PBW

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March 17, 2014 PBW Project No. 1358

VIA EMAIL

Mr. Kirk Coulter MC-127 Environmental Cleanup Section I, Team 3, Remediation Division Texas Commission on Environmental Quality P.O. Box 13087 Austin, Texas 78711-3087

 Re: DNAPL Recovery Pilot Test – 12-Month Status Update (February 2013 – January 2014) 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 Mr. Coulter:

Pastor, Behling & Wheeler, LLC (PBW), on behalf of Union Pacific Railroad Company, is providing this status update for the dense non-aqueous phase liquid (DNAPL) recovery pilot test being conducted at the Houston Wood Preserving Works Facility (the Site). As detailed in the PBW letter dated February 5, 2013, PBW proposed to conduct a 24-month DNAPL recovery pilot test at the Site consisting of monthly manual DNAPL recovery. This letter discusses the DNAPL recovery pilot test activities and results for the first 12 months of the study (February 2013 through January 2014).

The following monitoring wells were selected to be included in the DNAPL recovery test based on the amount of DNAPL historically observed in the wells:

Well Name	Zone	Min. DNAPL Thickness	Max DNAPL Thickness
wen name		(ft.)	(ft.)
MW-57A	A-TZ	4.11	4.25
MW-12B	B-TZ	0.41	5.70
MW-41B	B-TZ	5.06	24.14
MW-57B	B-CZ	0.44	0.50
MW-32B	B-CZ	5.77	6.13
MW-33BR	B-CZ	0.30	0.30
MW-70B	B-CZ	1.44	1.53
MW-75B	B-CZ	1.84	1.90
MW-34C	C-TZ	7.24	7.60
MW-44C	C-TZ	0.75	7.10
MW-45C	C-TZ	0.39	1.50
MW-46C	C-TZ	0.10	1.25

Notes:

Average depth to water values, minimum and maximum DNAPL thicknesses based on data collected between January 2011 and December 2012.

Figure 1 shows the location of the wells used in the pilot study.

Mr. Kirk Coulter, TCEQ DNAPL Recovery Pilot Test – 12-Month Status Update UPRR HWPW, Houston, Texas March 17, 2014 Page 2 of 3

The pilot test procedures consisted of measuring the depth to groundwater surface, the depth to the groundwater/DNAPL interface, and the total depth of the well relative to the top of well casing prior to DNAPL recovery. Using a peristaltic pump, DNAPL was pumped from the bottom of the well until groundwater is returned in the pump discharge. The volume of recovered DNAPL was estimated from each well, and the well was gauged to measure the total depth of the well and depth to residual DNAPL following pumping. Recovered DNAPL was temporarily stored at the Containment Storage Area. Waste manifests for the recovered DNAPL and groundwater are provided in Attachment A.

A summary of the DNAPL recovery measurements from February 2013 through January 2014 is provided on Table 1. DNAPL thicknesses prior to each month recovery efforts over time are presented on Figure 2. Observations from the recovery testing are provided below:

- 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 thickness in well MW-12B gradual decreased from 8.18 feet in May 2013 to less than a foot thick measured in the well in January 2014. DNAPL thickness in MW-41B decreased from the August 2013 event (measured at 10.26 feet) but has leveled out to about 5.5 feet thick over the last two months (Figure 2).
- The other DNAPL wells tested showed significant decreases in DNAPL thicknesses over the first two months of testing, with some sporadic increases from May through August 2013 (Figure 2). Overall, over the 12-month period DNAPL thicknesses in the wells generally decreased to less than one-foot thick, except in MW-32B, which has leveled out between 1.13 feet and 1.26 feet over the past four months.
- DNAPL thickness in well MW-57B decreased from 1.28 feet thick in July 2013 to less than measureable (DNAPL noted on end of probe) thickness in January 2014. DNAPL thickness in MW-44C followed a similar pattern decreasing from 0.54 feet in July 2013 to no measureable thickness in December 2013, but increased to 0.38 feet in January 2014.
- Of the 12 wells tested as part of the pilot test, well MW-33BR did not have any measureable DNAPL during the 12-month period. Well MW-34C was gauged in October 2013, and no DNAPL was measured in the well. Since a street lane closure permit through the City of Houston is required for this well for the testing and no DNAPL was measured during the October 2013 event, this well was removed from the list of wells tested for the next 12-month period.
- An estimated total of 79 gallons of DNAPL have been recovered during the 12-month period, with monthly DNAPL recovery volumes slightly decreasing over the past six months to around 5.5 gallons. Approximately 47% of the DNAPL recovered is from wells MW-12B and MW-41B.

The preliminary results from the DNAPL recovery pilot test after the first 12 months indicate the following:

- Once per month DNAPL recovery activities are resulting in an overall decreasing DNAPL thickness trend in the wells tested.
- The current monthly recovery frequency appears to be effective with total DNAPL volume recovered decreasing in the wells over time. Given the decreasing trend, more frequent recovery activities would not likely be effective in increasing overall DNAPL recovery.

UPRR plans to continue the monthly DNAPL pilot test recovery efforts, and will submit the next status report following the July 2014 recovery event. Concurrently with the pilot test, PBW is assessing the recovery data for evaluating more effective DNAPL recovery efforts.

Mr. Kirk Coulter, TCEQ DNAPL Recovery Pilot Test – 12-Month Status Update UPRR HWPW, Houston, Texas March 17, 2014 Page 3 of 3

If you have any questions or need additional information, please feel free to call me at (512) 671-3434 or Mr. Geoffrey Reeder of UPRR at (281) 350-7197.

Sincerely,

PASTOR, BEHLING & WHEELER, LLC

Eric C. Matzner, P.G. Senior Consultant

cc: Waste Program Manager, TCEQ Region 12, Houston Mr. Geoffrey Reeder, P.G., UPRR – Spring, TX

TABLES

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

TABLE 1

		MW	-12B			MW	-32B			MW-	-33BR			MW	-34C	
	DNAPL DNAPL					DNAPL	DNAPL		DNAPL DNAPL		DNAPL		DN		DNAPL	
DNAPL Recovery	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped
Date	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)
2/14/2013	9.06	39.87	5.93	2.5	6.01	30.06	6.23	2	3.72	ND	0		NM	NM	NM	
4/3/2013	9.41	39.95	5.85	1	4.86	33.61	2.68	1	4.02	PoP	0		NM	NM	NM	
4/22/2013	8.61	31.64	14.16	0.5*	5.62	36.08	0.21	0.25	3.63	ND	0		NM	NM	NM	
5/30/2013	8.47	37.62	8.18	1.5*	5.86	32.21	4.08	2	3.59	ND	0		NM	NM	NM	
6/29/2013	9.62	38.22	7.58	1.5	6.79	33.59	2.7	1.5	6.07	ND	0		NM	NM	NM	
7/22/2013	11.16	39.04	6.76	1	7.14	33.91	2.38	1.5	9.68	ND	0		NM	NM	NM	
8/26/2013	11.31	39.61	6.19	1	7.48	33.83	2.46	1	9.86	ND	0		NM	NM	NM	
9/27/2013	11.17	40.63	5.17	1	7.23	34.39	1.9	1	9.57	ND	0		NM	NM	NM	
10/31/2013	11.09	43.71	2.09	1	7.16	34.96	1.33	0.53	9.32	ND	0		21.63	NM	NM	
11/27/2013	11.17	44.06	1.74	1	7.29	35.03	1.26	0.53	9.16	ND	0		NM	NM	NM	
12/31/2013	11.02	44.62	1.18	1	7.16	35.16	1.13	0.5	8.97	ND	0		NM	NM	NM	
1/30/2014	11.34	45.12	0.68	1	6.72	34.82	1.47	0.53	7.41	ND	0		NM	NM	NM	

		MW	-41B			MW	-44C			MW	'-45C			MW	-46C	
	DNAPL DNAPL					DNAPL	DNAPL			DNAPL	DNAPL			DNAPL	DNAPL	
DNAPL Recovery	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped
Date	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)	BTOC)	BTOC)	(ft)	(gal)
2/14/2013	8.91	41.1	3.71	3	18.96	62.95	7.85	1	21.26	69.9	0.7	0.25	21.07	71.3	1.6	0.25
4/3/2013	9.37	41.6	3.21	1.5	19.34	70.47	0.33	0.25*	21.39	70.39	0.21	0.25*	20.61	72.36	0.54	0.25*
4/22/2013	8.62	41.6	3.21	0.5*	18.62	70.64	0.16	0.25*	21.03	70.47	0.13	0.25*	20.61	72.61	0.29	0.25*
5/30/2013	8.73	34.16	10.65	2	18.43	70.01	0.79	0.25*	21.16	70.25	0.35	0.25*	20.59	71.61	1.29	0.25*
6/29/2013	9.72	37.12	7.69	2	19.34	70.32	0.48	0.25	21.93	70.32	0.28	0.25*	21.09	72.34	0.56	0.25*
7/22/2013	10.31	39.29	5.52	1.5	20.36	70.26	0.54	0.25	22.72	70.39	0.21	0.25*	21.96	72.16	0.74	0.25*
8/26/2013	10.09	34.55	10.26	2.5	20.62	70.39	0.41	0.25	22.86	70.31	0.29	0.25	22.23	72.32	0.58	0.25
9/27/2013	9.63	37.29	7.52	2	20.39	70.61	0.19	0.25	22.66	70.17	0.43	0.25	22.09	72.09	0.81	0.25
10/31/2013	9.52	38.16	6.65	2	20.17	70.75	0.05	0.066	22.59	70.42	0.18	0.13	22.41	72.34	0.56	0.2
11/27/2013	9.57	38.39	6.42	2	20.09	70.78	0.02		22.52	70.49	0.11		22.31	72.47	0.43	0.07
12/31/2013	9.42	39.36	5.45	2	20.01	70.8	PoP		22.39	70.46	0.14		22.03	72.53	0.37	0.07
1/30/2014	9.06	39.17	5.64	2	19.67	70.42	0.38	0.25	22.13	70.35	0.25		21.81	72.55	0.35	0.07

	MW-57A					MW	-57B			MW	7-70B			MW	-75B		Approx
			DNAPL	DNAPL	DNAPL												
DNAPL Recovery	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	DTW (ft	DTD (ft	Thickness	Pumped	Recovered
Date	BTOC)	BTOC)	(ft)	(gal)	(gal)												
2/14/2013	10.56	22.12	4.78	0.5	28.56	41.41	1.54	0.25	6.57	34.09	1.61	0.25	10.01	34.1	3.1	0.25	10.25
4/3/2013	10.32	24.79	2.11	0.5	28.09	42.36	0.59	0.25*	6.79	35.26	0.44	0.25	13.71	36.47	0.73	0.25	5.5
4/22/2013	10.71	25.85	1.05	0.5	27.06	42.17	0.78	0.25	6.06	35.12	0.58	0.25	9.72	36.72	0.48	0.25	3.25
5/30/2013	10.63	24.16	2.74	0.5	27.13	41.63	1.32	0.25	6.19	34.67	1.03	0.25	9.61	35.09	2.11	0.75	7.25
6/29/2013	12.16	23.82	3.08	2	18.26	42.07	0.88	0.25	8.01	34.92	0.78	0.25*	10.61	35.61	1.59	0.75	8.25
7/22/2013	13.21	23.05	3.85	2	16.34	41.67	1.28	0.75	8.22	34.07	1.63	0.25*	9.74	35.71	1.49	0.75	7.5
8/26/2013	12.91	25.32	1.58	1	18.01	42.31	0.64	0.25	8.17	35.09	0.61	0.25	10.76	35.93	1.27	0.75	7.5
9/27/2013	12.72	25.71	1.19	0.75	17.74	42.51	0.39	0.25	8.32	35.34	0.36	0.25	10.52	36.39	0.81	0.5	6.5
10/31/2013	12.72	25.92	0.98	1	17.61	42.61	0.29	0.07	8.26	35.39	0.31	0.07	10.31	36.47	0.73	1	6.07
11/27/2013	12.61	25.98	0.92	1	17.54	42.67	0.23	0.07	8.12	35.42	0.28	0.07	10.39	36.51	0.69	1	5.74
12/31/2013	12.46	26.09	0.81	1	17.36	42.74	0.16	0.07	7.89	35.51	0.19	0.07	10.13	36.72	0.48	1	5.71
1/30/2014	11.79	26.15	0.75	0.25	17.04	NM	PoP		7.84	35.06	0.64	0.07	12.62	36.49	0.71	0.75	5.52

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)

NM - Not measured

ND - Not detected

PoP - Product on probe, not measureable

FIGURES

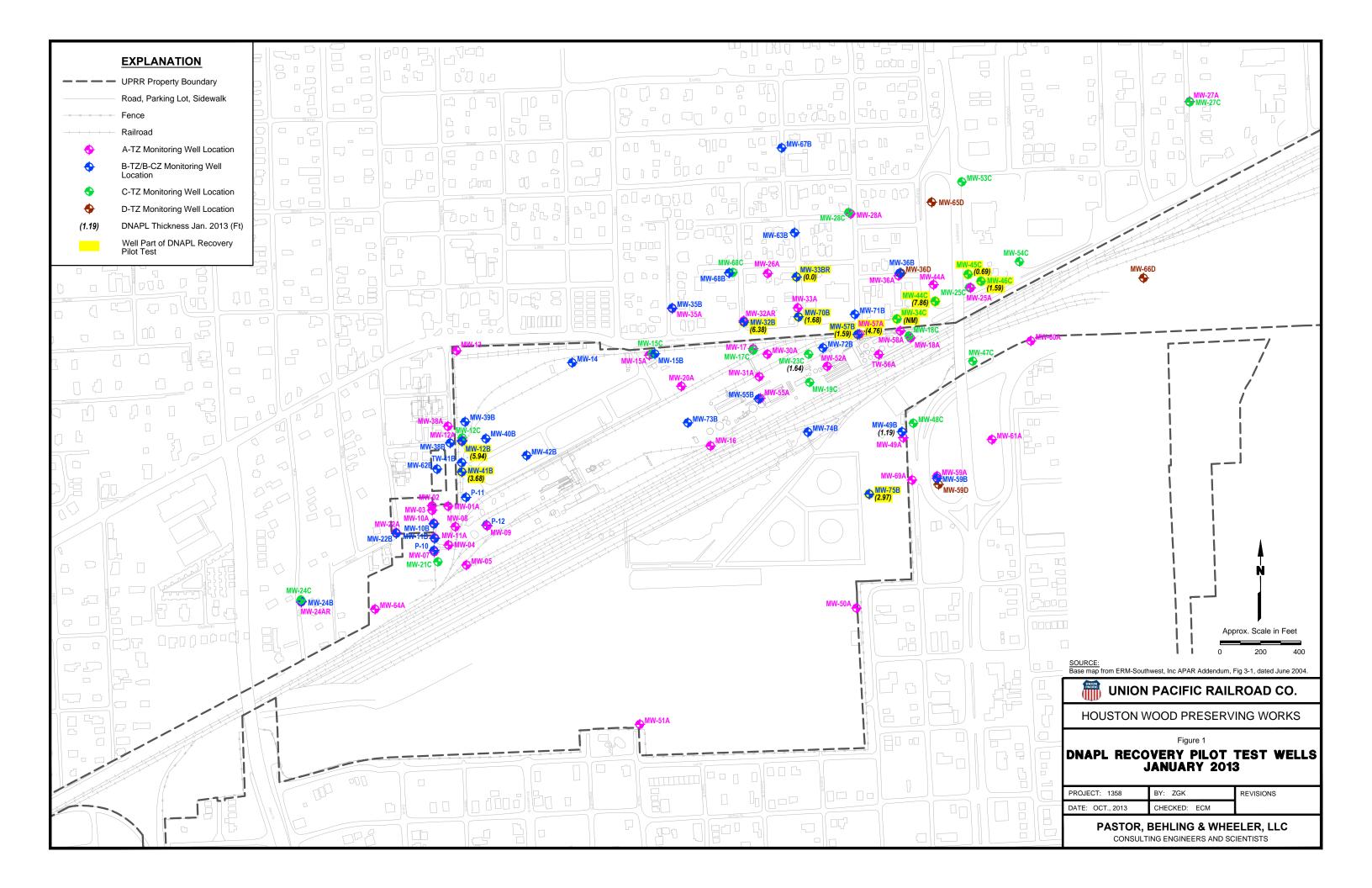
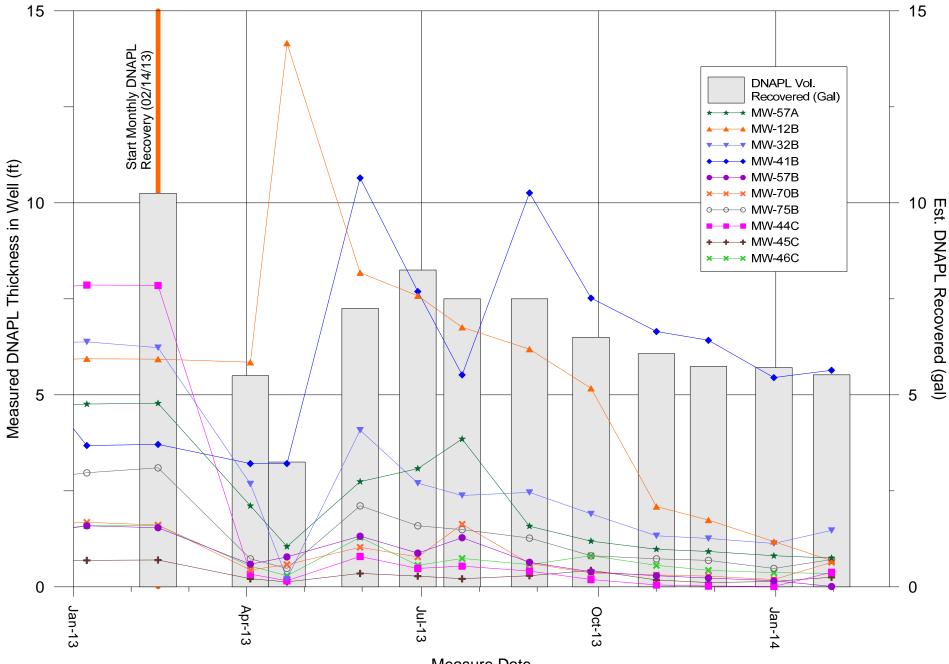


Figure 2 DNAPL Recovery Pilot Test February 2013 - January 2014 **UPRR Houston Wood Preserving Works**



Measure Date

ATTACHMENT A

WASTE MANIFESTS

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+	5. Generator's Name and Mailing Address UNION PACIFIC RAILROAD c/o USA, P.O. Box 87687 Houston, TX 77287	4	or's Site Address (910 Liberty loueton, TX	Road	an mailing addres	5)			
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	8. Designated Facility Name and Site Address CLEAN HARBORS DEER PARK, LLC 2027 INDEPENDENCE PARKWAY SOUTH LA PORTE, TX. 77571 Facility's Phone: 281-930-2300					055141	378		
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SIGN	19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous was		cycling systems)		4.				
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	29 Designated Facility Owner or Operator: Certification of receipt of hazardous materials	Skitchhure	ii 1	LH	sen	n	·	MOST D	013
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PA Form 8700-22 (Rev. 3-05) P	revious aditions are absolute.		DESIG	NATED FA	CILITYT	O DESTIN	ATION	STATE (IF REC	UIREC
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