

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 1 of 20

Section A

A.1 Title and Approval Page

Brownfields Site Specific Quality Assurance Project Plan (QAPP) Addendum for
Steve's Gas Station, 645 Main Street, Middletown, CT

Document Title

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Prepared by: (Preparer's Name and Organizational Affiliation)

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Address and Telephone Number

11/4/2014

T&B Project Manager:



Signature

Amy Vaillancourt 11/4/2014

Printed Name/Date

T&B Project QA Officer:



Signature

James T. Olsen, LEP 11/4/2014

Printed Name/Date

U.S. EPA QA Chemist:

Signature

Robert Reinhart

Printed Name/Date

U.S. EPA Project Manager Approval:

Signature

Dorrie Paar

Printed Name/Date

A.2 Introduction

Tighe & Bond has completed this *Site Specific Quality Assurance Project Plan (QAPP)* in accordance with the U.S. Environmental Protection Agency (EPA) guidance document, *Planning and Documenting Brownfields Projects: Generic Quality Assurance Project Plans and Site-Specific QAPP Addenda*, dated March 2009 and EPA New England *Quality Assurance Project Plan Program Guidance*, dated January 9, 2010. This QAPP Addendum has been prepared for the property located at 645 Main Street in Middletown, Connecticut, on behalf of the City of Middletown as part of their EPA Brownfield Assessment Grant. This addendum addresses the installation and sampling of groundwater monitoring wells for purposes of delineating gasoline impacts in groundwater migrating along Main Street. The gasoline contaminant concentrations have been detected at levels exceeding the applicable Connecticut Department of Energy & Environmental Protection (CTDEEP) Remediation Standard Regulations (RSRs).

Tighe & Bond's Generic QAPP for Connecticut Brownfields sites has been approved by EPA. This site specific addendum has been prepared in accordance with Tighe & Bond's CT Generic QAPP (RFA#14040).

Tighe & Bond understands the process of the Site-Specific QAPP Addendum for individual projects and that approval of both the Generic QAPP and Site-Specific QAPP Addendum must be given by the EPA Project Officer and the EPA QA Officer prior to commencement of any site work. All project work will be conducted according to the processes and procedures outlined in the Generic QAPP. Any site-specific work that requires modifications and/or additions to the Generic QAPP, are provided in this QAPP Addendum.

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 3 of 20

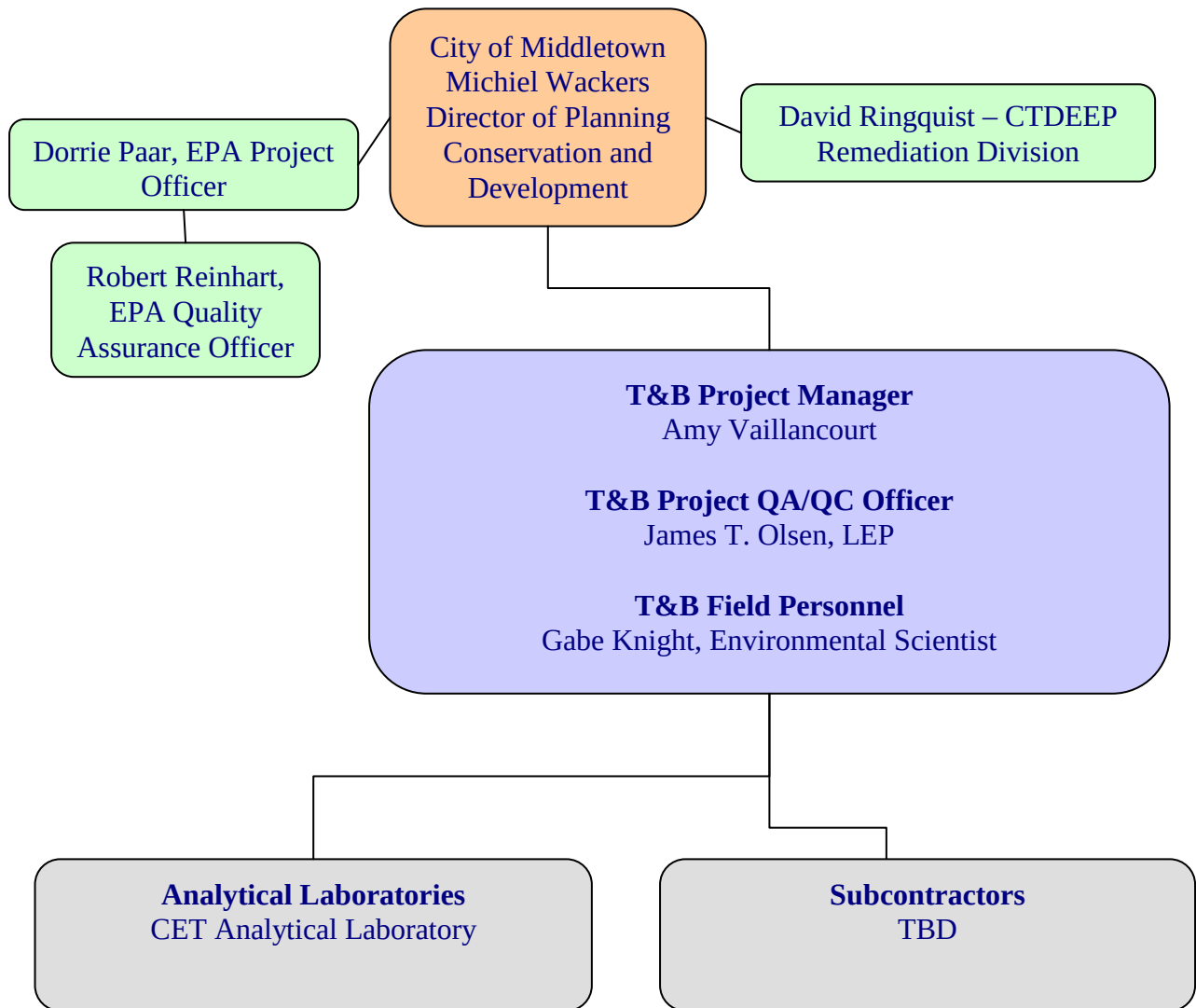
A.3 Table of Contents

Section A.....	1
A.1 - Title and Approval Page	
A.2 - Introduction	
A.3 - Table of Contents	
Section B - Project Organization and Responsibility.....	4
Section C - Problem Definition.....	5
Section D - Project Description and Project Timeline.....	6
Section E - Sampling Design and Site Figures.....	8
Section F - Sampling and Analytical Methods Requirements.....	10
Section K – Analytical Precision and Accuracy Requirements.....	14

Appendix A	<u>Figures</u>	
	Figure 1	Site Location Map
	Figure 2	Site Plan

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 4 of 20

Section B – Project Organization and Responsibility



Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 5 of 20

Section C – Problem Definition

It is Tighe & Bond's understanding that the City of Middletown, Connecticut (City) intends to utilize funds from their Brownfields Petroleum Assessment Grant to install and sample groundwater monitoring wells. The purpose of this work is to delineate gasoline impacts migrating along Main Street from the former Steve's Auto Repair & Gas Station located at 645 Main Street in Middletown, CT (site). Approximately five groundwater monitoring wells are proposed to be installed and sampled. Three existing groundwater monitoring wells located along Main Street and downgradient of the site will also be sampled as part of this work.

Location

The site, owned by the City, consists of a parcel of land totaling 0.14 acres located at the intersection of Grand and Main Streets in Middletown, Connecticut and is identified by the City of Middletown Tax Assessor's Office as Parcel 22-0255. The site is currently a vacant gravel parking lot, but was formerly (1924 to 2012) improved with a 1,880 square foot brick and concrete block building and formerly operated as Steve's Auto Repair & Gas Station. A map showing the site and surrounding area is provided as Figure 1 (Appendix A).

Previous Investigations

The following environmental investigations were previously conducted for the site and gasoline release along Main Street:

- Groundwater Sampling for Main & Liberty Street, Vanasse Hangen Brustlin (VHB), June 2010
- Limited Subsurface Investigation, CTDEEP, May-June 2011
- Pre-Demolition Hazardous Building Materials Inspection (HBMI), Eagle Environmental, Inc., April 2011
- Phase I Environmental Site Assessment (ESA), VHB, November 2011
- Hazardous Building Materials Abatement and Building Demolition, Tighe & Bond, April 2013
- UST Removal Oversight, Tighe & Bond, August 2014

Groundwater sampling along Main & Liberty Streets was conducted by VHB in response to light non-aqueous phase liquid (LNAPL) consisting of gasoline which was detected in groundwater downgradient of the site. Three groundwater monitoring wells were installed along Main Street to depths of 32 feet below grade (bg). These wells were gauged for LNAPL and the groundwater was sampled and analyzed for gasoline constituents. Results identified gasoline impacts (weathered gasoline) extending approximately two city blocks along Main Street (from Grand to Liberty Streets). Several historic gas stations existed in this area. CTDEEP was notified who subsequently conducted a subsurface investigation (summarized below) at 645 Main Street.

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 6 of 20

The CTDEEP investigation consisted of the advancement of nine soil borings from 16 to 32 feet bg at the site utilizing a truck-mounted Geoprobe® and select borings were finished as temporary groundwater monitoring wells. Ten groundwater samples and eleven soil samples were submitted for laboratory analysis of volatile organic compounds (VOCs) during the investigation. Gasoline impacts to soil and groundwater were identified at the site at levels that exceeded the CTDEEP Remediation Standard Regulation (RSR) numeric criteria. Groundwater was reported by CTDEEP to be approximately 12 to 32 feet bg.

The Pre-Demolition HBMI for the on-site structure included the inspection and sampling of suspect asbestos containing materials (ACM), lead based paint, and potential polychlorinated biphenyls (PCB) containing materials. Sampling results confirmed ACM were present in roofing materials, window glazing and caulking; elevated levels of lead were identified on the structural brick and block and PCBs greater than 1 part per million (ppm) in both interior and exterior caulking.

The Phase I ESA was conducted on behalf of the City as part of the North End Gateway Redevelopment Project and identified environmental concerns including: historical automotive repair operations; potential generation and storage of waste oil and/or hazardous waste; hydraulic lifts; floor drain; existing and former USTs and dispenser pumps; and potential impacts to groundwater.

Tighe & Bond conducted oversight during the abatement and demolition of the former on-site structure (auto repair facility). Bestech, Inc. of Ellington, CT was the contractor selected by the City to perform the work. Abatement included removal of asbestos and PCB containing building materials. All work was conducted in accordance with state and federal regulations. All waste was disposed off-site at approved licensed facilities.

Tighe & Bond recently conducted oversight during the removal of gasoline Underground Storage Tanks (USTs), pump island, and hydraulic lifts at the site. Connecticut Tank Removal was the contractor selected by the City to perform the work. Confirmatory soil samples were collected following removal of these structures. Based on results, gasoline releases were identified beneath the pump island and UST areas. No remediation of soils or groundwater was conducted as part of this work. The City intends on developing a Remedial Action Plan (RAP) for soil and groundwater remediation of gasoline impacts once delineation has been completed.

Section D – Project Description and Project Timeline

Data Quality Objectives

The Data Quality Objectives (DQOs) for the remediation activities outlined within this QAPP are as follows:

- Install groundwater monitoring wells in select locations to delineate extent of gasoline impacts to groundwater.
- Screen appropriate interval for wells to obtain appropriate representative samples (intersect water table with well screen and position three to four feet above interface to account for seasonal fluctuations)
- Conduct gauging of wells for LNAPL and water levels along with an elevation survey to determine groundwater flow direction
- Collect representative groundwater samples in accordance with CTDEEP protocols to document concentrations of contaminants
- Compare laboratory results to applicable CTDEEP RSR criteria to determine potential remedial requirements
- Complete a Well Installation and Sampling Report.

Scope of Work

Well Installation

The following scope of work includes the installation of approximately five overburden groundwater monitoring wells along Main Street and downgradient of the site. Locations of monitoring wells are show on an area plan provided as Figure 2 and have been selected based on groundwater flow direction (east towards Connecticut River), access (highly urbanized area), and results of previous investigations of the area (downgradient of where gasoline impacts have already been detected) Soil boring samples will not be submitted for laboratory analysis as part of this scope of work. However, soil cutting samples will be collected for field-screen purposes, typically at five foot intervals.

Prior to conducting groundwater monitoring well installation activities, Tighe & Bond will contact Call-Before-You-Dig (CBYD) to have underground utilities marked out (as required by law). In addition, a ground penetrating radar (GPR) survey will be conducted to clear bore hole/monitoring well locations for potential underground utility lines. Boreholes with potential utility conflicts will be cleared using soil vacuum excavation techniques prior to drilling. Tighe & Bond will coordinate access with the City, abutting property owners, tenants, and other project stakeholders. Tighe & Bond will provide an Environmental Scientist to conduct the field work and a Licensed Environmental Professional (LEP) to oversee the completion of the scope of work.

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 8 of 20

Groundwater monitoring wells will consist of 2-inch diameter PVC with approximately ten (10) feet of slotted screen intersecting the groundwater table. The wells will be backfilled with native material, sand, and grouted with an annular seal of bentonite clay. Each well will be capped, locked, and completed with a flush-mounted traffic-rated metal curb box secured in a concrete pad at grade. Each well will be developed after installation to remove suspended sediments from the wells. Purge water will be stored in drums and properly disposed of at a licenced facility.

Groundwater Sampling and Elevation Survey

Following a one-week equilibrium period after development, Tighe & Bond will gauge wells to determine depth to groundwater within each well. Tighe & Bond will complete an elevation survey (referenced to an arbitrary local benchmark) to determine the direction of shallow groundwater flow. Groundwater samples will then be collected from each of the five newly installed wells and three of the existing wells previously installed wells along Main Street and submitted for laboratory analysis of volatile organic compounds (VOCs) via EPA Method 8260, extractable total petroleum hydrocarbons (ETPH) via the Connecticut Department of Public Health (CTDPH) approved method, and total lead via EPA Methods 6020 and 7470. Samples will be collected using a peristaltic pump, Horiba YSI water quality meter, and EPA Low Flow methods. Physical characteristics of groundwater samples (i.e. sheen, color, odor, etc.) will be recorded. In accordance with CTDEEP Reasonable Confidence Protocols (RCPs), a trip blank and equipment blank will be provided to the laboratory for QA/QC and a duplicate sample will be collected from one of the sampled wells. The duplicate sample will be analyzed for each of the analytical parameters (VOCs, ETPH, and lead).

Waste Characterization Sampling

Due to the presumed presence of contaminants in groundwater, the purged water generated during sampling will be drummed and staged on-Site pending laboratory analytical results. The drum will be labeled appropriately and staged in an out of the way location. Once laboratory analytical results are received, Tighe & Bond will work with the City to determine appropriate disposal options and will coordinate off-site disposal of drummed groundwater if necessary. Soils generated during well installation activities will be utilized as back-fill material as much as possible unless contamination is encountered. Excess soil will be drummed and sampled for waste characterization purposes. Analytical parameters will include volatile organic compounds (VOCs) via EPA Method 8260, extractable total petroleum hydrocarbons (ETPH) via the CTDPH approved method, total lead via EPA Methods 6020 and 7470, semi-volatile organic compounds (SVOCs) via EPA Method 8270, flashpoint, analysis of lead and benzene in soil via the Toxicity Characteristic Leaching Procedure (TCLP), and polychlorinated biphenyls (PCBs) via EPA Method 8082 with soxhlet extraction.

Title: Site Specific Assessment QAPP Addendum– 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 9 of 20

Reporting

Following completion of well installation and sampling activities, Tighe & Bond will prepare a report. The report will provide a summary of installation and sampling activities and will include a data quality and usability evaluation as well as a comparison of the sample analytical results to the applicable CTDEEP RSRs.

Residential and Commercial criteria will be used for comparison since that is the land use in the area. The groundwater results will be compared to the Surface Water Protection Criteria (SWPC), Residential Groundwater Volatilization Criteria (RES GWVC), and Industrial/Commercial Groundwater Volatilization Criteria (I/C GWVC) of the RSRs.

Copies of well installation logs, analytical reports, summary tables, pertinent findings, and photographs will be included as Appendices to the report. Final well locations and groundwater contours will be shown on an area plan. A draft copy of the report will be provided to the City and EPA for review and comment. Once comments are incorporated, a final report will be issued to the City, EPA, and CTDEEP.

Timeline for Assessment QAPP 645 Main Street, Middletown, CT

Task	Approximate Completion Date
EPA Site Specific QAPP Review Complete	October 2014
Installation and Sampling of Monitoring Wells	November 2014
Data Evaluation/Report Preparation Complete	December 2014

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 10 of 20

Section E – Sampling Design and Site Figures

Sampling Details

The sampling strategy at the site is designed to follow CTDEEP Site Characterization Guidance Document dated September 2007 and revised December 2010. The key components of the sampling design are detailed below.

Groundwater Monitoring Wells

- Sample Matrix: Groundwater
- Approximate number of Samples: 8
Samples will be collected from each of the five newly installed groundwater monitoring wells as well as the three existing monitoring wells along Main Street. Each sample will be submitted for laboratory analysis of COCs associated with gasoline, including those listed below.
- Groundwater COCs and analytical methods:
 - VOCs – EPA Method 8260
 - Lead – EPA Method 6010
 - ETPH – CTDPH ETPH Method

Waste Characterization Sampling for Purged Groundwater

Sample Matrix – Groundwater

- Approximate Number of Waste Characterization Samples: 1
It is anticipated that approximately 25-30 gallons of groundwater will be purged from wells prior to sampling wells. The purged water will be stored in a 55-gallon drum. One sample will be collected from the drum for analysis of COCs listed below.
- Groundwater COCs and analytical methods:
 - VOCs – EPA Method 8260
 - SVOCs – EPA Method 8270
 - Lead – EPA Method 6010
 - ETPH – CT DPH ETPH Method
 - Flashpoint

Waste Characterization Sampling for Drill Cuttings

Sample Matrix – Soil

- Approximate Number of Waste Characterization Samples: 1
It is anticipated that approximately one 55-gallon drum of soil cuttings will be produced as a result of well installation activities. One sample will be collected from the drum for analysis of COCs listed below.
- Soil COCs and analytical methods:

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 11 of 20

- VOCs – EPA Method 8260
- SVOCs – EPA Method 8270
- Lead – EPA Method 6010
- ETPH – CT DPH ETPH Method
- Flashpoint
- Lead & Benzene - TCLP
- PCBs – EPA Method 8082 with soxhlet extraction

Sampling Rationale

During groundwater monitoring well installation, Tighe & Bond personnel will observe and perform associated visual examination of soil cuttings from wells utilizing a two-step approach:

- The physical characteristics of soils from the excavation will be visually inspected and documented for evidence of environmental impacts using visual, olfactory, and photoionization detector (PID) methods for the presence or absence of contamination. No sampling of soil cuttings is planned, however, if soil contamination is observed, impacted soils will be drummed, sampled, and analyzed as part of the waste characterization procedures outlined in this QAPP.
- Field screening with the PID will be conducted using a head-space screening analysis immediately after sample collection. Select soil cutting samples (approximately 5 foot intervals) will be placed in a glass jar which will be then sealed and agitated. The headspace (air inside the jar) will be then screened using the PID.

During groundwater monitoring well purging and sampling activities, Tighe & Bond personnel will observe and perform associated visual examination of groundwater evacuated from wells to document evidence of contamination (i.e. odor, color, sheen, etc.). Water quality parameters including dissolved oxygen, specific conductance, temperature, pH, and turbidity will be recorded at approximately five minute intervals. Sampling will be conducted using EPA Low-Flow protocols.

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 12 of 20

Section F – Sampling and Analytical Methods Requirements

F.2 CET Analytical Laboratory - Stratford, CT

Parameter	Matrix	CET Analytical SOP	Number of Samples	T&B Sampling SOP	Containers (Number, size & type)	Preservation Requirements (temperature, light, chemical)	Maximum Holding Time (preparation/ analysis)
CT ETPH	Soil/Solids	GC0032.6	Waste Soil Cuttings - 1	TBSOP # 3,20,21,22,24, 27 & 29	1 - 8 oz glass jar	None / 4°C	14 days
	Water	GC0032.6	Groundwater – 8 Waste Purge Water - 1	TBSOP # 5,7,11,12,13,15 ,16,20,21,22,24 ,26,27,29 & 30	1 – 1 liter glass amber bottle	None / 4°C	7 days
SVOCs	Soil/Solids	GC0005.3	Waste Soil Cuttings - 1	TBSOP # 3,8,9,20,21,22, 24,27 & 29	1 - 8 oz glass jar	None / 4°C	14 days to extract / 40 days to analyze
	Water	GC0005.3	Waste Purge Water - 1	TBSOP # 5,7,11,12,13,15 ,16,20,21,22,24 ,26,27,29 & 30	1 – 1 liter amber glass bottle	None / 4°C	7 days
VOCs	Soil/Solids	GC0006.4	Waste Soil Cuttings - 1	TBSOP # 3,8,9,20,21,22, 24,27 & 29	3 - ENCOR or 3 -40ml vials 1- 8 oz. glass jar for % solids	ENCORE = None / Frozen Vials = 1 – methanol & 2 - sodium bisulfate 1 - 8 oz. non-preserved jar / 4°C	14 Days

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 13 of 20

Parameter	Matrix	CET Analytical SOP	Number of Samples	T&B Sampling SOP	Containers (Number, size & type)	Preservation Requirements (temperature, light, chemical)	Maximum Holding Time (preparation/ analysis)
	Water	GC0006.4	Groundwater – 8 Waste Purge Water - 1	TBSOP # 5,7,11,12,13,15 ,16,20,21,22,24 ,26,27,29 & 30	2 - 40ml vials (no headspace)	HCl / 4°C	14 Days
Lead (Total)	Soil/Solids	ICP0009.1, Hg0007.3	Waste Soil Cuttings - 1	TBSOP # 3,20,21,22,24, 27 & 29	1 – 8 oz glass jar	None / 4°C	180 days / 28 Days for Mercury
	Water	ICP0009.1, Hg0007.3	Groundwater – 8 Waste Purge Water - 1	TBSOP # 5,7,11,12,13,15 ,16,20,21,22,24 ,26,27,29 & 30	1 - 500ml plastic bottle	Nitric / 4°C	180 days / 28 Days for Mercury
TCLP	Soil/Solids	PR0036.2	Waste Soil Cuttings - 1	TBSOP # 3,20,21,22,24, 27 & 29	1 – 8 oz glass jar	None / 4°C	VOCs – 14 days SVOCs – 14 days Mercury – 28 days Other Metals – 180 days
Ignitability	Soil/Solids	PH0015.1	Waste Soil Cuttings - 1	TBSOP # 3,20,21,22,24, 27 & 29	1 - 8 oz glass jar	None / 4°C	14 days

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT

RFA#: 14040

Revision Number: 1

Revision Date: 11/4/2014

Page: 14 of 20

Parameter	Matrix	CET Analytical SOP	Number of Samples	T&B Sampling SOP	Containers (Number, size & type)	Preservation Requirements (temperature, light, chemical)	Maximum Holding Time (preparation/ analysis)
PCBs	Soil/Solids	PR0091.4 GC0002.4	Waste Soil Cuttings - 1	TBSOP # 3,20,21,22,24, 27 & 29	1 - 8 oz. glass jar	None / 4°C	14 days to extract / 40 days to analyze
<u>Notes:</u> CT ETPH – Extractable Total Petroleum Hydrocarbons via CTDPH Approved Methodology EPH – Extractable Petroleum Hydrocarbons via MA DEP Approved Methodology PCBs – Polychlorinated Biphenyls RCP – Reasonable Confidence Protocols SOP – Standard Operating Procedure SPLP – Synthetic Precipitation Leaching Procedure SVOCs – Semi Volatile Organic Compounds TBSOP – Tighe & Bond Standard Operating Procedure TCLP – Toxicity Characteristic Leaching Procedure VOCs – Volatile Organic Compounds VPH – Volatile Petroleum Hydrocarbons via MA DEP Approved Method							

***It is noted that CET Analytical Laboratory is a Connecticut-certified analytical laboratory.**

****It is also noted that duplicate samples will be collected as field quality control measures as warranted on a site by site basis and these samples will be included in the total number of samples identified in the site-specific QAPP.**

Section K - Analytical Precision and Accuracy

CET Analytical Detection Limit, MDL, Precision, and Accuracy

The table below summarizes target compound lists for analytical methods, method detection limits, and precision/accuracy, as applicable. The method detection limits (MDLs) indicated are statistically MDLs and the reporting limits provided by CET are based upon the calibration standards. Tighe & Bond has reviewed the MDLs to verify they are at or below the applicable CTDEEP RSR criteria for each method and parameter.

If the precision and accuracy criteria are not met in a sample, the value will be noted as estimated. The case narrative will contain a list of samples that are noted as estimated and the reason for noting them as such. Reporting Limit for individual compounds may be elevated due to poor calibration performance at the RL. RL's may also be elevated for individual samples due to matrix interferences.

Analyte / Method	Soil					Soil - Criteria			Water				Groundwater - Criteria			
CET	Detection Limit (µg / kg)	Quantitation Limit (µg / kg)	Precision	Accuracy		RES DEC (µg / Kg)	IDEC (µg / Kg)	GBPMC (µg / Kg)	Detection Limit (µg / L)	Quantitation Limit (µg / L)	Precision	Accuracy		GWPC (ug / L)	SWPC (µg / L)	RGWVC (µg / L)
VOCs (Method 8260B)																
Acetone	3.75	50.00	≤30	70	130	500,000	1,000,000	140,000	0.86	100.00	≤30	70	130	700	NE	50,000
Acrylonitrile	1.54	25.00	≤30	70	130	1,100	11,000	100	0.62	25.00	≤30	70	130	0.5	20	NE
Benzene	0.22	5.00	≤30	70	130	21,000	200,000	200	0.15	1.00	≤30	70	130	1	710	215
Bromobenzene	0.25	5.00	≤30	70	130	NE	NE	NE	0.09	1.00	≤30	70	130	NE	NE	NE
Bromodichloromethane	0.33	5.00	≤30	70	130	NE	NE	NE	0.12	1.00	≤30	70	130	NE	NE	NE
Bromoform	0.58	5.00	≤30	70	130	78,000	720,000	800	0.3	1.00	≤30	70	130	4	10,800	920
Bromomethane (methyl bromide)	0.58	5.00	≤30	70	130	NE	NE	NE	0.32	5.00	≤30	70	130	NE	NE	NE
Carbon disulfide	0.68	5.00	≤30	70	130	NE	NE	NE	0.02	5.00	≤30	70	130	NE	NE	NE
Carbon tetrachloride	0.16	5.00	≤30	70	130	4,700	44,000	1000	0.13	1.00	≤30	70	130	5	132	16
Chlorobenzene	0.22	5.00	≤30	70	130	500,000	1,000,000	20,000	0.19	1.00	≤30	70	130	100	420,000	1,800
Chloroethane	1.95	5.00	≤30	70	130	NE	NE	NE	0.15	5.00	≤30	70	130	NE	NE	NE
Chloroform	0.33	5.00	≤30	70	130	100,000	940,000	1,200	0.12	1.00	≤30	70	130	6	14,100	287
Chloromethane	0.37	5.00	≤30	70	130	NE	NE	NE	0.43	5.00	≤30	70	130	NE	NE	NE
2-Chlorotoluene	1.62	5.00	≤30	70	130	NE	NE	NE	0.1	1.00	≤30	70	130	NE	NE	NE
4-Chlorotoluene	1.93	5.00	≤30	70	130	NE	NE	NE	0.22	1.00	≤30	70	130	NE	NE	NE
Dibromochloromethane	0.41	5.00	≤30	70	130	7,300	68,000	100	0.24	0.50	≤30	70	130	0.5	1,020	NE
Dibromomethane	0.47	5.00	≤30	70	130	NE	NE	NE	0.17	1.00	≤30	70	130	NE	NE	NE
Dichlorodifluoromethane	0.81	25.00	≤30	70	130	NE	NE	NE	0.56	10.00	≤30	70	130	NE	NE	NE
1,2-Dibromo-3-chloropropane	1.31	5.00	≤30	70	130	NE	NE	NE	0.65	1.00	≤30	70	130	NE	NE	NE
1,2-Dibromoethane	0.63	5.00	≤30	70	130	7	67	100	0.17	1.00	≤30	70	130	0.5	NE	4
1,2-Dichlorobenzene	0.26	5.00	≤30	70	130	500,000	1,000,000	3,100	0.19	1.00	≤30	70	130	600	170,000	30,500
1,3-Dichlorobenzene	0.31	5.00	≤30	70	130	500,000	1,000,000	120,000	0.11	1.00	≤30	70	130	600	26,000	24,200
1,4-Dichlorobenzene	0.38	5.00	≤30	70	130	26,000	240,000	15,000	0.09	1.00	≤30	70	130	75	26,000	50,000

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 16 of 20

Analyte / Method	Soil					Soil - Criteria			Water					Groundwater - Criteria		
CET	Detection Limit (µg/kg)	Quantitation Limit (µg/kg)	Precision	Accuracy		RES DEC (µg/Kg)	IDEC (µg/Kg)	GBPMC (µg/Kg)	Detection Limit (µg/L)	Quantitation Limit (µg/L)	Precision	Accuracy		GWPC (ug/L)	SWPC (µg/L)	RGWVC (µg/L)
1,1-Dichloroethane	0.69	5.00	≤30	70	130	500,000	1,000,000	14,000	0.22	1.00	≤30	70	130	70	NE	34,600
1,2-Dichloroethane	0.52	5.00	≤30	70	130	6,700	63,000	200	0.11	1.00	≤30	70	130	1	2,970	21
1,1-Dichloroethene	0.85	5.00	≤30	70	130	1,000	9,500	1400	0.19	1.00	≤30	70	130	7	96	1
cis-1,2-Dichloroethene	0.29	5.00	≤30	70	130	500,000	1,000,000	14,000	0.14	1.00	≤30	70	130	70	NE	NE
trans-1,2-Dichloroethene	0.88	5.00	≤30	70	130	500,000	1,000,000	20,000	0.21	1.00	≤30	70	130	100	NE	NE
trans-1,4-Dichloro-2-butene	0.78	10.00	≤30	70	130	NE	NE	NE	0.68	5.00	≤30	70	130	NE	NE	NE
1,2-Dichloropropane	0.35	5.00	≤30	70	130	9,000	84,000	1,000	0.15	1.00	≤30	70	130	5	NE	14
1,3-Dichloropropene	0.53	5.00	≤30	70	130	3,400	32,000	100	0.18	1.00	≤30	70	130	0.5	34,000	6
2,2-Dichloropropane	0.72	5.00	≤30	70	130	NE	NE	NE	0.28	1.00	≤30	70	130	NE	NE	NE
1,1-Dichloropropene	0.21	5.00	≤30	70	130	NE	NE	NE	0.13	1.00	≤30	70	130	NE	NE	NE
cis-1,3-Dichloropropene	0.32	5.00	≤30	70	130	NE	NE	NE	0.13	1.00	≤30	70	130	NE	NE	NE
trans-1,3-Dichloropropene	0.23	5.00	≤30	70	130	NE	NE	NE	0.18	1.00	≤30	70	130	NE	NE	NE
2-Butanone (MEK)	3.24	25.00	≤30	70	130	500,000	1,000,000	80,000	0.74	25.00	≤30	70	130	400	NE	50,000
2-Hexanone	2.82	25.00	≤30	70	130	NE	NE	NE	0.38	25.00	≤30	70	130	NE	NE	NE
Hexachlorobutadiene	0.35	5.00	≤30	70	130	NE	NE	NE	0.38	0.50	≤30	70	130	NE	NE	NE
4-methyl-2-pentanone	2.49	25.00	≤30	70	130	500,000	1,000,000	14,000	0.37	25.00	≤30	70	130	350	NE	50,000
Ethylbenzene	0.22	5.00	≤30	70	130	500,000	1,000,000	101,000	0.03	1.00	≤30	70	130	700	580,000	50,000
Isopropylbenzene	0.14	5.00	≤30	70	130	NE	NE	NE	0.11	1.00	≤30	70	130	NE	NE	NE
4-Isopropyltoluene	0.21	5.00	≤30	70	130	NE	NE	NE	0.09	1.00	≤30	70	130	NE	NE	NE
Methylene chloride	7.07	5.00	≤30	70	130	82,000	760,000	1,000	4.56	5.00	≤30	70	130	5	48,000	50,000
Methyl tert butyl ether (MTBE)	0.89	10.00	≤30	70	130	500,000	1,000,000	20,000	0.12	5.00	≤30	70	130	100	NE	50,000
Styrene	0.17	5.00	≤30	70	130	500,000	1,000,000	20,000	0.13	1.00	≤30	70	130	100	NE	580
1,1,2,2-Tetrachloroethane	0.93	5.00	≤30	70	130	3,100	29,000	100	0.25	5.00	≤30	70	130	0.5	110	12
1,1,1,2-Tetrachloroethane	0.33	5.00	≤30	70	130	24,000	220,000	200	0.22	1.00	≤30	70	130	1	NE	23
Tetrachloroethene	0.31	5.00	≤30	70	130	12,000	110,000	1,000	0.08	1.00	≤30	70	130	5	88	1,500
Tetrahydrofuran (THF)	1.63	25.00	≤30	70	130	NE	NE	NE	0.57	1.00	≤30	70	130	NE	NE	NE
Toluene	0.24	5.00	≤30	70	130	500,000	1,000,000	67,000	0.08	1.00	≤30	70	130	1,000	4,000,000	23,500
1,2,3-Trichlorobenzene	0.38	5.00	≤30	70	130	NE	NE	NE	0.36	1.00	≤30	70	130	NE	NE	NE
1,2,4-Trichlorobenzene	0.4	5.00	≤30	70	130	NE	NE	NE	0.38	1.00	≤30	70	130	NE	NE	NE
1,1,1-Trichloroethane	0.27	5.00	≤30	70	130	500,000	1,000,000	40,000	0.16	1.00	≤30	70	130	200	62,000	20,400

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 17 of 20

Analyte / Method	Soil					Soil - Criteria			Water					Groundwater - Criteria		
CET	Detection Limit (µg/kg)	Quantitation Limit (µg/kg)	Precision	Accuracy		RES DEC (µg/Kg)	IDEC (µg/Kg)	GBPMC (µg/Kg)	Detection Limit (µg/L)	Quantitation Limit (µg/L)	Precision	Accuracy		GWPC (ug/L)	SWPC (µg/L)	RGWVC (µg/L)
1,1,2-Trichloroethane	0.54	5.00	≤30	70	130	11,000	100,000	1,000	0.12	1.00	≤30	70	130	5	1,260	8,000
Trichlorotrifluoroethane (Freon-113)	0.93	25.00	≤30	70	130	NE	NE	NE	0.13	25.00	≤30	70	130	NE	NE	NE
Trichloroethene	0.29	5.00	≤30	70	130	56,000	520,000	1,000	0.25	1.00	≤30	70	130	5	2,340	219
Trichlorofluoromethane	0.7	25.00	≤30	70	130	NE	NE	NE	0.13	25.00	≤30	70	130	NE	NE	NE
1,2,3-Trichloropropane	0.76	5.00	≤30	70	130	NE	NE	NE	0.51	1.00	≤30	70	130	NE	NE	NE
1,2,4-Trimethylbenzene	0.19	5.00	≤30	70	130	NE	NE	NE	0.1	1.00	≤30	70	130	NE	NE	NE
1,3,5-Trimethylbenzene	0.22	5.00	≤30	70	130	NE	NE	NE	0.11	1.00	≤30	70	130	NE	NE	NE
Vinyl chloride	0.45	5.00	≤30	70	130	320	3,000	400	0.62	2.00	≤30	70	130	2	15,750	2
o-Xylene	0.17	5.00	≤30	70	130	NE	NE	NE	0.09	1.00	≤30	70	130	NE	NE	NE
Naphthalene	0.89	5.00	≤30	70	130	NE	NE	NE	0.44	1.00	≤30	70	130	NE	NE	NE
n-Butylbenzene	0.39	5.00	≤30	70	130	NE	NE	NE	0.2	1.00	≤30	70	130	NE	NE	NE
n-Propylbenzene	0.35	5.00	≤30	70	130	NE	NE	NE	0.07	1.00	≤30	70	130	NE	NE	NE
m&p-Xylene	0.27	5.00	≤30	70	130	NE	NE	NE	0.13	1.00	≤30	70	130	NE	NE	NE
Sec-Butylbenzene	0.29	5.00	≤30	70	130	NE	NE	NE	0.17	1.00	≤30	70	130	NE	NE	NE
Tert-Butylbenzene	0.2	5.00	≤30	70	130	NE	NE	NE	0.1	1.00	≤30	70	130	NE	NE	NE
Xylenes, Total	0.22	5.00	≤30	70	130	500,000	1,000,000	195,000	0.11	1.00	≤30	70	130	530	NE	21,300
Semi-Volatile Organic Compounds (Method 8270C)																
						RDEC	I/CDEC	GBPMC								
1,2,4,5-Tetrachlorobenzene	47.6	300	≤30	40	140	NE	NE	NE	0.62	20	≤30	40	140	NE	NE	NE
1,2,4-Trichlorobenzene	44.47	300	≤30	40	140	NE	NE	NE	0.83	5	≤30	40	140	NE	NE	NE
1,2-Dichlorobenzene	28.73	300	≤30	40	140	NE	NE	NE	0.67	5	≤30	40	140	NE	NE	NE
1,2-Diphenylhydrazine	45.58	300	≤30	40	140	NE	NE	NE	0.9	20	≤30	40	140	NE	NE	NE
1,3-Dichlorobenzene	34.86	300	≤30	40	140	NE	NE	NE	0.88	5	≤30	40	140	NE	NE	NE
1,4-Dichlorobenzene	59.5	300	≤30	40	140	NE	NE	NE	0.55	5	≤30	40	140	NE	NE	NE
2,4,5-Trichlorophenol	32.35	300	≤30	30	130	NE	NE	NE	0.77	20	≤30	30	130	NE	NE	NE
2,4,6-Trichlorophenol	30.36	300	≤30	30	130	NE	NE	NE	0.68	20	≤30	30	130	NE	NE	NE
2,4-Dichlorophenol	30.05	300	≤30	30	130	200,000	2,500,000	4,000	0.99	20	≤30	30	130	20	15,800	NE
2,4-Dimethylphenol	44.71	300	≤30	30	130	NE	NE	NE	0.78	20	≤30	30	130	NE	NE	NE
2,4-Dinitrophenol	51.94	300	≤30	30	130	NE	NE	NE	0.81	20	≤30	30	130	NE	NE	NE
2,4-Dinitrotoluene	27.69	300	≤30	40	140	NE	NE	NE	0.75	75	≤30	40	140	NE	NE	NE
2,6-Dinitrotoluene	23.56	300	≤30	40	140	NE	NE	NE	0.43	75	≤30	40	140	NE	NE	NE

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 18 of 20

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2-Chloronaphthalene	44.58	300	≤30	40	140	NE	NE	NE	1	20	≤30	40	140	NE	NE	NE
2-Chlorophenol	25.83	300	≤30	30	130	340,000	2,500,000	7,200	0.73	20	≤30	30	130	36	NE	NE
2-Methylnaphthalene	39.68	300	≤30	40	140	NE	NE	NE	0.022	1	≤30	40	140	NE	NE	NE
2-Methylphenol (o-cresol)	31.62	300	≤30	30	130	NE	NE	NE	0.8	20	≤30	30	130	NE	NE	NE
2-Nitroaniline	36.96	300	≤30	40	140	NE	NE	NE	0.66	20	≤30	40	140	NE	NE	NE
2-Nitrophenol	30.41	300	≤30	30	130	NE	NE	NE	0.73	20	≤30	30	130	NE	NE	NE
3&4-Methylphenol (m&p-cresol)	78.58	300	≤30	30	130	NE	NE	NE	1.48	20	≤30	30	130	NE	NE	NE
3,3'-Dichlorobenzidine	39.74	300	≤30	40	140	NE	NE	NE	2.68	75	≤30	40	140	NE	NE	NE
3-Nitroaniline	49.87	300	≤30	40	140	NE	NE	NE	2.41	20	≤30	40	140	NE	NE	NE
4,6-Dinitro-2-methylphenol	42.14	300	≤30	30	130	NE	NE	NE	0.93	20	≤30	30	130	NE	NE	NE
4-Bromophenyl phenyl ether	37.99	300	≤30	40	140	NE	NE	NE	1.24	20	≤30	40	140	NE	NE	NE
4-Chloro-3-methylphenol	38.26	300	≤30	30	130	NE	NE	NE	0.57	20	≤30	30	130	NE	NE	NE
4-Chloroaniline	36.18	300	≤30	40	140	NE	NE	NE	0.75	20	≤30	40	140	NE	NE	NE
4-Chlorophenyl phenyl ether	46.04	300	≤30	40	140	NE	NE	NE	0.61	20	≤30	40	140	NE	NE	NE
4-Nitroaniline	98.72	300	≤30	40	140	NE	NE	NE	0.63	20	≤30	40	140	NE	NE	NE
4-Nitrophenol	44.07	300	≤30	30	130	NE	NE	NE	0.78	75	≤30	30	130	NE	NE	NE
Acenaphthene	45.31	300	≤30	40	140	NE	NE	NE	0.02	1	≤30	40	140	NE	NE	NE
Acenaphthylene	21.65	300	≤30	40	140	1,000,000	2,500,000	84,000	0.017	0.3	≤30	40	140	420	0.3	NE
Acetophenone	NE	NE	≤30	NE	NE	NE	NE	NE	NE	NE	≤30	NE	NE	NE	NE	NE
Aniline	34.86	300	≤30	40	140	NE	NE	NE	0.88	20	≤30	40	140	NE	NE	NE
Anthracene	56.85	300	≤30	40	140	1,000,000	2,500,000	400,000	0.029	1	≤30	40	140	2,000	110,000	NE
Benzo(a)anthracene	30.82	300	≤30	40	140	1,000	7,800	1,000	0.033	0.06	≤30	40	140	0.06	0.3	NE
Benzidine	NE	300	≤30	40	140	NE	NE	NE	NE	75	≤30	40	140	NE	NE	NE
Benzo(a)pyrene	40.12	300	≤30	40	140	1,000	1,000	1,000	0.035	0.2	≤30	40	140	0.2	0.3	NE
Benzo(b)fluoranthene	31.61	300	≤30	40	140	1,000	7,800	1,000	0.031	0.08	≤30	40	140	0.08	0.3	NE
Benzo(ghi)perylene	32.22	300	≤30	40	140	NE	NE	NE	0.015	1	≤30	40	140	NE	NE	NE
Benzo(k)fluoranthene	30.38	300	≤30	40	140	8,400	78,000	1,000	0.024	0.3	≤30	40	140	0.5	0.3	NE
Benzoic acid	36.6	300	≤30	30	130	NE	NE	NE	0.64	20	≤30	30	130	NE	NE	NE
Benzyl butyl phthalate	40.68	300	≤30	40	140	1,000,000	2,500,000	200,000	0.84	20	≤30	40	140	1,000	NE	NE
Bis(2-chloroethoxy)methane	47.35	300	≤30	40	140	NE	NE	NE	1.07	20	≤30	40	140	NE	NE	NE

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 19 of 20

Analyte / Method	Soil					Soil - Criteria			Water					Groundwater - Criteria		
CET	Detection Limit (µg/kg)	Quantitation Limit (µg/kg)	Precision	Accuracy		RES DEC (µg/Kg)	IDEC (µg/Kg)	GBPMC (µg/Kg)	Detection Limit (µg/L)	Quantitation Limit (µg/L)	Precision	Accuracy		GWPC (ug/L)	SWPC (µg/L)	RGWVC (µg/L)
Bis(2-chloroethyl)ether	26.11	300	≤30	40	140	1,000	5,200	2,400	0.58	10	≤30	40	140	12	42	NE
Bis(2-chloroisopropyl)ether	96.75	300	≤30	40	140	8,800	82,000	2,400	0.92	10	≤30	40	140	12	340,000	NE
Bis(2-ethylhexyl)phthalate	39.74	300	≤30	40	140	44,000	410,000	11,000	2	2	≤30	40	140	2	59	NE
Carbazole	39.57	300	≤30	40	140	NE	NE	NE	0.74	1	≤30	40	140	NE	NE	NE
Chrysene	48.28	300	≤30	40	140	NE	NE	NE	0.029	1	≤30	40	140	NE	NE	NE
Dibenz(a,h)anthracene	41.86	300	≤30	40	140	NE	NE	NE	0.02	0.2	≤30	40	140	NE	NE	NE
Dibenzofuran	93.92	300	≤30	40	140	NE	NE	NE	1.65	4	≤30	40	140	NE	NE	NE
Diethyl phthalate	38.56	300	≤30	40	140	NE	NE	NE	0.76	20	≤30	40	140	NE	NE	NE
Dimethylphthalate	60.42	300	≤30	40	140	NE	NE	NE	0.76	20	≤30	40	140	NE	NE	NE
Di-n-butylphthalate	33.78	300	≤30	40	140	1,000,000	2,500,000	140,000	0.54	20	≤30	40	140	700	120,000	NE
Di-n-octylphthalate	33.29	300	≤30	40	140	1,000,000	2,500,000	20,000	0.91	20	≤30	40	140	100	NE	NE
Fluoranthene	42.26	300	≤30	40	140	1,000,000	2,500,000	56,000	0.033	1	≤30	40	140	280	3,700	NE
Fluorene	37.33	300	≤30	40	140	1,000,000	2,500,000	56,000	0.011	1	≤30	40	140	280	140,000	NE
Hexachlorobenzene	41.78	300	≤30	40	140	1,000	3,600	1,000	0.82	0.077	≤30	40	140	1	0.077	NE
Hexachlorobutadiene	41.78	300	≤30	40	140	NE	NE	NE	0.55	20	≤30	40	140	NE	NE	NE
Hexachlorocyclopentadiene	58.02	300	≤30	40	140	NE	NE	NE	0.75	20	≤30	40	140	NE	NE	NE
Hexachloroethane	33.8	300	≤30	40	140	44,000	410,000	1,000	0.68	3	≤30	40	140	3	89	NE
Indeno(1,2,3-cd)pyrene	41.35	300	≤30	40	140	NE	NE	NE	0.022	0.2	≤30	40	140	NE	NE	NE
Isophorone	43.37	300	≤30	40	140	NE	NE	NE	0.73	20	≤30	40	140	NE	NE	NE
Naphthalene	30.17	300	≤30	40	140	1,000,000	2,500,000	56,000	0.028	1	≤30	40	140	280	NE	NE
Nitrobenzene	38.03	300	≤30	40	140	NE	NE	NE	0.73	20	≤30	40	140	NE	NE	NE
N-Nitrosodimethylamine	33.34	300	≤30	40	140	NE	NE	NE	0.84	20	≤30	40	140	NE	NE	NE
N-Nitrosodi-n-propylamine	25.83	300	≤30	40	140	NE	NE	NE	0.73	10	≤30	40	140	NE	NE	NE
N-Nitrosodiphenylamine	34.01	300	≤30	40	140	NE	NE	NE	0.74	20	≤30	40	140	NE	NE	NE
Pentachloronitrobenzene	32.72	300	≤30	40	140	NE	NE	NE	1.25	20	≤30	40	140	NE	NE	NE
Pentachlorophenol	32.18	300	≤30	30	130	5,100	48,000	1,000	0.84	1	≤30	30	130	1	NE	NE
Phenanthrene	49.41	300	≤30	40	140	1,000,000	2,500,000	40,000	0.031	0.077	≤30	40	140	200	0.077	NE
Phenol	26.11	300	≤30	30	130	1,000,000	2,500,000	800,000	0.58	20	≤30	30	130	4,000	920,000	NE
Pyrene	39.76	300	≤30	40	140	1,000,000	2,500,000	40,000	0.02	1	≤30	40	140	200	110,000	NE
Pyridine	59.5	300	≤30	40	140	NE	NE	NE	0.55	4	≤30	40	140	NE	NE	NE

Title: Site Specific Remediation QAPP – 645 Main Street, Middletown, CT
RFA#: 14040
Revision Number: 1
Revision Date: 11/4/2014
Page: 20 of 20

Analyte / Method	Soil					Soil - Criteria			Water				Groundwater - Criteria					
CET	Detection Limit (µg/kg)	Quantitation Limit (µg/kg)	Precision	Accuracy		RES DEC (µg/Kg)	IDEC (µg/Kg)	GBPMC (µg/Kg)	Detection Limit (µg/L)	Quantitation Limit (µg/L)	Precision	Accuracy		GWPC (ug/L)	SWPC (µg/L)	RGWVC (µg/L)		
PCBs (Aroclors) (Method 8082)									µg/L by TCLP or SPLP									
Aroclor 1016	22.7	200	≤30	40	140	1,000	10,000	5	0.0869	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1221	25.7	200	≤30	40	140	1,000	10,000	5	0.13	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1232	25.1	200	≤30	40	140	1,000	10,000	5	0.0173	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1242	17.6	200	≤30	40	140	1,000	10,000	5	0.0594	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1248	13	200	≤30	40	140	1,000	10,000	5	0.0525	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1254	12.9	200	≤30	40	140	1,000	10,000	5	0.0719	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
Aroclor 1260	10.8	200	≤30	40	140	1,000	10,000	5	0.0714	0.2	≤20	40	140	0.5 ²	0.5 ²	NE		
ETPH - CT ETPH Method																		
ETPH - CT ETPH Method	24279	50,000	≤30	50	150	500,000	2,500,000	2,500,000	40	100	≤20	50	150	250	NE	NE		
Total Lead (Method 6010, 7471)																		
Lead	126.61	2000	≤30	80	120	400,000	1,000,000	NE	0.85	13	≤20	80	120	15	13	NE		
TCLP Lead & Benzene (Method 1311 or 1312) (µg/L)														NE			NE	NE
Lead ⁴	NE	NE	≤30	NE	NE	NE	NE	150	0.85	13	≤20	80	120	15	13	NE		
Benzene ⁵	0.22	5	≤30	70	130	21,000	200,000	200	0.15	1	≤20	70	130	NE	NE	NE		
Flashpoint	NA	NA	NA	NA	NA	NE	NE	NE	NA	NA	NA	NA	NA	NE	NE	NE		

Notes:
NE - Criteria Not Established
NA – Not Applicable
TCLP – Toxicity Characteristic Leaching Procedure
RES DEC - Industrial/commercial Direct Exposure Criteria (CT RSRs, 1996; amended 2013)
I/C DEC - Industrial/commercial Direct Exposure Criteria (CT RSRs, 1996; amended 2013)
GB PMC - Class GB Pollutant Mobility Criteria (CT RSRs, 1996; amended 2013)
GWPC – Groundwater Protection Criteria (CT RSRs, 1996; amended 2013)
SWPC - Surface Water Protection Criteria (CT RSRs, 1996; amended 2013)
RES GWVC - Residential Groundwater Volatilization Criteria (CT RSRs, 1996; amended 2013)
² Applies to total PCB concentration
³ Criteria applies to dissolved fraction, per WQS
⁴ Lead TCLP results will also be compared to RCRA Toxicity criteria of 5.0 mg/L
⁵ Benene TCLP results will also be compared to RCRA Toxicity criteria of 0.5 mg/L
* Criterion applies to trivalent As³⁺.
** Criterion applies to hexavalent Cr⁶⁺.

According to Complete Environmental Testing, Inc. (CET), the compounds highlighted in the table above (which have lower detection limits) are quantified and reported, if need be, using the SIM technique in water samples.

Tighe & Bond has reviewed all standards and reporting limits and confirm they are accurate and up to date.



0 1,000 2,000 Feet
1" = 2,000'

**FIGURE 1
SITE LOCATION MAP**

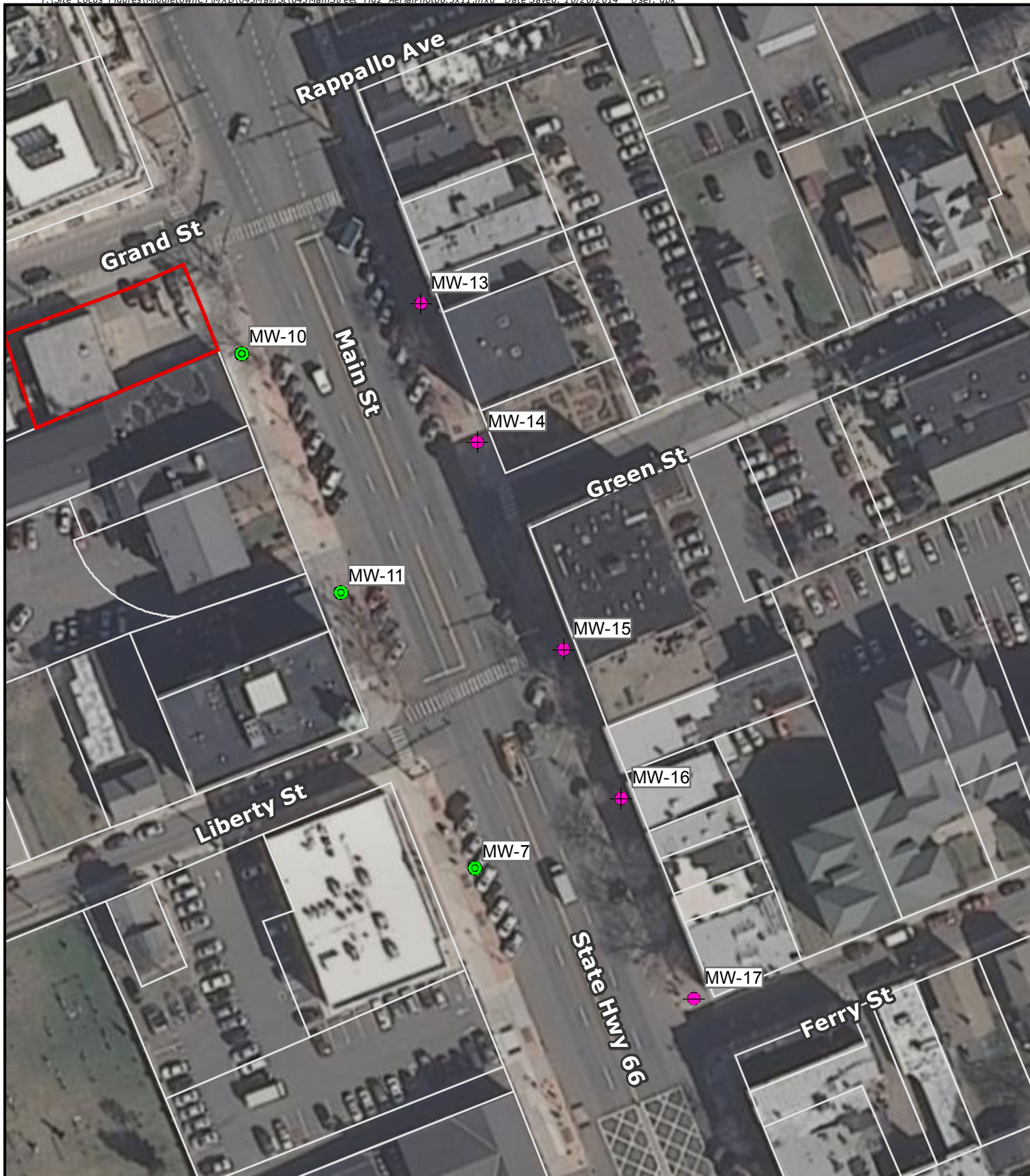
**645 MAIN STREET
MIDDLETOWN, CONNECTICUT**

LOCUS MAP



NOTES

Data source: CT DEP
USGS Quadrangle: Middletown, CT (1992)
Map Date: February, 2012
Coordinate System: NAD 1983 StatePlane Connecticut FIPS 0600 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
Units: Foot US



LEGEND

- Existing Monitoring Wells
- ◆ Proposed Monitoring Wells
- Site Property
- Parcel Boundary

NOTES

Aerial Photograph Source: CT DEEP, 2012
 Map Date: October, 2014
 Coordinate System: NAD 1983 StatePlane Connecticut FIPS 0600 Feet
 Projection: Lambert Conformal Conic
 Datum: North American 1983
 Units: Foot US

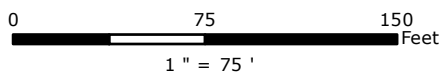


FIGURE 2 MONITORING WELL LOCATIONS

**645 MAIN STREET
MIDDLETOWN, CONNECTICUT**