



Mr. Rob Hill
Oil Control Program
Maryland Department of the Environment
Waste Management Administration
33 West Franklin Street, Suite 303
Hagerstown, Maryland 21742

Subject:
Supplemental LPH Delineation Work Plan
C&O Canal/CSXT Brunswick Rail Yard, Brunswick, Maryland
MDE Case Number 94-1379FR
CSXT Project #9415381

Dear Mr. Hill:

ARCADIS has prepared this work plan on behalf of CSX Transportation, Inc. (CSXT) to propose investigation activities to delineate the horizontal and vertical extent of liquid phase hydrocarbons (LPH) in the subsurface in the area east of the former roundhouse (Figure 1). The first occurrence of LPH in two site monitoring wells (CSXT MW-39 and CSXT MW-70) was reported in the first quarter of 2013. LPH have not been previously observed in CSXT MW-39 since it was installed in November 2007. LPH was also not observed in CSXT MW-70, which was installed on January 9, 2013, the first time it was gauged on January 11, 2013. Table 1 summarizes the observation of LPH at these well locations. LPH thicknesses measured at CSXT MW-39 and CSXT MW-70 in January, February, March and April 2013 were less than 0.10 feet. However, LPH has not been observed in CSXT MW-39 since April 11, 2013, and has not been observed in CSXT MW-70 since April 26, 2013.

The occurrence of LPH in both wells was reported to the MDE and LPH was removed using an absorbent sock. The LPH observed in these wells was pink or red, consistent with the coloration seen in off-road diesel fuel. The coloration and location of this LPH relative to LPH historically observed at the Site indicates a source unrelated to the historical diesel releases that have been the focus of previous Site investigations. A possible source of the LPH detected at CSXT MW-39 and CSXT MW-70 has not been identified during preliminary assessment activities, including interviews with CSXT personnel, review of MDE records for properties in the vicinity

Imagine the result

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ENVIRONMENT

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August 14, 2013

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Our ref:
MD000843.0010

of the Brunswick Rail Yard available under the Public Information Act, review of potential subsurface conduits and site visits.

Laser Induced Fluorescence (LIF) Investigation

LIF investigations are conducted by advancing an ultraviolet optical sensing tool (UVOST[®]) probe in areas of known or suspected LPH impact. The UVOST[®] probe emits an ultraviolet excitation light and captures returning fluorescence. Polycyclic aromatic hydrocarbon (PAH) compounds, which are a component of common petroleum fuels, readily fluoresce when exposed to ultraviolet light. The UVOST[®] probe detects four distinct fluorescent light wavelengths; the relative returns of each wavelength at a given depth are collectively referred to as a waveform. Differences in waveform patterns may indicate differences in LPH composition.

The return (fluorescent) light signal is analyzed in real time by on-site equipment. As the probe is advanced downward, the fluorescence data form a vertical profile of LPH impact present at the soil boring location. Results are reviewed after completing each LIF boring and considered when selecting subsequent locations.

Hydraulic permeability and electrical conductivity (EC) will also be recorded as the UVOST[®] probe is advanced. A hydraulic profiling tool (HPT) measures permeability by injecting water into the formation as the probe is advanced. The pressure required to inject the water provides a direct indication of the soil grain size and permeability of the surrounding formation. The HPT data collected provides additional evidence of potential migration pathways and confining units when evaluated in conjunction with the UVOST[®] data.

EC is the measure of the soils ability to conduct an electrical current measured on the UVOST[®] probe. Each boring log includes the vertical profile of the EC data recorded in millisiemens per meter (mS/m) in addition to the fluorescence and HPT data. The soil type can be interpreted from the EC data since soil is in the pathway of the electrical current flow. The lithology can thus be determined by comparing the EC log to previously completed boring logs and the corresponding HPT data.

The proposed investigation will include the completion of 14 initial borings (Figure 2). The data collected from these boring locations will be used to evaluate the distribution of LPH in the vicinity of CSXT MW-39 and CSXT MW-70 and potential sources of the LPH, including underground piping associated with the oil/water separator that may have acted as a migration pathway. If present, LPH collected

from CSXT MW-39 and CSXT MW-70 will be applied to the UVOST[®] sensor to allow field personnel to understand the expected LIF response to LPH from the investigation area.

The borings will be advanced using direct-push equipment to 5 feet (ft) below the last LIF response in a boring or to refusal. If no LIF response is observed, the boring will be terminated at 20 ft below ground surface (bgs). The water table at the Site is historically less than 20 ft bgs. LIF data will be collected from ground surface to the bottom of each boring. At borings where shallow (less than 15 ft bgs) refusal is encountered, the direct-push equipment will be offset approximately 10 feet from the original location and a second effort will be made to advance the probe to depth.

Additional contingency borings will be advanced as needed to delineate the horizontal extent of LPH in the vicinity of CSXT MW-39 and CSXT MW-70 and beyond the initial 14 borings, to the extent possible based on the location of facility and underground structures. Figure 2 shows the 27 planned contingency boring locations. The final number of contingency borings advanced will be dependent on evaluation of LIF data collected as borings are completed.

The 14 initial and 27 contingency boring locations shown on Figure 2 will be cleared for underground utilities prior to the LIF subcontractor mobilizing to the Site. This facilitates delineating the extent of LPH in one mobilization.

LPH Characterization Sampling

As part of the investigation, a total of up to five LPH samples will be collected for fingerprint analysis from CSXT MW-39 or CSXT MW-70 and from selected monitoring wells where LPH has historically been observed:

- CSXT MW-39 or CSXT MW-70
- CSXT MW-41, CSXT MW-53 or CSXT MW-55
- CSXT MW-49
- CSXT MW-56
- CSXT MW-37

The fingerprint analyses will be performed through NewFields Environmental Forensics Practice, LLC (Rockland, MA) and will include:

- Gas chromatography/flame ionization detector (GC/FID) fingerprinting (EPA Method 8015M);
- Alkylated polycyclic aromatic hydrocarbon (PAH) and sulfur-containing aromatic fingerprinting (EPA Method 8270M); and
- Total sulfur determination (ASTM D5453).

Comparison of the LPHs will assess the degree of spatial homo/heterogeneity among LPHs, which will provide a basis to evaluate continuity among the LPH and whether samples originated from the same release or source. The fingerprint analysis data may also provide an indication of how recently the LPH at CSXT MW-39 and CSXT MW-70 was released based on evidence of sulfur content and/or relative degree of weathering.

The final LPH sampling locations will be determined in the field based on LPH thicknesses observed on the day of LPH sampling. Active LPH recovery will be suspended for approximately 2 weeks prior to LPH sampling in an effort to maximize the volume of recoverable LPH.

Reporting

ARCADIS will submit a report presenting and evaluating the data collected during the investigation activities discussed above. The report will also provide recommendations for future activities including additional investigation, monitoring, and/or LPH recovery activities, depending on the results of the initial investigation.

Schedule

ARCADIS will begin coordinating the investigation described in this work plan upon approval from the MDE. ARCADIS anticipates the investigation field work will start within 3 to 6 weeks of receiving MDE approval, depending on LIF subcontractor availability.

ARCADIS estimates that the investigation activities described in this work plan will require approximately 1 week to complete. Utility locating is expected to require 1 to 2 days. The LIF investigation is expected to require 2 to 4 days to complete, depending on the final number of LIF borings completed. ARCADIS will collect LPH samples for fingerprint analysis while on-site during the LIF investigation. ARCADIS has obtained an excavation/dig permit from CSX in anticipation of the investigation.

If you have any questions or concerns with the proposed LIF investigation, please do not hesitate to contact me at 410.923.7814.

Sincerely,

ARCADIS U.S., Inc.



Megan E. Kellner
Project Manager

Copies:

Susan Bull, MDE
Jim Richmond, MDE
Paul Kurzanski, CSXT

Figures

- 1 Liquid-Phase Hydrocarbon Thickness – January 11, 2013
- 2 LPH Delineation Boring Locations

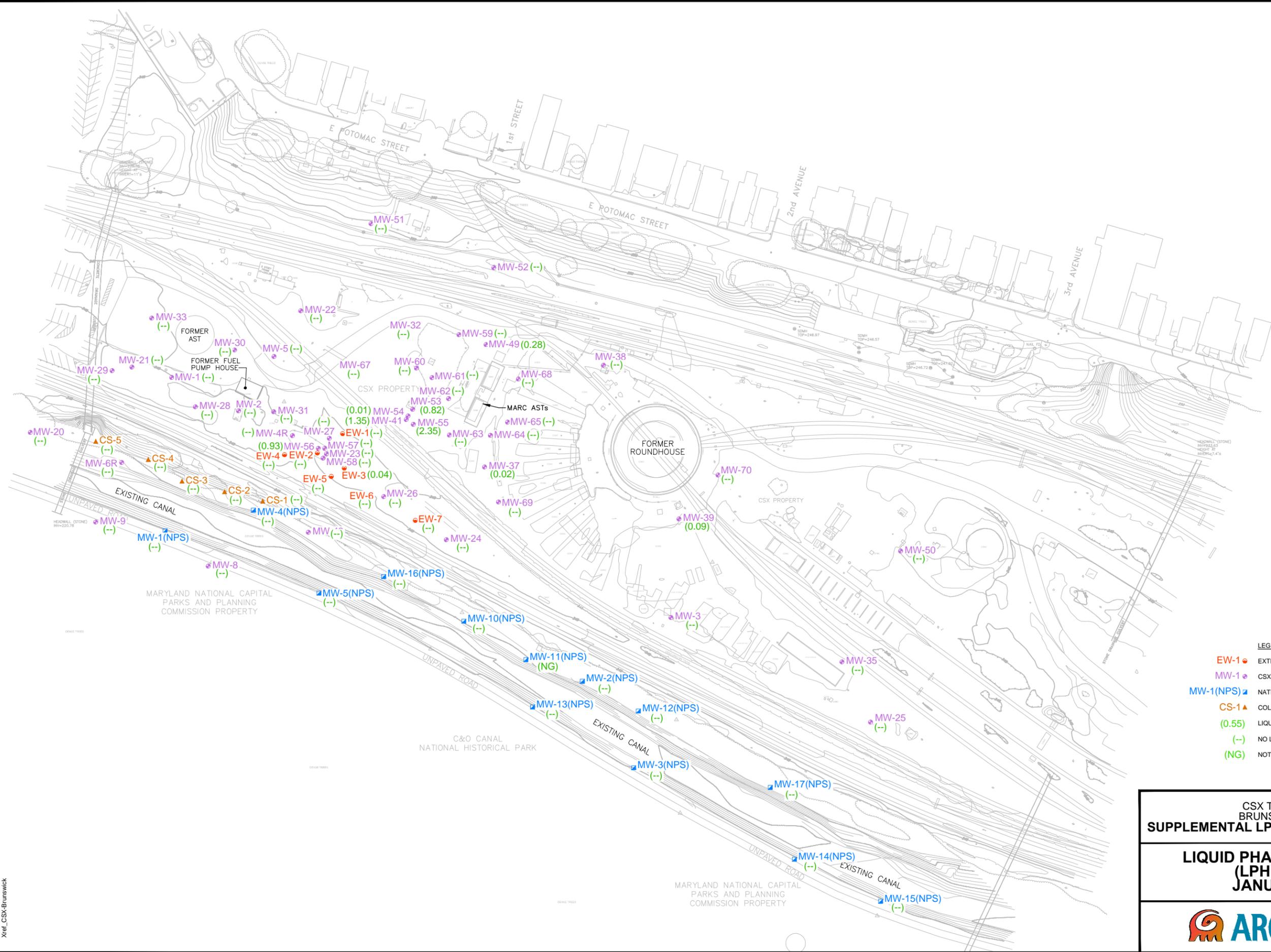
Tables

- 1 LPH and Water Level Data for CSXT MW-39 and CSXT MW-70

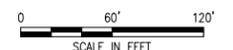


Figures

CITY: (Read) DIV: (Group) (Read) DB: (Read) LD: (Opt) PIC: (Opt) PM: (Read) TM: (Opt) Lyr: (Opt) ON: "OFF" REF: G:\ENVCAD\SYRACUSE\ACT\MD000843\001\10006\MD0843_11_6_02.dwg LAYOUT: 2. SAVED: 8/13/2013 11:26 AM ACADVER: 18.1 S (LMS TECH) PAGES: 18.1 S (LMS TECH) PLOTSETUP: ... PLOTSTYLETABLE: TOPOCTB PLOTTED: 8/13/2013 11:27 AM BY: SANCHEZ, ADRIAN XREFS: Xref_CsX-Brunswick PROJECTNAME: ...



- LEGEND:**
- EW-1 ● EXTRACTION WELL
 - MW-1 ● CSXT MONITORING WELL
 - MW-1(NPS) ▣ NATIONAL PARK SERVICE MONITORING WELL
 - CS-1 ▲ COLLECTION SUMP LOCATION
 - (0.55) LIQUID PHASE HYDROCARBON THICKNESS (FEET)
 - (--) NO LPH DETECTED
 - (NG) NOT GAUGED - WELL DESTROYED



CSX TRANSPORTATION
BRUNSWICK, MARYLAND
SUPPLEMENTAL LPH DELINEATION WORK PLAN

**LIQUID PHASE HYDROCARBON
(LPH) THICKNESS
JANUARY 11, 2013**

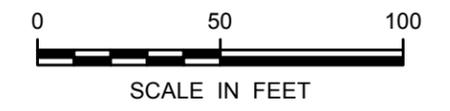


CITY: (HIGHLANDS RANCH) DIV: (GROUP: (ENV/IGIS)) DB: B. BALTON LD: G. MCKINNEY PIC: PM: T.M. J. WILSON



LEGEND

- Monitoring Well
- Proposed LPH Delineation Boring
- Contingency LPH Delineation Boring
- Approximate Location of Oil/Water Separator Piping



PROJECTION: NAD 1983 StatePlane Maryland FIPS 1900 Feet
DATA SOURCE:
-IMAGERY PROVIDED BY BING MAPS, ACCESSED ON 5/8/2013
THROUGH ARCGIS ONLINE USING ARCMAP 10.

CSX TRANSPORTATION, INC.
BRUNSWICK, MARYLAND
SUPPLEMENTAL LPH DELINEATION WORK PLAN
PROPOSED LPH DELINEATION BORING LOCATIONS





Tables

Table 1
 LPH and Water Level Data for CSXT MW-39 and CSXT MW-70
 Supplemental LPH Delineation Work Plan
 C and O Canal/Brunswick Rail Yard, Brunswick, Maryland

Well ID	Measurement Date	Top of Casing Elevation (feet amsl)	DTLPH (feet bTOC)	DTW (feet bTOC)	LPH Thickness (feet)	Groundwater Elevation (feet amsl)
MW-39	12/3/2007	245.65		15.37		230.28
	2/25/2008			12.8		232.85
	5/19/2008			10.75		234.9
	2/25/2009			11.21		234.44
	6/15/2010			13.22		232.43
	9/21/2010			16.38		229.27
	12/10/2010			13.95		231.70
	2/14/2011			14.73		230.92
	5/26/2011			11.95		233.70
	8/8/2011			15.16		230.49
	12/15/2011			11.95		233.70
	3/21/2012			13.45		232.20
	6/13/2012			13.23		232.42
	9/24/2012			14.08		231.57
	1/11/2013		13.22	13.31	0.09	232.42
	3/15/2013		11.48	11.56	0.08	234.16
	3/29/2013			12.91		232.74
	4/11/2013		13.43	13.46	0.03	232.23
	4/26/2013			13.86		231.79
	5/13/2013			12.78		232.87
5/20/2013	245.65		13.91		231.74	
5/24/2013	245.65		13.25		232.40	
6/10/2013	245.65		12.40		233.25	
MW-70	1/11/2013	245.57		13.43		232.14
	3/1/2013		12.89	12.97	0.08	232.67
	3/15/2013			12.41		233.16
	3/29/2013		13.10	13.25	0.15	232.45
	4/11/2013			13.41		232.16
	4/26/2013		13.92	13.93	0.01	231.65
	5/13/2013			13.24		232.33
	5/20/2013	245.57		13.51		232.06
	5/24/2013	245.57		13.13		232.44
6/10/2013	245.57		12.86		232.71	

Notes:

- feet amsl - feet above mean sea level
- DTLPH- depth to liquid phase hydrocarbons
- DTW - depth to water
- feet bTOC - feet below top of well casing
- LPH - liquid phase hydrocarbon