

June 13, 2019

Project No. 19119232

Ms. Maureen Hatfield

Texas Commission on Environmental Quality
MC-127
VCP-CA Section, Remediation Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

**RE: DNAPL RECOVERY ACTIVITIES QUARTERLY REPORT – 1ST QUARTER 2019
UNION PACIFIC RAILROAD HOUSTON WOOD PRESERVING WORKS FACILITY
4910 LIBERTY ROAD FACILITY, HOUSTON, TEXAS
POST-CLOSURE CARE PERMIT NO. HW-50343; INDUSTRIAL SWR NO. 31547**

Dear Ms. Hatfield:

Golder Associates Inc. (Golder), on behalf of Union Pacific Railroad Company (UPRR), is pleased to provide this 1st Quarter 2019 summary report for the dense non-aqueous phase liquid (DNAPL) recovery activities conducted at the UPRR Houston Wood Preserving Works Facility (the Site). As detailed in the Response Action Plan (RAP) dated November 24, 2014, a 24-month DNAPL recovery pilot test was conducted at the Site that consisted of manual DNAPL recovery on a monthly basis of selected wells. Following the 24-month testing period, the DNAPL recovery activities have continued monthly, and will continue monthly following the same procedures detailed in the RAP. The following monitoring wells are included as part of the DNAPL recovery activities:

Well Name	Zone
MW-57A	A-TZ
MW-78A	A-TZ
MW-12B	B-TZ
MW-32B	B-CZ
MW-41B	B-TZ
MW-57B	B-CZ
MW-70B	B-CZ
MW-75B	B-CZ
MW-23C	C-TZ
MW-34CR	C-TZ
MW-44C	C-TZ
MW-45C	C-TZ
MW-46C	C-TZ

Figure 1 shows the location of the DNAPL recovery wells.

The DNAPL recovery activities consist of measuring the depth to groundwater surface, the depth to groundwater/DNAPL interface, and the total depth of the well relative to the top of casing prior to DNAPL recovery. Using a peristaltic pump or submersible pump, DNAPL is pumped from the bottom of the well until groundwater returns in the pump discharge. The volume of recovered DNAPL is estimated from each well based on the volume pumped, and the well is gauged to measure the total depth of the well and depth to residual DNAPL following pumping. Recovered DNAPL is temporarily stored at the Containment Storage Area. The most recent waste manifests for the recovered DNAPL and groundwater are provided in Attachment A.

A summary of the DNAPL recovery measurements from February 2013 through March 2019 (measured April 2, 2019) is provided in Table 1. A graph of DNAPL thicknesses prior to each monthly recovery efforts over time is presented on Figure 2. Observations from the recovery activities are provided below:

- **A-TZ Wells:** Initially, MW-57A was the only well completed in the A-TZ Unit that contained DNAPL. DNAPL thickness decreased from 4.78 feet in February 2013 to less than 1 foot thick from October 2013 through January 2015 in MW-57A. DNAPL thickness decreased in MW-57A in January 2015 from 0.39 feet to not detected in August 2015. No measurable DNAPL has been detected in MW-57A since August 2015 (approximately 43 months). However, DNAPL was noted on the end of probe at MW-57A in January 2019 through April 2019. Following installation of MW-78A in May 2014 in the Englewood Intermodal Yard and detection of DNAPL in the well, MW-78A was incorporated in the recovery program starting in early November 2014. DNAPL thickness in MW-78A was measured at 4.06 feet (late January 2015), increased to 5.38 feet (late February 2015), and has steadily decreased to 0.92 feet (April 2019).
- **B-TZ/B-CZ Wells:** At the beginning of the recovery activities, monitoring wells with the thickest DNAPL measurements included MW-12B and MW-41B on the west side of the Site (Figure 1). DNAPL thicknesses increased following the February 2013 recovery event in MW-12B (May 2013) and in MW-41B (June 2013). However, DNAPL thicknesses in well MW-12B gradually decreased from 8.18 feet in May 2013 to 0.11 feet thick in August 2015, with a slight increase to 0.65 feet from August 2015 to February 2016. Since February 2016, the DNAPL thickness in MW-12B has fluctuated between 0.19 feet (August 2018) to 0.6 feet (September 2017).

DNAPL thicknesses in MW-41B during the first months of the recovery activities increased to 10.26 feet (August 2013). Measured thicknesses through May 2014 fluctuated, then began a steady decrease over time, with a slight increase from January to May 2015, and from April to May 2017. Since August 2017, DNAPL thickness in MW-41B has been relatively stable at about 4 feet thick over that period fluctuating only about 0.26 feet in the monthly measurements (3.92 feet to 4.18 feet) (Figure 2).

Monitoring well MW-32B had a DNAPL thickness of 6.23 feet at the beginning of the recovery activities in February 2013. During the first 12 months, DNAPL thicknesses in the well generally decreased to less than two-feet thick by September 2013. Over the past year, the DNAPL thickness in this well has fluctuated between 0.11 feet (January 2019) and 0.29 feet (June 2018).

DNAPL thickness in well MW-57B decreased from 1.28 feet thick in July 2013 to less than measurable (DNAPL noted on end of probe) thickness in January 2014 through early October 2014. Since June

2016, no measurable DNAPL has been detected in MW-57B. DNAPL was noted on the end of probe at MW-57B in January 2019 through April 2019.

Wells MW-70B and MW-75B had measurable DNAPL at 1.61 feet and 3.1 feet, respectively, at the beginning of the recovery activities (February 2013). During the first 12 months of recovery activities, DNAPL thicknesses in these wells generally decreased to less than one-foot thick, then increased to just over one foot thick in early October 2014. Over the past six months, DNAPL thickness in MW-70B has remained relatively stable fluctuating between 0.44 feet (November 2018) and 0.29 feet (February 2019) thick. DNAPL thickness in MW-75B has fluctuated over the past six months between 0.19 feet (January 2019) to 0.27 feet (November 2018).

- C-TZ Wells: Similar to the wells measured in the other units, DNAPL thicknesses in the C-TZ wells MW-44C, MW-45C, and MW-46C significantly decreased over the first two months of recovery activities, with some sporadic increases from May through August 2013 (Figure 2). From December 2013 through early October 2014, C-TZ wells MW-44C, MW-45C, and MW-46C showed increasing DNAPL thicknesses with the largest increase at MW-44C of about 1.57 feet. Since August 2015, no DNAPL has been detected in MW-45C. MW-44C was unable to be measured during March, April, and May 2018 due to road construction activities that had covered the well. Before this interruption, the DNAPL thickness in MW-44C had remained relatively stable from July 2017 to February 2018, ranging from 0.37 feet (September 2017) to 0.46 feet (February 2018). The DNAPL thickness has ranged from 0.41 (April 2019) to 0.34 (November 2018) over the past six months. DNAPL thickness in well MW-46C has fluctuated between 0.58 feet (April 2019) to 0.41 feet (February 2019) over the past six months. Well MW-34C was gauged in October 2013, and no DNAPL was measured in the well (the well historically had DNAPL sporadically present). In May 2014, replacement well MW-34CR was installed and is now gauged as part of the recovery program. However, no DNAPL has been detected in this well.

Monitoring well MW-23C was added to the pilot test program in early November 2014. The initial DNAPL thickness in the well in November 2014 was 2.09 feet. Through October 2016, the DNAPL thickness has steadily decreased to less than one foot in the well, with a slight increase from October 2016 to February 2017. From February 2017 to February 2018, there was a steady decrease in DNAPL thickness from 1.06 feet to 0.34 feet. Over the past six months, DNAPL thickness in MW-23C has remained relatively stable fluctuating between 0.36 feet (February 2019) and 0.50 (November 2018).

- DNAPL Recovery: From February 2013 to April 2019, an estimated 570 gallons of creosote DNAPL have been recovered from the wells, with monthly DNAPL recovery volumes increased after the January 2015 event (changed pumping techniques). Over the past six months, recovery has ranged from approximately 7.50 to 8.75 gallons per month (Table 1).

With the on-going monthly DNAPL recovery activities, the overall trend in DNAPL thicknesses over the past six months has been either 1) a stable or decreasing trend in the wells with a significant DNAPL thickness (MW-41B and MW-78A) or 2) a relatively stable trend for the wells with less than a foot of measurable DNAPL thickness. In response to the TCEQ 4th Technical Notice of Deficiency (TNOD) letter dated April 11, 2019, UPRR and Golder are developing plans for a DNAPL Site Assessment to evaluate the overall DNAPL recovery at the Site. In the interim, UPRR will continue to conduct monthly manual bailing of DNAPL from the monitoring wells, will evaluate

more frequent recovery events, and will continue to submit quarterly DNAPL recovery activities reports to the TCEQ.

If you have any questions or need additional information, please feel free to call me at (512) 671-3434 or Mr. Kevin Peterburs of UPRR at (414) 267-4164.

Sincerely,

Golder Associates Inc.



Eric Matzner, P.G.
Associate Hydrogeologist



CC: Waste Program Manager, TCEQ Region 12, Houston
Mr. Kevin Peterburs, UPRR – Milwaukee, WI

Attachments: Table 1 - Summary of DNAPL Recovery Measurements
Figure 1 – In-Well DNAPL Thickness – April 2019
Figure 2 - DNAPL Recovery Activities February 2013 – April 2019
Attachment A – Recovered DNAPL Waste Manifest

TABLES

TABLE 1

**SUMMARY OF DNAPL RECOVERY MEASUREMENTS
UPRR HOUSTON, TX - WOOD PRESERVING WORKS**

DNAPL Recovery Date	MW-12B				MW-23C				MW-32B				MW-33BR			
	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)
2/14/2013	9.06	39.87	5.93	2.5	NM	NM	NM	0	6.01	30.06	6.23	2	3.72	ND	0	0
4/3/2013	9.41	39.95	5.85	1	NM	NM	NM	0	4.86	33.61	2.68	1	4.02	PoP	0	0
4/22/2013	8.61	31.64	14.16	0.5*	NM	NM	NM	0	5.62	36.08	0.21	0.25	3.63	ND	0	0
5/30/2013	8.47	37.62	8.18	1.5*	NM	NM	NM	0	5.86	32.21	4.08	2	3.59	ND	0	0
6/29/2013	9.62	38.22	7.58	1.5	NM	NM	NM	0	6.79	33.59	2.7	1.5	6.07	ND	0	0
7/22/2013	11.16	39.04	6.76	1	NM	NM	NM	0	7.14	33.91	2.38	1.5	9.68	ND	0	0
8/26/2013	11.31	39.61	6.19	1	NM	NM	NM	0	7.48	33.83	2.46	1	9.86	ND	0	0
9/27/2013	11.17	40.63	5.17	1	NM	NM	NM	0	7.23	34.39	1.9	1	9.57	ND	0	0
10/31/2013	11.09	43.71	2.09	1	NM	NM	NM	0	7.16	34.96	1.33	0.53	9.32	ND	0	0
11/27/2013	11.17	44.06	1.74	1	NM	NM	NM	0	7.29	35.03	1.26	0.53	9.16	ND	0	0
12/31/2013	11.02	44.62	1.18	1	NM	NM	NM	0	7.16	35.16	1.13	0.5	8.97	ND	0	0
1/30/2014	11.34	45.12	0.68	1	NM	NM	NM	0	6.72	34.82	1.47	0.53	7.41	ND	0	0
3/3/2014	11.17	44.32	1.48	1	NM	NM	NM	0	6.53	34.52	1.77	0.53	7.16	ND	0	0
3/31/2014	11.03	44.53	1.27	1	NM	NM	NM	0	6.29	34.21	2.08	0.53	7.04	ND	0	0
4/30/2014	10.92	44.26	1.54	1	NM	NM	NM	0	6.42	34.67	1.62	0.53	6.88	ND	0	0
5/27/2014	10.81	44.34	1.46	1	NM	NM	NM	0	6.36	34.72	1.57	0.53	6.72	ND	0	0
6/26/2014	10.72	44.61	1.19	1	NM	NM	NM	0	6.21	34.61	1.68	0.53	6.52	ND	0	0
7/31/2014	10.13	44.96	0.84	1	NM	NM	NM	0	6.06	34.33	1.96	0.25	6.29	ND	0	0
8/27/2014	10.26	45.12	0.68	1	NM	NM	NM	0	6.18	34.98	1.31	0.25	6.47	ND	0	0
10/3/2014	10.17	44.91	0.89	1	NM	NM	NM	0	6.06	34.72	1.57	0.25	6.32	ND	0	0
11/3/2014	10.29	44.97	0.83	1	22.51	70.71	2.09	0.25	6.18	34.91	1.38	0.25	NM	NM	NM	0
11/24/2014	10.27	44.99	0.81	1	22.56	70.92	1.88	0.5	6.21	35.16	1.13	0.5	NM	NM	NM	0
12/22/2014	10.23	44.71	1.09	1	22.47	70.81	1.99	0.5	6.14	35.02	1.27	0.75	NM	NM	NM	0
1/29/2015	10.16	44.96	0.84	1	22.26	71.04	1.76	0.5	5.71	35.29	1	0.75	NM	NM	NM	0
2/26/2015	10.12	44.96	0.84	1.5	22.06	71.09	1.71	0.5	6.02	35.29	1	1	NM	NM	NM	0
3/26/2015	9.96	45.21	0.59	1.5	22.17	71.12	1.68	0.25	5.46	35.36	0.93	1	NM	NM	NM	0
4/27/2015	9.89	45.37	0.43	1.5	22.23	71.06	1.74	0.5	5.21	35.29	1	1	NM	NM	NM	0
5/26/2015	9.72	45.61	0.19	2	22.17	71.14	1.66	0.5	5.07	35.46	0.83	1	NM	NM	NM	0
7/6/2015	7.12	45.96	0.24	2	19.01	71.39	1.41	0.5	4.06	35.66	0.63	1	NM	NM	NM	0
8/3/2015	7.26	46.09	0.11	2	19.16	71.46	1.34	0.75	4.29	35.71	0.58	1	NM	NM	NM	0
8/27/2015	8.09	46.01	0.19	1	20.34	71.51	1.29	0.75	5.05	35.77	0.52	1	NM	NM	NM	0
10/5/2015	7.12	45.86	0.34	1	19.02	71.57	1.23	0.5	4.31	35.96	0.33	1	NM	NM	NM	0
11/5/2015	6.86	45.81	0.39	1	18.59	71.59	1.21	0.5	4.02	35.91	0.38	1	NM	NM	NM	0
12/3/2015	6.46	45.79	0.41	1	18.33	71.67	1.13	0.5	3.92	35.96	0.33	1	NM	NM	NM	0
12/28/2015	6.23	45.62	0.58	1.25	23.21	71.61	1.19	0.75	3.73	35.91	0.38	1	NM	NM	NM	0
2/3/2016	6.04	45.55	0.65	1.5	17.96	71.64	1.16	0.5	3.61	35.87	0.42	1	NM	NM	NM	0
3/3/2016	5.96	45.61	0.59	1.5	17.92	71.71	1.09	0.5	3.51	35.91	0.38	1	NM	NM	NM	0
3/31/2016	6.06	45.72	0.48	1.5	17.86	71.79	1.01	0.5	3.56	35.92	0.37	1	NM	NM	NM	0
5/3/2016	6.13	45.66	0.54	1	NM	NM	NM	0	3.67	35.87	0.53	0.5	NM	NM	NM	0
6/2/2016	6.21	45.61	0.59	1	22.9	71.51	1.29	0.5	3.74	35.92	0.48	0.5	NM	NM	NM	0
7/8/2016	6.29	45.72	0.48	1	23.09	71.52	1.28	0.25	3.91	35.96	0.44	0.5	NM	NM	NM	0
8/3/2016	6.34	45.77	0.43	1	23.16	71.66	1.14	0.25	4.03	35.49	0.91	0.5	NM	NM	NM	0
8/30/2016	6.47	45.69	0.51	1	23.31	71.61	1.19	0.5	4.22	36.09	0.31	0.5	NM	NM	NM	0
9/30/2016	6.59	45.81	0.39	1	23.39	71.81	0.99	0.5	4.33	35.91	0.49	0.5	NM	NM	NM	0
11/3/2016	6.64	45.92	0.28	1	23.41	71.98	0.82	0.5	4.47	35.99	0.41	0.5	NM	NM	NM	0
11/30/2016	6.86	45.86	0.34	0.5	23.59	71.91	0.89	0.75	4.62	35.91	0.49	0.5	NM	NM	NM	0
1/4/2017	7.02	45.81	0.39	0.5	23.74	71.82	0.98	0.75	4.83	36.02	0.38	0.25	NM	NM	NM	0
2/7/2017	6.97	45.69	0.51	0.5	23.67	71.74	1.06	0.75	4.81	35.91	0.49	0.25	NM	NM	NM	0
3/2/2017	6.91	45.64	0.56	0.5	23.54	76.82	0.98	0.75	4.66	35.97	0.43	0.25	NM	NM	NM	0
4/3/2017	6.82	45.71	0.49	0.5	23.46	76.96	0.84	0.75	4.57	36.01	0.39	0.25	NM	NM	NM	0
4/27/2017	6.74	45.64	0.56	0.5	23.21	77.04	0.76	0.5	4.51	36.06	0.34	0.25	NM	NM	NM	0
5/29/2017	6.89	45.77	0.43	0.5	23.49	77.21	0.59	0.25	4.74	36.03	0.37	0.25	NM	NM	NM	0
7/5/2017	7.01	45.71	0.49	0.5	23.61	77.27	0.53	0.25	4.86	36.13	0.27	0.25	NM	NM	NM	0
8/1/2017	7.14	45.63	0.57	0.75	23.79	77.17	0.63	0.25	4.99	36.24	0.16	0.25	NM	NM	NM	0
9/5/2017	7.03	45.6	0.6	1	23.67	77.29	0.51	0.25	4.78	36.24	0.16	0.25	NM	NM	NM	0
10/4/2017	7.07	45.69	0.51	1	23.61	77.36	0.44	0.25	4.89	36.29	0.11	0.25	NM	NM	NM	0
11/2/2017	7.11	45.76	0.44	1	23.74	77.42	0.38	0.25	4.96	36.26	0.14	0.25	NM	NM	NM	0
11/29/2017	7.16	45.71	0.49	1	23.81	77.4	0.40	0.25	5.06	36.31	0.09	0.25	NM	NM	NM	0
1/2/2018	6.96	45.82	0.38	1	23.67	77.43	0.37	0.25	4.93	36.27	0.13	0.25	NM	NM	NM	0
2/7/2018	7.13	45.87	0.33	1	23.86	77.46	0.34	0.25	5.16	36.21	0.19	0.25	NM	NM	NM	0
3/1/2018	7.36	45.96	0.24	1	23.96	77.41	0.39	0.25	5.38	36.13	0.27	0.25	NM	NM	NM	0
4/2/2018	7.29	45.94	0.26	1	23.9	77.32	0.48	0.5	5.31	36.18	0.22	0.25	NM	NM	NM	0
5/1/2018	8.17	45.91	0.29	1	24.47	77.39	0.41	0.5	6.12	36.23	0.17	0.5	NM	NM	NM	0
6/1/2018	8.49	45.86	0.34	1	24.81	77.31	0.49	0.5	6.41	36.19	0.21	0.5	NM	NM	NM	0
6/29/2018	8.62	45.81	0.39	1	24.99	77.37	0.43	0.5	6.59	36.11	0.29	0.75	NM	NM	NM	0
8/3/2018	8.79	45.96	0.24	1	25.12	77.39	0.41	0.5	6.74	36.19	0.21	0.75	NM	NM	NM	0
8/31/2018	8.32	46.01	0.19	0.75	24.81	77.43	0.37	0.5	6.47	36.23	0.17	0.75	NM	NM	NM	0
9/28/2018	8.27	45.93	0.27	0.5	24.69	77.39	0.41	0.5	6.41	36.19	0.21	0.75	NM	NM	NM	0
11/2/2018	8.16	45.91	0.29	0.5	24.57	77.36	0.44	0.5	6.33	36.21	0.19	0.5	NM	NM	NM	0
11/29/2018	8.01	45.9	0.30	0.5	24.36	77.3	0.50	0.5	6.21	36.27	0.13	0.25	NM	NM	NM	0
1/2/2019	7.96	45.87	0.33	0.5	24.29	77.31	0.49	0.5	6.09	36.29	0.11	0.25	NM	NM	NM	0
2/2/2019	7.82	45.89	0.31	0.5	24.21	77.44	0.36	0.5	5.97	36.24	0.16	0.5	NM	NM	NM	0
2/28/2019	7.69	45.81	0.39	0.5	24.16	77.36	0.44	0.5	5.86	36.21	0.19	0.25	NM	NM	NM	0
4/2/2019	7.61	45.8	0.4	0.5	24.08	77.32	0.48	0.5	5.79	36.24	0.16	0.25	NM	NM	NM	0
Total DNAPL Pumped (gal)	74.25				25				45.99				0			

Notes:

* - indicates DNAPL and groundwater mixture

--- - No DNAPL pumped

DTW - Depth to water (feet Below Top of Casing (BTOC))

DTD - Depth to DNAPL (feet BTOC)

ND - Not detected

NM - Not measured

PoP - Product on probe, not measureable

TR- Trace amount of DNAPL Extracted

MW-12B- TD measured at 46.2 instead of 45.8, August 28, 2015.

MW-23C- added 5 feet to TOC due to capping after 2/3/2016

TABLE 1

**SUMMARY OF DNAPL RECOVERY MEASUREMENTS
UPRR HOUSTON, TX - WOOD PRESERVING WORKS**

DNAPL Recovery Date	MW-34C/MW-34CR (July 2014)				MW-41B				MW-44C				MW-45C			
	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)
2/14/2013	NM	NM	NM	0	8.91	41.1	3.71	3	18.96	62.95	7.85	1	21.26	69.9	0.7	0.25
4/3/2013	NM	NM	NM	0	9.37	41.6	3.21	1.5	19.34	70.47	0.33	0.25*	21.39	70.39	0.21	0.25*
4/22/2013	NM	NM	NM	0	8.62	41.6	3.21	0.5*	18.62	70.64	0.16	0.25*	21.03	70.47	0.13	0.25*
5/30/2013	NM	NM	NM	0	8.73	34.16	10.65	2	18.43	70.01	0.79	0.25*	21.16	70.25	0.35	0.25*
6/29/2013	NM	NM	NM	0	9.72	37.12	7.69	2	19.34	70.32	0.48	0.25	21.93	70.32	0.28	0.25*
7/22/2013	NM	NM	NM	0	10.31	39.29	5.52	1.5	20.36	70.26	0.54	0.25	22.72	70.39	0.21	0.25*
8/26/2013	NM	NM	NM	0	10.09	34.55	10.26	2.5	20.62	70.39	0.41	0.25	22.86	70.31	0.29	0.25
9/27/2013	NM	NM	NM	0	9.63	37.29	7.52	2	20.39	70.61	0.19	0.25	22.66	70.17	0.43	0.25
10/31/2013	21.63	NM	NM	0	9.52	38.16	6.65	2	20.17	70.75	0.05	0.07	22.59	70.42	0.18	0.13
11/27/2013	NM	NM	NM	0	9.57	38.39	6.42	2	20.09	70.78	0.02	0.00	22.52	70.49	0.11	0
12/31/2013	NM	NM	NM	0	9.42	39.36	5.45	2	20.01	70.8	PoP	0.00	22.39	70.46	0.14	0
1/30/2014	NM	NM	NM	0	9.06	39.17	5.64	2	19.67	70.42	0.38	0.25	22.13	70.35	0.25	0
3/3/2014	NM	NM	NM	0	8.62	38.06	6.75	2	19.29	70.17	0.63	0.25	21.86	70.09	0.51	0
3/31/2014	NM	NM	NM	0	8.52	37.74	7.07	2	19.17	70.02	0.78	0.25	21.71	69.63	0.97	0.25
4/30/2014	NM	NM	NM	0	8.36	37.21	7.6	2	19.02	69.81	0.99	0.25	21.59	69.74	0.86	0.25
5/27/2014	NM	NM	NM	0	8.26	37.29	7.52	2	18.92	69.71	1.09	0.00	21.52	69.67	0.93	0.25
6/26/2014	NM	NM	NM	0	8.02	37.47	7.34	2	18.81	69.52	1.28	0.25	21.59	69.77	0.83	0.25
7/31/2014	19.06	ND	0	0	8.21	37.92	6.89	2	18.66	69.37	1.43	0.25	21.21	69.96	0.64	0.25
8/27/2014	18.96	ND	0	0	8.07	38.29	6.52	1.5	18.53	69.47	1.33	0.25	21.13	70.12	0.48	0.25
10/3/2014	18.81	ND	0	0	8.02	38.13	6.68	2	18.41	69.23	1.57	0.25	20.13	70.41	0.19	0.25
11/3/2014	19.06	ND	0	0	8.22	38.29	6.52	2	18.52	69.37	1.43	0.25	20.29	70.36	0.24	0.25
11/24/2014	19.11	ND	0	0	8.27	38.47	6.34	2	18.57	69.49	1.31	0.5	20.34	70.48	0.12	0.25
12/22/2014	19.06	ND	0	0	8.16	38.39	6.42	2	18.51	69.31	1.49	0.5	20.31	70.41	0.19	0.25
1/29/2015	18.79	ND	0	0	8.02	39.16	5.65	1.5	18.39	69.39	1.41	0.5	20.17	70.51	0.09	0.25
2/26/2015	18.71	ND	0	0	7.92	39.06	5.75	2.5	18.42	69.51	1.29	0.5	20.11	70.59	0.01	0
3/26/2015	18.67	ND	0	0	7.83	38.74	6.07	2.5	18.39	69.42	1.38	0.25	19.26	70.52	0.08	0
4/27/2015	18.79	ND	0	0	8.02	38.61	6.20	3	18.29	69.52	1.28	0.5	20.17	70.48	0.12	0.25
5/26/2015	18.63	ND	0	0	7.91	38.72	6.09	3	18.17	69.57	1.23	0.75	20.12	70.41	0.19	0.25
7/6/2015	17.29	ND	0	0	6.03	38.96	5.85	2.5	16.29	69.86	0.94	0.5	18.07	70.49	0.11	0.25
8/3/2015	17.21	ND	0	0	6.09	39.01	5.80	2.5	16.18	69.82	0.98	0.5	18.16	70.56	0.04	TR*
8/27/2015	18.46	ND	0	0	7.39	39.14	5.67	2	17.46	69.74	1.06	0.25	19.03	70.54	0.06	TR*
10/5/2015	17.29	ND	0	0	6.32	39.34	5.47	2	16.83	69.86	0.94	0.25	18.39	ND	0	0
11/5/2015	16.78	ND	0	0	6.01	39.51	5.30	2	16.62	69.79	1.01	0.25	17.96	ND	0	0
12/3/2015	16.44	ND	0	0	5.76	39.56	5.25	2	16.46	69.73	1.07	0.25	17.72	ND	0	0
12/28/2015	16.16	ND	0	0	5.62	39.63	5.18	2.25	16.32	69.77	1.03	0.25	17.62	ND	0	0
2/3/2016	15.98	ND	0	0	5.32	39.72	5.09	3	16.17	69.74	1.06	0.25	17.42	ND	0	0
3/3/2016	15.98	ND	0	0	5.17	39.81	5.00	3	16.12	69.79	1.01	0.25	17.39	ND	0	0
3/31/2016	15.98	ND	0	0	5.26	39.77	5.04	3	16.06	69.71	1.09	0.25	17.33	ND	0	0
5/3/2016	15.79	ND	0	0	5.52	39.96	4.85	3	16.27	69.59	1.21	0.25	17.47	ND	0	0
6/2/2016	15.97	ND	0	0	5.67	40.07	4.74	3	16.38	69.63	1.17	0.25	17.52	ND	0	0
7/8/2016	16.06	ND	0	0	5.72	40.01	4.8	3	16.47	69.71	1.09	0.25	17.62	ND	0	0
8/3/2016	16.17	ND	0	0	5.79	40.09	4.72	3	16.59	69.7	1.1	0.25	17.69	ND	0	0
8/30/2016	16.31	ND	0	0	5.91	40.26	4.55	3	16.67	69.58	1.22	0.25	17.76	ND	0	0
9/30/2016	16.42	ND	0	0	6.06	40.13	4.68	3	16.79	69.49	1.31	0.5	17.86	ND	0	0
11/3/2016	16.51	ND	0	0	6.11	40.29	4.52	3	16.86	69.71	1.09	0.5	17.92	ND	0	0
11/30/2016	16.72	ND	0	0	6.26	40.42	4.39	3	17.03	69.94	0.86	0.75	18.09	ND	0	0
1/4/2017	16.94	ND	0	0	6.39	40.56	4.25	3	17.22	70.11	0.69	0.75	18.22	ND	0	0
2/7/2017	16.91	ND	0	0	6.44	40.51	4.3	3	17.29	70.01	0.79	0.5	18.17	ND	0	0
3/2/2017	16.78	ND	0	0	6.29	40.76	4.05	3	17.17	70.16	0.64	0.5	17.96	ND	0	0
4/3/2017	16.71	ND	0	0	6.21	40.67	4.14	2.5	17.06	70.21	0.59	0	17.89	ND	0	0
4/27/2017	16.61	ND	0	0	6.19	40.87	3.94	3	17.01	70.29	0.51	0	17.67	ND	0	0
5/29/2017	16.84	ND	0	0	6.14	40.29	4.52	3	17.23	70.24	0.56	0.25	17.84	ND	0	0
7/5/2017	17.01	ND	0	0	6.34	40.57	4.24	2.5	17.33	70.34	0.46	0.25	17.96	ND	0	0
8/1/2017	17.17	ND	0	0	6.42	40.79	4.02	3	17.39	70.39	0.41	0.25	18.09	ND	0	0
9/5/2017	17.11	ND	0	0	6.36	40.68	4.13	3	17.36	70.43	0.37	0.25	18.16	ND	0	0
10/4/2017	17.06	ND	0	0	6.29	40.69	4.12	2.5	17.31	70.41	0.39	0.25	18.21	ND	0	0
11/2/2017	17.17	ND	0	0	6.41	40.73	4.08	3	17.42	70.4	0.4	0.25	18.32	ND	0	0
11/29/2017	17.29	ND	0	0	6.52	40.82	3.99	2.5	17.49	70.36	0.44	0.25	18.43	ND	0	0
1/2/2018	17.52	ND	0	0	6.72	40.72	4.09	2.5	17.67	70.31	0.49	0.5	18.73	ND	0	0
2/7/2018	18.11	ND	0	0	6.97	40.79	4.02	2.5	17.77	70.34	0.46	0.5	18.62	ND	0	0
3/1/2018	18.38	ND	0	0	7.16	40.63	4.18	2	NM	NM	NM	0	18.79	ND	0	0
4/2/2018	18.29	ND	0	0	7.13	40.71	4.10	2	NM	NM	NM	0	18.72	ND	0	0
5/1/2018	18.33	ND	0	0	8.26	40.76	4.05	2	NM	NM	NM	0	19.31	ND	0	0
6/1/2018	18.62	ND	0	0	8.71	40.81	4.00	2.25	18.31	70.17	0.63	0.75	19.47	ND	0	0
6/29/2018	18.91	ND	0	0	9.02	40.71	4.10	2.5	18.79	70.39	0.41	0.75	19.67	ND	0	0
8/3/2018	19.06	ND	0	0	9.13	40.76	4.05	2.5	18.97	70.36	0.44	0.75	19.77	ND	0	0
8/31/2018	18.77	ND	0	0	8.89	40.86	3.95	2	18.87	70.39	0.41	0.5	19.41	ND	0	0
9/28/2018	18.64	ND	0	0	8.77	40.76	4.05	2	18.82	70.41	0.39	0.75	19.32	ND	0	0
11/2/2018	18.57	ND	0	0	8.61	40.71	4.10	2	18.67	70.44	0.36	0.75	19.26	ND	0	0
11/29/2018	18.39	ND	0	0	8.41	40.81	4.00	2	18.47	70.46	0.34	0.25	19.16	ND	0	0
1/2/2019	18.26	ND	0	0	8.22	40.83	3.98	2	18.42	70.41	0.39	0.5	19.02	ND	0	0
2/2/2019	18.19	ND	0	0	8.16	40.89	3.92	2	18.29	70.41	0.39	0.5	18.93	ND	0	0
2/28/2019	18.02	ND	0	0	8.03	40.76	4.05	3	18.16	70.42	0.38	0.5	18.77	ND	0	0
4/2/2019	17.96	ND	0	0	7.93	40.69	4.12	3	18.09	70.39	0.41	0.5	18.71	ND	0	0
Total DNAPL Pumped (gal)	0				175.5				25.57				5.63			

Notes:

* - indicates DNAPL and groundwater mixture

ND - Not detected

MW-44C not measured 3/1/18 - 5/1/18; couldn't locate well due to construction.

--- - No DNAPL pumped

NM - Not measured

DTW - Depth to water (feet Below Top of Casing (BTOC))

PoP - Product on paper, not measureable

DTD - Depth to DNAPL (feet BTOC)

TR- Trace amount of DNAPL Extracted

TABLE 1

**SUMMARY OF DNAPL RECOVERY MEASUREMENTS
UPRR HOUSTON, TX - WOOD PRESERVING WORKS**

DNAPL Recovery Date	MW-46C				MW-57A				MW-57B				MW-70B			
	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)
2/14/2013	21.07	71.3	1.6	0.25	10.56	22.12	4.78	0.5	28.56	41.41	1.54	0.25	6.57	34.09	1.61	0.25
4/3/2013	20.61	72.36	0.54	0.25*	10.32	24.79	2.11	0.5	28.09	42.36	0.59	0.25*	6.79	35.26	0.44	0.25
4/22/2013	20.61	72.61	0.29	0.25*	10.71	25.85	1.05	0.5	27.06	42.17	0.78	0.25	6.06	35.12	0.58	0.25
5/30/2013	20.59	71.61	1.29	0.25*	10.63	24.16	2.74	0.5	27.13	41.63	1.32	0.25	6.19	34.67	1.03	0.25
6/29/2013	21.09	72.34	0.56	0.25*	12.16	23.82	3.08	2	18.26	42.07	0.88	0.25	8.01	34.92	0.78	0.25*
7/22/2013	21.96	72.16	0.74	0.25*	13.21	23.05	3.85	2	16.34	41.67	1.28	0.75	8.22	34.07	1.63	0.25*
8/26/2013	22.23	72.32	0.58	0.25	12.91	25.32	1.58	1	18.01	42.31	0.64	0.25	8.17	35.09	0.61	0.25
9/27/2013	22.09	72.09	0.81	0.25	12.72	25.71	1.19	0.75	17.74	42.51	0.39	0.25	8.32	35.34	0.36	0.25
10/31/2013	22.41	72.34	0.56	0.2	12.72	25.92	0.98	1	17.61	42.61	0.29	0.07	8.26	35.39	0.31	0.07
11/27/2013	22.31	72.47	0.43	0.07	12.61	25.98	0.92	1	17.54	42.67	0.23	0.07	8.12	35.42	0.28	0.07
12/31/2013	22.03	72.53	0.37	0.07	12.46	26.09	0.81	1	17.36	42.74	0.16	0.07	7.89	35.51	0.19	0.07
1/30/2014	21.81	72.55	0.35	0.07	11.79	26.15	0.75	0.25	17.04	ND	PoP	0.00	7.84	35.06	0.64	0.07
3/3/2014	21.57	72.05	0.85	0.25	11.02	26.25	0.65	0.25	16.51	ND	PoP	0.00	7.09	35.05	0.65	0.13
3/31/2014	21.43	72.12	0.78	0.13	10.83	26.41	0.49	0.25	16.41	ND	PoP	0.00	6.87	35.17	0.53	0.07
4/30/2014	21.27	71.81	1.09	0.25	10.71	26.31	0.59	0.25	16.29	ND	PoP	0.00	6.72	35.01	0.69	0.07
5/27/2014	21.34	71.71	1.19	0.25	10.74	26.16	0.74	0.25	16.13	ND	PoP	0.00	6.64	34.86	0.84	0.07
6/26/2014	21.17	71.6	1.3	0.25	10.61	26.29	0.61	0.25	16.02	ND	PoP	0.00	6.52	34.97	0.73	0.25
7/31/2014	20.39	71.43	1.47	0.25	10.35	26.18	0.72	0.25	15.84	ND	PoP	0.00	6.26	34.76	0.94	0.25
8/27/2014	20.22	71.61	1.29	0.25	10.22	26.26	0.64	0.25	15.71	ND	PoP	0.00	6.84	34.86	0.84	0.25
10/3/2014	20.14	71.39	1.51	0.25	10.09	26.04	0.86	0.25	15.61	ND	PoP	0.00	6.71	34.61	1.09	0.25
11/3/2014	20.27	71.47	1.43	0.25	10.17	26.16	0.74	0.25	NM	NM	NM	0.00	6.79	34.79	0.91	0.25
11/24/2014	20.38	71.53	1.37	0.5	10.13	26.29	0.61	0.25	NM	NM	NM	0.00	6.77	34.93	0.77	0.25
12/22/2014	20.37	71.42	1.48	0.5	10.06	26.34	0.56	0.25	NM	NM	NM	0.00	6.69	34.86	0.84	0.25
1/29/2015	20.13	71.48	1.42	0.5	9.73	26.51	0.39	0.25	NM	NM	NM	0.00	6.48	34.92	0.78	0.25
2/26/2015	20.09	71.38	1.52	0.5	9.87	26.42	0.48	0.25	NM	NM	NM	0.00	6.39	34.81	0.89	0.5
3/26/2015	20.17	71.02	1.88	0.25	9.81	26.32	0.58	0.25	NM	NM	NM	0.00	6.27	34.91	0.79	0.25
4/27/2015	20.22	71.56	1.34	1	9.82	26.47	0.43	0.5	NM	NM	NM	0.00	6.19	34.99	0.71	0.25
5/26/2015	20.12	71.61	1.29	1	9.71	26.56	0.34	0.5	NM	NM	NM	0.00	6.07	35.11	0.59	0.5
7/6/2015	18.17	71.93	0.97	0.75	7.41	26.82	0.08	TR*	NM	NM	NM	0.00	5.03	35.32	0.38	0.25
8/3/2015	18.24	71.98	0.92	0.75	7.29	26.86	0.04	TR*	12.32	ND	PoP	0.00	5.12	35.37	0.33	TR*
8/27/2015	19.39	72.03	0.87	0.5	8.11	ND	0	TR*	13.04	ND	0.00	0.00	6.31	35.41	0.29	TR*
10/5/2015	18.72	72.34	0.56	0.5	7.72	ND	0	0	12.62	ND	0.00	0.00	5.72	35.47	0.23	0.25
11/5/2015	18.51	72.26	0.64	0.5	7.39	ND	0	0	12.27	ND	0.00	0.00	5.41	35.42	0.28	0.25
12/3/2015	18.62	72.36	0.54	0.5	7.13	ND	0	0	12.02	ND	0.00	0.00	5.13	35.63	0.07	0.25
12/28/2015	18.42	72.31	0.59	0.5	NM	NM	NM	0	NM	NM	NM	0.00	5.02	35.26	0.44	0.25
2/3/2016	18.29	72.46	0.44	0.25	NM	NM	NM	0	NM	NM	NM	0.00	4.86	35.21	0.49	0.25
3/3/2016	18.23	72.49	0.41	0.25	NM	NM	NM	0	NM	NM	NM	0.00	4.92	35.17	0.53	0.25
3/31/2016	18.24	72.54	0.36	0.25	NM	NM	NM	0	NM	NM	NM	0.00	4.91	35.24	0.46	0.25
5/3/2016	18.39	72.39	0.51	0.25	NM	NM	NM	0	NM	NM	NM	0.00	5.13	35.29	0.36	0.25
6/2/2016	18.43	72.43	0.47	0.25	7.26	ND	0	0	12.32	ND	0.00	0.00	5.26	35.36	0.29	0.25
7/8/2016	18.54	72.49	0.41	0.25	7.39	ND	0	0	12.44	ND	0.00	0.00	5.34	35.31	0.34	0.25
8/3/2016	18.51	72.53	0.37	0.25	7.46	ND	0	0	12.52	ND	0.00	0.00	5.42	35.39	0.26	0.25
8/30/2016	18.72	72.57	0.33	0.25	7.58	ND	0	0	12.67	ND	0.00	0.00	5.61	35.21	0.44	0.25
9/30/2016	18.83	72.46	0.44	0.25	7.69	ND	0	0	12.81	ND	0.00	0.00	5.74	35.03	0.62	0.25
11/3/2016	18.89	72.41	0.49	0.25	7.77	ND	0	0	12.92	ND	0.00	0.00	5.79	35.11	0.54	0.25
11/30/2016	19.12	72.32	0.58	0.25	7.92	ND	0	0	13.16	ND	0.00	0.00	6.03	35.23	0.42	0.25
1/4/2017	19.27	72.46	0.44	0.25	8.07	ND	0	0	13.24	ND	0.00	0.00	6.17	35.09	0.56	0.5
2/7/2017	19.19	72.39	0.51	0.25	8.18	ND	0	0	13.29	ND	0.00	0.00	6.26	35.01	0.64	0.5
3/2/2017	19.03	72.31	0.59	0.25	8.02	ND	0	0	13.17	ND	0.00	0.00	6.16	35.09	0.56	0.5
4/3/2017	18.97	72.39	0.51	0.25	8.06	ND	0	0	13.04	ND	0.00	0.00	6.09	35.13	0.52	0.5
4/27/2017	18.84	72.31	0.59	0.5	8.01	ND	0	0	13.14	ND	0.00	0.00	6.12	35.2	0.45	0.5
5/29/2017	18.94	72.47	0.43	0.25	8.34	ND	0	0	13.41	ND	0.00	0.00	6.29	35.06	0.59	0.5
7/5/2017	19.12	72.34	0.56	0.5	8.41	ND	0	0	13.57	ND	0.00	0.00	6.39	35.14	0.51	0.25
8/1/2017	19.23	72.27	0.63	0.5	8.52	ND	0	0	13.69	ND	0.00	0.00	6.47	35.21	0.44	0.25
9/5/2017	19.29	72.34	0.56	0.5	8.46	ND	0	0	13.79	ND	0.00	0.00	6.56	35.34	0.31	0.25
10/4/2017	19.36	72.3	0.6	0.5	8.41	ND	0	0	13.71	ND	0.00	0.00	6.63	35.39	0.26	0.25
11/2/2017	19.42	72.36	0.54	0.5	8.52	ND	0	0	13.91	ND	0.00	0.00	6.74	35.31	0.34	0.25
11/29/2017	19.57	72.34	0.56	0.5	8.67	ND	0	0	14.02	ND	0.00	0.00	6.79	35.29	0.36	0.25
1/2/2018	19.81	72.39	0.51	0.5	8.91	ND	0	0	13.06	ND	0.00	0.00	6.34	35.34	0.31	0.25
2/7/2018	19.96	72.46	0.44	0.5	8.98	ND	0	0	12.42	ND	0.00	0.00	6.42	35.31	0.34	0.25
3/1/2018	20.02	72.32	0.58	0.5	9.22	ND	0	0	12.58	ND	0.00	0.00	6.67	35.21	0.44	0.5
4/2/2018	19.81	72.39	0.51	0.5	9.16	ND	0	0	12.46	ND	0.00	0.00	6.61	35.16	0.49	0.5
5/1/2018	20.62	72.46	0.44	1	9.34	ND	0	0	13.04	ND	0.00	0.00	7.22	35.23	0.42	1.25
6/1/2018	20.87	72.51	0.39	1	9.67	ND	0	0	13.29	ND	0.00	0.00	7.42	35.29	0.36	1
6/29/2018	20.97	72.57	0.33	1	9.87	ND	0	0	13.47	ND	0.00	0.00	7.58	35.21	0.44	1
8/3/2018	21.11	72.59	0.31	1	10.02	ND	0	0	13.61	ND	0.00	0.00	7.69	35.29	0.36	0.75
8/31/2018	20.96	72.48	0.42	0.5	9.91	ND	0	0	13.47	ND	0.00	0.00	7.42	35.36	0.29	0.5
9/28/2018	20.91	72.43	0.47	0.5	9.86	ND	0	0	13.36	ND	0.00	0.00	7.33	35.28	0.37	0.5
11/2/2018	20.77	72.39	0.51	0.75	9.77	ND	0	0	13.21	ND	0.00	0.00	7.22	35.24	0.41	0.75
11/29/2018	20.52	72.34	0.56	0.5	9.56	ND	0	0	13.01	ND	0.00	0.00	7.06	35.21	0.44	0.5
1/2/2019	20.49	72.46	0.44	0.5	9.52	ND	PoP	0	13.03	ND	PoP	0.00	6.96	35.31	0.34	0.5
2/2/2019	20.43	72.49	0.41	0.5	9.41	ND	PoP	0	12.91	ND	PoP	0.00	6.87	35.36	0.29	0.5
2/28/2019	20.34	72.37	0.53	0.5	9.32	ND	PoP	0	12.83	ND	PoP	0.00	6.74	35.29	0.36	0.5
4/2/2019	20.18	72.32	0.58	0.5	9.27	ND	PoP	0	12.76	ND	PoP	0.00	6.67	35.27	0.38	0.5
Total DNAPL Pumped (gal)	30.54				15.5				2.71				24.37			

TABLE 1

**SUMMARY OF DNAPL RECOVERY MEASUREMENTS
UPRR HOUSTON, TX - WOOD PRESERVING WORKS**

DNAPL Recovery Date	MW-75B				MW-78A				Approx DNAPL Recovered (gal)
	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	DTW (ft BTOC)	DTD (ft BTOC)	DNAPL Thickness (ft)	DNAPL Pumped (gal)	
2/14/2013	10.01	34.1	3.1	0.25	NM	NM	NM	0	9.75
4/3/2013	13.71	36.47	0.73	0.25	NM	NM	NM	0	5.00
4/22/2013	9.72	36.72	0.48	0.25	NM	NM	NM	0	2.75
5/30/2013	9.61	35.09	2.11	0.75	NM	NM	NM	0	7.50
6/29/2013	10.61	35.61	1.59	0.75	NM	NM	NM	0	7.00
7/22/2013	9.74	35.71	1.49	0.75	NM	NM	NM	0	6.50
8/26/2013	10.76	35.93	1.27	0.75	NM	NM	NM	0	6.50
9/27/2013	10.52	36.39	0.81	0.5	NM	NM	NM	0	5.75
10/31/2013	10.31	36.47	0.73	1	NM	NM	NM	0	5.07
11/27/2013	10.39	36.51	0.69	1	NM	NM	NM	0	4.74
12/31/2013	10.13	36.72	0.48	1	NM	NM	NM	0	4.71
1/30/2014	12.62	36.49	0.71	0.75	NM	NM	NM	0	4.67
3/3/2014	12.12	36.35	0.85	0.75	NM	NM	NM	0	4.91
3/31/2014	12.01	36.27	0.93	0.75	NM	NM	NM	0	4.98
4/30/2014	11.84	36.02	1.18	0.75	NM	NM	NM	0	5.10
5/27/2014	11.71	35.79	1.41	0.75	NM	NM	NM	0	4.85
6/26/2014	11.58	35.91	1.29	0.5	NM	NM	NM	0	5.03
7/31/2014	11.32	35.82	1.38	0.5	NM	NM	NM	0	4.75
8/27/2014	11.19	36.09	1.11	0.5	NM	NM	NM	0	4.25
10/3/2014	11.09	36.01	1.19	0.5	NM	NM	NM	0	4.75
11/3/2014	11.16	36.19	1.01	0.75	9.31	19.12	6.23	2.00	7.25
11/24/2014	11.21	36.27	0.93	0.5	9.39	19.62	5.73	2.00	8.00
12/22/2014	11.26	36.19	1.01	0.5	9.34	19.86	5.49	2.00	8.25
1/29/2015	11.06	36.34	0.86	0.5	9.14	21.29	4.06	2.00	7.75
2/26/2015	11.09	36.34	0.86	0.5	9.17	19.97	5.38	2.5	10.00
3/26/2015	10.93	36.42	0.78	0.5	9.12	20.31	5.04	0.75	7.25
4/27/2015	10.78	36.52	0.68	0.5	9.17	20.46	4.89	2	10.50
5/26/2015	10.61	36.72	0.48	0.75	9.09	20.59	4.76	2.5	12.25
7/6/2015	8.52	36.91	0.29	0.75	7.01	21.16	4.19	2	10.50
8/3/2015	8.66	36.96	0.24	0.75	7.12	21.39	3.96	2.5	10.75
8/27/2015	9.31	36.91	0.29	0.75	7.96	21.51	3.84	2	8.25
10/5/2015	8.62	37.02	0.18	0.5	7.23	21.67	3.68	2	8.00
11/5/2015	8.34	36.93	0.27	0.5	7.02	21.56	3.79	2	8.00
12/3/2015	8.12	36.81	0.39	0.5	6.83	21.67	3.68	2	8.00
12/28/2015	8.01	36.72	0.48	0.5	6.71	21.52	3.83	2.25	9.00
2/3/2016	7.82	36.19	1.01	0.25	6.52	21.67	3.68	2	9.00
3/3/2016	7.74	36.27	0.93	0.5	6.46	21.72	3.63	2	9.25
3/31/2016	7.67	36.39	0.81	0.5	6.49	21.86	3.49	2	9.25
5/3/2016	7.79	36.47	0.68	0.5	6.57	21.94	3.41	2	7.75
6/2/2016	7.71	36.42	0.73	0.5	6.65	21.91	3.44	2	8.25
7/8/2016	7.8	36.53	0.62	0.5	6.71	21.97	3.38	2	8.00
8/3/2016	7.89	36.59	0.56	0.5	6.82	22.04	3.31	2	8.00
8/30/2016	7.96	36.64	0.51	0.5	6.94	22.21	3.14	2	8.25
9/30/2016	7.91	36.51	0.64	0.5	7.04	22.39	2.96	2	8.50
11/3/2016	7.86	36.36	0.79	0.5	7.11	22.49	2.86	2	8.50
11/30/2016	7.97	36.47	0.68	0.75	7.29	22.67	2.68	2	8.75
1/4/2017	8.04	36.36	0.79	0.75	7.42	22.74	2.61	2	8.75
2/7/2017	8.12	36.21	0.94	0.75	7.48	22.93	2.42	2.5	9.00
3/2/2017	8.01	36.26	0.89	0.75	7.36	23.26	2.09	2	8.50
4/3/2017	7.93	36.43	0.72	0.75	7.29	23.34	2.01	2	7.50
4/27/2017	7.86	36.52	0.63	0.75	7.36	23.42	1.93	2	8.00
5/29/2017	7.94	36.41	0.74	0.75	7.51	23.51	1.84	2	7.75
7/5/2017	8.04	36.36	0.79	0.75	7.79	23.59	1.76	2	7.25
8/1/2017	8.16	36.31	0.84	0.75	7.89	23.51	1.84	2	8.00
9/5/2017	8.22	36.47	0.68	0.75	7.81	23.48	1.87	2	8.25
10/4/2017	8.29	36.56	0.59	0.75	7.89	23.51	1.84	2	7.75
11/2/2017	8.37	36.51	0.64	1	7.97	23.59	1.76	2	8.50
11/29/2017	8.33	36.59	0.56	1	8.02	23.67	1.68	2	8.00
1/2/2018	8.07	36.72	0.43	1	8.17	23.82	1.53	2	8.25
2/7/2018	8.17	36.91	0.24	1	8.29	23.97	1.38	2	8.25
3/1/2018	8.31	36.94	0.21	1	8.47	23.91	1.44	2	7.50
4/2/2018	8.26	36.89	0.26	0.75	8.39	23.97	1.38	2.25	7.75
5/1/2018	8.92	36.96	0.19	0.75	9.02	24.06	1.29	2	9.00
6/1/2018	9.34	36.91	0.24	0.75	9.21	24.13	1.22	2	9.75
6/29/2018	9.67	36.82	0.33	0.75	9.39	24.21	1.14	2.25	10.50
8/3/2018	9.84	36.87	0.28	0.75	9.47	24.31	1.04	2	10.00
8/31/2018	9.71	36.91	0.24	0.75	9.32	24.47	0.88	2	8.25
9/28/2018	9.62	36.84	0.31	0.75	9.22	24.39	0.96	2	8.25
11/2/2018	9.57	36.88	0.27	0.75	9.09	24.27	1.08	2	8.50
11/29/2018	9.41	36.92	0.23	1	8.96	24.22	1.13	2	7.50
1/2/2019	9.28	36.96	0.19	1	8.78	24.39	0.96	2	7.75
2/2/2019	9.22	36.91	0.24	1	8.71	24.47	0.88	2	8.00
2/28/2019	9.16	36.93	0.22	1	8.67	24.42	0.93	2	8.75
4/2/2019	9.06	36.91	0.24	1	8.58	24.43	0.92	2	8.75
Total DNAPL Pumped (gal)	50.75				109.5				569.81

Notes:

* - indicates DNAPL and groundwater mixture

ND - Not detected

--- - No DNAPL pumped

NM - Not measured

DTW - Depth to water (feet Below Top of Casing (BTOC))

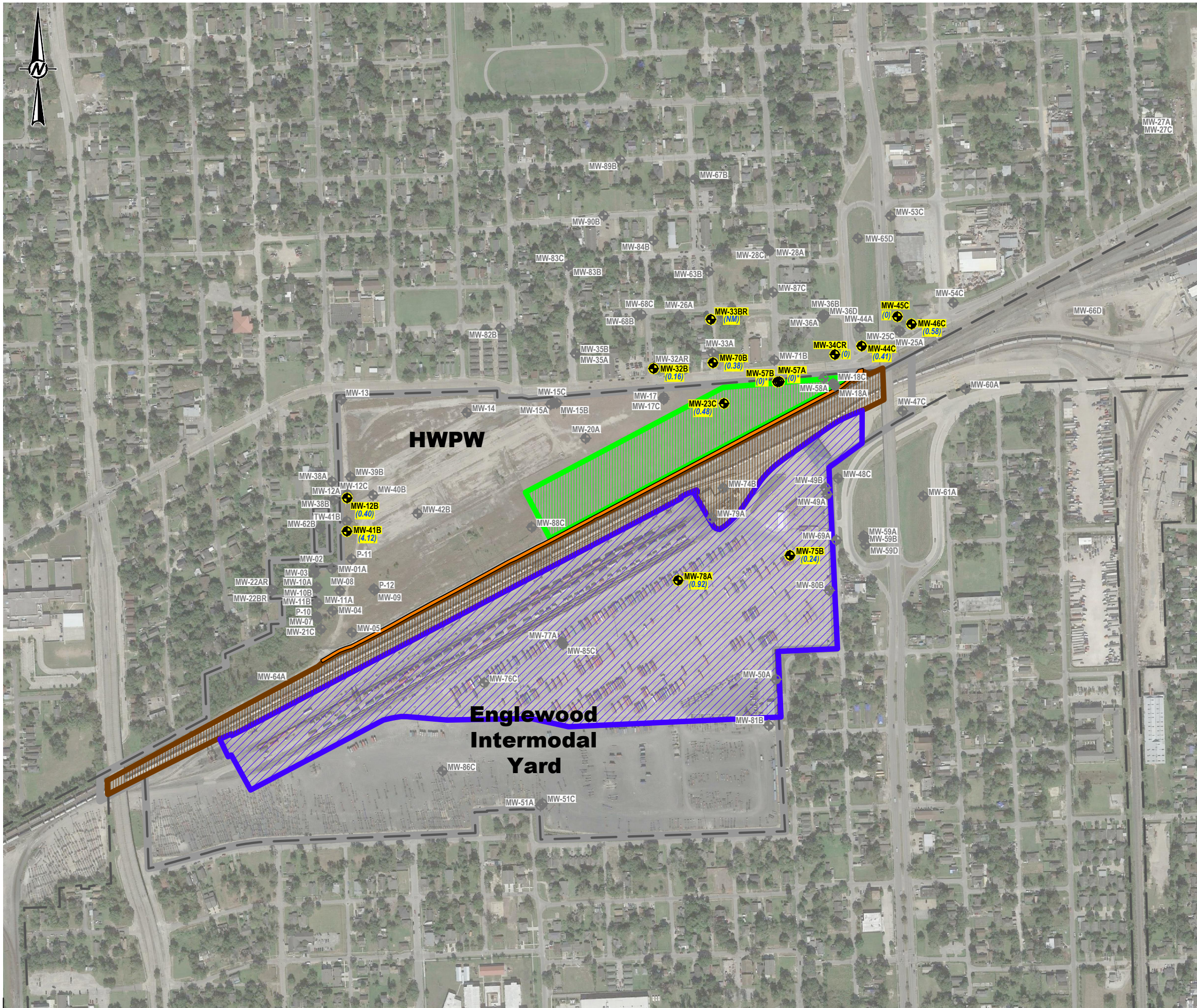
PoP - Product on probe, not measureable

DTD - Depth to DNAPL (feet BTOC)

TR- Trace amount of DNAPL Extracted

FIGURES

Path: \\userhand\data\Projects - Round Rock\1919232 - MW\2019-04-April - In-Well DNAPL Thickness (April 2019).dwg | File Name: FIG 1 - In-Well DNAPL Thickness (April 2019).dwg | Last Edited By: adamand | Date: 2019-05-16 | Time: 3:20:13 PM



LEGEND

- UPRR PROPERTY BOUNDARY
- MONITORING WELL LOCATION
- MONITORING WELL LOCATION USED FOR DNAPL RECOVERY
- (0.84) IN WELL DNAPL THICKNESS (FT)
- RAILROAD BALLAST CAP AREA
- ASPHALT CAP AREA
- SOIL CAP AREA
- CONCRETE CAP AREA

NOTE(S)

- * - NO THICKNESS MEASURED, BUT PRODUCT ON PROBE (POP) OBSERVED.

REFERENCE(S)

BASE MAP FROM GOOGLE EARTH, IMAGERY DATED 10/28/17.



CLIENT
UNION PACIFIC RAILROAD CO.

PROJECT
HOUSTON WOOD PRESERVING WORKS

TITLE
IN-Well DNAPL THICKNESS
APRIL 2019

CONSULTANT	YYYY-MM-DD	2019-05-16
	DESIGNED	AJD
	PREPARED	AJD
	REVIEWED	MH
	APPROVED	ECM



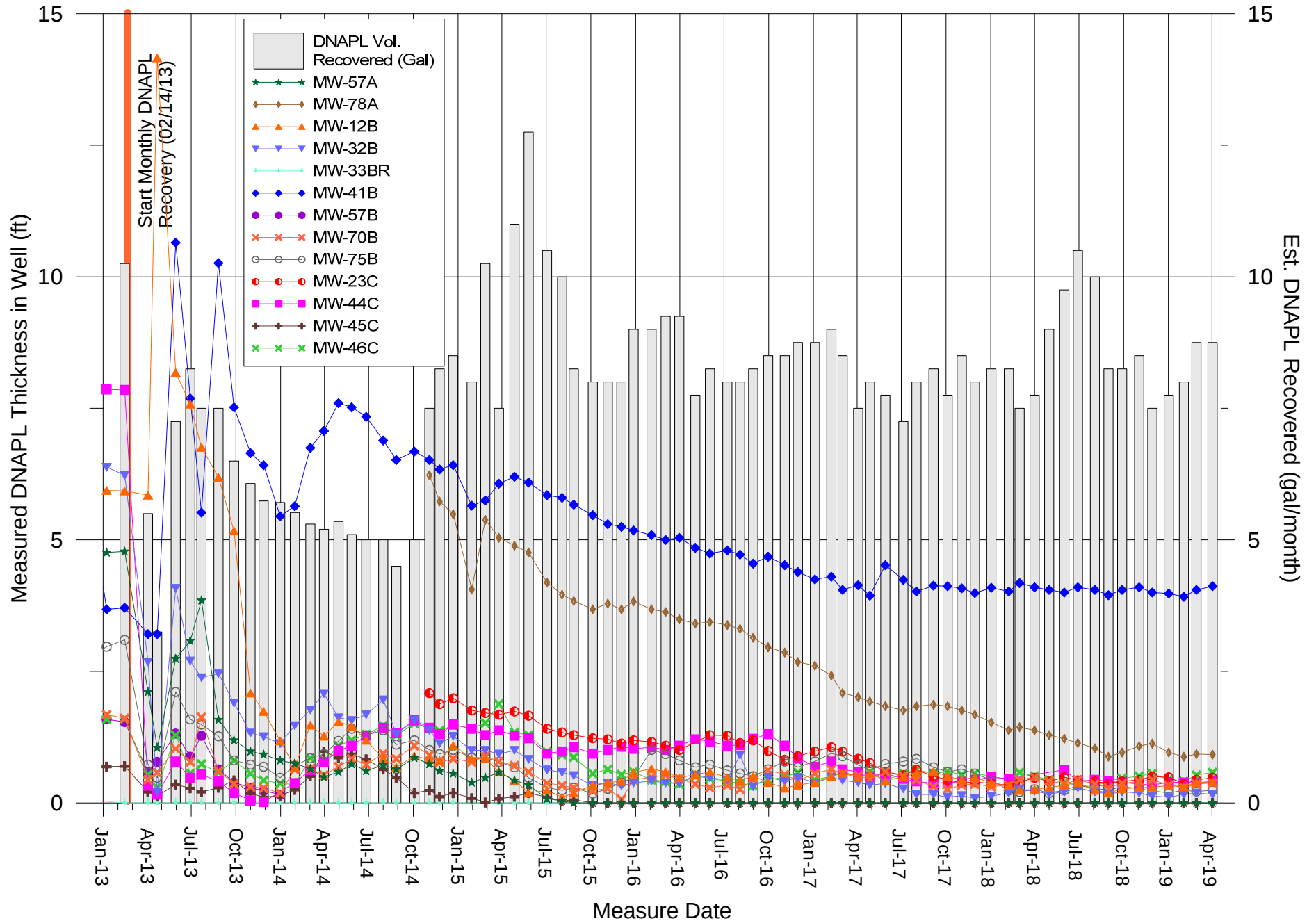
PROJECT NO.
19119232

REV.
0

FIGURE
1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

Figure 2
DNAPL Recovery Activities February 2013 - April 2019
UPRR Houston Wood Preserving Works



ATTACHMENT 1

Recovered DNAPL Waste Manifest

Projects #: 0-0

Please print or type.

1901757843 E

2

EFFECTIVE ENVIRONMENTAL



Order #: 168350

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST		1. Generator ID Number TXD000820266 / 31547		2. Page 1 of 2		3. Emergency Response Phone 877-577-2669		4. Manifest Tracking Number 013100529 FLE	
5. Generator's Name and Mailing Address Union Pacific Railroad 301 NE 2nd Ave, ATTN: Traci Rhode Portland, OR 97232 Generator's Phone: 414-267-4164 ATTN: Kevin Peterburs				Generator's Site Address (if different than mailing address) UP Railroad Houston Wood Preserving Works 4910 Liberty Rd Houston, TX 77026					
6. Transporter 1 Company Name Stericycle Specialty Waste Solutions Inc				Ph#: 972-329-1200 State ID#: 88922 / H-1495		U.S. EPA ID Number MNS000110924			
7. Transporter 2 Company Name Stericycle Environmental Solutions						U.S. EPA ID Number TXR000025841			
8. Designated Facility Name and Site Address Clean Harbors Deer Park, L.P. 2027 Independence Pkwy South LaPorte, TX 77571				State ID#: 50089		U.S. EPA ID Number TXD055141378			
Facility's Phone: 281 930 2300									
9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))			10. Containers No. Type		11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes	
☒	1. RQ, NA3082, Hazardous waste, liquid, n.o.s. (creosote), 9, PG III, ERG 171			1		DM	55	G	0918219H F034
☒	2. RQ, NA3082, Hazardous waste, liquid, n.o.s. (purge water contains creosote), 9 PG III, ERG 171			2		DM	110	G	0914101H F034
	3.								
	4.								
14. Special Handling Instructions and Additional Information 01:Recovered creosote WR # 21040 (PF:CH1269245) 55G 02:Purge water WR # 21035 (PF:CH1269232) 55G									
15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.									
Generator's/Offor's Printed/Typed Name Kevin Peterburs				Signature Kevin Peterburs		Month Day Year 3 15 19			
16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: _____ Transporter signature (for exports only): _____ Date leaving U.S.: _____									
17. Transporter Acknowledgment of Receipt of Materials									
Transporter 1 Printed/Typed Name Joe Arraño				Signature Joe Arraño		Month Day Year 3 19 19			
Transporter 2 Printed/Typed Name Austin Housa				Signature Austin Housa		Month Day Year 3 25 19			
18. Discrepancy									
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection									
Manifest Reference Number: _____									
18b. Alternate Facility (or Generator) U.S. EPA ID Number _____									
Facility's Phone: _____									
18c. Signature of Alternate Facility (or Generator) _____ Month Day Year _____									
19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)									
1. 01: H040		2. 02: H040		3.		4.			
20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a									
Printed/Typed Name a. Gohring				Signature a. Gohring		Month Day Year 4 15 19			