MEMORANDUM

Date: 21 January 2022

To: Mr. Gary Morin, P.E. & Ms. Heather Sullivan (USACE CENAE)

From: Mr. Michael Kulbersh, PG/LSP & Dr. Yixian Zhang (USACE CENAE)

Subject: Shutesbury - Westover Remote Site: Terminal VHF Omni-Range Facility (TVOR) by Westover AFB

Purpose:

The purpose of this memorandum is to briefly summarize the underground storage tank (UST) removal efforts completed at the subject project site by the US Army Corps of Engineers, New England District (USACE) in 1994 and 1995, and a subsequent limited subsurface investigation conducted on-behalf of the Town of Shutesbury (Town) in the area of the UST resulting in a potential reporting condition to the Massachusetts Department of Environmental Protection. Section 1. provides more detail on the activities completed at the site by USACE and the Town. Section 2. outlines potential data quality issues that were identified by (USACE), as a result of reviewing the Town's contractor's analytical data. Section 3. provides a conclusion.

1. Introduction:

The Westover Terminal VHF Omni-Range (TVOR) facility site was formerly located in Shutesbury, MA. The United States leased the Site along with leaseholds/purchase on other surrounding land in 1957. The Air Force constructed a circular concrete TVOR pad with tower and an Emergency Power Unit Shelter (4'x8') at the site and an associated underground fuel storage tank. Thirty-five wooden posts in a 100-foot radius around the TVOR pad were constructed to be used in conjunction with the TVOR facility to affect the transmission. The Air Force used the site until 1967; the leaseholds were not extended beyond June 1967. In 1992, the Department of Defense Installation Restoration Program (IRP) Formerly Used Defense Site Program recommended to remove one 275-gallon gasoline UST, contents, piping and any contaminated soil were slated for removal. Based on photologs, the tank was excavated on 14 September 1994, and soil was removed from the tank grave on approximately 26 September 1994. A total of 11.5 tons of petroleum impacted soil was removed and two confirmation soil samples were collected. One sample contained petroleum hydrocarbons at 145 mg/Kg (TV02) and TV01 contained 67.3 mg/Kg. Based on pay estimate sheets, an additional 89.78 tons of petroleum impacted soils were subsequently removed. Confirmatory soil samples collected on 5 January 1995, presumably following the removal of the approximately 90 tons of soil contained TPH at 94.9 mg/Kg TPH with a duplicate result 69.5 mg/Kg.

O'Reilly, Talbot & Okun Associates, Inc. (OTO) of on behalf of the Town, conducted a limited subsurface assessment at the above referenced property. On 16 September 2021, Martin Geo/Environmental, LLC and OTO performed ten soil borings (B-1 through B-10) using a direct-push drill rig. OTO logged the borings, field screened soil samples with a photoionization detector (PID) and retained soil samples for laboratory analysis. Sample location B-9 (**Figure 1**) was collected within the former tank grave of the 275-gallon gasoline UST. The sample collected from 8-10 feet below ground surface was analyzed for Volatile Petroleum Hydrocarbons (VPH), VOCs, and PCBs. The VPH results contained C5-C8 aliphatic hydrocarbons at 100 mg/Kg, exactly at the RCS-1 reporting concentration under the Massachusetts Contingency Plan (MCP) (**Table 1**).

The OTO report stated "*pursuant to 310 CMR 40.0315(3), the concentration of C5-C8 aliphatic hydrocarbon detected in soil at boring B-9 is a condition which requires release notification to MassDEP. The hydrocarbon profile detected is consistent with impacts frequently associated with releases of gasoline. Under the MCP at 310 CMR 40.0315, persons required to notify under 310 CMR 40.0331 shall inform MassDEP within 120 days after obtaining knowledge of a release to the environment indicated by the measurement of oil in soil in an amount equal to or greater than the applicable Reportable Concentration listed at 310 CMR 40.1600. We recommend providing notice to MassDEP on or before January 28, 2022, based on the date of receipt of the laboratory report. Further assessment is warranted to evaluate the source, nature, and extent of the release detected at boring B-9.*"

Figure 1- Location of TVOR Site and Soil Boring B-9

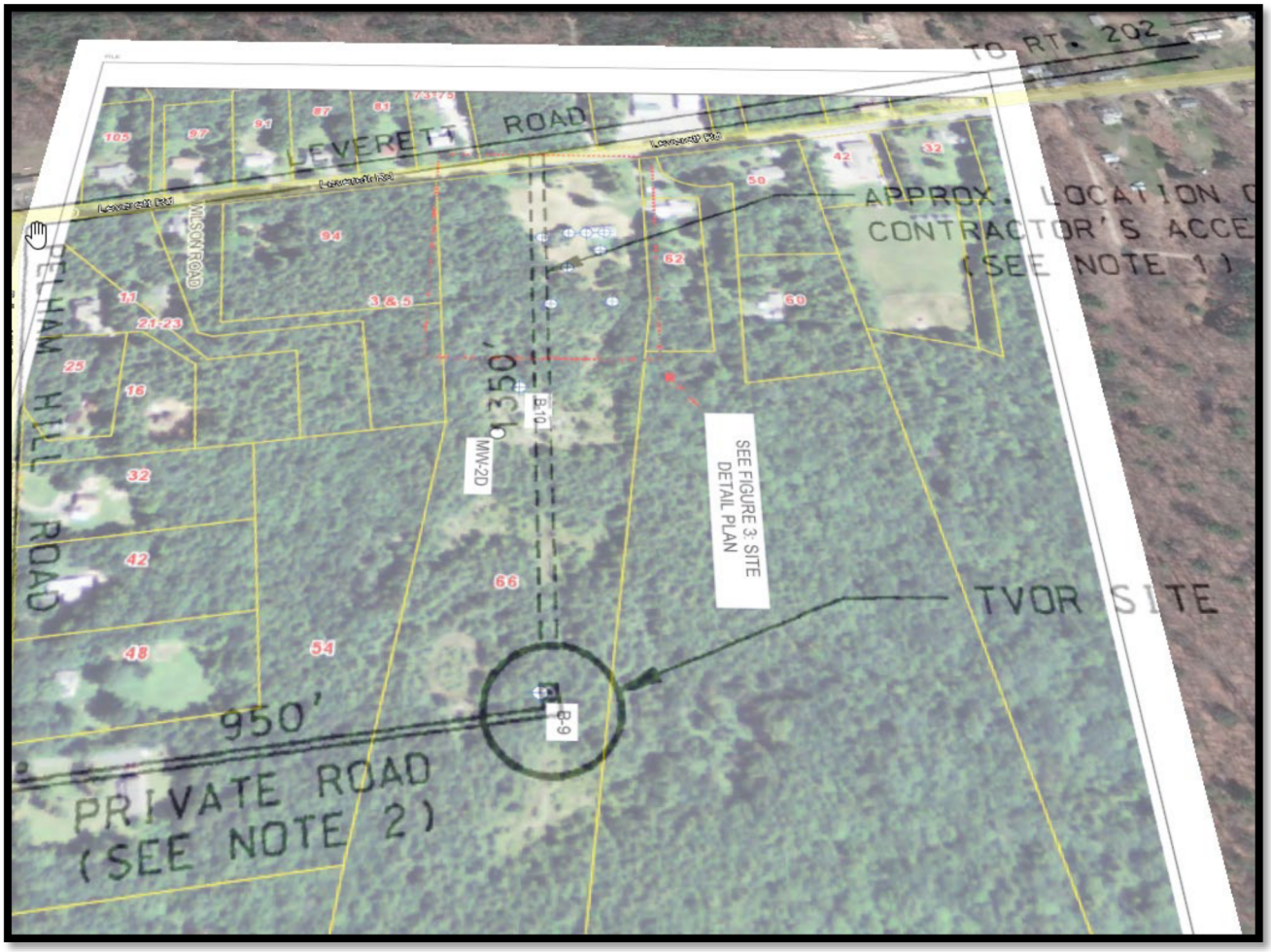

Table 1
Soil Analytical Results
Volatile Petroleum Hydrocarbons (VPH)
Concentrations in mg/kg
66 Leverett Road
Shutesbury, Massachusetts

Sample No.:	B-9	Reportable Conc. RCS-1
Depth (feet):	8-10'	
Date Collected:	9/16/21	
PID Reading (ppmv):	780	NA
VPH Fractions		
C5-C8 Aliphatics	**100**	100
C9-C12 Aliphatics	89	1,000
C9-C10 Aromatics	66	100
VPH Target Compounds		
Benzene	0.3	2
Ethylbenzene	0.18	40
Methyl tert-butyl ether	<0.085	0.1
Naphthalene	0.54	4
Toluene	<0.085	30
Xylenes (total)	0.48	100
VOCs by 8260		
n-Butylbenzene	1.2	NS
sec-Butylbenzene	0.28	NS
Isopropylbenzene	0.25	1,000
n-Propylbenzene	1.6	100
1,2,4-Trimethylbenzene	2.1	1,000
1,3,5-Trimethylbenzene	3.2	10

NOTES:
1. Concentrations in mg/kg (parts per million) on a dry weight basis.
2. "<" indicates not detected; value is sample-specific quantitation limit.
3. "RCS" = Reportable concentration from 310 CMR 40.1600.
4. "PID"=Photoionization detector soil headspace measurement in
5. Only analytes detected in at least one sample are shown; refer to laboratory reports for full analyte listing.
6. Values shown in **bold** are equal to or exceed Reportable Concentrations.

2. Potential Data Quality Issue:

As indicated in the MADEP MCP Analytical Method Report Certification Form (page 1 - **Attachment A)** contained in the report prepared by OTO, the laboratory indicated that not all QC performance standards specified in the Compendium of Analytical Methods (CAM) protocols were achieved. Given that the concentration of the C5-C8 aliphatic carbon fraction was detected exactly at the RCS-1 reporting concentration of 100 mg/Kg, Mr. Kulbersh (USACE Geologist and Licensed Site Professional (MA License # 1203)), requested that Dr. Zhang, USACE Chemist, further evaluate the data package to identify what were the QC performance standards that were not achieved. As part of her review, Dr. Zhang noted the following for the VPH data associated with sample B-9 (8-10 feet bgs). Dr. Zhang found two data quality issues as described below:

1) Field sample preservation did not meet method requirement: the MADEP VPH method requires that soil samples for VPH analysis be preserved in the field at a soil/sediment-to-methanol ratio of 1 gram soil/sediment to 1 mL methanol $\pm$25%. The case narrative of the lab report (page 2 in **Attachment A**) states "*Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount*." Because field sample preservation did not meet the method requirement in this sample, the quality of the VPH data may have been impacted.

2) Surrogate recoveries exceeded method acceptance limits: the case narrative also states "*Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached*." As indicated in the VPH result page for sample B-9 (8-10) (page 3 – **Attachment A**), recoveries of surrogates 2,5-dibromotoluene (FID) and 2,5-dibromotoluene (PID) were both above the method acceptance limits (70%-130%) at 136% and 131%, respectively. The high surrogate recoveries indicate that the VPH results in the sample may have a high bias (i.e., reported results are higher than the actual results). Because the 100 mg/kg C5-C8 Aliphatics was just at the MA Reportable Concentration of 100 mg/kg, the high bias suggests that the actual C5-C8 Aliphatics concentration in sample B-9 (8-10) may be below the 100 mg/kg MA Reportable Concentration. The VPH chromatogram is included as page 4 in **Attachment A**.

Mr. Kulbersh subsequently contacted Mr. John Fitzgerald of the MassDEP Northeast Regional office (NERO), an expert on the reDUA (Representative Evaluation and Data Useability Analysis) process used in the MCP (310 CMR 40.1056(2)(k) on 19 January 2022. Mr. Fitzgerald indicated the Data Useability Assessment is not necessarily required as part of the notification process; however valid data is required. Mr. Kulbersh indicated that the surrogate recoveries were over the acceptance range. Mr. Fitzgerald suggested that since a sample was also tested for Volatile Organic Compounds (VOC) that perhaps the chromatogram for that sample may shed some light on whether Non-Petroleum compounds might be present in the sample elevating the C5-C8 aliphatic result. Given the age of the release, Mr. Fitzgerald questioned why the other heavier weight carbon range fractions would be less than the C5-C8 aliphatics (**Table 1**), potentially questioning the results of the C5-C8aliphatic results.

3. Conclusion:

As a result of the above review of the data by Dr. Zhang and discussions with Mr. Fitzgerald (MassDEP NERO). The USACE project teams feels that this information should be presented to the Town for their consideration in discussions with their contractor, OTO, and MassDEP Western Regional Office (WERO). If the 120-day notification has already occurred, and the data is of questionable quality there is a process for retracting the reporting condition, if warranted.

ATTACHMENTS – Excerpts from Laboratory Data Package

ATTACHMENT A – Excerpts from Laboratory Data Package

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Con-Test, a Pace Analytical Laboratory	Project #: 21I0921
Project Location: Shutesbury, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

21I0921-01 thru 21I0921-11

Matrices: Soil

CAM Protocol (check all that below)

8260 VOC CAM II A (X)	7470/7471 Hg CAM IIIB ( )	MassDEP VPH CAM IV A (X)	8082 PCB CAM V A (X)	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP VPH CAM IV C ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
6010 Metals CAM III A ( )	6020 Metals CAM III D ( )	MassDEP EPH CAM IV B (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )

Affirmative response to Questions A throughF is 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[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
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[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
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).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is 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 perfomance 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 Environmental Laboratory case 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, accurate and complete.

Signature: Lisa Worthington Position: Technical Representative

Printed Name: Lisa A. Worthington Date: 09/23/21

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

MADEP-VPH-Feb 2018 Rev 2.1

Qualifications:

O-01

Soil/methanol ratio does not meet method specifications. Excess amount of soil. Sample was completely covered with methanol, but with less than the method-specified amount.

Analyte & Samples(s) Qualified:

21I0921-10[B-9 (8-10)]

S-15

Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.

Analyte & Samples(s) Qualified:

21I0921-10[B-9 (8-10)]

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

21I0921-01[B-1 (5-7)], 21I0921-02[B-2 (1-3)], 21I0921-03[B-3 (5-7)], 21I0921-04[B-4 (3-5)], 21I0921-05[B-5 (5-7)], 21I0921-06[B-6 (3-5)], 21I0921-07[B-7 (0-1)], 21I0921-08[B-8 (1-3)], 21I0921-09[B-9 (0-1)], 21I0921-10[B-9 (8-10)], 21I0921-11[B-10 (1-3)]

SW-846 8260C-D

Qualifications:

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

Chloroethane

B290528-BS1

RL-05

Elevated reporting limit due to high concentration of target compounds. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

21I0921-10[B-9 (8-10)]

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Dichlorodifluoromethane (Freon 12

21I0921-01[B-1 (5-7)], 21I0921-03[B-3 (5-7)], 21I0921-05[B-5 (5-7)], 21I0921-11[B-10 (1-3)], B290543-BLK1, B290543-BS1, B290543-BSD1, S063414-CCV1

V-16

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

Analyte & Samples(s) Qualified:

1,4-Dioxane

S063414-CCV1, S063445-CCV1

Tetrahydrofuran

S063414-CCV1

con-test®
A Pace Analytical® Laboratory

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

Project Location: Shutesbury, MA | Sample Description: | Work Order: 21I0921

Date Received: 9/17/2021

Field Sample #: B-9 (8-10) | Sampled: 9/16/2021 13:00

Sample ID: 21I0921-10

Sample Matrix: Soil

Sample Flags: O-01, S-15

Soil/Methanol Preservation Ratio: 1.48

Petroleum Hydrocarbons Analyses - VPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	100	17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
C5-C8 Aliphatics	100	17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Unadjusted C9-C12 Aliphatics	160	17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
C9-C12 Aliphatics	89	17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
C9-C10 Aromatics	66	17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Benzene	0.30	0.085	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Ethylbenzene	0.18	0.085	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Methyl tert-Butyl Ether (MTBE)	ND	0.085	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Naphthalene	0.54	0.42	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
Toluene	ND	0.085	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
m+p Xylene	0.28	0.17	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB
o-Xylene	0.20	0.085	mg/Kg dry	2		MADEP-VPH-Feb 2018 Rev 2.1	9/21/21	9/21/21 19:10	KMB

Surrogates	% Recovery		Recovery Limits	Flag/Qual		
2,5-Dibromotoluene (FID)	**136**	*	70-130		9/21/21 19:10	
2,5-Dibromotoluene (PID)	**131**	*	70-130		9/21/21 19:10	

Quantitation Report (QT Reviewed)

Data Path : C:\msdchem\1\data\092021\
Data File : H21V268060.D
Signal(s) : Signal #1: FID1B.ch Signal #2: OIMFID2A.ch
Acq On : 21 Sep 2021 07:10 pm
Operator :
Sample : 21i0921-10 @ 100x meoh Inst : VPHGC3
Misc :
ALS Vial : 19 Sample Multiplier: 1

Integration File signal 1: events.e
Integration File signal 2: events2.e
Quant Time: Sep 22 09:03:12 2021
Quant Method : C:\msdchem\1\methods\VN20421.M
Quant Title : VPHNEW
QLast Update : Mon Sep 20 15:42:15 2021
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj. :
Signal #1 Phase : Signal #2 Phase:
Signal #1 Info : Signal #2 Info :