Carbon Tetrachloride		2.5	2.4	96	2.8	112	15	11/15/2012
Chlorobenzene		2.5	2.4	96	2.6	104	8	11/15/2012
Dibromochloromethane		2.5	2.6	104	2.9	116	11	11/15/2012
Chloroethane		2.5	2.6	104	2.9	116	11	11/15/2012
Chloroform		2.5	2.4	96	2.6	104	8	11/15/2012
Chloromethane		2.5	2.1	84	2.5	100	17	11/15/2012
2-Chlorotoluene		2.5	2.6	104	2.9	116	11	11/15/2012
4-Chlorotoluene		2.5	2.6	104	2.9	116	11	11/15/2012
1,2-Dibromo-3-Chloropropane		2.5	2.3	92	2.5	100	8	11/15/2012
1,2-Dibromoethane(EDB)		2.5	2.6	104	2.8	112	7	11/15/2012
Dibromomethane		2.5	2.5	100	2.8	112	11	11/15/2012
1,3-Dichlorobenzene		2.5	2.4	96	2.6	104	8	11/15/2012
1,2-Dichlorobenzene		2.5	2.3	92	2.6	104	12	11/15/2012
1,4-Dichlorobenzene		2.5	2.3	92	2.6	104	12	11/15/2012
n-Propylbenzene		2.5	2.6	104	3.0	120	14	11/15/2012
Dichlorodifluoromethane		2.5	2.0	80	2.1	84	5	11/15/2012
1,1-Dichloroethane		2.5	2.6	104	3.0	120	14	11/15/2012
1,2-Dichloroethane		2.5	2.5	100	2.7	108	8	11/15/2012
1,1-Dichloroethene		2.5	2.3	92	2.6	104	12	11/15/2012
cis-1,2-Dichloroethene		2.5	2.4	96	2.8	112	15	11/15/2012
trans-1,2-Dichloroethylene		2.5	2.7	108	3.0	120	11	11/15/2012
1,2-Dichloropropane		2.5	2.5	100	2.7	108	8	11/15/2012
1,3-Dichloropropane		2.5	2.6	104	2.9	116	11	11/15/2012
2,2-Dichloropropane		2.5	2.4	96	2.9	116	19	11/15/2012
1,1-Dichloropropene		2.5	2.6	104	2.9	116	11	11/15/2012
cis-1,3-Dichloropropene		2.5	2.2	88	2.4	96	9	11/15/2012
trans-1,3-Dichloropropylene		2.5	2.3	92	2.5	100	8	11/15/2012
Diethyl ether		25	27	108	30	120	11	11/15/2012
Diisopropyl ether (DIPE)		2.5	2.6	104	2.9	116	11	11/15/2012
1,4-Dioxane		50	51	102	50	100	2	11/15/2012
Ethyl Tertiary Butyl Ether		2.5	2.7	108	2.9	116	7	11/15/2012
Ethylbenzene		2.5	2.5	100	2.8	112	11	11/15/2012
Hexachlorobutadiene		2.5	2.3	92	2.5	100	8	11/15/2012
2-Hexanone		25	29	116	32	128	10	11/15/2012
Isopropylbenzene		2.5	2.2	88	2.5	100	13	11/15/2012
p-Isopropyltoluene		2.5	2.3	92	2.5	100	8	11/15/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1211-23653
Date: 11/16/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
5035(Soil) (cont'd)								
2-Butanone(MEK)		25	27	108	29	116	7	11/15/2012
4-Methyl-2-pentanone(MIBK)		25	29	116	31	124	7	11/15/2012
MTBE		2.5	2.7	108	2.8	112	4	11/15/2012
Methylene Chloride		2.5	2.6	104	2.8	112	7	11/15/2012
Naphthalene		2.5	2.5	100	2.6	104	4	11/15/2012
1,1,2-Trichloroethane		2.5	2.5	100	2.8	112	11	11/15/2012
Styrene		2.5	2.2	88	2.4	96	9	11/15/2012
1,1,1,2-Tetrachloroethane		2.5	2.4	96	2.7	108	12	11/15/2012
1,1,2,2-Tetrachloroethane		2.5	2.4	96	2.6	104	8	11/15/2012
Tetrachloroethene		2.5	2.5	100	2.8	112	11	11/15/2012
Tetrahydrofuran		25	27	108	29	116	7	11/15/2012
Toluene		2.5	2.5	100	2.9	116	15	11/15/2012
1,2,4-Trichlorobenzene		2.5	2.4	96	2.6	104	8	11/15/2012
1,2,3-Trichlorobenzene		2.5	2.4	96	2.5	100	4	11/15/2012
1,1,1-Trichloroethane		2.5	2.4	96	2.8	112	15	11/15/2012
Trichloroethene		2.5	2.4	96	2.8	112	15	11/15/2012
Trichlorofluoromethane		2.5	2.4	96	2.9	116	19	11/15/2012
1,2,3-Trichloropropane		2.5	2.4	96	2.7	108	12	11/15/2012
1,2,4-Trimethylbenzene		2.5	2.3	92	2.6	104	12	11/15/2012
1,3,5-Trimethylbenzene		2.5	2.3	92	2.5	100	8	11/15/2012
Vinyl Chloride		2.5	2.3	92	2.7	108	16	11/15/2012
o-Xylene		2.5	2.2	88	2.4	96	9	11/15/2012
m,p-Xylene		5.0	4.4	88	4.9	98	11	11/15/2012
Surrogates								
Toluene-d8			104		108			
Dibromofluoromethane			100		101			
1,2 Dichloroethane-d4			101		101			
4-Bromofluorobenzene			103		104			

Case Narrative

Date: 11/16/2012

Capaccio Environmental Eng.
Attn: Mr. Matt Melvin
293 Boston Post Road - West
Marlborough, MA 01752

Project:

RIAL WO#: 1211-23653

All QA/QC procedures required by the EPH Method were followed. All performance/acceptance standards for the required QA/QC procedures were achieved or otherwise stated in this case narrative. A fractionation check was performed on the silica gel lot associated with this sample and found to pass the method criteria unless otherwise stated here. The data reported for this sample was not corrected for instrument/solvent baseline effects. No significant modifications were made to the EPH Method.

All QA/QC procedures required by the VPH Method were followed. All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated. No significant modifications were made to the VPH Method.

The following exceptions were noted for this Work Order:

Volatile Organics by 8260B

Question G - The S-1/GW-1 reporting limits were not met for (Dibromochloromethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropylene, 1,4-Dioxane, and 1,1,2,2-Tetrachloroethane) in Sample -001(TANK 1-1, 1-2, 1-3 COMPOSITE), and Dibromochloromethane, cis-1,3-Dichloropropene, trans-1,3-Dichloropropylene, 1,4-Dioxane, 4-Methyl-2-pentanone, and 1,1,2,2-Tetrachloroethane in Sample -002(TANK 2-1,2-2,2-3 COMPOSITE).

Question H - Laboratory control sample (11/15/12) / laboratory control sample duplicate (11/15/12) had analytes outside the 70%-130% QC acceptance limits. Up to 10% of the analytes are allowed to be out. The specific outliers include, (Bromomethane LCSD 144%). These analytes were not detected in the associated samples

There were no additional exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
QA/QC Director

R.I. ANALYTICAL
Specialists in Environmental Services

CHAIN OF CUSTODY RECORD

41 Illinois Avenue
Warwick, RI 02888-3007
800-937-2580 • Fax: 401-738-1970

131 Coolidge St., Suite 105
Hudson, MA 01749-1331
800-937-2580 • Fax: 978-568-0078

06-21-10

Date Collected	Time Collected	Field Sample Identification	Grab or Composite	# of Containers & Type C	Preservation Code P	Matrix Code M	EPH	VPH	VOC		
											LAB TO COMPOSIT
11/9/12	10:55	TANK 1-1	G	3G/VOA	M	S	✓	✓	✓	sample 001	1-1, 1-2, 1-3
	12:15	TANK 1-2	G			S	✓	✓	✓		AND
	12:15	TANK 1-3	G			S	✓	✓	✓		2-1, 2-2, 2-3
	2:15	TANK 2-1	G			S	✓	✓	✓	sample 002	
	2:20	TANK 2-2	G			S	✓	✓	✓		
	2:30	TANK 2-3	G			S	✓	✓	✓		

18 bottles rec

Client Information

Company Name: CAPACCIO ENVIRONMENTAL ENGINEERING
Address: 293 BOSTON POST ROAD WEST
City / State / Zip: MARLBOROUGH/MA 01752
Telephone: (508) 970-0033 ~~Fax~~ ~~EXT 143~~
Contact Person: MATT MELVIN

Project Information

Project Name: WATERS UST REMOVAL
P.O. Number:
Project Number:
Report To: MATT MELVIN
Phone: (508) 970-0033 ext. 143
Sampled By: MATT MELVIN
Email report to these addresses: mmelvin@capaccio.com ~~mmelvin~~ dhunter@capaccio.com
Quote No:

Relinquished By Signatures	Date	Time	Received By Signatures	Date	Time
[signature]	11/9/12	1714	[signature]	11-9-12	1714
[signature]	11-9-12	1603	[signature]	11/12/12	1603
[signature]	11/12/12	1815	Justin Phelan	11/12/12	1815

Turn Around Time

✓ Normal | EMAIL Report
5 Business days. Possible surcharge
Rush – Date Due: ___/___/___

Project Comments

Circle if applicable: GW-1, GW-2, GW-3, S-1, S-2, S-3 MCP Data Enhancement QC Package? Yes No

Temp. Upon Receipt 1.8 °C

Lab Use Only

Sample Pick-Up Only
RIAL sampled; attach field hours
✓ Shipped on ice
Workorder No: 1211-23653

Containers: P=Poly, G=Glass, AG=Amber Glass, V=Vial, St=Sterile Preservatives: A=Ascorbic Acid, NH4=NH_4Cl, H=HCl, M=MeOH, N=HNO_3, NP=None, S=H_2SO_4, SB=$NaHSO_4$, SH=NaOH, T=$Na_2S_2O_3$, Z=ZnOAc
Matrix Codes: GW=Groundwater, SW=Surface Water, WW=Wastewater, DW=Drinking Water, S=Soil, SL=Sludge, A=Air, B=Bulk/Solid, WP=Wipe, O=_____

APPENDIX 5

Soil Disposal Documentation

694034 1526203

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: MAD001047968
2. Page 1 of 1
3. Emergency Response Phone: (877) 577-2669
4. Manifest Tracking Number: 004979684 FLE

5. Generator's Name and Mailing Address
WATERS CORPORATION
34 MAPLE STREET ATTN: DAVE LEBLANC
MILFORD MA 01757 (508)478-2000
Generator's Phone:

Generator's Site Address (if different than mailing address)
WATERS CORPORATION
34 MAPLE STREET
MILFORD MA 01757 (508)478-2000

6. Transporter 1 Company Name: 21ST CENTURY ENV MGT LLC, OF RI
U.S. EPA ID Number: RIR000508457

7. Transporter 2 Company Name:
U.S. EPA ID Number:

8. Designated Facility Name and Site Address
NORTHLAND ENVIRONMENTAL, LLC
275 ALLENS AVENUE
Facility's Phone: PROVIDENCE, RI 02905 (401) 781-6340
U.S. EPA ID Number: RID040098352

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1. STATE REGULATED OILY WASTE	1	CM	57580 ~~36500~~	P	MA01
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information
(1) 548710-00 - OILY SOIL

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Dave LeBlanc
Signature:
Month Day Year: 8 23 12

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Chris Lambert
Signature:
Month Day Year: 8 23 12

Transporter 2 Printed/Typed Name:
Signature:
Month Day Year:

18. Discrepancy: Line 1- Section 10 Should be = 57580

18a. Discrepancy Indication Space ☒ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number:
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.
H141			

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name:
Signature:
Month Day Year: 8 23 12

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

PA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

APPENDIX 6

Tank Disposal Documentation

The Commonwealth of Massachusetts
Department of Fire Services - Office of the State Fire Marshal

RECEIPT OF DISPOSAL OF UNDERGROUND STEEL STORAGE TANK FORMERLY CONTAINING MOTOR FUEL

NAME AND ADDRESS OF APPROVED TANK YARD: Allied Recycling Center, Inc.
1901 Main Street
Walpole, MA 02081

Approved tank yard no. 0015 Tank Yard Ledger 502 CMR 3.03(4) Number: 20120236

I certify under penalty of law I have personally examined the underground steel storage tank delivered to this "approved tank yard" by (firm, corporation or partnership) Northeast Tank and accepted same in conformance with Office of the State Fire Marshal Regulations 502 CMR 3.00 Provisions for Approving Underground Steel Storage Tank Dismantling Yards. A valid permit was issued by the head of the **LOCAL** fire department FDID# 2718S to transport this tank to this yard.

Name and official title of approved tank yard owner or owners authorized representative:

Signature: [signature] Title: Dispatcher Date signed: 7/2/12

TANK DATA:	**TANK REMOVED FROM:**
Gallons: 15,000	No. and Street: 34 Maple St.
Previous contents: #2 fuel oil	City and Town: Milford
Diameter: 120"	Fire Dept. Permit #: 595
Length: 350"	Notes:
Date Received: 7/2/12	
Serial # (if available):	
Tank I.D. # (Form FP-290):	

EACH TANK MUST HAVE A RECEIPT OF DISPOSAL

Owner/Operator to mail revised copy of Notification Form (FP290, or FP290R) to local fire department and:

Department of Environmental Protection
Bureau of Waste Prevention - UST Program
P.O. Box 120-0165
Boston, MA 02112-0165

This signed receipt of disposal must be returned to the head of the local fire department.

Form FP 291 (Rev. 11/2009)

The Commonwealth of Massachusetts
Department of Fire Services - Office of the State Fire Marshal

RECEIPT OF DISPOSAL OF UNDERGROUND STEEL STORAGE TANK FORMERLY CONTAINING MOTOR FUEL

NAME AND ADDRESS OF APPROVED TANK YARD: Allied Recycling Center, Inc.
1901 Main Street
Walpole, MA 02081

Approved tank yard no. 0015 Tank Yard Ledger 502 CMR 3.03(4) Number: 2012000237

I certify under penalty of law I have personally examined the underground steel storage tank delivered to this "approved tank yard" by (firm, corporation or partnership) Northeast Tank and accepted same in conformance with Office of the State Fire Marshal Regulations 502 CMR 3.00 Provisions for Approving Underground Steel Storage Tank Dismantling Yards. A valid permit was issued by the head of the **LOCAL** fire department FDID# 27185 to transport this tank to this yard.

Name and official title of approved tank yard owner or owners authorized representative:

Signature: [illegible] Title: Dispatcher Date signed: 7/3/12

TANK DATA:	**TANK REMOVED FROM:**
Gallons: 15,000	No. and Street: 34 Made St.
Previous contents: #2 fuel oil	City and Town: Milford
Diameter: 120"	Fire Dept. Permit #: 596
Length: 330"	Notes:
Date Received: 7/3/12	
Serial # (if available):	
Tank I.D. # (Form FP-290):	

EACH TANK MUST HAVE A RECEIPT OF DISPOSAL

Owner/Operator to mail revised copy of Notification Form (FP290, or FP290R) to local fire department and:

Department of Environmental Protection
Bureau of Waste Prevention - UST Program
P.O. Box 120-0165
Boston, MA 02112-0165

This signed receipt of disposal must be returned to the head of the local fire department.

Form FP 291 (Rev. 11/2009)

The Commonwealth of Massachusetts
Department of Fire Services - Office of the State Fire Marshal

RECEIPT OF DISPOSAL OF UNDERGROUND STEEL STORAGE TANK FORMERLY CONTAINING MOTOR FUEL

NAME AND ADDRESS OF APPROVED TANK YARD: Allied Recycling Center, Inc.
1901 Main Street
Walpole, MA 02081

Approved tank yard no. 0015 Tank Yard Ledger 502 CMR 3.03(4) Number: 20120046 7

I certify under penalty of law I have personally examined the underground steel storage tank delivered to this "approved tank yard" by (firm, corporation or partnership) Northeast Tank and accepted same in conformance with Office of the State Fire Marshal Regulations 502 CMR 3.00 Provisions for Approving Underground Steel Storage Tank Dismantling Yards. A valid permit was issued by the head of the LOCAL fire department FDID# 27185 to transport this tank to this yard.

Name and official title of approved tank yard owner or owners authorized representative:

Signature: [illegible] Title: Dispatcher Date signed: 11/9/12

TANK DATA:	TANK REMOVED FROM:
Gallons: 1000	No. and Street: 5 Technology Dr
Previous contents: #2 fuel oil	City and Town: Milford
Diameter:	Fire Dept. Permit #: 609
Length:	Notes:
Date Received: 11/9/12	
Serial # (if available):	
Tank I.D. # (Form FP-290):	

EACH TANK MUST HAVE A RECEIPT OF DISPOSAL

Owner/Operator to mail revised copy of Notification Form (FP290, or FP290R) to local fire department and:

Department of Environmental Protection
Bureau of Waste Prevention - UST Program
P.O. Box 120-0165
Boston, MA 02112-0165

This signed receipt of disposal must be returned to the head of the local fire department.

Form FP 291 (Rev. 11/2009)

The Commonwealth of Massachusetts
Department of Fire Services - Office of the State Fire Marshal

RECEIPT OF DISPOSAL OF UNDERGROUND STEEL STORAGE TANK FORMERLY CONTAINING MOTOR FUEL

NAME AND ADDRESS OF APPROVED TANK YARD: Allied Recycling Center, Inc.
1901 Main Street
Walpole, MA 02081

Approved tank yard no. 0015 Tank Yard Ledger 502 CMR 3.03(4) Number: 20120468

I certify under penalty of law I have personally examined the underground steel storage tank delivered to this "approved tank yard" by (firm, corporation or partnership) Northeast Tank and accepted same in conformance with Office of the State Fire Marshal Regulations 502 CMR 3.00 Provisions for Approving Underground Steel Storage Tank Dismantling Yards. A valid permit was issued by the head of the LOCAL fire department FDID# 27185 to transport this tank to this yard.

Name and official title of approved tank yard owner or owners authorized representative:

Signature: [signature] Title: Dispatcher Date signed: 11/9/12

TANK DATA:	TANK REMOVED FROM:
Gallons: 2000	No. and Street: 5 Technology Dr.
Previous contents: #2 fuel oil	City and Town: Milford
Diameter:	Fire Dept. Permit #: 610
Length:	Notes:
Date Received: 11/9/12	
Serial # (if available):	
Tank I.D. # (Form FP-290):	

EACH TANK MUST HAVE A RECEIPT OF DISPOSAL

Owner/Operator to mail revised copy of Notification Form (FP290, or FP290R) to local fire department and:

Department of Environmental Protection
Bureau of Waste Prevention - UST Program
P.O. Box 120-0165
Boston, MA 02112-0165

This signed receipt of disposal must be returned to the head of the local fire department.

Form FP 291 (Rev. 11/2009)

APPENDIX 5

Field Data Report

EST
Associates, Inc.

Environmental Monitoring
Pipeline Services
Remediation Services
Industrial Services
Operations & Maintenance

LOW FLOW GROUNDWATER MONITORING REPORT

Client: **Capaccio Environmental Engineering**
293 Boston Post Road
Marlborough, MA 01752

Attention: **Dawn Horter**

Report Date: **July 16, 2012**

Site Location: **Waters Corporation, 134 Maple Street/5 Technology Drive Milford, MA**
Sample Date: **July 12, 2012**
Field Technician(s): **Ryan Decker, Mike Rivera**
Weather Conditions: **Clear, +/- 80°F**

Location ID	Depth (feet)	SWL (feet)	pH (S.U.)	Temp (°C)	Sp.Conductance (mS/cm)	DO (mg/L)	ORP (MV)
MW-1	21.46	12.34	6.38	19.05	0.459	4.83	-21.3
MW-2	18.42	9.06	6.46	18.25	0.421	3.04	-157.1
MW-4	18.29	10.08	5.89	16.61	1.249	3.23	-14.0
MW-5	17.58	11.64	5.99	17.50	0.497	2.57	-3.3
MW-6	19.02	10.29	6.50	18.95	0.671	5.30	-96.0

Location ID	Top of Well (feet)
MW-1	126.39
MW-2	125.66
MW-4	130.02
MW-5	115.66
MW-6	105.13

Note(s):

•Appropriately preserved samples delivered to RI Analytical Laboratory, Warwick RI, with the associated Chain of Custody documentation.
•Well depth and Static Water Levels were measured from top of PVC Riser unless indicated otherwise.
•Measurements listed above indicate final stabilized field analytical results.
•MW-1, MW-2 and MW-6 purge water remained turbid.

Reviewed By: BL 7/20/2012

51 Fremont Street, Needham, MA 02494 • Tel: (781) 455-0003 Fax: (781) 455-8336
www.estassociates.com

EST
Associates, Inc.

Environmental Monitoring
Pipeline Services
Remediation Services
Industrial Services
Operations & Maintenance

Date 7/12/12 Project Waters Corp. (for Cappaccio) Initial RD

Waters Corp. - Well Elavation Survey

Well ID	Top of Well (relavitive elevation (ft.))
MW-1	126.39'
MW-2	125.66'
MW-4	130.02'
MW-5	115.66'
MW-6	105.13'

51 Fremont Street, Needham, MA 02494 • (781) 455-0003 Fax (781) 455-8336
www.estassociates.com

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME: Capaccio | PROJECT#: | WELL ID: MW-1

LOCATION: Waters Corp

SAMPLING CREW: RD/MK | DATE: 7/12/12 | SAMPLE TIME: 1110

PURGING DATA

REFERENCE POINT: (PVC) Steel Casing | PURGING DEVICE: Geopump

DEPTH TO WATER: 12.34 (FT) | WELL DEPTH: 21.46 (FT) | Well Diameter: 1"

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (°C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS
1055	12.67	100ml/min	1.5	19.03	0.452	6.44	-24.1	4.78	405	
1100	12.69	"	2.0	19.06	0.456	6.41	-23.5	4.81	341	
1105	12.70	"	2.5	19.07	0.458	6.39	-22.7	4.83	297	
1110	12.70	"	3.0	19.05	0.459	6.38	-21.3	4.83	319	

FINAL FIELD DATA

pH: 6.38 (S.U.) | DO: 4.83 (mg/L) | COMMENTS: purged for 15 min prior to taking readings - turbidity slightly elevated, but not dropping

SPECIFIC CONDUCTANCE: 0.459 (mS/cm) | TURBIDITY: 319 (NTU)

TEMPERATURE: 19.05 (°C) | ORP: -21.3 (MV)

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: little silty / no odor

WEATHER CONDITIONS: clear / 80's

WELL CONDITION DATA

Protective Casing Present: (Y) N | Concrete pad present: (Y) N | Cap on riser: (Y) N

Protective Casing Locked: Y (N) | Standing Water: Y (N) | Visible Heaving: Y (N)

Physical Damage: Y (N)

If yes, Describe:

SAMPLER'S SIGNATURE:

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME: Capaccio | PROJECT#: | WELL ID: MW-2

LOCATION: Waters Corp

SAMPLING CREW: RD/MK | DATE: 7/12/12 | SAMPLE TIME: 1015

PURGING DATA

REFERENCE POINT: (PVC) Steel Casing | PURGING DEVICE: Geopump

DEPTH TO WATER: 9.06 (FT) | WELL DEPTH: 18.42 (FT) | Well Diameter: 1"

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (°C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS
0955	9.82	100ml/min	1.5	18.25	0.414	6.33	-159.4	2.93	728	
1000	9.87	"	2.0	18.21	0.419	6.47	-159.0	2.97	698	
1005	9.89	"	2.5	18.23	0.422	6.49	-157.9	3.01	847	
1010	9.90	"	3.0	18.26	0.423	6.48	-157.3	3.03	831	
1015	9.90	"	3.5	18.25	0.421	6.46	-157.1	3.04	863	

FINAL FIELD DATA

pH: 6.46 (S.U.) | DO: 3.04 (mg/L)

SPECIFIC CONDUCTANCE: 0.421 (mS/cm) | TURBIDITY: 863 (NTU)

TEMPERATURE: 18.25 (°C) | ORP: -157.1 (MV)

COMMENTS: - purged well for 15 min. prior to taking readings
- turbidity high, but no decreasing

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: Silty/no odor

WEATHER CONDITIONS: Clear/80's

WELL CONDITION DATA

Protective Casing Present: (Y) N

Protective Casing Locked: Y (N)

Physical Damage: Y (N)

If yes, Describe:

Concrete pad present: (Y) N

Standing Water: Y (N)

Cap on riser: (Y) N

Visible Heaving: Y (N)

SAMPLER'S SIGNATURE:

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME: Capaccio | PROJECT#: | WELL ID: MW-4

LOCATION: **Waters Corp**

SAMPLING CREW: RD/ MK | DATE: 7/12/12 | SAMPLE TIME: 0930

PURGING DATA

REFERENCE POINT: (PVC) Steel Casing | PURGING DEVICE: Geopump

DEPTH TO WATER: 10.08 (FT) | WELL DEPTH: 18.29 (FT) | Well Diameter: 1"

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (°C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS
0915	10.32	100ml/min	1.5	16.62	1.244	5.84	-14.8	3.15	78.6	
0920	10.35	"	2.0	16.63	1.246	5.85	-14.5	3.19	42.3	
0925	10.36	"	2.5	16.61	1.247	6.86	-14.3	3.21	19.7	
0930	10.36	"	3.0	16.61	1.249	6.89	-14.0	3.23	25.9	

FINAL FIELD DATA

pH: 5.89 (S.U.) | DO: 3.23 (mg/L) | COMMENTS: purged well for 15 min. prior to taking readings

SPECIFIC CONDUCTANCE: 1.249 (mS/cm) | TURBIDITY: 25.9 (NTU)

TEMPERATURE: 16.61 (°C) | ORP: -14.0 (MV)

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: Clear/no odor

WEATHER CONDITIONS: Clear/80's

WELL CONDITION DATA

Protective Casing Present: (Y) N | Concrete pad present: Y (N) | Cap on riser: (Y) N

Protective Casing Locked: Y (N) | Standing Water: Y (N) | Visible Heaving: Y (N)

Physical Damage: Y (N)

If yes, Describe:

SAMPLER'S SIGNATURE:

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME: Capaccio | PROJECT#: | WELL ID: MW-5

LOCATION: **Waters Corp**

SAMPLING CREW: RD/MK | DATE: 7/12/12 | SAMPLE TIME: 1150

PURGING DATA

REFERENCE POINT: (PVC) Steel Casing | PURGING DEVICE: Geopump

DEPTH TO WATER: 11.64 (FT) | WELL DEPTH: 17.58 (FT) | Well Diameter: 2"

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (°C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS
1130	11.77	100ml/min	1.5	17.44	0.489	6.01	-6.1	2.64	41.7	
1135	11.78	"	2.0	17.47	0.493	6.00	-5.3	2.59	36.8	
1140	11.78	"	2.5	17.49	0.495	5.98	-4.1	2.57	29.4	
1145	11.78	"	3.0	17.52	0.498	5.99	-3.2	2.56	26.9	
1150	11.78	"	3.5	17.50	0.497	5.99	-3.3	2.57	31.5	

FINAL FIELD DATA

pH: 5.99 (S.U.) | DO: 2.57 (mg/L) | COMMENTS: purged well for 15 min prior to taking readings

SPECIFIC CONDUCTANCE: 0.497 (mS/cm) | TURBIDITY: 31.5 (NTU)

TEMPERATURE: 17.50 (°C) | ORP: -3.3 (MV)

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: clear/no odor

WEATHER CONDITIONS: Clear/80's

WELL CONDITION DATA

Protective Casing Present: (Y) N | Concrete pad present: (Y) N | Cap on riser: (Y) N

Protective Casing Locked: Y (N) | Standing Water: Y (N) | Visible Heaving: Y (N)

Physical Damage: Y (N)

If yes, Describe:

SAMPLER'S SIGNATURE:

EST - LOW FLOW GROUNDWATER SAMPLING RECORD

PROJECT NAME: Capaccio | PROJECT#: | WELL ID: MW-6

LOCATION: **Waters Corp**

SAMPLING CREW: RD / MK | DATE: 7/12/12 | SAMPLE TIME: 1245

PURGING DATA

REFERENCE POINT: (PVC) Steel Casing | PURGING DEVICE: Geopump

DEPTH TO WATER: 10.29 (FT) | WELL DEPTH: 19.02 (FT) | Well Diameter: 1"

CLOCK TIME	STATIC DEPTH (FT)	PURGE RATE (ML)	CUM. VOLUME PURGED (L)	TEMP (°C)	SP. COND (mS/cm)	pH (s.u.)	ORP/Eh (MV)	DO (mg/L)	Turb (NTU)	COMMENTS
1230	10.73	100ml/min	1.5	18.93	0.677	6.54	-97.6	5.36	over 1000	
1235	10.75	"	2.0	18.96	0.674	6.52	-95.8	5.29	over 1000	
1240	10.76	"	2.5	18.94	0.673	6.49	-96.1	5.27	over 1000	
1245	10.76	"	3.0	18.95	0.671	6.50	-96.0	5.30	over 1000	

FINAL FIELD DATA

pH: 6.50 (S.U.) | DO: 5.30 (mg/L) | COMMENTS: purged well for 15 min. prior to taking readings

SPECIFIC CONDUCTANCE: 0.671 (mS/cm) | TURBIDITY: over 1000 (NTU)

TEMPERATURE: 18.95 (°C) | ORP: -96.0 (MV)

ODOR AND PHYSICAL APPEARANCE OF SAMPLE: silty / no odor

WEATHER CONDITIONS: Clear / 80's

WELL CONDITION DATA

Protective Casing Present: (Y) N | Concrete pad present: (Y) N | Cap on riser: (Y) N

Protective Casing Locked: Y (N) | Standing Water: Y (N) | Visible Heaving: Y (N)

Physical Damage: Y (N)

If yes, Describe:

SAMPLER'S SIGNATURE:

51 Fremont Street Needham, MA 02494 Tel: 781-455-0003, Fax: 781-455-8336

CHAIN OF CUSTODY RECORD

Laboratory: RIAL

lient: Capaccio Environmental Engineering
ddress: 293 Boston Post Road Marlborough, MA
ontact: Dawn Horter
hone #: 978-270-0193 Fax: 508-970-0028

roject Name: Waters Corporation
ddress: 34 Maple Street & 5 Technology Drive Milford, MA
ontact: Roger Eydenburg tel:
.ocation ID #: Fax:
escription: Low Flow Groundwater Sampling

MATRIX
1. Wastewater
2. Groundwater
3. Drinking Water
4. Soil
5. Surface Water
6. Other _____

EST to Invoice: Capaccio
Lab to Invoice: Capaccio
Lab Report to: dhorter@capaccio.com
Billing Reference: Proj No. 00-046.078

Field ID / Point of Collection	Collection Date	Collection Time	Matrix	# of bottles Type Glass	Plastic	VOA's	Preservation HCL	NaOH	HNO3	H2So4	MEOH	Other	None	VOC's (8260)	EPH w/ Targets	VPH	RCRA 8 Metals (6010)	Comments:
MW-1	7/12/12	1110	2			2	x							X				
MW-2		1015	2			2	x							X				
MW-4		0930	2			2	x							X				
MW-5		1150	2	2		4	x							X	X	X		
MW-6		1245	2	2		4	x							X	X	X		
~~Roof Drain Sample~~			~~6~~		~~1~~				~~X~~								~~X~~	

Turnaround Information
- [ ] Std. 10 Day Turnaround
- [ ] 5 Day *RUSH*
- [ ] 4 Day *RUSH*
- [ ] 3 Day *RUSH*
- [ ] 2 Day *RUSH*
- [ ] 1 Day *RUSH*

Approved By:

QA/QC

SPECIAL QA/QC or DATA Requirements:
Data Enhancement to meet GW-2 or GW-3 standards (whichever is more stringent).
EPH: 2 Ambers w/ HCL; VPH & 8260: 4 Vials w/ HCL

Additional Information

Sample Custody must be documented below each time samples change possesion, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Date Time:
1 (EST)	7/12/12 1800	1	7-13-12 1515
2		2	
3		3	

Seal # ☐ Preserve where applicable ☐ On Ice ☐ Temp.

APPENDIX 6

Groundwater Analytical Data Package

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 7/13/12
Date Reported: 7/26/12
P.O. #:
Work Order #: 1207-14368

DESCRIPTION: PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 001
SAMPLE DESCRIPTION: MW-1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:10

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Tertiary Amyl Methyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Benzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromodichloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromoform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromomethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Sec-butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
tert-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Disulfide	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Tetrachloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloroethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Chloroform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
2-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
4-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromo-3-Chloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromoethane(EDB)	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromomethane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Propylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dichlorodifluoromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,2-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,2-Dichloroethylene	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 001
SAMPLE DESCRIPTION: MW-1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:10

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,3-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,3-Dichloropropylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Diethyl ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Diisopropyl Ether (DIPE)	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dioxane	<100	100	ug/l	SW-846 8260B	7/20/12	KAC
Ethyl Tertiary Butyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Ethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Hexachlorobutadiene	<0.5	0.5	ug/l	SW-846 8260B	7/20/12	KAC
2-Hexanone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Isopropylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
p-Isopropyltoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2-Butanone(MEK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
4-Methyl-2-pentanone(MIBK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
Methylene Chloride	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Naphthalene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Styrene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrachloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrahydrofuran	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Toluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichlorofluoromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3,5-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Vinyl Chloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
o-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
m,p-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Surrogates			RANGE	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 001
SAMPLE DESCRIPTION: MW-1
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:10

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	103		86-118%	SW-846 8260B	7/20/12	KAC
Toluene-d8	100		88-110%	SW-846 8260B	7/20/12	KAC
4-Bromofluorobenzene	98		86-115%	SW-846 8260B	7/20/12	KAC
1,2 Dichloroethane-d4	99		80-120%	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 002
SAMPLE DESCRIPTION: MW-2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	10	10	ug/l	SW-846 8260B	7/20/12	KAC
Tertiary Amyl Methyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Benzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromodichloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromoform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromomethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Sec-butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
tert-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Disulfide	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Tetrachloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloroethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Chloroform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
2-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
4-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromo-3-Chloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromoethane(EDB)	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromomethane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Propylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dichlorodifluoromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,2-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,2-Dichloroethylene	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 002
SAMPLE DESCRIPTION: MW-2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,3-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,3-Dichloropropylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Diethyl ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Diisopropyl Ether (DIPE)	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dioxane	<100	100	ug/l	SW-846 8260B	7/20/12	KAC
Ethyl Tertiary Butyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Ethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Hexachlorobutadiene	<0.5	0.5	ug/l	SW-846 8260B	7/20/12	KAC
2-Hexanone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Isopropylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
p-Isopropyltoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2-Butanone(MEK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
4-Methyl-2-pentanone(MIBK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
Methylene Chloride	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Naphthalene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Styrene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrachloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrahydrofuran	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Toluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichlorofluoromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3,5-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Vinyl Chloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
o-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
m,p-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Surrogates			RANGE	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 002
SAMPLE DESCRIPTION: MW-2
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 10:15

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	104		86-118%	SW-846 8260B	7/20/12	KAC
Toluene-d8	101		88-110%	SW-846 8260B	7/20/12	KAC
4-Bromofluorobenzene	100		86-115%	SW-846 8260B	7/20/12	KAC
1,2 Dichloroethane-d4	98		80-120%	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 003
SAMPLE DESCRIPTION: MW-4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 09:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Volatile Organic Compounds						
Acetone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Tertiary Amyl Methyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Benzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromodichloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromoform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromomethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Sec-butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
tert-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Disulfide	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Tetrachloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloroethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Chloroform	2	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
2-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
4-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromo-3-Chloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromoethane(EDB)	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromomethane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Propylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dichlorodifluoromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,2-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,2-Dichloroethylene	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 003
SAMPLE DESCRIPTION: MW-4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 09:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
2,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,3-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,3-Dichloropropylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Diethyl ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Diisopropyl Ether (DIPE)	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dioxane	<100	100	ug/l	SW-846 8260B	7/20/12	KAC
Ethyl Tertiary Butyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Ethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Hexachlorobutadiene	<0.5	0.5	ug/l	SW-846 8260B	7/20/12	KAC
2-Hexanone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Isopropylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
p-Isopropyltoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2-Butanone(MEK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
4-Methyl-2-pentanone(MIBK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
Methylene Chloride	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Naphthalene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Styrene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrachloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrahydrofuran	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Toluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichlorofluoromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3,5-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Vinyl Chloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
o-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
m,p-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Surrogates			RANGE	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 003
SAMPLE DESCRIPTION: MW-4
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 09:30

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibromofluoromethane	104		86-118%	SW-846 8260B	7/20/12	KAC
Toluene-d8	101		88-110%	SW-846 8260B	7/20/12	KAC
4-Bromofluorobenzene	101		86-115%	SW-846 8260B	7/20/12	KAC
1,2 Dichloroethane-d4	98		80-120%	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 004
SAMPLE DESCRIPTION: MW-5
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:50

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Unadjusted C9-C12 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Methyl-tert-butylether	<5	5	ug/l	MADEP	7/18/12	KAC
Benzene	<5	5	ug/l	MADEP	7/18/12	KAC
Toluene	<5	5	ug/l	MADEP	7/18/12	KAC
Ethylbenzene	<5	5	ug/l	MADEP	7/18/12	KAC
m,p-Xylene	<5	5	ug/l	MADEP	7/18/12	KAC
o-Xylene	<5	5	ug/l	MADEP	7/18/12	KAC
Naphthalene	<5	5	ug/l	MADEP	7/18/12	KAC
Adjusted C5-C8 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Adjusted C9-C12 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
C9-C10 Aromatics(PID)	<50	50	ug/l	MADEP	7/18/12	KAC
Surrogate			RANGE		7/18/12	KAC
2,5-Dibromotoluene(PID)	115		70-130%	MADEP	7/18/12	KAC
2,5-Dibromotoluene(FID)	112		70-130%	MADEP	7/18/12	KAC
EPH/PAH						
C9-C18 Aliphatics	<110	110	ug/l	MADEP	7/20/12	TCL
C19-C36 Aliphatics	<110	110	ug/l	MADEP	7/20/12	TCL
C11-C22 Aromatics	<110	110	ug/l	MADEP	7/20/12	TCL
Total EPH	<330	330	ug/l	MADEP	7/20/12	TCL
TARGET PAH ANALYTES					7/20/12	TCL
Naphthalene	<6	6	ug/l	MADEP	7/20/12	TCL
2-Methylnaphthalene	<6	6	ug/l	MADEP	7/20/12	TCL
Acenaphthylene	<6	6	ug/l	MADEP	7/20/12	TCL
Acenaphthene	<6	6	ug/l	MADEP	7/20/12	TCL
Fluorene	<6	6	ug/l	MADEP	7/20/12	TCL
Phenanthrene	<6	6	ug/l	MADEP	7/20/12	TCL
Anthracene	<6	6	ug/l	MADEP	7/20/12	TCL
Fluoranthene	<6	6	ug/l	MADEP	7/20/12	TCL
Pyrene	<6	6	ug/l	MADEP	7/20/12	TCL
Benzo(a)anthracene	<6	6	ug/l	MADEP	7/20/12	TCL
Chrysene	<6	6	ug/l	MADEP	7/20/12	TCL
Benzo(b)fluoranthene	<6	6	ug/l	MADEP	7/20/12	TCL
Benzo(k)fluoranthene	<6	6	ug/l	MADEP	7/20/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 004
SAMPLE DESCRIPTION: MW-5
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:50

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<6	6	ug/l	MADEP	7/20/12	TCL
Indeno(1,2,3-cd)pyrene	<6	6	ug/l	MADEP	7/20/12	TCL
Dibenzo(a,h)anthracene	<6	6	ug/l	MADEP	7/20/12	TCL
Benzo(g,h,i)perylene	<6	6	ug/l	MADEP	7/20/12	TCL
Extraction Surrogates			RANGE		7/20/12	TCL
Chloro-octadecane	64		40-140%	MADEP	7/20/12	TCL
Ortho-terphenyl	82		40-140%	MADEP	7/20/12	TCL
Fractionation Surrogates			RANGE		7/20/12	TCL
2-Fluorobiphenyl	86		40-140%	MADEP	7/20/12	TCL
2-Bromonaphthalene	70		40-140%	MADEP	7/20/12	TCL
Extraction date	Extracted			MADEP	7/18/12	THP
Volatile Organic Compounds						
Acetone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Tertiary Amyl Methyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Benzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromodichloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromoform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromomethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Sec-butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
tert-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Disulfide	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Tetrachloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloroethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Chloroform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
2-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
4-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromo-3-Chloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromoethane(EDB)	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromomethane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 004
SAMPLE DESCRIPTION: MW-5
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:50

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Propylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dichlorodifluoromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,2-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,2-Dichloroethylene	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,3-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,3-Dichloropropylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Diethyl ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Diisopropyl Ether (DIPE)	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dioxane	<100	100	ug/l	SW-846 8260B	7/20/12	KAC
Ethyl Tertiary Butyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Ethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Hexachlorobutadiene	<0.5	0.5	ug/l	SW-846 8260B	7/20/12	KAC
2-Hexanone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Isopropylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
p-Isopropyltoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2-Butanone(MEK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
4-Methyl-2-pentanone(MIBK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
Methylene Chloride	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Naphthalene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Styrene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrachloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrahydrofuran	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Toluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 004
SAMPLE DESCRIPTION: MW-5
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 11:50

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,3-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichlorofluoromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3,5-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Vinyl Chloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
o-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
m,p-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Surrogates			RANGE	SW-846 8260B	7/20/12	KAC
Dibromofluoromethane	104		86-118%	SW-846 8260B	7/20/12	KAC
Toluene-d8	100		88-110%	SW-846 8260B	7/20/12	KAC
4-Bromofluorobenzene	102		86-115%	SW-846 8260B	7/20/12	KAC
1,2 Dichloroethane-d4	96		80-120%	SW-846 8260B	7/20/12	KAC

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 005
SAMPLE DESCRIPTION: MW-6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 12:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
VPH						
Unadjusted C5-C8 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Unadjusted C9-C12 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Methyl-tert-butylether	<5	5	ug/l	MADEP	7/18/12	KAC
Benzene	<5	5	ug/l	MADEP	7/18/12	KAC
Toluene	<5	5	ug/l	MADEP	7/18/12	KAC
Ethylbenzene	<5	5	ug/l	MADEP	7/18/12	KAC
m,p-Xylene	<5	5	ug/l	MADEP	7/18/12	KAC
o-Xylene	<5	5	ug/l	MADEP	7/18/12	KAC
Naphthalene	<5	5	ug/l	MADEP	7/18/12	KAC
Adjusted C5-C8 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
Adjusted C9-C12 Aliphatics(FID)	<50	50	ug/l	MADEP	7/18/12	KAC
C9-C10 Aromatics(PID)	<50	50	ug/l	MADEP	7/18/12	KAC
Surrogate			RANGE		7/18/12	KAC
2,5-Dibromotoluene(PID)	126		70-130%	MADEP	7/18/12	KAC
2,5-Dibromotoluene(FID)	125		70-130%	MADEP	7/18/12	KAC
EPH/PAH						
C9-C18 Aliphatics	240	200	ug/l	MADEP	7/20/12	TCL
C19-C36 Aliphatics	280	200	ug/l	MADEP	7/20/12	TCL
C11-C22 Aromatics	<200	200	ug/l	MADEP	7/20/12	TCL
Total EPH	520		ug/l	MADEP	7/20/12	TCL
TARGET PAH ANALYTES					7/20/12	TCL
Naphthalene	<10	10	ug/l	MADEP	7/20/12	TCL
2-Methylnaphthalene	<10	10	ug/l	MADEP	7/20/12	TCL
Acenaphthylene	<10	10	ug/l	MADEP	7/20/12	TCL
Acenaphthene	<10	10	ug/l	MADEP	7/20/12	TCL
Fluorene	<10	10	ug/l	MADEP	7/20/12	TCL
Phenanthrene	<10	10	ug/l	MADEP	7/20/12	TCL
Anthracene	<10	10	ug/l	MADEP	7/20/12	TCL
Fluoranthene	<10	10	ug/l	MADEP	7/20/12	TCL
Pyrene	<10	10	ug/l	MADEP	7/20/12	TCL
Benzo(a)anthracene	<10	10	ug/l	MADEP	7/20/12	TCL
Chrysene	<10	10	ug/l	MADEP	7/20/12	TCL
Benzo(b)fluoranthene	<10	10	ug/l	MADEP	7/20/12	TCL
Benzo(k)fluoranthene	<10	10	ug/l	MADEP	7/20/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 005
SAMPLE DESCRIPTION: MW-6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 12:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Benzo(a)pyrene	<10	10	ug/l	MADEP	7/20/12	TCL
Indeno(1,2,3-cd)pyrene	<10	10	ug/l	MADEP	7/20/12	TCL
Dibenzo(a,h)anthracene	<10	10	ug/l	MADEP	7/20/12	TCL
Benzo(g,h,i)perylene	<10	10	ug/l	MADEP	7/20/12	TCL
Extraction Surrogates			RANGE		7/20/12	TCL
Chloro-octadecane	39 *		40-140%	MADEP	7/20/12	TCL
Ortho-terphenyl	69		40-140%	MADEP	7/20/12	TCL
Fractionation Surrogates			RANGE		7/20/12	TCL
2-Fluorobiphenyl	82		40-140%	MADEP	7/20/12	TCL
2-Bromonaphthalene	70		40-140%	MADEP	7/20/12	TCL
Extraction date	Extracted			MADEP	7/18/12	THP
Volatile Organic Compounds						
Acetone	12	10	ug/l	SW-846 8260B	7/20/12	KAC
Tertiary Amyl Methyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Benzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromodichloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromoform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Bromomethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Sec-butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
tert-Butylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Disulfide	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Carbon Tetrachloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromochloromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloroethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Chloroform	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Chloromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
2-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
4-Chlorotoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromo-3-Chloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dibromoethane(EDB)	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dibromomethane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 005
SAMPLE DESCRIPTION: MW-6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 12:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
n-Propylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Dichlorodifluoromethane	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,2-Dichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,2-Dichloroethylene	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2,2-Dichloropropane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
cis-1,3-Dichloropropene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
trans-1,3-Dichloropropylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Diethyl ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Diisopropyl Ether (DIPE)	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
1,4-Dioxane	<100	100	ug/l	SW-846 8260B	7/20/12	KAC
Ethyl Tertiary Butyl Ether	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Ethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Hexachlorobutadiene	<0.5	0.5	ug/l	SW-846 8260B	7/20/12	KAC
2-Hexanone	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Isopropylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
p-Isopropyltoluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
2-Butanone(MEK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
4-Methyl-2-pentanone(MIBK)	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Methyl Tertiary Butyl Ether (MTBE)	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
Methylene Chloride	<5	5	ug/l	SW-846 8260B	7/20/12	KAC
Naphthalene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Styrene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,2,2-Tetrachloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrachloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Tetrahydrofuran	<10	10	ug/l	SW-846 8260B	7/20/12	KAC
Toluene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 005
SAMPLE DESCRIPTION: MW-6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 12:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
1,2,3-Trichlorobenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,1,1-Trichloroethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichloroethene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Trichlorofluoromethane	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,2,3-Trichloropropane	<2	2	ug/l	SW-846 8260B	7/20/12	KAC
1,2,4-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
1,3,5-Trimethylbenzene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Vinyl Chloride	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
o-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
m,p-Xylene	<1	1	ug/l	SW-846 8260B	7/20/12	KAC
Surrogates			RANGE	SW-846 8260B	7/20/12	KAC
Dibromofluoromethane	105		86-118%	SW-846 8260B	7/20/12	KAC
Toluene-d8	103		88-110%	SW-846 8260B	7/20/12	KAC
4-Bromofluorobenzene	101		86-115%	SW-846 8260B	7/20/12	KAC
1,2 Dichloroethane-d4	99		80-120%	SW-846 8260B	7/20/12	KAC
EPH/PAH						
C9-C18 Aliphatics	200	200	ug/l	MADEP	7/25/12	TCL
C19-C36 Aliphatics	220	200	ug/l	MADEP	7/25/12	TCL
C11-C22 Aromatics	<200	200	ug/l	MADEP	7/25/12	TCL
Total EPH	440		ug/l	MADEP	7/25/12	TCL
TARGET PAH ANALYTES					7/25/12	TCL
Naphthalene	<10	10	ug/l	MADEP	7/25/12	TCL
2-Methylnaphthalene	<10	10	ug/l	MADEP	7/25/12	TCL
Acenaphthylene	<10	10	ug/l	MADEP	7/25/12	TCL
Acenaphthene	<10	10	ug/l	MADEP	7/25/12	TCL
Fluorene	<10	10	ug/l	MADEP	7/25/12	TCL
Phenanthrene	<10	10	ug/l	MADEP	7/25/12	TCL
Anthracene	<10	10	ug/l	MADEP	7/25/12	TCL
Fluoranthene	<10	10	ug/l	MADEP	7/25/12	TCL
Pyrene	<10	10	ug/l	MADEP	7/25/12	TCL
Benzo(a)anthracene	<10	10	ug/l	MADEP	7/25/12	TCL
Chrysene	<10	10	ug/l	MADEP	7/25/12	TCL
Benzo(b)fluoranthene	<10	10	ug/l	MADEP	7/25/12	TCL
Benzo(k)fluoranthene	<10	10	ug/l	MADEP	7/25/12	TCL
Benzo(a)pyrene	<10	10	ug/l	MADEP	7/25/12	TCL
Indeno(1,2,3-cd)pyrene	<10	10	ug/l	MADEP	7/25/12	TCL

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 7/13/12

Work Order #: 1207-14368

PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING

Sample # 005
SAMPLE DESCRIPTION: MW-6
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 7/12/2012 @ 12:45

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Dibenzo(a,h)anthracene	<10	10	ug/l	MADEP	7/25/12	TCL
Benzo(g,h,i)perylene	<10	10	ug/l	MADEP	7/25/12	TCL
Extraction Surrogates			RANGE		7/25/12	TCL
Chloro-octadecane	34 *		40-140%	MADEP	7/25/12	TCL
Ortho-terphenyl	82		40-140%	MADEP	7/25/12	TCL
Fractionation Surrogates			RANGE		7/25/12	TCL
2-Fluorobiphenyl	94		40-140%	MADEP	7/25/12	TCL
2-Bromonaphthalene	86		40-140%	MADEP	7/25/12	TCL
Extraction date	extracted			MADEP	7/24/12	THP

All QA/QC procedures required by the VPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the VPH Method.

All QA/QC procedures required by the EPH Method were followed.
All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated.

No significant modifications were made to the EPH Method.

Customer Name : Capaccio Environmental Eng.

W.O. Number 1207-14368

MassDEP Analytical Protocol Certification Form

Laboratory Name: R.I. Analytical Laboratories	Work Order No: 1207-14368
Project / Location: PROJ# 00-046.078 WATERS CORP. LOW FLOW GROUNDWATER SAMPLING	RTN :
This Form provides certifications for the following data set: list Laboratory Sample ID Number(s): 1207-14368-001 through 1207-14368-005	

Matrices: ☒ Groundwater/Surface Water ☐ Soil / Sediment ☐ Drinking Water ☐ Air ☐ Other

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☒	7470/7471 Hg CAM III B ☐	MassDEP VPH CAM IV A ☒	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☒	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☐	6020 Metals CAM III D ☐	8082 PCB CAM V A ☐	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM V111 B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☒ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☐ Yes ☒ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature: [signature] Position: QA/QC Director

Printed Name: Mike Hobin Date: 7/27/12

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-14368
Date: 7/26/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Aqueous)			
C9-C18 Aliphatics	ug/l	<100	7/18/2012
C19-C36 Aliphatics	ug/l	<100	7/18/2012
C11-C22 Aromatics	ug/l	<100	7/18/2012
Target PAH Analytes			7/20/2012
Naphthalene	ug/l	<5	7/18/2012
2-Methylnaphthalene	ug/l	<5	7/18/2012
Acenaphthylene	ug/l	<5	7/18/2012
Acenaphthene	ug/l	<5	7/18/2012
Fluorene	ug/l	<5	7/18/2012
Phenanthrene	ug/l	<5	7/18/2012
Anthracene	ug/l	<5	7/18/2012
Fluoranthene	ug/l	<5	7/18/2012
Pyrene	ug/l	<5	7/18/2012
Benzo(a)anthracene	ug/l	<5	7/18/2012
Chrysene	ug/l	<5	7/18/2012
Benzo(b)fluoranthene	ug/l	<5	7/18/2012
Benzo(k)fluoranthene	ug/l	<5	7/18/2012
Benzo(a)pyrene	ug/l	<5	7/18/2012
Indeno(1,2,3-cd)pyrene	ug/l	<5	7/18/2012
Dibenzo(a,h)anthracene	ug/l	<5	7/18/2012
Benzo(g,h,i)perylene	ug/l	<5	7/18/2012
Extraction Surrogates	**RANGE**		
Chloro-octadecane	40-140%	64	7/18/2012
Ortho-terphenyl	40-140%	91	7/18/2012
Fractionation Surrogates	**RANGE**		
2-Fluorobiphenyl	40-140%	83	7/18/2012
2-Bromonaphthalene	40-140%	76	7/18/2012
Extractable Petroleum Hydrocarbons with PAH (Aqueous)			
C9-C18 Aliphatics	ug/l	<100	7/25/2012
C19-C36 Aliphatics	ug/l	<100	7/25/2012
C11-C22 Aromatics	ug/l	<100	7/25/2012
Target PAH Analytes			7/25/2012
Naphthalene	ug/l	<5	7/25/2012
2-Methylnaphthalene	ug/l	<5	7/25/2012
Acenaphthylene	ug/l	<5	7/25/2012
Acenaphthene	ug/l	<5	7/25/2012
Fluorene	ug/l	<5	7/25/2012

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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Aqueous) (cont'd)			
Phenanthrene	ug/l	<5	7/25/2012
Anthracene	ug/l	<5	7/25/2012
Fluoranthene	ug/l	<5	7/25/2012
Pyrene	ug/l	<5	7/25/2012
Benzo(a)anthracene	ug/l	<5	7/25/2012
Chrysene	ug/l	<5	7/25/2012
Benzo(b)fluoranthene	ug/l	<5	7/25/2012
Benzo(k)fluoranthene	ug/l	<5	7/25/2012
Benzo(a)pyrene	ug/l	<5	7/25/2012
Indeno(1,2,3-cd)pyrene	ug/l	<5	7/25/2012
Dibenzo(a,h)anthracene	ug/l	<5	7/25/2012
Benzo(g,h,i)perylene	ug/l	<5	7/25/2012
Extraction Surrogates	**RANGE**		
Chloro-octadecane	40-140%	60	7/25/2012
Ortho-terphenyl	40-140%	80	7/25/2012
Fractionation Surrogates	**RANGE**		
2-Fluorobiphenyl	40-140%	83	7/25/2012
2-Bromonaphthalene	40-140%	80	7/25/2012
Volatile Petroleum Hydrocarbons(Aqueous)			
Unadj C5-C8 Aliphatics(FID)	ug/l	<50	7/18/2012
Unadj C9-C12 Aliphatic(FID)	ug/l	<50	7/18/2012
Methyl-tert-butylether	ug/l	<5	7/18/2012
Benzene	ug/l	<5	7/18/2012
Toluene	ug/l	<5	7/18/2012
Ethylbenzene	ug/l	<5	7/18/2012
m,p-Xylene	ug/l	<5	7/18/2012
o-Xylene	ug/l	<5	7/18/2012
Naphthalene	ug/l	<5	7/18/2012
Adj C5-C8 Aliphatics(FID)	ug/l	<50	7/18/2012
Adj C9-C12 Aliphatics(FID)	ug/l	<50	7/18/2012
C9-C10 Aromatics(PID)	ug/l	<50	7/18/2012
Surrogate	**RANGE**		7/18/2012
2,5-Dibromotoluene(PID)	70-130%	96	7/18/2012
2,5-Dibromotoluene(FID)	70-130%	110	7/18/2012
Volatile Organics by Method 8260			
Acetone	ug/l	<10	7/20/2012

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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Volatile Organics by Method 8260 (cont'd)			
Tertiary Amyl Methyl Ether	ug/l	<5	7/20/2012
Benzene	ug/l	<1	7/20/2012
Bromobenzene	ug/l	<1	7/20/2012
Bromochloromethane	ug/l	<1	7/20/2012
Bromodichloromethane	ug/l	<1	7/20/2012
Bromoform	ug/l	<1	7/20/2012
Bromomethane	ug/l	<1	7/20/2012
n-Butylbenzene	ug/l	<1	7/20/2012
Sec-butylbenzene	ug/l	<1	7/20/2012
tert-Butylbenzene	ug/l	<1	7/20/2012
Carbon Disulfide	ug/l	<5	7/20/2012
Carbon Tetrachloride	ug/l	<1	7/20/2012
Chlorobenzene	ug/l	<1	7/20/2012
Dibromochloromethane	ug/l	<1	7/20/2012
Chloroethane	ug/l	<5	7/20/2012
Chloroform	ug/l	<1	7/20/2012
Chloromethane	ug/l	<5	7/20/2012
2-Chlorotoluene	ug/l	<1	7/20/2012
4-Chlorotoluene	ug/l	<1	7/20/2012
1,2-Dibromo-3-Chloropropane	ug/l	<2	7/20/2012
1,2-Dibromoethane(EDB)	ug/l	<1	7/20/2012
Dibromomethane	ug/l	<2	7/20/2012
1,3-Dichlorobenzene	ug/l	<1	7/20/2012
1,2-Dichlorobenzene	ug/l	<1	7/20/2012
1,4-Dichlorobenzene	ug/l	<1	7/20/2012
n-Propylbenzene	ug/l	<1	7/20/2012
Dichlorodifluoromethane	ug/l	<5	7/20/2012
1,1-Dichloroethane	ug/l	<1	7/20/2012
1,2-Dichloroethane	ug/l	<1	7/20/2012
1,1-Dichloroethene	ug/l	<1	7/20/2012
cis-1,2-Dichloroethene	ug/l	<1	7/20/2012
trans-1,2-Dichloroethylene	ug/l	<2	7/20/2012
1,2-Dichloropropane	ug/l	<1	7/20/2012
1,3-Dichloropropane	ug/l	<1	7/20/2012
2,2-Dichloropropane	ug/l	<1	7/20/2012
1,1-Dichloropropene	ug/l	<1	7/20/2012
cis-1,3-Dichloropropene	ug/l	<1	7/20/2012
Diethyl ether	ug/l	<5	7/20/2012
Diisopropyl ether (DIPE)	ug/l	<5	7/20/2012

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-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Volatile Organics by Method 8260 (cont'd)			
1,4-Dioxane	ug/l	<100	7/20/2012
Ethyl Tertiary Butyl Ether	ug/l	<5	7/20/2012
Ethylbenzene	ug/l	<1	7/20/2012
Hexachlorobutadiene	ug/l	<0.5	7/20/2012
2-Hexanone	ug/l	<10	7/20/2012
Isopropylbenzene	ug/l	<1	7/20/2012
p-Isopropyltoluene	ug/l	<1	7/20/2012
2-Butanone(MEK)	ug/l	<10	7/20/2012
4-Methyl-2-pentanone(MIBK)	ug/l	<10	7/20/2012
MTBE	ug/l	<2	7/20/2012
Methylene Chloride	ug/l	<5	7/20/2012
Naphthalene	ug/l	<1	7/20/2012
1,1,2-Trichloroethane	ug/l	<1	7/20/2012
Styrene	ug/l	<1	7/20/2012
1,1,1,2-Tetrachloroethane	ug/l	<1	7/20/2012
1,1,2,2-Tetrachloroethane	ug/l	<1	7/20/2012
Tetrachloroethene	ug/l	<1	7/20/2012
Tetrahydrofuran	ug/l	<10	7/20/2012
Toluene	ug/l	<1	7/20/2012
1,2,4-Trichlorobenzene	ug/l	<1	7/20/2012
1,2,3-Trichlorobenzene	ug/l	<1	7/20/2012
1,1,1-Trichloroethane	ug/l	<1	7/20/2012
Trichloroethene	ug/l	<1	7/20/2012
Trichlorofluoromethane	ug/l	<1	7/20/2012
1,2,3-Trichloropropane	ug/l	<2	7/20/2012
1,2,4-Trimethylbenzene	ug/l	<1	7/20/2012
1,3,5-Trimethylbenzene	ug/l	<1	7/20/2012
Vinyl Chloride	ug/l	<1	7/20/2012
o-Xylene	ug/l	<1	7/20/2012
m,p-Xylene	ug/l	<1	7/20/2012
trans-1,3-Dichloropropylene	ug/l	<1	7/20/2012
Surrogates	**RANGE**		7/20/2012
Dibromofluoromethane	86-118%	106	7/20/2012
Toluene-d8	88-110%	101	7/20/2012
4-Bromofluorobenzene	86-115%	99	7/20/2012
1,2 Dichloroethane-d4	80-120%	97	7/20/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Aqueous)								
C9-C18 Aliphatics		300	230	77	239	80	4	7/20/2012
C19-C36 Aliphatics		400	403	101	432	108	7	7/20/2012
C11-C22 Aromatics		850	700	82	687	81	2	7/20/2012
Target PAH Analytes								
Naphthalene		50	33.4	67	32.7	65	2	7/20/2012
2-Methylnaphthalene		50	33.3	67	33.6	67	1	7/20/2012
Acenaphthylene		50	35.5	71	35.7	71	1	7/20/2012
Acenaphthene		50	36.0	72	36.3	73	1	7/20/2012
Fluorene		50	39.8	80	39.8	80	0	7/20/2012
Phenanthrene		50	43.7	87	43.5	87	0	7/20/2012
Anthracene		50	42.3	85	41.5	83	2	7/20/2012
Fluoranthene		50	51.2	102	47.2	94	8	7/20/2012
Pyrene		50	42.9	86	41.2	82	4	7/20/2012
Benzo(a)anthracene		50	43.7	87	41.8	84	4	7/20/2012
Chrysene		50	44.1	88	42.1	84	5	7/20/2012
Benzo(b)fluoranthene		50	42.3	85	41.1	82	3	7/20/2012
Benzo(k)fluoranthene		50	43.1	86	43.8	88	2	7/20/2012
Benzo(a)pyrene		50	43.7	87	41.8	84	4	7/20/2012
Indeno(1,2,3-cd)pyrene		50	43.2	86	44.4	89	3	7/20/2012
Dibenzo(a,h)anthracene		50	42.1	84	41.9	84	0	7/20/2012
Benzo(g,h,i)perylene		50	40.3	81	39.2	78	3	7/20/2012
Extraction Surrogates								
Chloro-octadecane			74		77			
Ortho-terphenyl			80		78			
Fractionation Surrogates								
2-Fluorobiphenyl			82		78			
2-Bromonaphthalene			79		74			
C9-C18 Aliphatics		300	211	70	244	81	15	7/20/2012
C19-C36 Aliphatics		400	473	118	427	107	10	7/20/2012
C11-C22 Aromatics		850	709	83	823	97	15	7/20/2012
Naphthalene		50	21.6	43	38.6	77	56	7/20/2012
2-Methylnaphthalene		50	25.1	50	40.6	81	47	7/20/2012
Acenaphthylene		50	29.4	59	42.6	85	37	7/20/2012
Acenaphthene		50	31.0	62	44.5	89	36	7/20/2012
Fluorene		50	35.6	71	48.1	96	30	7/20/2012
Phenanthrene		50	42.6	85	52.6	105	21	7/20/2012
Anthracene		50	44.0	88	49.7	99	12	7/20/2012
Fluoranthene		50	49.8	100	55.6	111	11	7/20/2012
Pyrene		50	46.2	92	51.1	102	10	7/20/2012
Benzo(a)anthracene		50	47.5	95	51.5	103	8	7/20/2012
Chrysene		50	47.9	96	51.8	104	8	7/20/2012
Benzo(b)fluoranthene		50	51.7	103	48.1	96	7	7/20/2012
Benzo(k)fluoranthene		50	46.3	93	50.1	100	8	7/20/2012
Benzo(a)pyrene		50	47.4	95	51.9	104	9	7/20/2012
Indeno(1,2,3-cd)pyrene		50	52.3	105	50.9	102	3	7/20/2012
Dibenzo(a,h)anthracene		50	45.3	91	44.9	90	1	7/20/2012
Benzo(g,h,i)perylene		50	45.0	90	50.0	100	11	7/20/2012
Extraction Surrogates								
Chloro-octadecane			87		49			

QA/QC Report

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-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Extractable Petroleum Hydrocarbons with PAH (Aqueous) (cont'd)								
Ortho-terphenyl			97		92			
Fractionation Surrogates								
2-Fluorobiphenyl			135		88			
2-Bromonaphthalene			124		74			
Volatile Petroleum Hydrocarbons(Aqueous)								
Methyl-tert-butylether		50	49	98	50	100	2	7/18/2012
Benzene		50	50	100	49	98	2	7/18/2012
Toluene		50	49	98	49	98	0	7/18/2012
Ethylbenzene		50	50	100	50	100	0	7/18/2012
m,p-Xylene		100	103	103	103	103	0	7/18/2012
o-Xylene		50	50	100	49	98	2	7/18/2012
Naphthalene		50	52	104	49	98	6	7/18/2012
Adj C5-C8 Aliphatics(FID)		150	170	113	163	109	4	7/18/2012
Adj C9-C12 Aliphatics(FID)		100	85	85	84	84	1	7/18/2012
C9-C10 Aromatics(PID)		50	50	100	49	0	0	7/18/2012
Surrogate								
2,5-Dibromotoluene(PID)			111		105			
2,5-Dibromotoluene(FID)			112		102			
Volatile Organics by Method 8260								
Acetone		500	490	98	480	96	2	7/20/2012
Tertiary Amyl Methyl Ether		50	50	100	47	94	6	7/20/2012
Benzene		50	51	102	49	98	4	7/20/2012
Bromobenzene		50	50	100	47	94	6	7/20/2012
Bromochloromethane		50	52	104	50	100	4	7/20/2012
Bromodichloromethane		50	53	106	50	100	6	7/20/2012
Bromoform		50	52	104	51	102	2	7/20/2012
Bromomethane		50	53	106	52	104	2	7/20/2012
n-Butylbenzene		50	51	102	50	100	2	7/20/2012
Sec-butylbenzene		50	52	104	49	98	6	7/20/2012
tert-Butylbenzene		50	52	104	48	96	8	7/20/2012
Carbon Disulfide		50	54	108	50	100	8	7/20/2012
Carbon Tetrachloride		50	56	112	53	106	6	7/20/2012
Chlorobenzene		50	52	104	50	100	4	7/20/2012
Dibromochloromethane		50	52	104	51	102	2	7/20/2012
Chloroethane		50	52	104	49	98	6	7/20/2012
Chloroform		50	52	104	50	100	4	7/20/2012
Chloromethane		50	59	118	56	112	5	7/20/2012
2-Chlorotoluene		50	52	104	49	98	6	7/20/2012
4-Chlorotoluene		50	52	104	49	98	6	7/20/2012
1,2-Dibromo-3-Chloropropane		50	46	92	47	94	2	7/20/2012
1,2-Dibromoethane(EDB)		50	50	100	49	98	2	7/20/2012

QA/QC Report

Client: Capaccio Environmental Eng.
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-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Volatile Organics by Method 8260 (cont'd)								
Dibromomethane		50	54	108	52	104	4	7/20/2012
1,3-Dichlorobenzene		50	50	100	48	96	4	7/20/2012
1,2-Dichlorobenzene		50	52	104	48	96	8	7/20/2012
1,4-Dichlorobenzene		50	51	102	48	96	6	7/20/2012
n-Propylbenzene		50	53	106	50	100	6	7/20/2012
Dichlorodifluoromethane		50	65	130	63	126	3	7/20/2012
1,1-Dichloroethane		50	53	106	50	100	6	7/20/2012
1,2-Dichloroethane		50	54	108	52	104	4	7/20/2012
1,1-Dichloroethene		50	53	106	50	100	6	7/20/2012
cis-1,2-Dichloroethene		50	53	106	51	102	4	7/20/2012
trans-1,2-Dichloroethylene		50	54	108	49	98	10	7/20/2012
1,2-Dichloropropane		50	52	104	49	98	6	7/20/2012
1,3-Dichloropropane		50	51	102	50	100	2	7/20/2012
2,2-Dichloropropane		50	48	96	43	86	11	7/20/2012
1,1-Dichloropropene		50	55	110	51	102	8	7/20/2012
cis-1,3-Dichloropropene		50	51	102	50	100	2	7/20/2012
Diethyl ether		500	540	108	510	102	6	7/20/2012
Diisopropyl ether (DIPE)		50	51	102	49	98	4	7/20/2012
1,4-Dioxane		1000	870	87	980	98	12	7/20/2012
Ethyl Tertiary Butyl Ether		50	48	96	51	102	6	7/20/2012
Ethylbenzene		50	53	106	49	98	8	7/20/2012
Hexachlorobutadiene		50	54	108	53	106	2	7/20/2012
2-Hexanone		500	510	102	510	102	0	7/20/2012
Isopropylbenzene		50	53	106	50	100	6	7/20/2012
p-Isopropyltoluene		50	51	102	50	100	2	7/20/2012
2-Butanone(MEK)		500	490	98	480	96	2	7/20/2012
4-Methyl-2-pentanone(MIBK)		500	480	96	480	96	0	7/20/2012
MTBE		50	51	102	49	98	4	7/20/2012
Methylene Chloride		50	54	108	51	102	6	7/20/2012
Naphthalene		50	40	80	47	94	16	7/20/2012
1,1,2-Trichloroethane		50	50	100	49	98	2	7/20/2012
Styrene		50	53	106	50	100	6	7/20/2012
1,1,1,2-Tetrachloroethane		50	52	104	49	98	6	7/20/2012
1,1,2,2-Tetrachloroethane		50	47	94	46	92	2	7/20/2012
Tetrachloroethene		50	54	108	49	98	10	7/20/2012
Tetrahydrofuran		500	500	100	480	96	4	7/20/2012
Toluene		50	52	104	49	98	6	7/20/2012
1,2,4-Trichlorobenzene		50	49	98	51	102	4	7/20/2012
1,2,3-Trichlorobenzene		50	46	92	54	108	16	7/20/2012
1,1,1-Trichloroethane		50	56	112	51	102	9	7/20/2012
Trichloroethene		50	54	108	50	100	8	7/20/2012
Trichlorofluoromethane		50	60	120	55	110	9	7/20/2012

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1207-14368
Date: 7/26/2012

-LCS/LCS Duplicate Data Results-

Parameter	CRM Acceptance Limits	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Volatile Organics by Method 8260 (cont'd)								
1,2,3-Trichloropropane		50	51	102	48	96	6	7/20/2012
1,2,4-Trimethylbenzene		50	52	104	49	98	6	7/20/2012
1,3,5-Trimethylbenzene		50	52	104	48	96	8	7/20/2012
Vinyl Chloride		50	60	120	57	114	5	7/20/2012
o-Xylene		50	52	104	49	98	6	7/20/2012
m,p-Xylene		100	110	110	99	99	11	7/20/2012
trans-1,3-Dichloropropylene		50	51	102	49	98	4	7/20/2012
Surrogates								
Dibromofluoromethane			101		102			
Toluene-d8			101		100			
4-Bromofluorobenzene			102		101			
1,2 Dichloroethane-d4			100		100			

Case Narrative

Date: 7/26/2012

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Project: PROJ# 00-046.078 WATERS CORP.LOW FLOW GROUNDWATER SAMPLING

RIAL WO#: 1207-14368

All QA/QC procedures required by the EPH Method were followed. All performance/acceptance standards for the required QA/QC procedures were achieved or otherwise stated in this case narrative. A fractionation check was performed on the silica gel lot associated with this sample and found to pass the method criteria unless otherwise stated here. The data reported for this sample was not corrected for instrument/solvent baseline effects. No significant modifications were made to the EPH Method.

All QA/QC procedures required by the VPH Method were followed. All Performance/Acceptance Standards for the required QA/QC procedures were achieved or otherwise stated. No significant modifications were made to the VPH Method.

The following exceptions were noted for this Work Order:

Extractable Petroleum Hydrocarbons

Question H - Sample -005(MW-6): Contained one Surrogate recovery (Chloro-octadecane) below QC range. Sample was re-extracted, yielding similar results, due to matrix interference. Both sets of results are reported.

Question H - The RPD for (Napthalene 56%, 2-Methylnaphthalene 47%, Acenaphtylene 37%, Acenaphthene 36%, and Fluorene 30%) in the laboratory control sample (7/20/12)/ laboratory control sample duplicate (7/20/12) was outside the 25% QC acceptance limits.

There were no exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
QA/QC Director

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CHAIN OF CUSTODY RECORD

Laboratory: RIAL

Client	Capaccio Environmental Engineering
Address	293 Boston Post Road Marlborough, MA
Contact	Dawn Horter
Phone #	978-270-0193 Fax: 508-970-0028
Project Name	Waters Corporation
Address	34 Maple Street & 5 Technology Drive Milford, MA
Contact	Roger Eydenburg tel:
Location ID #	Fax:
Description	Low Flow Groundwater Sampling

MATRIX

1. Wastewater
2. Groundwater
3. Drinking Water
4. Soil
5. Surface Water
6. Other _____

EST to Invoice: Capaccio

Lab to Invoice: Capaccio

Lab Report to: dhorter@capaccio.com

Billing Reference: Proj No. 00-046.078

Field ID / Point of Collection	Collection Date	Collection Time	Matrix	# of bottles Type Glass	Plastic	VOA's	Preservation HCL	NaOH	HNO3	H2So4	MEOH	Other	None	VOC's (8260)	EPH w/ Targets	VPH	RCRA 8 Metals (6010)	Comments:
MW-1	7/12/12	1110	2			2	x							X				
MW-2	↓	1015	2			2	x							X				
MW-4		0930	2			2	x							X				
MW-5		1150	2	2		4	x							X	X	X		
MW-6	↓	1245	2	2		4	x							X	X	X		
~~Roof Drain Sample~~			~~6~~		~~1~~				~~X~~								~~X~~	

Turnaround Information

- [ ] Std. 10 Day Turnaround
- [ ] 5 Day *RUSH*
- [ ] 4 Day *RUSH*
- [ ] 3 Day *RUSH*
- [ ] 2 Day *RUSH*
- [ ] 1 Day *RUSH*

Approved By:

QA/QC

SPECIAL QA/QC or DATA Requirements:

Data Enhancement to meet GW-2 or GW-3 standards (whichever is more stringent).

EPH: 2 Ambers w/ HCL; VPH & 8260: 4 Vials w/ HCL

Additional Information

1.6 < 1207 ~ 14368

Sample Custody must be documented below each time samples change possesion, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Date Time:
(EST)	7/12/12 1800	1	7-13-12 1515
2	7-12-12 1845	2	7/13/12 1845
3		3	

Seal # ☐ Preserve where applicable ☐ On Ice ☐ Temp.

APPENDIX 7

Roof Drain Laboratory Analytical Data Package

R.I. ANALYTICAL
Specialists in Environmental Services

CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Date Received: 8/16/12
Date Reported: 8/24/12
Date Revised: 8/30/2012
P.O. #:
Work Order #: 1208-17210

DESCRIPTION: WATERS CORPORATION (ROOF DRAIN SAMPLE)

Subject sample(s) has/have been analyzed by our Warwick, R.I. laboratory with the attached results.

Reference: All parameters were analyzed by U.S. EPA approved methodologies.
The specific methodologies are listed in the methods column of the Certificate Of Analysis.

Data qualifiers (if present) are explained in full at the end of a given sample's analytical results.

Certification #: RI-033, MA-RI015, CT-PH-0508, ME-RI015
NH-253700 A & B, USDA S-41844

This Certificate represents all data associated with the referenced work order and is paginated for completeness. The complete Certificate includes one attachment; the original Chain of Custody.

If you have any questions regarding this work, or if we may be of further assistance, please contact our customer service department.

Approved by:

Data Reporting

enc: Chain of Custody

R.I. Analytical Laboratories, Inc.
CERTIFICATE OF ANALYSIS

Capaccio Environmental Eng.

Date Received: 8/16/12

Work Order #: 1208-17210

WATERS CORPORATION (ROOF DRAIN SAMPLE)

Sample # 001
SAMPLE DESCRIPTION: ROOF DRAIN SAMPLE
SAMPLE TYPE: GRAB **SAMPLE DATE/TIME:** 8/15/2012 @ 10:00

PARAMETER	SAMPLE RESULTS	DET. LIMIT	UNITS	METHOD	DATE ANALYZED	ANALYST
Total Metals Analyzed by ICP/MS						
Lead	0.001	0.001	mg/l	SW-846 6020A	8/22/12	PJC
Silver	<0.001	0.001	mg/l	SW-846 6020A	8/22/12	PJC
Total Metals Analyzed by ICP						
Arsenic	<0.1	0.1	mg/l	SW-846 6010C	8/22/12	PJC
Barium	<0.005	0.005	mg/l	SW-846 6010C	8/22/12	PJC
Chromium	<0.03	0.03	mg/l	SW-846 6010C	8/22/12	PJC
Mercury	<0.0005	0.0005	mg/l	SW-846 7470A	8/22/12	PJC
Total Metals Analyzed by ICP/MS						
Cadmium	<0.001	0.001	mg/l	SW-846 6020A	8/22/12	PJC
Selenium	<0.002	0.002	mg/l	SW-846 6020A	8/22/12	PJC

Customer Name : Capaccio Environmental Eng.

W.O. Number 1208-17210

MassDEP Analytical Protocol Certification Form

Laboratory Name:	R.I. Analytical Laboratories	Work Order No:	1208-17210
Project / Location:	WATERS CORPORATION (ROOF DRAIN SAMPLE)	RTN :	

This Form provides certifications for the following data set: list Laboratory Sample ID Number(s):

1208-17210-001 through 1208-17210-001

Matrices: ☐ Groundwater/Surface Water ☐ Soil / Sediment ☐ Drinking Water ☐ Air ☒ Other

CAM Protocol (check all that apply below):

8260 VOC CAM II A ☐	7470/7471 Hg CAM III B ☒	MassDEP VPH CAM IV A ☐	8081 Pesticides CAM V B ☐	7196 Hex Cr CAM VI B ☐	MassDEP APH CAM IX A ☐
8270 SVOC CAM II B ☐	7010 Metals CAM III C ☐	MassDEP EPH CAM IV B ☐	8151 Herbicides CAM V C ☐	8330 Explosives CAM VIII A ☐	TO-15 VOC CAM IX B ☐
6010 Metals CAM III A ☒	6020 Metals CAM III D ☒	8082 PCB CAM V A ☐	9014 Total Cyanide /PAC CAM VI A ☐	6860 Perchlorate CAM V111 B ☐	

Affirmative responses to Questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☒ Yes ☐ No
B	Were the analytical methods(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	☒ Yes ☐ No
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☒ Yes ☐ No
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Aquisition and Reporting of Analytical Data"?	☒ Yes ☐ No
E	a. VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s) ? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes ☐ No ☐ Yes ☐ No
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	☒ Yes ☐ No

Responses to Questions G,H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☒ Yes ☐ No [1]

***Data User Note:** Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.*

H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	☒ Yes ☐ No [1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☐ Yes ☒ No [1]

[1] *All negative responses must be addressed in an attached laboratory narrative.*

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

Signature _____ Position: QC/QC Director

Printed Name: Mike Hobin Date: 8/30/12

QA/QC Report

Client: Capaccio Environmental Eng.
WO #: 1208-17210
Date: 8/30/2012

-Method Blanks Results-

Parameter	Units	Results	Date Analyzed
Metals (Aqueous)			
Arsenic	mg/l	<0.1	8/22/2012
Barium	mg/l	<0.005	8/22/2012
Chromium	mg/l	<0.03	8/22/2012
Mercury	mg/l	<0.0005	8/22/2012
Metals by ICPMS (Aqueous)			
Cadmium	mg/l	<0.001	8/22/2012
Lead	mg/l	<0.001	8/22/2012
Selenium	mg/l	<0.002	8/22/2012
Silver	mg/l	<0.001	8/22/2012

-LCS/LCS Duplicate Data Results-

Parameter	Spike Conc	LCS Conc	LCS % Rec	LCS Dup Conc	LCS DUP % Rec	% RPD	Date Analyzed
Metals (Aqueous)							
Arsenic	1.00	1	100	1.0	100	0	8/22/2012
Barium	1.00	1.04	104	0.997	100	4	8/22/2012
Chromium	1.00	1.0	100	1.0	100	0	8/22/2012
Mercury	0.0020	0.0021	105	0.0020	100	5	8/22/2012
Metals by ICPMS (Aqueous)							
Lead	0.050	0.048	96	0.046	92	4	8/22/2012
Silver	0.050	0.049	98	0.048	96	2	8/22/2012
Cadmium	0.050	0.044	88	0.043	86	2	8/22/2012
Selenium	0.050	0.040	80	0.041	82	2	8/22/2012

Case Narrative

Date: 8/24/2012

Capaccio Environmental Eng.
Attn: Ms. Dawn Horter
293 Boston Post Road - West
Marlborough, MA 01752

Project: WATERS CORPORATION (ROOF DRAINSAMPLE)

RIAL WO#: 1208-17210

The following exceptions were noted for this Work Order:

Total Metals by 6010C, 6020A

RIAL has revised the Certificate of Analysis for Cadmium, and Selenium. Methods have been changed to 6020A to meet GW-2, GW-3 Standards.

Question I - Per the client's request, only a subset of the MCP analyte list for SW-846 Method 6010C, 6020A TotalMetals is reported.

There were no additional exceptions or analytical issues to discuss concerning the testing requirements for the project.

Mike Hobin
Director of Quality

[illegible] Fremont Street Needham, MA 02494 Tel: [illegible] 456-[illegible] Fax: 781-455-[illegible]

CHAIN OF CUSTODY RECORD

Laboratory: RIAL

Client	Capaccio Environmental Engineering		
Address	203 Boston Post Road Marlborough, MA		
Contact	Dawn Horter		
Phone #	978-270-0193	Fax:	508-970-0028
Project Name	Waters Corporation		
Address	34 Maple Street & 5 Technology Drive Milford, MA		
Contact	Roger Eydenburg	tel:	401-864-8729
Location ID #		Fax:	
Description	Roof Drain Sample		

MATRIX

1. Wastewater
2. Groundwater
3. Drinking Water
4. Soil
5. Surface Water
6. Other _____

EST to Invoice: Capaccio

Lab to Invoice: Capaccio

Lab Report to: dhorter@capaccio.com

Billing Reference: Proj No. 00-046.078

Field ID / Point of Collection	Collection Date	Collection Time	Matrix	# of bottles Type: Glass	Plastic	VOA's	Preservation: HCL	NaOH	HNO3	H2SO4	MEOH	Other	None	Analytical Information: RCRA 8 Metals (6010)	Comments:
Roof Drain Sample	8/15	10:00	6		1				X					X	

Turnaround Information

- [ ] Std 10 Day Turnaround
- [ ] 5 Day RUSH
- [ ] 4 Day RUSH
- [ ] 3 Day RUSH
- [ ] 2 Day RUSH
- [ ] 1 Day RUSH

Approved By:

QA/QC

SPECIAL QA/QC or DATA Requirements:

Data Enhancement to meet GW-2 or GW-3 standards (whichever is more stringent).

Additional Information

1208-17210

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler	Date Time	Received By	Date Time
1 Shawn Slowey EST	8/15/12 10:00	1 [signature]	8-16-12 1410
2 [signature]	8-16-12	2 [signature]	8/16/12 1623
3 [signature] 8/16/12 1830		3 [signature]	8/16/12 1830

Seals: Preserve where applicable: Cooler: X 1.0°C Temp:

[illegible]