



May 13, 2015

Ms. Michelle Kaysen
USEPA Region 5, Mail Code LU-9J
77 West Jackson Boulevard
Chicago, IL 60604

RE: First Quarter 2015 Sentinel Well Monitoring Summary Report, Hartford Petroleum Release Site,
Hartford, Illinois

Dear Ms. Kaysen,

Trihydro Corporation (Trihydro) has prepared the following letter report describing groundwater monitoring activities conducted by Apex Oil Company, Inc. (Apex) for the five sentinel groundwater monitoring wells located at the Hartford Petroleum Release Site (Hartford Site). On September 18, 2014, the United States Environmental Protection Agency (USEPA) sent Apex and the Hartford Working Group a letter describing reassignment of activities at the Hartford Site, which included Apex resuming groundwater monitoring within the sentinel well network beginning in the first quarter 2015. Monitoring activities were performed by Apex on January 29, 2015. A representative from the Hartford Working Group accompanied Apex during the first quarter 2015 monitoring event.

BACKGROUND

The five sentinel wells (HMW-25 through HMW-29) were installed in 2003 to provide an early indication of petroleum hydrocarbon migration towards the well head protection area for the Hartford drinking water well field (McGuire et al. 2001). As shown on Figure 1, the well head protection area is located approximately 600 feet to the southwest of petroleum hydrocarbons present in soil and groundwater attributed to historical releases from the refineries and petroleum storage facilities situated to the north and east of the Village of Hartford. The sentinel groundwater monitoring wells are located between the well head protection area and the distribution of petroleum hydrocarbons beneath the Hartford Site.

The Village of Hartford drinking water wells are screened within deeper portions of the Main Sand stratum because of the high groundwater transmissivity within this aquifer. The two most recently installed groundwater production wells (No. 3 and No. 4) were installed by the Village of Hartford to a total depth of approximately 105 ft-bgs and were constructed with between 20 and 35 feet of screen.

In the absence of groundwater pumping (rates exceed 10,000 gallons per minute) by the various facilities around the Hartford Site (e.g., British Petroleum, Phillips 66, Premcor, etc.) groundwater flow within the Main Sand under typical river stage conditions may flow to the south and southwest, parallel to surface water flow within the Mississippi River (USEPA 2010). However, natural flow of groundwater in the Main Sand aquifer has been altered beneath the Village of Hartford such that during periods of high river stage groundwater flow is generally towards the east to northeast due to recharge from the river and bank



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storage within the Main Sand. During moderate river elevations, the groundwater flow direction is northward and during low river stages, groundwater flow trends westerly to northwesterly.

GROUNDWATER ELEVATIONS

The depth to groundwater within the sentinel wells is measured quarterly as part of the site-wide fluid level gauging event performed at the Hartford Site. In addition, the depth to water is gauged immediately prior to purging and groundwater sample collection. The depth to groundwater was measured using a Solonist™ water level indicator, decontaminated prior to and immediately following gauging within each sentinel well. The water level indicator is decontaminated using isopropyl alcohol in accordance with Hartford Working Group Standard Operating Procedure No. 05 (Equipment Decontamination). The depth to groundwater measurements were made from the pre-marked (surveyed) measuring point on the north side of the well casing. Fluid level measurements were recorded on digital field forms using Trihydro's environmental information management system.

Table 1 summarizes the depth to water measurements and groundwater elevations measured within the sentinel wells from April 2013 through March 2015. As shown on Figure 2, groundwater flow during the first quarter 2015 was generally to the west and northwest and is attributed to the low water table combined with the high rate of pumping conducted within production wells on the Phillips 66 River Dock. There is also a small area of the Hartford Site along North Olive Street between East Date and East Watkins Streets, where ground flow was locally influenced in March 2015 by pumping within Area A and on the Premcor facility.

GROUNDWATER SAMPLING PROCEDURES

Groundwater was purged and samples collected using a low-flow (minimal drawdown) groundwater sampling methodology (Puls and Barcelona 1996). A ProActive™ Monsoon® submersible pump with a flow controller and dedicated low-density polyethylene (LDPE) tubing was utilized for purging and sample collection. The pumps were installed so that the intake was located approximately five feet below the saturated portion of the screened interval. The flow rate was maintained between 0.1 and 0.5 liters per minute to minimize drawdown and to avoid undue pressure, temperature, or other physical disturbances to groundwater over the sampling interval.

Prior to purging each sentinel well, the submersible pump was decontaminated in the following manner:

- External surfaces were brushed free of loose material, washed with a phosphate free decontamination solution and potable water, and rinsed with deionized or distilled water.
- Internal surfaces were cleaned by placing the pump in a 5-gallon bucket containing a phosphate-free decontamination solution and allowing the pump to operate for several minutes to circulate the



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decontamination solution through the impellers and pump housing. The pump was then rinsed by circulating with potable water, followed by a distilled water rinse.

Decontamination fluids and purge water were collected and disposed of in accordance with state and federal regulations.

Field Analyses

Field parameters (including specific conductivity, pH, temperature, dissolved oxygen, oxygen reduction potential, and turbidity) were measured using a Horiba™ U-53G® multi-parameter meter over five-minute intervals during purging to ensure a representative groundwater sample was collected. The multi-parameter water quality meters were calibrated daily, in accordance with the manufacturer's guidelines, using a factory-prepared calibration standard. In general, the following stabilization criteria were achieved over three successive readings before collecting groundwater samples:

- Temperature: $\pm 3\%$
- pH: ± 0.1
- Specific Conductance: $\pm 3\%$
- DO: $\pm 10\%$ or <10 nephelometric turbidity units
- ORP: ± 0.3 milligrams per liter
- Turbidity: ± 10 millivolts

Sample Collection and Analyses

Once the stabilization criteria were achieved, groundwater samples were collected in 40-milliliter glass vials preserved with hydrochloric acid and immediately placed in a cooler with ice. Groundwater samples were carefully filled during sample collection to minimize headspace and agitation. A blind duplicate sample was collected from monitoring well HMW-025 during the first quarter 2015 monitoring event. The lids on each sample container were tightly secured. The sample labels and chain of custody were filled out completely including sample identification, date and time of collection, project name, client name, field personnel initials, requested analyses, and preservation methods.

The samples were collected and analyzed in general accordance with the Test Methods for Evaluating Solid Waste (U.S. EPA 1997). The groundwater samples collected from the sentinel wells (along with groundwater samples collected from the monitoring wells Area A) were transported to TekLab, Inc. located in Collinsville, Illinois for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tert-butyl ether (MTBE) via USEPA Method 8260B.



GROUNDWATER ANALYTICAL RESULTS

A summary of the groundwater analytical results are provided in Table 2. The laboratory analytical results and data validation review are included in Attachment A. The laboratory analytical results were validated in accordance with the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2014) with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review (USEPA 1999). Review of field duplicates was conducted according to the USEPA New England Environmental Data Review Supplement for Regional Data Review Elements and Superfund Specific Guidance/Procedures (USEPA 2013). Overall the analytical results were acceptable as reported by the laboratory, although J-qualifiers indicating estimated concentrations were associated with detections of ethylbenzene and total xylenes as summarized in Attachment A and Table 2.

In general, concentrations of BTEX and MTBE were below the reporting limit within the groundwater samples collected from the sentinel wells during the first quarter 2015, with the following exceptions:

- Benzene was measured in the groundwater sample collected from sentinel well HMW-025 at a concentration of 2.8 micrograms per liter ($\mu\text{g/L}$), which is below the Illinois EPA Tier 1, Class 1 Groundwater Remediation Objective (35 Illinois Administrative Code 742) for benzene ($5 \mu\text{g/L}$). Benzene was not detected above the reporting limit in the duplicate sample collected from well HMW-025.
- Ethylbenzene was estimated at the reporting limit in the sample collected from sentinel well HMW-026 ($1.0 \mu\text{g/L}$) and slightly above the reporting limit in the groundwater sample collected from sentinel well HMW-025 ($1.6 \mu\text{g/L}$). The detected results are several orders of magnitude below the Illinois EPA Tier 1, Class 1 Groundwater Remediation Objective (35 Illinois Administrative Code 742) for ethylbenzene ($700 \mu\text{g/L}$). Ethylbenzene was not detected above the reporting limit in the duplicate sample collected from well HMW-025.
- Total xylenes were estimated to be present in each of the groundwater samples collected from the sentinel monitoring wells. Concentrations were estimated between $1.4 \mu\text{g/L}$ and $5.4 \mu\text{g/L}$, several orders of magnitude below the Illinois EPA Tier 1, Class 1 Groundwater Remediation Objective (35 Illinois Administrative Code 742) for total xylenes ($10,000 \mu\text{g/L}$).

As shown on Figure 2, groundwater flow during the first quarter 2015 was to the west and northwest. Therefore, the sentinel monitoring wells were situated up-gradient of light non-aqueous phase liquids and dissolved phase petroleum hydrocarbons attributed to the Hartford Site and down-gradient from the well head protection area for the Hartford drinking water well field. Therefore, detections of benzene, ethylbenzene, and xylenes in the groundwater samples collected in the sentinel wells are not attributed to migration of dissolved phase petroleum hydrocarbons from the Hartford Site.



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It should be noted that samples collected from the sentinel monitoring wells in January 2015 were shipped and analyzed with groundwater samples collected from monitoring wells located in Area A. The groundwater samples collected from the Area A wells contained elevated concentrations of benzene, ethylbenzene, and total xylenes. Following receipt of the analytical results from Teklab, Inc., Trihydro requested re-analysis of the groundwater samples from the sentinel monitoring wells. The laboratory analytical results for the re-analysis are included in Attachment B, and are consistent with the original results. It is possible that the volatile constituents present in the groundwater samples collected from the sentinel wells are attributed to cross contamination from the groundwater samples collected from the Area A monitoring wells. During future quarterly monitoring events, groundwater samples collected from the sentinel wells will be segregated and transported to the laboratory in a separate cooler from any other groundwater samples collected at the Hartford Site. If you have any questions regarding the first quarter 2015 sentinel well monitoring results, please contact me at (513) 429-7452.

Sincerely,
Trihydro Corporation

Paul Michalski, P.G.
Team Leader

24S-007-001

Attachments

cc: James F. Sanders, Apex Oil Company, Inc.
Kevin Turner, United States Environmental Protection Agency
Tom Miller, Illinois Environmental Protection Agency
Chris Cahnovsky, Illinois Environmental Protection Agency

TABLES

**TABLE 1. SENTINEL WELL GAUGING RESULTS
HARTFORD PETROLEUM RELEASE SITE, HARTFORD, ILLINOIS**

Location	Date	Measuring Point Elevation (ft-amsl)	Depth to LNAPL (ft-bmp)	Depth to Water (ft-bmp)	LNAPL Thickness (ft)	Groundwater Elevation (ft-amsl)
HMW-025	4/2/13	427.45	--	27.48	--	399.97
	10/2/13		--	28.92	--	398.53
	1/16/14		--	30.78	--	396.67
	5/15/14		--	26.40	--	401.05
	8/5/14		--	24.14	--	403.31
	10/30/14		--	23.95	--	403.50
	1/29/15		--	30.19	--	397.26
	3/6/15		--	31.14	--	396.31
HMW-026	4/2/13	425.20	--	25.52	--	399.68
	10/2/13		--	25.06	--	400.14
	1/16/14		--	27.70	--	397.50
	5/15/14		--	24.70	--	400.50
	8/5/14		--	20.95	--	404.25
	10/30/14		--	21.25	--	403.95
	1/29/15		--	26.96	--	398.24
	3/6/15		--	NM	--	--
HMW-027	4/1/13	430.51	--	30.72	--	399.79
	10/2/13		--	30.00	--	400.51
	1/16/14		--	32.52	--	397.99
	5/15/14		--	29.83	--	400.68
	8/5/14		--	25.53	--	404.98
	10/30/14		--	26.20	--	404.31
	1/29/15		--	31.58	--	398.93
	3/5/15		--	32.62	--	397.89
HMW-028	4/1/13	430.97	--	30.42	--	400.55
	10/2/13		--	30.42	--	400.55
	1/16/14		--	32.61	--	398.36
	5/15/14		--	29.50	--	401.47
	8/5/14		--	26.26	--	404.71
	10/30/14		--	26.50	--	404.47
	1/29/15		--	31.62	--	399.35
	3/5/15		--	32.60	--	398.37
HMW-029	4/1/13	429.13	--	29.12	--	400.01
	10/2/13		--	28.20	--	400.93
	1/16/14		--	30.39	--	398.74
	5/15/14		--	28.77	--	400.36
	8/5/14		--	24.96	--	404.17
	10/30/14		--	25.09	--	404.04
	1/29/15		--	29.47	--	399.66
	3/5/15		--	30.56	--	398.57

Notes:

ft - feet

ft-amsl - feet above mean sea level

ft-bmp - feet below measuring point

NM - not measured

**TABLE 2. SENTINEL WELL GROUNDWATER ANALYTICAL RESULTS SUMMARY
HARTFORD PETROLEUM RELEASE SITE, HARTFORD, ILLINOIS**

Location	Date	Benzene (µg/L)	Ethylbenzene (µg/L)	MTBE (µg/L)	Toluene (µg/L)	m,p-Xylene (µg/L)	o-Xylene (µg/L)	Xylenes, Total (µg/L)
HMW-025	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-025	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-025	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-025	1/29/15	2.8	1.6	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	5.4 J
HMW-025 Dup	1/29/15	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	2.3 J
HMW-026	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-026	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-026	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-026	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-026	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-026	1/29/15	ND(2.0)	1.0 J	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	2.6 J
HMW-027	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-027	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-027	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-027	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-027	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-027	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-027	1/29/15	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	2.3 J
HMW-028	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-028	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-028	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-028	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-028	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-028	1/29/15	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	1.8 J
HMW-029	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-029	8/27/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-029	11/11/13	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-029	2/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-029	5/12/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(10.0)	ND(5.0)	ND(10.0)
HMW-029	8/11/14	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(5.0)	ND(5.0)	ND(10.0)
HMW-029	1/29/15	ND(2.0)	ND(1.0)	ND(2.0)	ND(1.0)	ND(5.0)	ND(5.0)	1.4 J
Tier 1 Class 1 GRO ¹		5.0	700	70	1,000	NA	NA	10,000

Notes:

¹Tier 1 Class 1 Groundwater Remediation Objectives from Illinois EPA's Tiered Approach to Corrective Action Objectives (35 IAC Part 742)

Dup - duplicate sample

MTBE - methyl tert-butyl ether

J - estimated concentration

ND(1.0) - non detect at the indicated reporting limit

NA - not applicable

µg/L - micrograms per liter

FIGURES

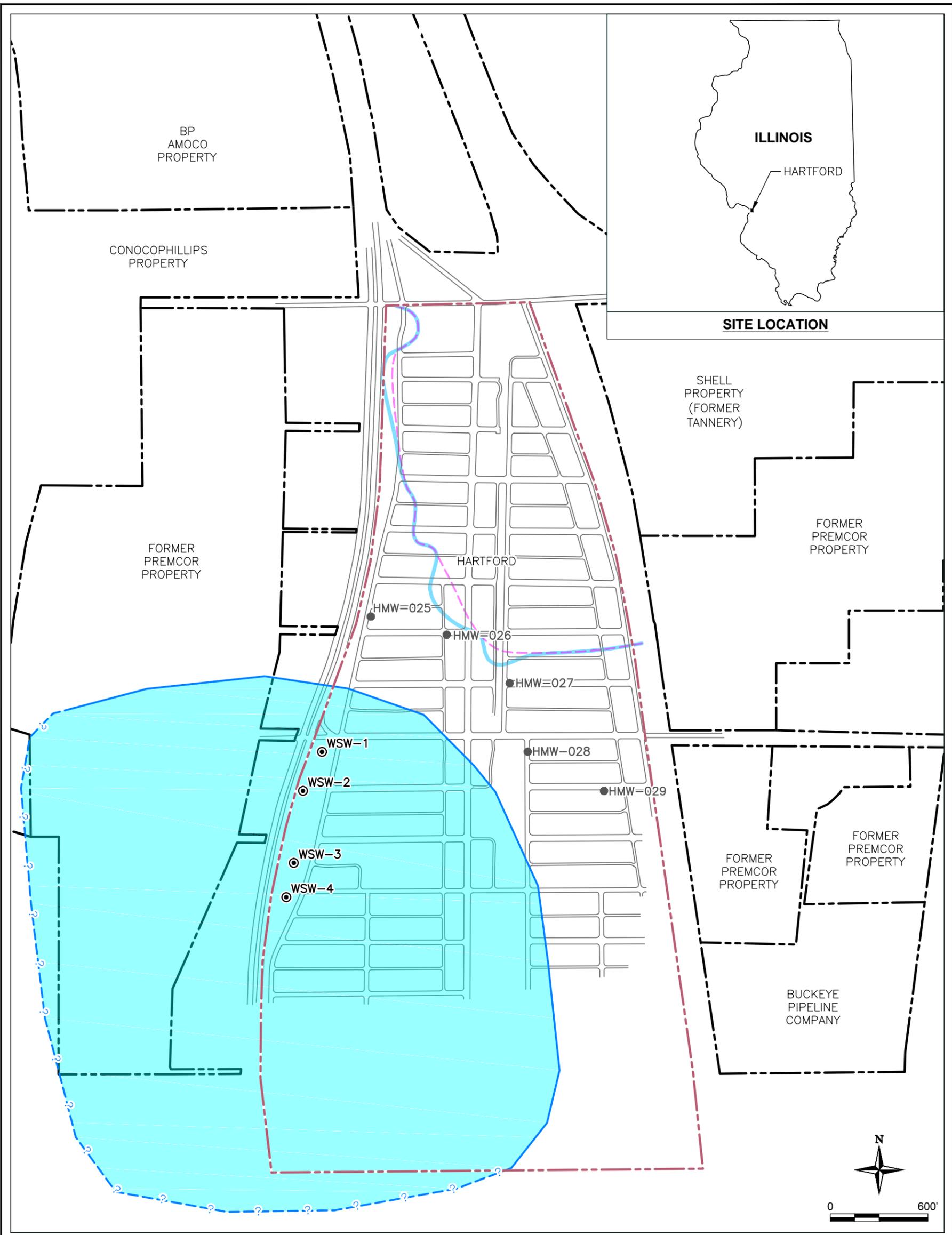


Image Cite: MapMart, Satellite Provider - DigitalGlobe, Image Capture Date - March 9, 2012

EXPLANATION

- WSW-1** PUBLIC WATER SUPPLY WELL AND DESIGNATION
- HMW-029** GROUNDWATER MONITORING SENTINEL WELL AND DESIGNATION
- PROPERTY BOUNDARY (APPROXIMATE)
- HARTFORD PROPERTY BOUNDARY (APPROXIMATE)
- PUBLIC WATER SUPPLY WELL HEAD PROTECTION AREA (UNKNOWN)
- PUBLIC WATER SUPPLY WELL HEAD PROTECTION AREA
- INTERPRETED EXTENT OF LIF RESPONSE (ALL STRATA)
- INTERPRETED EXTENT OF DISSOLVED PHASE BENZENE (2012, MAIN SAND)

NOTE: INTERPRETED EXTENT OF LIF RESPONSE FROM APPENDIX A OF "ACTIVE LNAPL RECOVERY SYSTEM 90% DESIGN REPORT", CLAYTON GROUP SERVICES, INC., JULY 31, 2006, AND UPDATED USING 2013 LIF RESULTS.

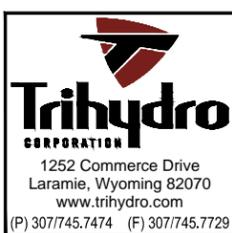
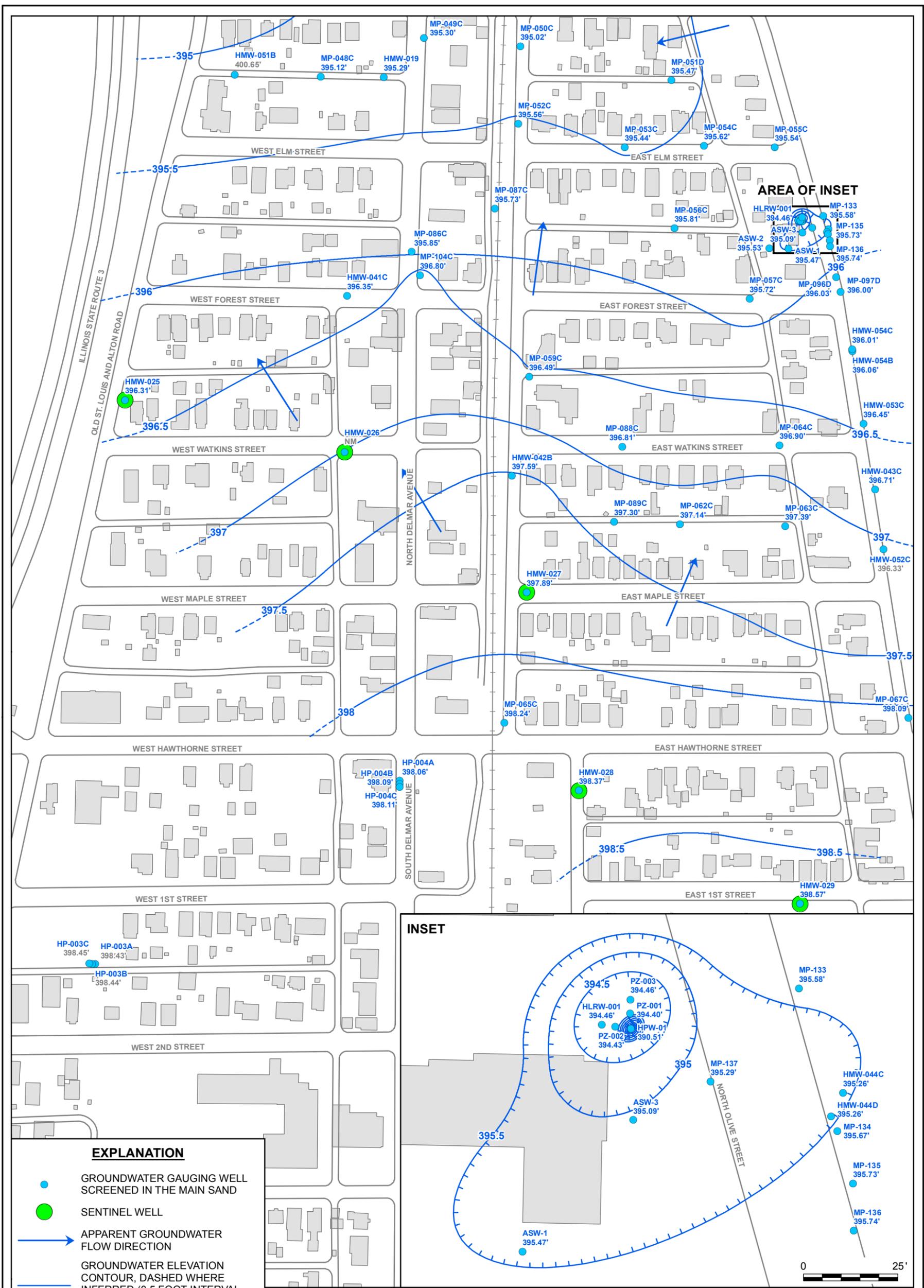


FIGURE 1			
SITE LAYOUT			
HARTFORD PETROLEUM RELEASE SITE HARTFORD, ILLINOIS			
Drawn By: KBW	Checked By: PM	Scale: 1" = 1,000'	Date: 4/13/15 File: 24S_WELLFIELDSZ_201505



EXPLANATION

- GROUNDWATER GAUGING WELL SCREENED IN THE MAIN SAND
- SENTINEL WELL
- APPARENT GROUNDWATER FLOW DIRECTION
- GROUNDWATER ELEVATION CONTOUR, DASHED WHERE INFERRED (0.5 FOOT INTERVAL MARCH 2015)
- - - GROUNDWATER ELEVATION DEPRESSION CONTOUR (0.5 FOOT INTERVAL, MARCH 2015)
- BUILDING

NOTES: Wells with GRAY groundwater elevations were not used to construct contours.
 NM = Not Measured

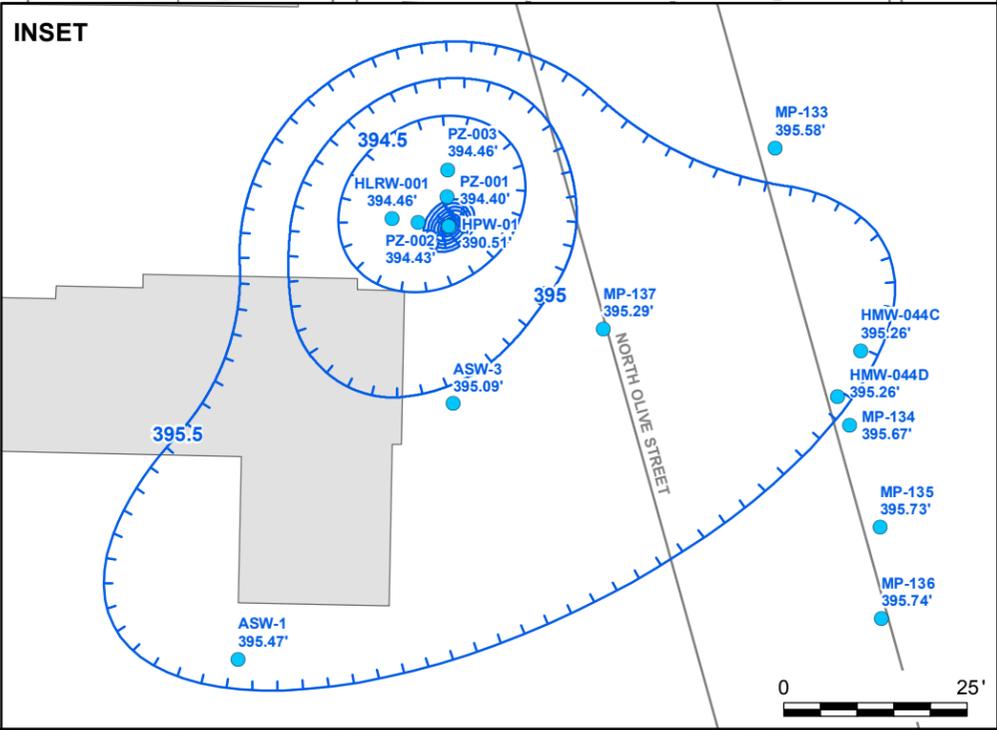
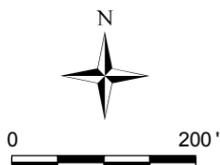


FIGURE 2

**FIRST QUARTER 2015 GROUNDWATER ELEVATIONS
 MAIN SAND HYDROSTRATIGRAPHIC UNIT**

**HARTFORD PETROLEUM RELEASE SITE
 HARTFORD, ILLINOIS**



1252 Commerce Drive
 Laramie, WY 82070
 www.trihydro.com
 (P) 307/745.7474 (F) 307/745.7729

ATTACHMENT 1

(PLEASE SEE ATTACHED CD)

February 04, 2015

Todd Aseltyne
Trihydro Corporation
1252 Commerce Drive
Laramie, WY 82070
TEL: (513) 429-7470
FAX:



RE: Dissolved-Phase Investigation

WorkOrder: 15011440

Dear Todd Aseltyne:

TEKLAB, INC received 6 samples on 1/30/2015 4:00:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,



Marvin L. Darling
Project Manager
(618)344-1004 ex 41
mdarling@teklabinc.com



Report Contents

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

This reporting package includes the following:

Cover Letter	1
Report Contents	2
Definitions	3
Case Narrative	4
Laboratory Results	5
Sample Summary	11
Dates Report	12
Quality Control Results	13
Receiving Check List	15
Chain of Custody	Appended

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Abbr Definition

- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MB Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit
- NELAP NELAP Accredited
- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
- Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TNTC Too numerous to count (> 200 CFU)

Qualifiers

- | | |
|--|---|
| # - Unknown hydrocarbon | B - Analyte detected in associated Method Blank |
| E - Value above quantitation range | H - Holding times exceeded |
| M - Manual Integration used to determine area response | ND - Not Detected at the Reporting Limit |
| R - RPD outside accepted recovery limits | S - Spike Recovery outside recovery limits |
| X - Value exceeds Maximum Contaminant Level | |



Case Narrative

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Cooler Receipt Temp: 5.42 °C

Locations and Accreditations

	<u>Collinsville</u>	<u>Springfield</u>	<u>Kansas City</u>	<u>Collinsville Air</u>
Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425	3920 Pintail Dr Springfield, IL 62711-9415	8421 Nieman Road Lenexa, KS 66214	5445 Horseshoe Lake Road Collinsville, IL 62234-7425
Phone	(618) 344-1004	(217) 698-1004	(913) 541-1998	(618) 344-1004
Fax	(618) 344-1005	(217) 698-1005	(913) 541-1998	(618) 344-1005
Email	jhriley@teklabinc.com	KKlostermann@teklabinc.com	dthompson@teklabinc.com	EHurley@teklabinc.com

<u>State</u>	<u>Dept</u>	<u>Cert #</u>	<u>NELAP</u>	<u>Exp Date</u>	<u>Lab</u>
Illinois	IEPA	100226	NELAP	1/31/2016	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2015	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2015	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2015	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2015	Collinsville
Arkansas	ADEQ	88-0966		3/14/2015	Collinsville
Illinois	IDPH	17584		5/31/2015	Collinsville
Kentucky	KDEP	98006		12/31/2015	Collinsville
Kentucky	UST	0073		1/31/2016	Collinsville
Missouri	MDNR	00930		5/31/2015	Collinsville
Oklahoma	ODEQ	9978		8/31/2015	Collinsville



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab ID: 15011440-001

Client Sample ID: HMW-025, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 9:57

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		2.8	µg/L	1	02/02/2015 11:45	105943
Ethylbenzene	NELAP	1.0		1.6	µg/L	1	02/02/2015 11:45	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 11:45	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 11:45	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 11:45	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 11:45	105943
Xylenes, Total	NELAP	1.0		5.4	µg/L	1	02/02/2015 11:45	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		102.7	%REC	1	02/02/2015 11:45	105943
Surr: 4-Bromofluorobenzene		86-119		96.7	%REC	1	02/02/2015 11:45	105943
Surr: Dibromofluoromethane		81.7-123		100.3	%REC	1	02/02/2015 11:45	105943
Surr: Toluene-d8		84.3-114		99.4	%REC	1	02/02/2015 11:45	105943



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab ID: 15011440-002

Client Sample ID: HMW-026, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 11:27

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		ND	µg/L	1	02/02/2015 12:11	105943
Ethylbenzene	NELAP	1.0		1.0	µg/L	1	02/02/2015 12:11	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 12:11	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 12:11	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 12:11	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 12:11	105943
Xylenes, Total	NELAP	1.0		2.6	µg/L	1	02/02/2015 12:11	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		101.5	%REC	1	02/02/2015 12:11	105943
Surr: 4-Bromofluorobenzene		86-119		96.9	%REC	1	02/02/2015 12:11	105943
Surr: Dibromofluoromethane		81.7-123		99.5	%REC	1	02/02/2015 12:11	105943
Surr: Toluene-d8		84.3-114		97.7	%REC	1	02/02/2015 12:11	105943



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab ID: 15011440-003

Client Sample ID: HMW-027, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 12:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		ND	µg/L	1	02/02/2015 12:38	105943
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/02/2015 12:38	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 12:38	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 12:38	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 12:38	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 12:38	105943
Xylenes, Total	NELAP	1.0		2.3	µg/L	1	02/02/2015 12:38	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		98.6	%REC	1	02/02/2015 12:38	105943
Surr: 4-Bromofluorobenzene		86-119		96.9	%REC	1	02/02/2015 12:38	105943
Surr: Dibromofluoromethane		81.7-123		99.6	%REC	1	02/02/2015 12:38	105943
Surr: Toluene-d8		84.3-114		97.6	%REC	1	02/02/2015 12:38	105943



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab ID: 15011440-004

Client Sample ID: HMW-028, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 13:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		ND	µg/L	1	02/02/2015 13:06	105943
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/02/2015 13:06	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 13:06	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 13:06	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 13:06	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 13:06	105943
Xylenes, Total	NELAP	1.0		1.8	µg/L	1	02/02/2015 13:06	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		99.4	%REC	1	02/02/2015 13:06	105943
Surr: 4-Bromofluorobenzene		86-119		96.7	%REC	1	02/02/2015 13:06	105943
Surr: Dibromofluoromethane		81.7-123		99.3	%REC	1	02/02/2015 13:06	105943
Surr: Toluene-d8		84.3-114		98.3	%REC	1	02/02/2015 13:06	105943



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation
 Client Project: Dissolved-Phase Investigation
 Lab ID: 15011440-005
 Matrix: AQUEOUS

Work Order: 15011440
 Report Date: 04-Feb-15
 Client Sample ID: HMW-029, 012915
 Collection Date: 01/29/2015 14:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		ND	µg/L	1	02/02/2015 13:34	105943
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/02/2015 13:34	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 13:34	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 13:34	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 13:34	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 13:34	105943
Xylenes, Total	NELAP	1.0		1.4	µg/L	1	02/02/2015 13:34	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		100.4	%REC	1	02/02/2015 13:34	105943
Surr: 4-Bromofluorobenzene		86-119		96.9	%REC	1	02/02/2015 13:34	105943
Surr: Dibromofluoromethane		81.7-123		98.8	%REC	1	02/02/2015 13:34	105943
Surr: Toluene-d8		84.3-114		97.1	%REC	1	02/02/2015 13:34	105943



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab ID: 15011440-006

Client Sample ID: BD-1, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 0:00

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		ND	µg/L	1	02/02/2015 14:01	105943
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/02/2015 14:01	105943
m,p-Xylenes	NELAP	5.0		ND	µg/L	1	02/02/2015 14:01	105943
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/02/2015 14:01	105943
o-Xylene	NELAP	5.0		ND	µg/L	1	02/02/2015 14:01	105943
Toluene	NELAP	1.0		ND	µg/L	1	02/02/2015 14:01	105943
Xylenes, Total	NELAP	1.0		2.3	µg/L	1	02/02/2015 14:01	105943
Surr: 1,2-Dichloroethane-d4		74.7-129		99.4	%REC	1	02/02/2015 14:01	105943
Surr: 4-Bromofluorobenzene		86-119		95.5	%REC	1	02/02/2015 14:01	105943
Surr: Dibromofluoromethane		81.7-123		98.3	%REC	1	02/02/2015 14:01	105943
Surr: Toluene-d8		84.3-114		98.2	%REC	1	02/02/2015 14:01	105943



Sample Summary

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Lab Sample ID	Client Sample ID	Matrix	Fractions	Collection Date
15011440-001	HMW-025, 012915	Aqueous	1	01/29/2015 9:57
15011440-002	HMW-026, 012915	Aqueous	1	01/29/2015 11:27
15011440-003	HMW-027, 012915	Aqueous	1	01/29/2015 12:42
15011440-004	HMW-028, 012915	Aqueous	1	01/29/2015 13:32
15011440-005	HMW-029, 012915	Aqueous	1	01/29/2015 14:42
15011440-006	BD-1, 012915	Aqueous	1	01/29/2015 0:00



Dates Report

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Sample ID	Client Sample ID	Collection Date	Received Date	Prep Date/Time	Analysis Date/Time
15011440-001A	HMW-025, 012915	01/29/2015 9:57	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 11:45
15011440-002A	HMW-026, 012915	01/29/2015 11:27	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 12:11
15011440-003A	HMW-027, 012915	01/29/2015 12:42	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 12:38
15011440-004A	HMW-028, 012915	01/29/2015 13:32	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 13:06
15011440-005A	HMW-029, 012915	01/29/2015 14:42	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 13:34
15011440-006A	BD-1, 012915	01/29/2015 0:00	01/30/2015 16:00		
	SW-846 5030, 8260B, Volatile Organic Compounds by GC/MS				02/02/2015 14:01

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS

Batch 105943		SampType: MBLK		Units µg/L						
SampID: MBLK-T150202-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		ND							02/02/2015
Ethylbenzene	5.0		ND							02/02/2015
m,p-Xylenes	5.0		ND							02/02/2015
Methyl tert-butyl ether	2.0		ND							02/02/2015
o-Xylene	5.0		ND							02/02/2015
Toluene	5.0		ND							02/02/2015
Xylenes, Total	5.0		ND							02/02/2015
Surr: 1,2-Dichloroethane-d4			49.4	50.00		98.9	74.7	129		02/02/2015
Surr: 4-Bromofluorobenzene			50.0	50.00		100.0	86	119		02/02/2015
Surr: Dibromofluoromethane			48.8	50.00		97.5	81.7	123		02/02/2015
Surr: Toluene-d8			49.2	50.00		98.4	84.3	114		02/02/2015

Batch 105943		SampType: LCSD		Units µg/L						
SampID: LCSD-T150202-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed	
Benzene	2.0		46.4	50.00	0	92.9	46.09	0.73		02/02/2015
Ethylbenzene	5.0		46.3	50.00	0	92.7	46.33	0.02		02/02/2015
m,p-Xylenes	5.0		95.8	100.0	0	95.8	94.91	0.94		02/02/2015
Methyl tert-butyl ether	2.0		44.8	50.00	0	89.7	44.53	0.67		02/02/2015
o-Xylene	5.0		46.4	50.00	0	92.8	45.72	1.43		02/02/2015
Toluene	5.0		45.1	50.00	0	90.2	44.88	0.51		02/02/2015
Xylenes, Total	5.0		142	150.0	0	94.8	140.6	1.10		02/02/2015
Surr: 1,2-Dichloroethane-d4			51.0	50.00		102.1				02/02/2015
Surr: 4-Bromofluorobenzene			47.5	50.00		95.1				02/02/2015
Surr: Dibromofluoromethane			50.5	50.00		101.0				02/02/2015
Surr: Toluene-d8			49.0	50.00		97.9				02/02/2015

Batch 105943		SampType: LCS		Units µg/L						
SampID: LCS-T150202-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		46.1	50.00	0	92.2	80	114		02/02/2015
Ethylbenzene	5.0		46.3	50.00	0	92.7	77.2	113		02/02/2015
m,p-Xylenes	5.0		94.9	100.0	0	94.9	79.6	113		02/02/2015
Methyl tert-butyl ether	2.0		44.5	50.00	0	89.1	76.8	117		02/02/2015
o-Xylene	5.0		45.7	50.00	0	91.4	80.1	111		02/02/2015
Toluene	5.0		44.9	50.00	0	89.8	77.5	113		02/02/2015
Xylenes, Total	5.0		141	150.0	0	93.8	80.1	111		02/02/2015
Surr: 1,2-Dichloroethane-d4			50.9	50.00		101.8	74.7	129		02/02/2015
Surr: 4-Bromofluorobenzene			50.0	50.00		100.1	86	119		02/02/2015
Surr: Dibromofluoromethane			49.2	50.00		98.3	81.7	123		02/02/2015
Surr: Toluene-d8			49.1	50.00		98.2	84.1	114		02/02/2015



Quality Control Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS

Batch 105943		SampType: MS		Units µg/L						
SampID: 15011440-006AMS										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		46.4	50.00	1.880	89.0	62.5	121	02/02/2015	
Ethylbenzene	5.0		45.7	50.00	0	91.5	74.4	130	02/02/2015	
m,p-Xylenes	5.0		48.6	50.00	2.260	92.6	70.5	126	02/02/2015	
o-Xylene	5.0		45.2	50.00	0	90.5	71.2	124	02/02/2015	
Toluene	5.0		42.8	50.00	0	85.6	69.5	118	02/02/2015	
Xylenes, Total	5.0		93.8	100.0	2.260	91.6	71.1	125	02/02/2015	
Surr: 1,2-Dichloroethane-d4			51.2	50.00		102.5	74.7	129	02/02/2015	
Surr: 4-Bromofluorobenzene			48.4	50.00		96.7	86	119	02/02/2015	
Surr: Dibromofluoromethane			49.8	50.00		99.7	81.7	123	02/02/2015	
Surr: Toluene-d8			49.3	50.00		98.7	84.3	114	02/02/2015	

Batch 105943		SampType: MSD		Units µg/L				RPD Limit 20		Date Analyzed	
SampID: 15011440-006AMSD											
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed		
Benzene	2.0		46.8	50.00	1.880	89.9	46.37	1.03	02/02/2015		
Ethylbenzene	5.0		47.4	50.00	0	94.9	45.74	3.63	02/02/2015		
m,p-Xylenes	5.0		49.8	50.00	2.260	95.0	48.57	2.42	02/02/2015		
o-Xylene	5.0		46.4	50.00	0	92.9	45.24	2.64	02/02/2015		
Toluene	5.0		43.6	50.00	0	87.2	42.82	1.76	02/02/2015		
Xylenes, Total	5.0		96.2	100.0	2.260	94.0	93.81	2.53	02/02/2015		
Surr: 1,2-Dichloroethane-d4			50.5	50.00		101.1			02/02/2015		
Surr: 4-Bromofluorobenzene			48.5	50.00		97.0			02/02/2015		
Surr: Dibromofluoromethane			48.8	50.00		97.7			02/02/2015		
Surr: Toluene-d8			50.1	50.00		100.2			02/02/2015		



Receiving Check List

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15011440

Client Project: Dissolved-Phase Investigation

Report Date: 04-Feb-15

Carrier: Todd Aseltyne

Received By: EEP

Completed by: *Emily Pohlman*
On: 30-Jan-15
Emily E. Pohlman

Reviewed by: *Elizabeth A. Hurley*
On: 30-Jan-15
Elizabeth A. Hurley

Pages to follow: Chain of custody Extra pages included

- Shipping container/cooler in good condition? Yes No Not Present Temp °C **5.42**
- Type of thermal preservation? None Ice Blue Ice Dry Ice
- Chain of custody present? Yes No
- Chain of custody signed when relinquished and received? Yes No
- Chain of custody agrees with sample labels? Yes No
- Samples in proper container/bottle? Yes No
- Sample containers intact? Yes No
- Sufficient sample volume for indicated test? Yes No
- All samples received within holding time? Yes No
- Reported field parameters measured: Field Lab NA
- Container/Temp Blank temperature in compliance? Yes No

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

- Water – at least one vial per sample has zero headspace? Yes No No VOA vials
- Water - TOX containers have zero headspace? Yes No No TOX containers
- Water - pH acceptable upon receipt? Yes No NA
- NPDES/CWA TCN interferences checked/treated in the field? Yes No NA

Any No responses must be detailed below or on the COC.

March 18, 2015

Justin Pruis, P.E.
Trihydro Corporation
1252 Commerce Drive
Laramie, WY 82070
TEL: (307) 755-4861
FAX:



RE: Dissolved Phase Investigation

WorkOrder: 15030651

Dear Justin Pruis, P.E.:

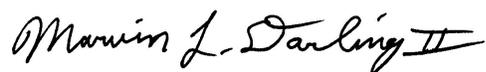
TEKLAB, INC received 5 samples on 1/30/2015 4:00:00 PM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column. Unless otherwise documented within this report, Teklab Inc. analyzes samples utilizing the most current methods in compliance with 40CFR. All tests are performed in the Collinsville, IL laboratory unless otherwise noted in the Case Narrative.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,



Marvin L. Darling
Project Manager
(618)344-1004 ex 41
mdarling@teklabinc.com



Report Contents

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

This reporting package includes the following:

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Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

Abbr Definition

- CCV Continuing calibration verification is a check of a standard to determine the state of calibration of an instrument between recalibration.
- DF Dilution factor is the dilution performed during analysis only and does not take into account any dilutions made during sample preparation. The reported result is final and includes all dilutions factors.
- DNI Did not ignite
- DUP Laboratory duplicate is an aliquot of a sample taken from the same container under laboratory conditions for independent processing and analysis independently of the original aliquot.
- ICV Initial calibration verification is a check of a standard to determine the state of calibration of an instrument before sample analysis is initiated.
- IDPH IL Dept. of Public Health
- LCS Laboratory control sample, spiked with verified known amounts of analytes, is analyzed exactly like a sample to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system. The acceptable recovery range is in the QC Package (provided upon request).
- LCSD Laboratory control sample duplicate is a replicate laboratory control sample that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MB Method blank is a sample of a matrix similar to the batch of associated sample (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as samples through all steps of the analytical procedures, and in which no target analytes or interferences should present at concentrations that impact the analytical results for sample analyses.
- MDL Method detection limit means the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero.
- MS Matrix spike is an aliquot of matrix fortified (spiked) with known quantities of specific analytes that is subjected to the entire analytical procedures in order to determine the effect of the matrix on an approved test method's recovery system. The acceptable recovery range is listed in the QC Package (provided upon request).
- MSD Matrix spike duplicate means a replicate matrix spike that is prepared and analyzed in order to determine the precision of the approved test method. The acceptable recovery range is listed in the QC Package (provided upon request).
- MW Molecular weight
- ND Not Detected at the Reporting Limit
- NELAP NELAP Accredited
- PQL Practical quantitation limit means the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operation conditions. The acceptable recovery range is listed in the QC Package (provided upon request).
- RL The reporting limit the lowest level that the data is displayed in the final report. The reporting limit may vary according to customer request or sample dilution. The reporting limit may not be less than the MDL.
- RPD Relative percent difference is a calculated difference between two recoveries (ie. MS/MSD). The acceptable recovery limit is listed in the QC Package (provided upon request).
- SPK The spike is a known mass of target analyte added to a blank sample or sub-sample; used to determine recovery deficiency or for other quality control purposes.
- Surr Surrogates are compounds which are similar to the analytes of interest in chemical composition and behavior in the analytical process, but which are not normally found in environmental samples.
- TNTC Too numerous to count (> 200 CFU)

Qualifiers

- | | |
|--|--|
| # - Unknown hydrocarbon | B - Analyte detected in associated Method Blank |
| E - Value above quantitation range | H - Holding times exceeded |
| J - Analyte detected below quantitation limits | M - Manual Integration used to determine area response |
| ND - Not Detected at the Reporting Limit | R - RPD outside accepted recovery limits |
| S - Spike Recovery outside recovery limits | X - Value exceeds Maximum Contaminant Level |



Case Narrative

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

Cooler Receipt Temp: °C

Per Todd Aseltyne's request, vial 2 of 2 was analyzed for HMW-025, HMW-026, HMW-027, HMW-028, and HMW-29 and reported on this workorder. Vial 1 of 2 for each sample was reported on WO# 15011440. MLDII/EAH 3/12/15

Locations and Accreditations

	<u>Collinsville</u>	<u>Springfield</u>	<u>Kansas City</u>	<u>Collinsville Air</u>
Address	5445 Horseshoe Lake Road Collinsville, IL 62234-7425	3920 Pintail Dr Springfield, IL 62711-9415	8421 Nieman Road Lenexa, KS 66214	5445 Horseshoe Lake Road Collinsville, IL 62234-7425
Phone	(618) 344-1004	(217) 698-1004	(913) 541-1998	(618) 344-1004
Fax	(618) 344-1005	(217) 698-1005	(913) 541-1998	(618) 344-1005
Email	jhriley@teklabinc.com	KKlostermann@teklabinc.com	dthompson@teklabinc.com	EHurley@teklabinc.com

<u>State</u>	<u>Dept</u>	<u>Cert #</u>	<u>NELAP</u>	<u>Exp Date</u>	<u>Lab</u>
Illinois	IEPA	100226	NELAP	1/31/2016	Collinsville
Kansas	KDHE	E-10374	NELAP	4/30/2015	Collinsville
Louisiana	LDEQ	166493	NELAP	6/30/2015	Collinsville
Louisiana	LDEQ	166578	NELAP	6/30/2015	Collinsville
Texas	TCEQ	T104704515-12-1	NELAP	7/31/2015	Collinsville
Arkansas	ADEQ	88-0966		3/14/2016	Collinsville
Illinois	IDPH	17584		5/31/2015	Collinsville
Kentucky	KDEP	98006		12/31/2015	Collinsville
Kentucky	UST	0073		1/31/2016	Collinsville
Missouri	MDNR	00930		5/31/2015	Collinsville
Oklahoma	ODEQ	9978		8/31/2015	Collinsville



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation
Client Project: Dissolved Phase Investigation
Lab ID: 15030651-001
Matrix: AQUEOUS

Work Order: 15030651
Report Date: 18-Mar-15
Client Sample ID: HMW-025, 012915
Collection Date: 01/29/2015 9:57

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0		2.6	µg/L	1	02/05/2015 14:23	107069
Ethylbenzene	NELAP	1.0		1.8	µg/L	1	02/05/2015 14:23	107069
m,p-Xylenes	NELAP	5.0	J	4.9	µg/L	1	02/05/2015 14:23	107069
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/05/2015 14:23	107069
o-Xylene	NELAP	5.0	J	1.0	µg/L	1	02/05/2015 14:23	107069
Toluene	NELAP	1.0		ND	µg/L	1	02/05/2015 14:23	107069
Xylenes, Total	NELAP	1.0		5.9	µg/L	1	02/05/2015 14:23	107069
Surr: 1,2-Dichloroethane-d4		74.7-129		95.5	%REC	1	02/05/2015 14:23	107069
Surr: 4-Bromofluorobenzene		86-119		100.2	%REC	1	02/05/2015 14:23	107069
Surr: Dibromofluoromethane		81.7-123		96.1	%REC	1	02/05/2015 14:23	107069
Surr: Toluene-d8		84.3-114		99.4	%REC	1	02/05/2015 14:23	107069



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

Lab ID: 15030651-002

Client Sample ID: HMW-026, 012915

Matrix: AQUEOUS

Collection Date: 01/29/2015 11:27

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0	J	1.6	µg/L	1	02/05/2015 14:49	107069
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/05/2015 14:49	107069
m,p-Xylenes	NELAP	5.0	J	2.4	µg/L	1	02/05/2015 14:49	107069
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/05/2015 14:49	107069
o-Xylene	NELAP	5.0		ND	µg/L	1	02/05/2015 14:49	107069
Toluene	NELAP	1.0		ND	µg/L	1	02/05/2015 14:49	107069
Xylenes, Total	NELAP	1.0		2.4	µg/L	1	02/05/2015 14:49	107069
Surr: 1,2-Dichloroethane-d4		74.7-129		102.1	%REC	1	02/05/2015 14:49	107069
Surr: 4-Bromofluorobenzene		86-119		101.1	%REC	1	02/05/2015 14:49	107069
Surr: Dibromofluoromethane		81.7-123		96.6	%REC	1	02/05/2015 14:49	107069
Surr: Toluene-d8		84.3-114		98.4	%REC	1	02/05/2015 14:49	107069



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation
 Client Project: Dissolved Phase Investigation
 Lab ID: 15030651-003
 Matrix: AQUEOUS

Work Order: 15030651
 Report Date: 18-Mar-15
 Client Sample ID: HMW-027, 012915
 Collection Date: 01/29/2015 12:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0	J	1.0	µg/L	1	02/05/2015 15:15	107069
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/05/2015 15:15	107069
m,p-Xylenes	NELAP	5.0	J	1.8	µg/L	1	02/05/2015 15:15	107069
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/05/2015 15:15	107069
o-Xylene	NELAP	5.0		ND	µg/L	1	02/05/2015 15:15	107069
Toluene	NELAP	1.0		ND	µg/L	1	02/05/2015 15:15	107069
Xylenes, Total	NELAP	1.0		1.8	µg/L	1	02/05/2015 15:15	107069
Surr: 1,2-Dichloroethane-d4		74.7-129		104.2	%REC	1	02/05/2015 15:15	107069
Surr: 4-Bromofluorobenzene		86-119		99.0	%REC	1	02/05/2015 15:15	107069
Surr: Dibromofluoromethane		81.7-123		99.9	%REC	1	02/05/2015 15:15	107069
Surr: Toluene-d8		84.3-114		98.4	%REC	1	02/05/2015 15:15	107069



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation
Client Project: Dissolved Phase Investigation
Lab ID: 15030651-004
Matrix: AQUEOUS

Work Order: 15030651
Report Date: 18-Mar-15
Client Sample ID: HMW-028, 012915
Collection Date: 01/29/2015 13:32

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0	J	1.0	µg/L	1	02/05/2015 15:41	107069
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/05/2015 15:41	107069
m,p-Xylenes	NELAP	5.0	J	1.3	µg/L	1	02/05/2015 15:41	107069
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/05/2015 15:41	107069
o-Xylene	NELAP	5.0		ND	µg/L	1	02/05/2015 15:41	107069
Toluene	NELAP	1.0		ND	µg/L	1	02/05/2015 15:41	107069
Xylenes, Total	NELAP	1.0		1.3	µg/L	1	02/05/2015 15:41	107069
Surr: 1,2-Dichloroethane-d4		74.7-129		100.7	%REC	1	02/05/2015 15:41	107069
Surr: 4-Bromofluorobenzene		86-119		103.5	%REC	1	02/05/2015 15:41	107069
Surr: Dibromofluoromethane		81.7-123		98.0	%REC	1	02/05/2015 15:41	107069
Surr: Toluene-d8		84.3-114		98.0	%REC	1	02/05/2015 15:41	107069



Laboratory Results

<http://www.teklabinc.com/>

Client: Trihydro Corporation
 Client Project: Dissolved Phase Investigation
 Lab ID: 15030651-005
 Matrix: AQUEOUS

Work Order: 15030651
 Report Date: 18-Mar-15
 Client Sample ID: HMW-029, 012915
 Collection Date: 01/29/2015 14:42

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Batch
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Benzene	NELAP	2.0	J	1.1	µg/L	1	02/06/2015 12:48	106111
Ethylbenzene	NELAP	1.0		ND	µg/L	1	02/06/2015 12:48	106111
m,p-Xylenes	NELAP	5.0	J	1.1	µg/L	1	02/06/2015 12:48	106111
Methyl tert-butyl ether	NELAP	2.0		ND	µg/L	1	02/06/2015 12:48	106111
o-Xylene	NELAP	5.0		ND	µg/L	1	02/06/2015 12:48	106111
Toluene	NELAP	1.0		ND	µg/L	1	02/06/2015 12:48	106111
Xylenes, Total	NELAP	1.0		1.1	µg/L	1	02/06/2015 12:48	106111
Surr: 1,2-Dichloroethane-d4		74.7-129		104.2	%REC	1	02/06/2015 12:48	106111
Surr: 4-Bromofluorobenzene		86-119		101.6	%REC	1	02/06/2015 12:48	106111
Surr: Dibromofluoromethane		81.7-123		101.3	%REC	1	02/06/2015 12:48	106111
Surr: Toluene-d8		84.3-114		98.2	%REC	1	02/06/2015 12:48	106111

Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS

Batch 106111		SampType: MBLK		Units µg/L						
SampID: MBLK-T150206-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		ND						02/06/2015	
Ethylbenzene	5.0		ND						02/06/2015	
m,p-Xylenes	5.0		ND						02/06/2015	
Methyl tert-butyl ether	2.0		ND						02/06/2015	
o-Xylene	5.0		ND						02/06/2015	
Toluene	5.0		ND						02/06/2015	
Xylenes, Total	5.0		ND						02/06/2015	
Surr: 1,2-Dichloroethane-d4			51.1	50.00		102.1	74.7	129	02/06/2015	
Surr: 4-Bromofluorobenzene			49.9	50.00		99.8	86	119	02/06/2015	
Surr: Dibromofluoromethane			50.0	50.00		100.0	81.7	123	02/06/2015	
Surr: Toluene-d8			49.4	50.00		98.8	84.3	114	02/06/2015	

Batch 106111		SampType: LCSD		Units µg/L		RPD Limit 40				
SampID: LCSD-T150206-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed	
Benzene	2.0		49.1	50.00	0	98.1	47.76	2.69	02/06/2015	
Ethylbenzene	5.0		48.2	50.00	0	96.4	47.26	1.99	02/06/2015	
m,p-Xylenes	5.0		99.8	100.0	0	99.8	96.32	3.51	02/06/2015	
Methyl tert-butyl ether	2.0		48.2	50.00	0	96.4	46.91	2.73	02/06/2015	
o-Xylene	5.0		48.1	50.00	0	96.1	46.45	3.41	02/06/2015	
Toluene	5.0		47.2	50.00	0	94.4	45.85	2.92	02/06/2015	
Xylenes, Total	5.0		148	150.0	0	98.5	142.8	3.48	02/06/2015	
Surr: 1,2-Dichloroethane-d4			50.0	50.00		100.1			02/06/2015	
Surr: 4-Bromofluorobenzene			51.6	50.00		103.1			02/06/2015	
Surr: Dibromofluoromethane			50.2	50.00		100.5			02/06/2015	
Surr: Toluene-d8			49.0	50.00		98.1			02/06/2015	

Batch 106111		SampType: LCS		Units µg/L						
SampID: LCS-T150206-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		47.8	50.00	0	95.5	80	114	02/06/2015	
Ethylbenzene	5.0		47.3	50.00	0	94.5	77.2	113	02/06/2015	
m,p-Xylenes	5.0		96.3	100.0	0	96.3	79.6	113	02/06/2015	
Methyl tert-butyl ether	2.0		46.9	50.00	0	93.8	76.8	117	02/06/2015	
o-Xylene	5.0		46.4	50.00	0	92.9	80.1	111	02/06/2015	
Toluene	5.0		45.8	50.00	0	91.7	77.5	113	02/06/2015	
Xylenes, Total	5.0		143	150.0	0	95.2	80.1	111	02/06/2015	
Surr: 1,2-Dichloroethane-d4			49.5	50.00		99.0	74.7	129	02/06/2015	
Surr: 4-Bromofluorobenzene			49.3	50.00		98.6	86	119	02/06/2015	
Surr: Dibromofluoromethane			50.7	50.00		101.5	81.7	123	02/06/2015	
Surr: Toluene-d8			49.2	50.00		98.4	84.1	114	02/06/2015	

Client: Trihydro Corporation

Work Order: 15030651

Client Project: Dissolved Phase Investigation

Report Date: 18-Mar-15

SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS

Batch 107069		SampType: MBLK		Units µg/L						
SampID: MBLK-T150205-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		ND						02/05/2015	
Ethylbenzene	5.0		ND						02/05/2015	
m,p-Xylenes	5.0		ND						02/05/2015	
Methyl tert-butyl ether	2.0		ND						02/05/2015	
o-Xylene	5.0		ND						02/05/2015	
Toluene	5.0		ND						02/05/2015	
Xylenes, Total	5.0		ND						02/05/2015	
Surr: 1,2-Dichloroethane-d4			50.6	50.00		101.3	74.7	129	02/05/2015	
Surr: 4-Bromofluorobenzene			49.6	50.00		99.2	86	119	02/05/2015	
Surr: Dibromofluoromethane			49.5	50.00		99.1	81.7	123	02/05/2015	
Surr: Toluene-d8			48.6	50.00		97.2	84.3	114	02/05/2015	

Batch 107069		SampType: LCSD		Units µg/L		RPD Limit 40				
SampID: LCSD-T150205-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	RPD Ref Val	%RPD	Date Analyzed	
Benzene	2.0		48.0	50.00	0	95.9	48.45	1.04	02/05/2015	
Ethylbenzene	5.0		47.8	50.00	0	95.5	48.39	1.31	02/05/2015	
m,p-Xylenes	5.0		99.1	100.0	0	99.1	99.15	0.09	02/05/2015	
Methyl tert-butyl ether	2.0		48.4	50.00	0	96.8	47.71	1.48	02/05/2015	
o-Xylene	5.0		47.4	50.00	0	94.8	47.81	0.90	02/05/2015	
Toluene	5.0		46.9	50.00	0	93.8	46.89	0.02	02/05/2015	
Xylenes, Total	5.0		146	150.0	0	97.6	147.0	0.35	02/05/2015	
Surr: 1,2-Dichloroethane-d4			49.0	50.00		97.9			02/05/2015	
Surr: 4-Bromofluorobenzene			49.8	50.00		99.7			02/05/2015	
Surr: Dibromofluoromethane			50.3	50.00		100.7			02/05/2015	
Surr: Toluene-d8			48.9	50.00		97.9			02/05/2015	

Batch 107069		SampType: LCS		Units µg/L						
SampID: LCS-T150205-1										
Analyses	RL	Qual	Result	Spike	SPK Ref Val	%REC	Low Limit	High Limit	Date Analyzed	
Benzene	2.0		48.4	50.00	0	96.9	80	114	02/05/2015	
Ethylbenzene	5.0		48.4	50.00	0	96.8	77.2	113	02/05/2015	
m,p-Xylenes	5.0		99.2	100.0	0	99.2	79.6	113	02/05/2015	
Methyl tert-butyl ether	2.0		47.7	50.00	0	95.4	76.8	117	02/05/2015	
o-Xylene	5.0		47.8	50.00	0	95.6	80.1	111	02/05/2015	
Toluene	5.0		46.9	50.00	0	93.8	77.5	113	02/05/2015	
Xylenes, Total	5.0		147	150.0	0	98.0	80.1	111	02/05/2015	
Surr: 1,2-Dichloroethane-d4			48.9	50.00		97.9	74.7	129	02/05/2015	
Surr: 4-Bromofluorobenzene			51.2	50.00		102.5	86	119	02/05/2015	
Surr: Dibromofluoromethane			50.1	50.00		100.3	81.7	123	02/05/2015	
Surr: Toluene-d8			49.0	50.00		98.0	84.1	114	02/05/2015	

TEKLAB, INC

5445 Horseshoe Lake Road
Collinsville, IL 62234-7425

TEL: (618) 344-1004

FAX: (618) 344-1005

CHAIN-OF-CUSTODY RECORD

15030651
Page 1 of 1

WorkOrder: 15030651

Client:

Trihydro Corporation
1252 Commerce Drive
Laramie, WY 82070

TEL: (307) 755-4861

FAX:

Project: Dissolved-Phase Investigatio

12-Mar-15

Sample ID	ClientSampID	Matrix	Date Collected	Bottle	Requested Tests	
					SW8260B	
15030651-001	HMW-025, 012915	Aqueous	1/29/2015 9:57:00 AM	A		
15030651-002	HMW-026, 012915	Aqueous	1/29/2015 11:27:00 AM	A		
15030651-003	HMW-027, 012915	Aqueous	1/29/2015 12:42:00 PM	A		
15030651-004	HMW-028, 012915	Aqueous	1/29/2015 1:32:00 PM	A		
15030651-005	HMW-029, 012915	Aqueous	1/29/2015 2:42:00 PM	A		
15030651-006	BD-1, 012915	Aqueous	1/29/2015	A		

Comments: Re-analysis of VOC samples on WO#15011440 per Todd Aseltyne. MLDII 3/12/15

	Date/Time		Date/Time
Relinquished by:		Received by: <i>af</i>	3/12/15
Relinquished by:		Received by:	
Relinquished by:		Received by:	

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.

Bottle Type: L-Liter V-Voa S-Soil Jar O-Orbo T-Tedlar B-Brass P-Plastic OT-Other



Tier II Data Validation Report Summary

Client: Apex Oil Company, Inc.	Laboratory: Teklab Environmental Laboratory, Inc.
Project Name: Dissolved Phase Investigation	Sample Matrix: Groundwater
Project Number: 24S-007-001 Task 0545	Sample Start Date: 01/29/2015
Date Validated: 04/02/2015	Sample End Date: 01/29/2015
Parameters Included: <ul style="list-style-type: none">• Volatile Organic Compounds (VOC) by Test Methods for Evaluating Solid Waste (SW846) Method 8260B	
Laboratory Project ID: 15011440	
Data Validator: Kyle Power, Environmental Chemist	
Reviewer: Charlie Ballek, Senior Chemist	

DATA EVALUATION CRITERIA SUMMARY

A Tier II Data Validation was performed by Trihydro Corporation's Chemical Data Evaluation Services Group on the analytical data report package generated by Teklab, Inc. in Collinsville, Illinois, evaluating samples from the Apex Oil Company Hartford Petroleum Release site, located in Hartford, Illinois.

Precision, accuracy, method compliance, and completeness of this data package were assessed during this data review. Precision was determined by evaluating the calculated relative percent difference (RPD) values from:

- Field duplicate pairs
- Matrix spike (MS) and matrix spike duplicate (MSD) pairs
- Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) pairs

Laboratory accuracy was established by reviewing the demonstrated percent recoveries (%R) of the following items to verify that data are not biased.

- MS/MSD samples
- LCS/LCSD samples
- Organic system monitoring compounds (surrogates)

Method compliance was established by reviewing sample integrity, holding times, detection limits, surrogate recoveries, laboratory blanks, initial and continuing calibrations (where applicable), and the LCS/LCSD percent recoveries against method-specific requirements.

Completeness was evaluated by determining the overall ratio of the number of samples and analyses planned versus the number of samples with valid analyses. Determination of completeness included a review of the chain-of-custody (CoC), laboratory analytical methods, and other laboratory and field documents associated with this analytical data set.





Tier II Data Validation Report Summary

SAMPLE NUMBERS TABLE

Client Sample ID	Laboratory Sample Number
HMW-025, 012915	15011440-001
HMW-026, 012915	15011440-002
HMW-027, 012915	15011440-003
HMW-028, 012915	15011440-004
HMW-029, 012915	15011440-005
BD-1, 012915	15011440-006



Tier II Data Validation Report Summary

The laboratory data were reviewed to evaluate compliance with the methods and the quality of the reported data. Assessment of CoC completeness is included in Item 3 of the Data Validation Checklist. A check mark (✓) indicates that the referenced validation criteria were deemed acceptable, whereas a crossed circle (⊗) indicates validation criteria for which the data have been qualified by the data validator. An empty circle (○) indicates that the specified criterion does not apply to the reviewed data. Details are noted in the tables below.

Validation Criteria

- ✓ Data Completeness
- ✓ CoC Documentation (Item 3)
- ✓ Holding Times and Preservation (Items 6 and 7)
- Initial and Continuing Calibrations (Item 9)
- ✓ Laboratory Blanks (Item 10)
- ✓ MS/MSD (Item 12)
- ✓ LCS/LCSD (Item 14)
- ✓ System Monitoring Compounds (i.e., Surrogates) (Item 16)
- Field, Equipment, and Trip Blanks (Item 17)
- ⊗ Field Duplicate (Item 19)
- Laboratory Duplicates (Item 21)

Guidance References

Chemical data validation was conducted in accordance with the United States Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) National Functional Guidelines for the analyses listed below, or by the appropriate method if not covered in the National Functional Guidelines.

- Data for organic analyses were evaluated according to validation criteria set forth in the USEPA CLP National Functional Guidelines for Superfund Organic Methods Data Review, document number EPA-540-R-014-002, August 2014 with additional reference to the USEPA CLP National Functional Guidelines for Organic Data Review, document number EPA 540/R-99/008, October 1999.
- Review of field duplicates was conducted according to the USEPA New England Environmental Data Review Supplement for Regional Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement0, April 2013.
- Trihydro Data Validation Variance Documentation, March 2015.





Tier II Data Validation Report Summary

OVERALL DATA PACKAGE ASSESSMENT

Based on a data validation review, the data are acceptable as delivered. Data qualified by the laboratory are discussed in Item 2 of the Validation Criteria Checklist.

The purpose of validating data and assigning qualifiers is to assist in proper data interpretation. Data that are not qualified meet the site data quality objectives. If values are assigned qualifiers other than an R (rejected, data not usable), the data may be used for site evaluation; however, consideration should be given to the reasons for qualification when interpreting sample concentrations. Data points that are assigned an R qualifier should not be used for site evaluation purposes.

Text identified in **bold font** in the Validation Criteria Checklist indicates that further action and/or qualification of the data were required. Data validation qualifiers were added for the items noted with crossed circles in the Validation Criteria section above. Please see the Data Qualification Summary table at the end of this report for a complete list of samples and analytes qualified.

Data qualifiers used during this validation are included in the following table.

<u>Qualifier</u>	<u>Definition</u>
J	Estimated concentration

Data Completeness

The analyses were performed as requested on the CoC records. The associated samples were received by the laboratory and analyzed properly unless otherwise noted in the Criteria Checklist below. The complete data package consisted of 42 data points. No data points were rejected. The data completeness measure for this data package is calculated to be 100% and is acceptable.



VALIDATION CRITERIA CHECKLIST	
1. Was the report free of non-conformances identified by the laboratory?	Yes
Comments: The laboratory did not identify non-conformances regarding the analytical data.	
2. Were the data free of data qualification flags and/or notes used by the laboratory? If no, define.	Yes
Comments: The laboratory did not use data qualification flags with this data set.	
3. Were sample CoC forms and procedures complete?	Yes
Comments: The CoC records from field to laboratory were complete and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt.	
4. Were detection limits in accordance with the quality assurance project plan (QAPP), permit, or method, or indicated as acceptable?	Yes
Comments: The detection limits appeared to be acceptable. Dilutions were not applied for the sample analyses.	
5. Were the reported analytical methods and constituents in compliance with the QAPP, permit, or CoC? Were any analytes reported by more than one method?	Yes
Comments: The reported analytical methods were in compliance with the CoC and the laboratory reported the requested constituents in accordance with the CoC.	
6. Were samples received in good condition within method-specified requirements?	Yes
Comments: Samples were received on ice, in good condition, and with the cooler temperature within the recommended temperature range of 4°C ± 2°C at 5.42°C as noted in the Case Narrative and Receiving Check List. The laboratory noted that the shipping containers were sealed and custody seals were present.	
7. Were samples extracted/digested and analyzed within method-specified or technical holding times?	Yes
Comments: The samples were extracted and analyzed within method-specific holding times.	
8. Were reported units appropriate for the sample matrix/matrices and analytical method(s)? Specify if wet or dry units were used for soil.	Yes
Comments: The results were reported in concentration units of micrograms per liter (µg/L), which was acceptable for the sample matrix and the analyses requested.	
9. Was there indication from the laboratory that the initial or continuing calibration verification results were within acceptable limits?	N/A
Comments: Initial and continuing calibration data were not included as part of this data set; however, these data were assumed to be acceptable as the laboratory did not note that any calibration verification results were outside acceptable limits.	
10. Was the total number of laboratory blank samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of laboratory blank samples prepared was equal to at least 5% of the total number of samples.	
11. Were laboratory blank samples reported to be free of target analyte contamination?	Yes
Comments: The laboratory blank sample was reported to be free of target analyte contamination.	



VALIDATION CRITERIA CHECKLIST	
12. Was the total number of MS samples prepared equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of matrix spike samples prepared was equal to at least 5% of the total number of samples. Matrix spike samples were prepared for batch 105943 from sample BD-1, 012915.	
13. For MS/MSDs prepared from project samples, were percent recoveries and RPDs within data validation or laboratory quality control (QC) limits?	Yes
Comments: The MS/MSD percent recoveries and RPDs for project samples were within laboratory QC limits.	
14. Was the total number of LCSs analyzed equal to at least 5% of the total number of samples or analyzed as required by the method?	Yes
Comments: The total number of LCS samples analyzed was equal to at least 5% of the total number of samples.	
15. Were LCS/LCSD percent recoveries and LCS/LCSD RPDs within data validation or laboratory QC limits?	Yes
Comments: The LCS/LCSD percent recoveries and LCS/LCSD RPDs were within laboratory QC limits.	
16. Were surrogate recoveries within laboratory QC limits?	Yes
Comments: Surrogate recoveries were within laboratory QC limits.	
17. Were the number of trip blank, field blank, and/or equipment blank samples collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	No
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
18. Were the trip blank, field blank, and/or equipment blank samples reported to be free of target analyte contamination?	N/A
Comments: Trip, field, and equipment blank samples were not collected for this sample set.	
19. Was the number of field duplicates collected equal to at least 10% of the total number of samples or as required by the project guidelines, QAPP, SAP, or permit?	Yes
Comments: The number of field duplicates collected was equal to at least 10% of the number of samples. Sample BD-1, 012915 was collected as a field duplicate of sample HMW-025, 012915.	
20. Were field duplicate RPD values within data validation QC limits (soil 0-50%, water 0-30%, or air 0-25%)?	No
Comments: As indicated in the Field Duplicate Summary Table at the end of this report, field duplicate RPD values were within data validation QC limits of 0-30% for water samples, with the following exception. The RPD value for total xylenes exceeded the upper data validation QC limit of 30% at 80.5%, which was evidence of poor precision. Total xylenes were qualified as J for samples HMW-025, 012915 and BD-1, 012915.	
21. For laboratory duplicates prepared from project samples, were RPDs within laboratory QC limits?	N/A
Comments: Laboratory duplicate samples were not prepared for this sample set.	



FIELD DUPLICATE SUMMARY

Client Sample ID: HMW-025, 012915				
Field Duplicate Sample ID: BD-1, 012915				
Analyte	Method	Laboratory Result (µg/L)	Duplicate Result (µg/L)	Relative Percent Difference (RPD)
Benzene	8260B	2.8	ND (2)	DL
Ethylbenzene	8260B	1.6	ND (1)	DL
Xylenes, Total	8260B	5.4	2.3	80.5%
<p>Field duplicate RPD control limits are not to exceed 30% for water as established by USEPA New England Environmental Data Review Supplement for Regional Data Review Elements and Superfund Specific Guidance/Procedures, EQADR-Supplement0, April 2013.</p> <p>DL – Indicates that the analyte was detected in one of the duplicate samples and was undetected in the other sample, and therefore an RPD could not be calculated. Data were not qualified since the detection was within two times the reporting limit. Non-detected results are indicated above with the applicable reporting limit as ND (RL).</p> <p>The RPD value for total xylenes exceeded the upper data validation QC limit and was qualified as J for samples HMW-025, 012915 and BD-1, 012915 due to evidence of poor precision.</p>				



DATA QUALIFICATION SUMMARY

Abbreviation	Reason
MDLRL	Result is greater than MDL but less than RL
ERPD-FD	High field duplicate RPD.

Analyte	Method	Field Sample ID	Lab Sample ID	Result	Limit	Units	Reviewer Qualifier	DV Flag Reasons
Ethylbenzene	SW8260B	HMW-025, 012915	15011440-001A	1.0	1.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	HMW-025, 012915	15011440-001A	5.4	5.0	µg/L	J	ERPD-FD
Xylenes, Total	SW8260B	BD-1, 012915	15011440-006A	2.3	5.0	µg/L	J	ERPD-FD
Xylenes, Total	SW8260B	HMW-026, 012915	15011440-002A	2.6	5.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	HMW-027, 012915	15011440-003A	2.3	5.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	HMW-028, 012915	15011440-004A	1.8	5.0	µg/L	J	MDLRL
Xylenes, Total	SW8260B	HMW-029, 012915	15011440-005A	1.4	5.0	µg/L	J	MDLRL

