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November 14, 2019

Mr. Matt Thompson
Wisconsin Department of Natural Resources
1300 W. Clairemont Avenue
Eau Claire, WI 54701

Subject: Residual Phase LNAPL Site Investigation Results Transmittal
Wauleco, Inc., Wausau, Wisconsin
BRRTS #02-37-000006

Dear Mr. Thompson:

On behalf of Wauleco, Inc. and pursuant to Chp. NR 716.14((2), Wis. Admn. Code, TRC is transmitting the analytical results of soil samples collected to implement the April 22, 2019 Residual Phase LNAPL Site Investigation Work Plan.

Seven borings were completed using cryogenic coring to collect frozen core samples for analysis of the residual phase LNAPL identified by the laser induced fluorescence (LIF) surveys. One hundred twenty-seven (127) samples were cut from the seven borings where frozen cores were collected. These samples were analyzed for total petroleum hydrocarbons (TPH) using gasoline range organics (GRO) and diesel range organics (DRO), for pentachlorophenol (PCP), methane, porosity, and water saturation. LNAPL saturation and gas saturation were calculated from these properties. The locations of the seven borings are shown on Figure 1.

This transmittal is organized to provide the information required by NR 716.14(2), as follows:

- **716.14(2).(a):**

  Preliminary Cause and Significance: The cause of the TPH and PCP at the water table, as described in numerous prior submittals, was the result of migration of mobile phase LNAPL to the area currently shown as having residual phase LNAPL, as shown on Figure 1. These data provide additional details on the physical and chemical characteristics of the residual phase LNAPL (e.g., NAPL saturation and PCP content within the residual phase LNAPL) and will provide data to be used in evaluating remedial action technologies and alternatives.

  In addition to the TPH, PCP, and saturation data, several total oxidant demand (TOD) analyses were conducted. As part of the TOD analysis, Pre-Oxidant and Post-Oxidant

analysis for TPH and PCP were performed. These data will also be used in evaluating remedial technologies and alternatives.

- ***List of Names and Addresses of Those Receiving Notification:***
  - Matt Thompson, Wisconsin Department of Natural Resources, 1300 W Clairemont Ave, Eau Claire, WI 54701
  - Eric Lindman, Director of Public Works & Utilities, City of Wausau, 407 Grant Street, Wausau, WI 54403-4783
- ***Date of Sampling Event and Mailing:*** The date of sampling was June 3 through June 7, 2019, and last sample results were received on October 31, 2019.

- **716.14(2)(b):** Additional information in accordance with 714.05(5) may be obtained by contacting Mr. Matt Thompson at (715) 839-3750.
- **716.14(2)(c):**

1. ***Responsible party name, address, and phone number:***

   Wauleco Inc.
   Attn: Evan Schreiner
   1800 North Point Drive
   Stevens Point, Wisconsin 54481
   (715) 346-8530

2. ***Site Name and Property Address:*** Wauleco Inc., 125 Rosecrans St., Wausau, Wisconsin 54402
3. ***Department BRRTS Number:*** 02-37-000006
4. ***Department Contact Person:*** Mr. Matt Thompson, (715) 839-3750
5. ***Reason for Sampling:*** To gather data in support of evaluation of remedial options.
6. ***Contaminant Type:*** TPH and PCP
7. ***Sample Type:*** Cores from within the residual phase LNAPL zone. These cores were collected via cryogenic coring methods, so the cores were frozen immediately after coring, and prior to removal of the core barrel. Upon removal from the ground, the PVC sleeve holding the core was labeled, packaged, and placed on dry ice for shipment to the Colorado State University for analysis. When received at CSU the cores were placed in a -80°C freezer to await processing.
8. ***Map Meeting the Requirements of NR 716.15(4):*** See Figure 1.

9. ***Collection Date, Specific Contaminant Levels per Location, and Whether Sample Results Exceed State Standards:*** See Table 1 and Table 2. It is TRC's understanding that there are no specific State Standards in Wisconsin that are applicable based on the type of samples collected (i.e., cores of residual phase LNAPL) and sample depths (i.e., much greater than 4 ft.).
10. ***Copy of the Results from the Laboratory:*** See Attachment 1 for core sample analytical results, and Attachment 2 for TOD analytical results.

In addition to this submittal, a Technical Memorandum will also be submitted by December 30, 2019 (i.e., within 60 days of receipt of final sample results). If you have any questions or comments regarding this information, please call me at (608) 826-3644.

Sincerely,

TRC Environmental Corporation

Bruce Iverson P.E.
Project Manager

Enclosures: Table 1: Summary of Residual Phase LNAPL Soil Samples
Table 2: Summary of Total Oxidant Demand Analyses
Figure 1: Location of Cryogenic Residual Phase LNAPL Borings
Attachment 1: Core Sample Laboratory Analytical Reports
Attachment 2: Total Oxidant Demand Laboratory Analytical Reports

cc: Eric Lindman – City of Wausau
Evan Schreiner – Wauleco, Inc.
David Crass – Michael Best & Friedrich, LLP
Ken Quinn – TRC

Table 1
Summary of Residual Phase LNAPL Cryogenic Coring Samples
Wauleco, Inc.
Wausau, Wisconsin

NO.	BORING	DEPTH	SAMPLE ID	TPH (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PCP (mg/kg)	METHANE (mg/kg)	NAPL	GAS	WATER	POROSITY	VALUES EXCLUDED / NOT COLLECTED FROM DATA SET FOR SPECIFIED REASONS
									SATURATION % (as percent of porosity)				
1	M01	24.083	700	104.5	0.0	104.5	0.0	0.008	0.0	91.3	8.7	32.5	
2	M01	24.583	701	21.6	0.0	21.6	0.0						Rocks likely; excluded
3	M01	25.083	702	0.0	0.0	0.0	0.0	0.008	0.0	83.9	16.1	22.2	
4	M01	25.750	703	0.0			0.0						Ran out of cuttable core for water jar; not collected
5	M01	27.083	704	0.0	0.0	0.0	24.017	0.011	0.0	53.9	46.1	36.5	
6	M01	27.670	705	2.08	0.0	2.08	6.589	0.007	0.0	62.0	38.0	24.4	
7	M01	29.083	706	4061.5	2457.9	1603.7	344.2	0.119					Porosity value too high; sample not included
8	M01	29.250	707	850.4	501.3	349.1	70.5	0.014	0.122	28.8	71.0	48.7	
9	M01	29.420	708	0.0	0.0	0.0	9.627	0.006	0.000	35.7	64.3	40.6	
10	M01	29.583	709	3.47	3.47	0.0	3.350	0.011	0.000	39.6	60.4	37.7	
11	M01	29.750	710	115.1	98.8	16.3	2.422	0.011	0.000	45.5	54.5	35.9	
12	M01	29.920	711	134.0	111.6	22.4	1.616	0.011	0.000	48.2	51.8	39.4	
13	M01	30.083	712	2814.3	1687.7	1126.6	5.096	0.013	1.509	53.7	44.8	33.7	
14	M01	30.250	713	3902.9	2374.3	1528.6	11.829	0.015	2.627	49.8	47.5	30.0	
15	M01	30.420	714	3716.3	1744.2	1972.1	4.409	0.005					Rocks likely; excluded
16	M01	30.580	715	228.8	165.0	63.8	2.398	0.014	0.000	62.1	37.9	29.2	
17	M01	30.750	716	7001.2	4439.4	2561.8	60.266	0.008	6.882	38.3	54.8	23.8	
18	M01	30.920	717	7376.6	4742.5	2634.1	76.600	0.018	7.308	48.3	44.4	23.8	
19	M01	31.080	718	99.8	91.3	8.47	11.783	0.014	0.000	63.5	36.5	26.2	
20	M01	31.417	719	60.1	55.5	4.56	4.431	0.009	0.000	62.4	37.6	31.7	
21	M01	32.167	720	4742.9	3305.5	1437.5	140.584	0.054	0.409	22.9	76.7	77.4	
22	M01	32.500	721	0.0	0.0	0.0		0.013	0.000	31.8	68.2	44.9	
23	M01	32.917	722	47.8	42.7	5.148	4.691	0.013	0.000	40.2	59.8	28.8	
24	M01	33.300	723	5.28	5.28	0.0	2.356	0.013	0.000	34.7	65.3	27.1	
25	M02	21.583	724	0.0	0.0	0.0	1.853	0.000	0.000				Rocks likely; excluded
26	M02	23.084	725	0.0	0.0	0.0	0.000	0.007	0.000	52.9	47.1	37.9	
27	M02	23.418	726	0.0	0.0	0.0	0.000	0.006	0.000				Rocks likely; excluded
28	M02	24.083	727	129.9	106.5	23.3	0.000	0.026	0.000	36.5	63.5	39.3	
29	M02	24.584	728	212.8	185.6	27.2	0.000	0.042	0.000	38.6	61.4	38.4	
30	M02	24.918	729	340.4	255.4	85.0	0.000	0.000	0.000	53.3	46.7	32.5	
31	M02	25.084	730	621.4	431.0	190.5	0.000	0.049	0.068	39.7	60.3	37.3	
32	M02	25.251	731										Rocks likely; excluded
33	M02	25.418	732	7102.7	4222.4	2880.3	0.964	0.017	5.359	53.8	40.9	29.0	
34	M02	25.584	733	2269.8	1408.7	861.1	0.923	0.051	1.036	64.9	34.0	36.1	
35	M02	26.583	734					0.140	0.000	30.6	69.4	53.9	
36	M02	26.751	735	205.5	187.9	17.6	0.855	0.077	0.000	31.9	68.1	43.9	
37	M02	26.917	736	257.4	206.3	51.1	0.831	0.075	0.000	25.7	74.3	42.7	
38	M02	27.084	737	196.2	177.7	18.5	0.832	0.077	0.000	24.4	75.6	45.1	
39	M02	27.251	738	208.8	185.7	23.1	0.840	0.084	0.000	39.5	60.5	45.0	
40	M02	27.418	739	794.7	576.3	218.4	0.839	0.060	0.128	34.5	65.4	43.3	
41	M02	27.584	740	538.0	443.4	94.6	0.842	0.049	0.023	51.9	48.1	35.2	
42	M02	27.751	741	418.7	351.7	67.0	0.926	0.057	0.000	35.1	64.9	25.1	
43	M02	27.918	742	2128.3	1432.4	696.0	1.061	0.058	1.539	46.7	51.7	25.9	
44	M02	28.084	743	2460.4	1705.1	755.2	1.027	0.122	1.145	42.7	56.1	36.2	
45	M02	29.001	744	2542.2	1721.2	821.0	0.535	0.151	0.440	24.8	74.7	60.6	

Table 1
Summary of Residual Phase LNAPL Cryogenic Coring Samples
Wauleco, Inc.
Wausau, Wisconsin

NO.	BORING	DEPTH	SAMPLE ID	TPH (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PCP (mg/kg)	METHANE (mg/kg)	NAPL	GAS	WATER	POROSITY	VALUES EXCLUDED / NOT COLLECTED FROM DATA SET FOR SPECIFIED REASONS
									SATURATION % (as percent of porosity)				
46	M02	29.251	745	427.4	342.5	84.8	0.822	0.073	0.000	42.3	57.7	47.6	
47	M02	29.584	746	373.2	316.7	56.5	0.896	0.053	0.000	42.7	57.3	32.9	
48	M02	29.751	747	2415.8	1642.2	773.5	0.955	0.040	1.474	38.2	60.3	30.1	
49	M02	30.084	748	7.48	7.48	0.0	0.978	0.029	0.000	45.6	54.4	25.6	
50	M02	30.251	749	0.0	0.0	0.0	0.959	0.013	0.000	63.6	36.4	27.2	
51	M02	31.501	750	1258.3	934.2	324.1	0.475	0.168	0.102	30.9	69.0	71.2	
52	M02	32.084	751	188.7	156.5	32.2	0.765	0.023	0.000	36.4	63.6	52.4	
53	M02	32.584	752	107.5	96.2	11.3	0.823	0.139	0.000	31.3	68.7	48.0	
54	M02	33.171	753	0.0	0.0	0.0	0.894	0.029	0.000	52.6	47.4	27.8	
55	M03	21.583	754	0.0	0.0	0.0	0.971	0.012	0.000	91.4	8.6	39.2	
56	M03	23.084	755	0.0	0.0	0.0	1.072	0.013	0.000	70.5	29.5	29.8	
57	M03	24.001	756	0.0	0.0	0.0	0.910	0.003	0.000	53.3	46.7	43.4	
58	M03	25.101	757	0.0	0.0	0.0	0.907	0.013	0.000	53.7	46.3	47.9	
59	M03	25.501	758	10477.5	5635.6	4841.9	0.865	0.012	3.426	57.0	39.6	49.1	
60	M03	25.668	759	3108.7	1759.7	1349.0	0.840	0.011	0.812	48.7	50.5	51.5	
61	M03	26.501	760	8870.4	5612.3	3258.1	0.879	0.042	3.269	39.8	56.9	45.9	
62	M03	26.751	761	10057.9	7107.9	2950.0	0.304	0.051	2.189	26.8	71.0	59.1	
63	M03	26.918	762	658.8	516.8	142.0	0.832	0.009	0.064	31.7	68.3	45.0	
64	M03	27.084	763	2374.4	1809.1	565.3	0.829	0.069	0.993	44.4	54.6	38.5	
65	M03	27.251	764	4081.1	2828.4	1252.8	0.930	0.051	2.403	49.6	48.0	33.0	
66	M03	27.421	765	3368.9	2403.5	965.5	0.898						Ran out of cuttable core for water jar; not collected
67	M03	29.001	766	2350.8	1801.0	549.7	0.513	0.019	0.419	28.6	71.0	59.4	
68	M03	29.251	767	559.3	451.7	107.5	0.803	0.016	0.022	34.3	65.6	47.1	
69	M03	29.418	768	306.2	254.7	51.5	0.814	0.017	0.000	32.7	67.3	46.6	
70	M03	29.584	769	362.7	295.8	66.9	0.833	0.013	0.000	31.5	68.5	44.7	
71	M03	29.751	770	506.8	413.9	93.0	0.842	0.017	0.003	33.2	66.7	44.9	
72	M03	30.084	771	3435.3	2397.3	1038.0	0.946	0.014	2.436	41.7	55.9	28.5	
73	M03	31.101	772	36.4	33.0	3.4	0.870	0.011	0.000	38.8	61.2	32.4	
74	M04	24.033	773	0.00	0.00	0.00	0.441	0.014	0.000	46.5	53.5	52.6	
75	M04	25.101	774	0.00	0.00	0.00	0.930	0.037	0.000	43.6	56.4	29.9	
76	M04	26.583	775	61371.5	33631.5	27740.0	0.136	0.619	1.673	22.2	76.1	92.3	
77	M04	26.834	776	1257.5	732.0	525.5	0.809	0.045	0.334	33.4	66.3	42.9	
78	M04	27.001	777	859.8	547.9	311.9	0.837	0.045	0.155	33.4	66.4	43.5	
79	M04	27.168	778	1841.3	1080.6	760.8	0.872	0.015					Rocks likely; excluded
80	M04	27.334	779	496.7	312.1	184.6	0.904	0.024	0.000	40.4	59.6	32.4	
81	M04	27.584	780	16.3	13.1	3.25	0.920	0.039	0.000	37.9	62.1	29.6	
82	M04	27.834	781	0.0	0.0	0.0	0.970	0.016	0.000	49.8	50.2	22.8	
83	M04	29.083	782	407.3	300.8	106.5	0.383	0.080	0.000	22.1	77.9	73.3	
84	M04	30.501	783	0.0	0.0	0.0	0.934	0.019	0.000	66.5	33.5	35.5	
85	M05	21.583	784	0.0	0.0	0.0	0.400	0.017	0.000	33.7	66.3	45.3	
86	M05	22.584	785	0.0	0.0	0.0	0.904	0.017	0.000	49.7	50.3	26.7	
87	M05	23.001	786	0.0	0.0	0.0	0.919	0.014	0.000	45.6	54.4	33.7	
88	M05	24.083	787	0.0	0.0	0.0	0.127	0.617	0.000	23.4	76.6	81.0	
89	M05	25.084	788	0.0	0.0	0.0	0.970	0.581	0.000	52.1	47.9	34.9	
90	M05	25.421	789	380.2	243.5	136.7	0.980	1.058	0.000	45.9	54.1	29.4	

Table 1
Summary of Residual Phase LNAPL Cryogenic Coring Samples
Wauleco, Inc.
Wausau, Wisconsin

NO.	BORING	DEPTH	SAMPLE ID	TPH (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PCP (mg/kg)	METHANE (mg/kg)	NAPL SATURATION % (as percent of porosity)	GAS SATURATION % (as percent of porosity)	WATER SATURATION % (as percent of porosity)	POROSITY SATURATION % (as percent of porosity)	VALUES EXCLUDED / NOT COLLECTED FROM DATA SET FOR SPECIFIED REASONS
91	M05	25.584	790	2273.6	1262.8	1010.8	0.948	0.812	1.633	44.6	53.8	26.5	
92	M05	25.751	791	1799.5	1012.3	787.2	0.982	1.408	0.864	41.3	57.9	33.3	
93	M05	26.583	792	3438.1	2716.7	721.4	0.062	3.179	0.049	22.4	77.5	95.2	
94	M05	27.583	793	70.3	60.9	9.48	0.836	0.380	0.000	47.2	52.8	46.5	
95	M05	29.083	794	2.66	2.66	0.0	0.712	0.054	0.000	31.1	68.9	46.7	
96	M05	29.584	795	0.0	0.0	0.0	0.832	0.038	0.000	32.5	67.5	44.5	
97	M05	30.084	796	2.17	2.17	0.0	0.819	0.059	0.000	31.1	68.9	44.5	
98	M05	30.584	797	0.0	0.0	0.0	0.837	0.045	0.000	38.6	61.4	37.7	
99	M05	30.834	798	0.0	0.0	0.0	0.858	0.032	0.000	38.2	61.8	43.9	
100	M06	17.583	799	0.0	0.0	0.0	0.863	0.009	0.000	41.5	58.5	33.0	
101	M06	18.084	800	275.6	220.4	55.2	0.894	0.009	0.000	46.3	53.7	31.2	
102	M06	18.584	801	8073.0	5034.0	3039.0	0.884	0.007	3.233	37.1	59.7	43.7	
103	M06	18.834	802	5207.7	3271.6	1936.1	0.902	0.009	3.870	48.4	47.7	28.7	
104	M06	19.083	803	2794.8	1814.9	979.9	0.871	0.014	1.395	31.7	67.0	35.3	
105	M06	19.668	804	3089.7	2009.1	1080.6	0.928	0.022	2.433	33.2	64.4	26.1	
106	M06	20.001	805	3219.2	2075.5	1143.7	0.934	0.056	2.685	41.2	56.1	25.1	
107	M06	20.334	806	7421.4	4646.4	2774.9	0.915	0.198	4.369	63.2	32.4	34.4	
108	M06	20.501	807	1078.4	779.2	299.2	0.889	0.180	0.339	32.3	67.4	36.1	
109	M06	21.583	808	1136.2	988.2	148.0	0.272	0.714	0.109	23.5	76.3	66.0	
110	M06	21.834	809	63.5	58.8	4.73	0.844	0.108	0.000	37.6	62.4	34.4	
111	M06	22.001	810	0.0	0.0	0.0	0.931	0.150	0.000	44.0	56.0	29.7	
112	M06	22.168	811	2.97	2.97	0.0	0.908	0.183	0.000	38.6	61.4	30.1	
113	M06	22.301	812	3.10	3.10	0.0	0.937	0.111	0.000	41.6	58.4	27.2	
114	M07	14.583	813	0.0	0.0	0.0	0.978	0.012	0.000	84.6	15.4	37.6	
115	M07	15.418	814	0.0	0.0	0.0	1.015	0.010	0.000	75.2	24.8	21.2	
116	M07	15.668	815	0.0	0.0	0.0	0.994	0.006	0.000	66.3	33.7	31.0	
117	M07	16.168	816	0.0	0.0	0.0	0.970	0.013	0.000	76.5	23.5	32.5	
118	M07	19.583	817	1878.0	1036.8	841.2	0.778	0.019	0.639	34.6	64.8	41.7	
119	M07	19.751	818	2843.8	1567.3	1276.6	0.891	0.025	1.412	71.8	26.8	35.5	
120	M07	19.918	819	194.4	168.7	25.7	0.355	0.024	0.000	51.2	48.8	25.4	
121	M07	20.084	820	202.3	154.3	48.0	0.922	0.036	0.000	43.6	56.4	24.9	
122	M07	20.501	821	15.8	13.2	2.58	0.937	0.037	0.000	38.5	61.5	26.1	
123	M07	20.834	822	3.53	3.53	0.00	0.917	0.044	0.000	53.0	47.0	29.2	
124	M07	21.083	823	0.0	0.0	0.0	0.940	0.028	0.000	45.0	55.0	26.8	
125	M07D	18.083	824	1.78	1.78	0.0	0.913	0.011	0.000	49.4	50.6	39.3	
126	M07D	18.584	825	681.1	403.8	277.3	0.930	0.017	0.168	52.8	47.0	26.3	
127	M07D	18.751	826	543.6	316.1	227.5	0.995	0.008	0.134				Rocks likely; excluded

Notes:

1. Sample analysis performed by Colorado State University.
2. Cells with no data indicate analysis not performed.

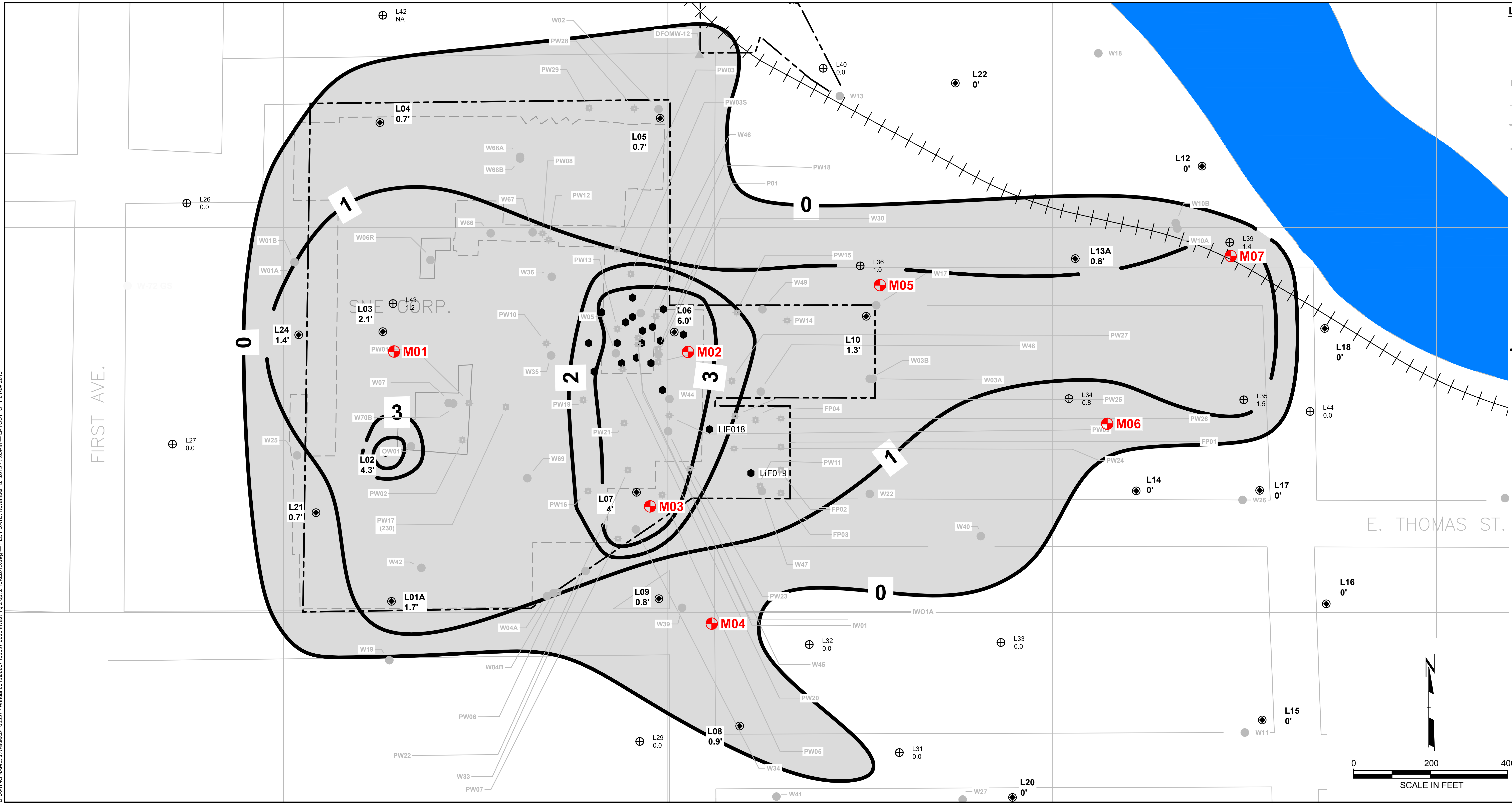
Table 2
Total Oxidant Demand Analytical Results
Wauleco, Inc.
Wausau, Wisconsin

ANALYSIS	SAMPLE									
	M04-775E	M04-775E	M05-792	M05-792	M06-806	M06-806	M01-130	M01-160	M07-730	M07-760
Dose (g/Kg)	30	60	30	60	30	60	30	60	30	60
Total Oxidant Demand (g/kg Soil)	16.9	25.5	10.6	18.7	14.3	19.2	6.8	12.3	6.3	13.4
Pre-Oxidant Analyses										
TPH as Min. Spirits (mg/kg)	752		<7.4		859		15.6		232	
PCP (mg/kg)	10.3		0.552		17.5		0.55		4.31	
Post Oxidant Analyses	M04-30	M04-60	M05-30	M05-60	M06-30	M06-60	M01-30	M01-60	M07-30	M07-60
TPH as Min. Spirits (mg/kg)	220	590	70.8	47.6	103	124	66.1	75.3	85.3	92.3
PCP (mg/kg)	6.63	6.10	<0.069	<0.058	1.30	1.27	<0.060	<0.059	<0.058	<0.057

Notes:

1. Dose - sodium persulfate applied as two doses (e.g., 30 g/kg and 60 g/kg).

Prepared by: K. Quinn 11/1/2019
Checked by: S. Sellwood 11/11/2019



LEGEND

W17	MONITORING WELL LOCATION AND NUMBER
PW12	EXTRACTION WELL LOCATION AND NUMBER
DFOMW-5	3M GROUNDWATER MONITORING WELL
	APPROXIMATE PROPERTY LINE
	FORMER BUILDING OUTLINE
50	PCP ISOCONCENTRATION CONTOUR INTERVAL VARIES (DASHED WHERE INFERRED)
	-2003 & 2005 LIF LOCATIONS (LIF001-LIF017 SHOWN BUT NOT LABELED)
L22 0'	- 2013 LIF LOCATION - THICKNESS OF LIF RESPONSE
L24 1.4'	-2015 LIF PROBE LOCATION -THICKNESS OF LIF RESPONSE
M06	CRYOGENIC RESIDUAL PHASE LNAPL INVESTIGATION BORING LOCATIONS
0	ESTIMATED THICKNESS OF RESIDUAL PHASE PRODUCT

NOTES

1. BASE MAP DEVELOPED FROM DRAWING A107250-1 OF THE SEPTEMBER 1992 SEMI- ANNUAL GROUNDWATER MONITORING REPORT BY KEYSTONE ENVIRONMENTAL, MWH DRAWING 2082658.302160101-B1, AND 3M WELLS LOCATION BASED ON 3M MAPS.
2. LASER INDUCED FLUORESCENCE (LIF) SURVEY COMPLETED JUNE 2-13, 2015 AND JUNE 11-13, 2013 BY TRC AND COLUMBIA TECHNOLOGIES, INC.
3. LIF RESULTS FROM 2003 AND 2005 WERE ALSO USED TO ESTIMATE THE THICKNESS OF RESIDUAL PHASE PRODUCT.
4. THICKNESS OF LIF RESPONSE AT L06 WAS CORRECTED FROM AUGUST 25, 2015 MEMORANDUM, WAULECO: EXTENT OF RESIDUAL PHASE PRODUCT/2015 LIF SURVEY, FIGURE 1, LIF SURVEY RESULTS.

PROJECT: 125 ROSENCRANS STREET RESIDUAL PHASE LNAPL INVESTIGATION WAUSAU, WISCONSIN

TITLE: LOCATION OF CRYOGENIC RESIDUAL PHASE LNAPL BORINGS

DRAWN BY:	T. FIEBRANZ	PROJ NO.:	189597
CHECKED BY:	K. QUINN	FIGURE 1	
APPROVED BY:	B. IVERSON		
DATE:	NOVEMBER 2019		

TRC
708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone: 608.826.3600

FILE NO.: 189597.0008 Invest fig 2 opt 2 nov22019.dwg

Attachment 1

Core Sample Laboratory Analytical Reports

		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	Saturation %			
Depth	Sample ID	TPH	GRO	DRO	PCP	Methane	NAPL	Gas	Water	Porosity
24.0831	700	104.5269	0	104.5269	0	0.008478	0	91.29362	8.706383	32.5382
24.5831	701	21.6449	0	21.6449	0					
25.0831	702	0	0	0	0	0.00756	0	83.92803	16.07197	22.19505
25.7501	703	0			0					
27.0831	704	0	0	0	24.01659	0.010519	0	53.87833	46.12167	36.52604
27.6701	705	2.081893	0	2.081893	6.589255	0.007028	0	62.04196	37.95804	24.44302
29.0831	706	4061.528	2457.875	1603.653	344.1726	0.118586				
29.2501	707	850.3968	501.2633	349.1334	70.52928	0.013579	0.12232	28.84018	71.0375	48.68884
29.4201	708	0	0	0	9.627032	0.00594	0	35.71527	64.28473	40.63964
29.5831	709	3.472021	3.472021	0	3.350356	0.010931	0	39.57455	60.42545	37.6608
29.7501	710	115.1296	98.84862	16.28099	2.421725	0.011447	0	45.47793	54.52207	35.92249
29.9201	711	134.0489	111.6165	22.43244	1.616454	0.010566	0	48.1994	51.8006	39.4013
30.0831	712	2814.28	1687.703	1126.577	5.096111	0.013442	1.508883	53.73323	44.75788	33.68971
30.2501	713	3902.902	2374.35	1528.553	11.8289	0.015087	2.626574	49.84905	47.52438	30.02866
30.4201	714	3716.3	1744.243	1972.057	4.40934	0.005076				
30.5801	715	228.8181	165.0256	63.79252	2.397588	0.014133	0	62.14771	37.85229	29.19386
30.7501	716	7001.23	4439.412	2561.818	60.26558	0.007512	6.882205	38.29743	54.82037	23.8335
30.9201	717	7376.607	4742.524	2634.083	76.60039	0.018137	7.307642	48.28229	44.41007	23.76373
31.0801	718	99.81641	91.34584	8.470569	11.78269	0.013646	0	63.54677	36.45323	26.17739
31.4171	719	60.07707	55.51948	4.557583	4.430563	0.008974	0	62.39556	37.60444	31.73989
32.1671	720	4742.924	3305.47	1437.454	140.5836	0.053795	0.409222	22.85761	76.73317	77.4495
32.5001	721	0	0	0	0	0.012697	0	31.8333	68.1667	44.92535
32.9171	722	47.81822	42.6701	5.14812	4.690965	0.012607	0	40.17361	59.82639	28.80436
33.3001	723	5.282391	5.282391	0	2.356307	0.01334	0	34.73199	65.26801	27.06684
25.083	724	0	0	0	1.853046	0				
23.084	725	0	0	0	0	0.007081	0	52.85994	47.14006	37.9495
23.418	726	0	0	0	0	0.005606				
24.083	727	129.8865	106.5381	23.34837	0	0.025697	0	36.47773	63.52227	39.2565
24.584	728	212.7983	185.6041	27.19417	0	0.042066	0	38.60243	61.39757	38.402
24.918	729	340.3988	255.375	85.02381	0	0	0	53.29328	46.70672	32.48443
25.084	730	621.4278	430.9543	190.4735	0	0.049251	0.067732	39.67236	60.2599	37.25915
25.251	731									
25.418	732	7102.69	4222.417	2880.273	0.964021	0.016581	5.358749	53.7518	40.88945	28.98453
25.584	733	2269.762	1408.68	861.0819	0.92265	0.051286	1.035726	64.91902	34.04525	36.14353
26.583	734	0	0	0	0	0.140363	0	30.56778	69.43222	53.91108
26.751	735	205.4799	187.8932	17.58667	0.854972	0.076747	0	31.92678	68.07322	43.87538
26.917	736	257.4379	206.3137	51.12421	0.831144	0.075251	0	25.72577	74.27423	42.66103
27.084	737	196.1584	177.6628	18.49568	0.831756	0.077017	0	24.44495	75.55505	45.12828
27.251	738	208.7965	185.7211	23.07533	0.840056	0.084152	0	39.45768	60.54232	45.00125
27.418	739	794.6732	576.2608	218.4124	0.838583	0.060305	0.127622	34.50102	65.37136	43.33765
27.584	740	538.018	443.4093	94.60867	0.84207	0.0485	0.023193	51.90616	48.07065	35.19092
27.751	741	418.7373	351.6999	67.03733	0.926156	0.056998	0	35.10282	64.89718	25.11934
27.918	742	2128.325	1432.357	695.9681	1.061111	0.057532	1.5394	46.73548	51.72512	25.94704
28.084	743	2460.357	1705.148	755.2085	1.026777	0.121651	1.144863	42.7421	56.11304	36.19201
29.001	744	2542.204	1721.157	821.047	0.534762	0.150917	0.440402	24.82089	74.73871	60.56863
29.251	745	427.371	342.5362	84.83477	0.82176	0.073132	0	42.32911	57.67089	47.56638
29.584	746	373.2157	316.7348	56.48084	0.89641	0.053283	0	42.6823	57.3177	32.90593
29.751	747	2415.76	1642.221	773.5387	0.955405	0.039564	1.474061	38.23819	60.28775	30.09479
30.084	748	7.480309	7.480309	0	0.977869	0.029308	0	45.60847	54.39153	25.64302
30.251	749	0	0	0	0.958628	0.01333	0	63.59265	36.40735	27.17261
31.501	750	1258.296	934.15	324.1462	0.475248	0.16805	0.101509	30.87325	69.02524	71.21903
32.084	751	188.684	156.4515	32.2325	0.764596	0.023435	0	36.37596	63.62404	52.37091
32.584	752	107.5119	96.21295	11.29899	0.82314	0.13856	0	31.25211	68.74789	47.95852
33.171	753	0	0	0	0.893668	0.029197	0	52.5948	47.4052	27.79814
21.501	754	0	0	0	0.970563	0.012187	0	91.40289	8.597107	39.19648
23.084	755	0	0	0	1.07206	0.012571	0	70.52145	29.47855	29.83919
24.001	756	0	0	0	0.909662	0.003384	0	53.30604	46.69396	43.35764
25.101	757	0	0	0	0.907087	0.01255	0	53.69389	46.30611	47.85617
25.501	758	10477.5	5635.607	4841.897	0.864964	0.011785	3.426285	56.99309	39.58062	49.09946
25.668	759	3108.652	1759.7	1348.952	0.839747	0.01052	0.81227	48.73176	50.45597	51.54637
26.501	760	8870.419	5612.333	3258.086	0.879267	0.042198	3.268813	39.83911	56.89207	45.89414
26.751	761	10057.9	7107.92	2949.983	0.304323	0.050809	2.189152	26.80249	71.00835	59.12107
26.918	762	658.8439	516.8348	142.009	0.831613	0.009414	0.064434	31.66126	68.2743	44.95227
27.084	763	2374.407	1809.087	565.3199	0.829064	0.069317	0.993279	44.37913	54.62759	38.46527
27.251	764	4081.129	2828.365	1252.765	0.930138	0.050775	2.403188	49.58216	48.01465	33.04833
27.421	765	3368.949	2403.457	965.4921	0.89792					
29.001	766	2350.75	1801.023	549.7272	0.513247	0.01942	0.418666	28.62759	70.95374	59.42088
29.251	767	559.2751	451.7461	107.5291	0.80303	0.015551	0.022078	34.33519	65.64273	47.07101
29.418	768	306.2181	254.7292	51.48896	0.814295	0.017128	0	32.66813	67.33187	46.62073
29.584	769	362.7455	295.8202	66.92531	0.833424	0.01314	0	31.46324	68.53676	44.65668
29.751	770	506.8137	413.8622	92.95147	0.842424	0.016509	0.002773	33.24946	66.74776	44.86754
30.084	771	3435.288	2397.298	1037.99	0.945745	0.013527	2.435747	41.65917	55.90509	28.52983
31.101	772	36.41177	32.98253	3.429243	0.869939	0.010622	0	38.83857	61.16143	32.37771

24.033	773	0	0	0	0.441402	0.013831	0	46.45332	53.54668	52.5829
25.101	774	0	0	0	0.930106	0.036784	0	43.59793	56.40207	29.90356
26.583	775	61371.49	33631.52	27739.97	0.135574	0.618609	1.672925	22.23044	76.09664	92.3389
26.834	776	1257.497	732.014	525.4833	0.809078	0.045038	0.333575	33.37703	66.2894	42.92946
27.001	777	859.7804	547.8606	311.9198	0.837374	0.045031	0.154973	33.40624	66.43879	43.47151
27.168	778	1841.34	1080.582	760.7577	0.872121	0.014524				
27.334	779	496.7367	312.1103	184.6264	0.904247	0.023831	0	40.43022	59.56978	32.4377
27.584	780	16.31356	13.06646	3.247102	0.919807	0.038859	0	37.94367	62.05633	29.63477
27.834	781	0	0	0	0.970156	0.016207	0	49.75154	50.24846	22.79506
29.083	782	407.3422	300.8344	106.5078	0.382819	0.080132	0	22.11323	77.88677	73.28405
30.501	783	0	0	0	0.933664	0.018546	0	66.46834	33.53166	35.51258
21.501	784	0	0	0	0.400345	0.01719	0	33.74297	66.25703	45.33691
22.584	785	0	0	0	0.903797	0.016694	0	49.667	50.333	26.71382
23.001	786	0	0	0	0.919418	0.014021	0	45.60375	54.39625	33.68347
24.083	787	0	0	0	0.126751	0.617346	0	23.36031	76.63969	81.02715
25.084	788	0	0	0	0.969772	0.580833	0	52.13056	47.86944	34.87447
25.421	789	380.1667	243.4996	136.6671	0.980188	1.058015	0	45.91183	54.08817	29.38951
25.584	790	2273.62	1262.801	1010.819	0.947738	0.812235	1.632944	44.57765	53.78941	26.45905
25.751	791	1799.524	1012.336	787.1884	0.982421	1.407874	0.86372	41.28203	57.85425	33.26159
26.583	792	3438.138	2716.698	721.44	0.062448	3.178854	0.048873	22.43019	77.52094	95.21848
27.583	793	70.34013	60.86506	9.475074	0.836143	0.38013	0	47.18329	52.81671	46.53067
29.083	794	2.658905	2.658905	0	0.711997	0.053759	0	31.13533	68.86467	46.67922
29.584	795	0	0	0	0.831589	0.038064	0	32.5401	67.4599	44.47287
30.084	796	2.170231	2.170231	0	0.818935	0.059075	0	31.10793	68.89207	44.46144
30.584	797	0	0	0	0.836826	0.044597	0	38.60975	61.39025	37.72243
30.834	798	0	0	0	0.85822	0.031793	0	38.19035	61.80965	43.86665
15.583	799	0	0	0	0.862892	0.009024	0	41.54248	58.45752	33.04783
18.084	800	275.6477	220.4276	55.2201	0.894487	0.009355	0	46.28951	53.71049	31.15811
18.584	801	8072.992	5034	3038.992	0.884316	0.007053	3.233243	37.08523	59.68153	43.68935
18.834	802	5207.708	3271.573	1936.135	0.901602	0.00908	3.870299	48.44232	47.68739	28.7202
19.083	803	2794.784	1814.892	979.8926	0.870618	0.014117	1.395131	31.65011	66.95476	35.2691
19.668	804	3089.685	2009.095	1080.591	0.927566	0.022447	2.432784	33.15063	64.41659	26.06907
20.001	805	3219.242	2075.52	1143.722	0.934197	0.055794	2.684887	41.2124	56.10271	25.12104
20.334	806	7421.351	4646.444	2774.907	0.915342	0.198128	4.368952	63.1993	32.43175	34.41637
20.501	807	1078.364	779.1844	299.1799	0.889035	0.179942	0.339406	32.2603	67.40029	36.08041
21.583	808	1136.174	988.1589	148.0154	0.272457	0.714346	0.108607	23.54318	76.34822	65.99015
21.834	809	63.47576	58.75044	4.725317	0.843761	0.107547	0	37.55878	62.44122	34.39179
22.001	810	0	0	0	0.930991	0.150494	0	44.04193	55.95807	29.71304
22.168	811	2.974668	2.974668	0	0.908179	0.183495	0	38.62412	61.37588	30.08271
22.301	812	3.096084	3.096084	0	0.937342	0.111177	0	41.59863	58.40137	27.22112
14.583	813	0	0	0	0.977692	0.012115	0	84.62252	15.37748	37.5793
15.418	814	0	0	0	1.015302	0.010226	0	75.19644	24.80356	21.19183
15.668	815	0	0	0	0.993608	0.005884	0	66.28868	33.71132	30.95681
16.168	816	0	0	0	0.969649	0.012799	0	76.4587	23.5413	32.5237
19.583	817	1877.99	1036.794	841.1961	0.778374	0.018916	0.639083	34.551	64.80992	41.66514
19.751	818	2843.849	1567.253	1276.595	0.891252	0.025278	1.4121	71.76731	26.82059	35.47636
19.918	819	194.3823	168.6536	25.72867	0.354537	0.023644	0	51.1625	48.8375	25.41203
20.084	820	202.2775	154.252	48.02557	0.922396	0.036097	0	43.58241	56.41759	24.9033
20.501	821	15.79083	13.20978	2.581048	0.937446	0.03686	0	38.46404	61.53596	26.13785
20.834	822	3.526355	3.526355	0	0.917053	0.043916	0	52.95512	47.04488	29.22328
21.083	823	0	0	0	0.939529	0.028045	0	45.03515	54.96485	26.78044
18.001	824	1.784098	1.784098	0	0.912568	0.011467	0	49.42605	50.57395	39.30305
18.584	825	681.0831	403.7702	277.3129	0.93015	0.017299	0.167755	52.82247	47.00978	26.33888
18.751	826	543.5941	316.065	227.5291	0.995381	0.008206	0.134246			

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Department of Civil and Environmental Engineering
Colorado State University, Fort Collins CO.

Thomas C Sale , PhD.
Professor, Center for contaminant Hydrology
Department of Civil and Environmetal Engineering
Colorado State University, Fort Collins CO.

Attachment 2

Total Oxidant Demand Laboratory Analytical Reports

REDOX TECH, LLC

"Providing Innovative In Situ Soil and Groundwater Treatment"

DATA PACKAGE TRC WAUSAU, WI WAULECO

1) TOTAL OXIDANT DEMAND (TOD) SAMPLE ANALYSIS

Samples prepared: August 19, 2019
Samples titrated: September 8, 2019
Oxidant: Sodium Persulfate

Sample	Dose (g/Kg)	Total Oxidant Demand (g/kg Soil)
MO4-775E	30	16.9
MO4-775E	60	25.5
MO5-792	30	10.6
MO5-792	60	18.7
MO6-806	30	14.3
MO6-806	60	19.2
Control	30 g/L	26.3*
Control	60 g/L	47.4*

*Measured control

Pre- and Post-Treatment laboratory analyses for these samples are provided in Appendix A and Appendix B, respectively.

2) TOTAL OXIDANT DEMAND (TOD) SAMPLE ANALYSIS

Samples prepared: September 29, 2019
Samples titrated: October 10, 2019
Oxidant: Sodium Persulfate

Sample	Dose (g/Kg)	Total Oxidant Demand (g/kg Soil)
M0130	30	6.8
M0160	60	12.3
M0730	30	6.3
M0760	60	13.4
Control	30 g/L	29.2*
Control	60 g/L	54.1*

*Measured control

Pre- and Post-Treatment laboratory analyses for these samples are provided in Appendix C and Appendix D, respectively.

For any additional questions on this data package, please contact me.

Sincerely,

Joe Rossabi, Ph.D., P.E.
Redox Tech, LLC
200 Quade Drive
Cary, NC 27513
919-678-0140
919-678-0150 fax

App. A Pre-Treatment Analytical Results 8/23/19

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ANALYTICAL REPORT

TRC ENVIRONMENTAL
KEN QUINN
708 HEARTLAND TRAIL
MADISON, WI 53717

Project Name: WAULECO INC: 2019 REMEDIATION SERVICES
Project Phase:
Contract #: 2399
Project #: 189597.0008.0000
Folder #: 147422
Purchase Order #: 139413

Arrival Temperature: See COC
Report Date: 08/23/2019
Date Received: 08/20/2019
Reprint Date: 08/23/2019

CT LAB Sample#: 317385 Sample Description: M04-PRE — Sampled: 08/19/2019 1200

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**14.8**	%	0.1	0.1	1			08/21/2019 14:21	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**752**	mg/kg	7.4	25	1		08/20/2019 13:30	08/22/2019 16:11	AJZ	EPA 8015
Pentachlorophenol	**10.3**	mg/kg	0.29	0.98	5		08/20/2019 13:30	08/22/2019 16:35	JJY	EPA 8270D

CT LAB Sample#: 317386 Sample Description: M05-PRE — Sampled: 08/19/2019 1200

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**13.7**	%	0.1	0.1	1			08/21/2019 14:21	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	<7.4	mg/kg	7.4	25	1		08/20/2019 13:30	08/22/2019 15:03	AJZ	EPA 8015
Pentachlorophenol	**0.552**	mg/kg	0.058	0.20	1		08/20/2019 13:30	08/22/2019 15:04	JJY	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

CT LAB Sample#: 317387 Sample Description: M06-PRE Sampled: 08/19/2019 1200

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**12.1**	%	0.1	0.1	1			08/21/2019 14:21	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**859**	mg/kg	7.3	24	1		08/20/2019 13:30	08/22/2019 15:37	AJZ	EPA 8015
Pentachlorophenol	**17.5**	mg/kg	0.28	0.95	5		08/20/2019 13:30	08/22/2019 16:17	JJY	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

Notes: * Indicates a value in between the LOD (limit of detection) and the LOQ (limit of quantitation). All LOD/LOQs are adjusted to reflect dilution and also any differences in the sample weight / volume as compared to standard amounts.

All samples were received intact and properly preserved unless otherwise noted. The results reported relate only to the samples tested. This report shall not be reproduced, except in full, without written approval of this laboratory. The Chain of Custody is attached.

Submitted by: Brett M. Szymanski
Project Manager
608-356-2760

Current CT Laboratories Certifications
Wisconsin (WDNR) Chemistry ID# 157066030
Wisconsin (DATCP) Bacteriology ID# 289
Louisiana NELAP (primary) ID# ACC20190002
Illinois NELAP Lab ID# 200073
Kansas NELAP Lab ID# E-10368
Virginia NELAP Lab ID# 460203
Maryland Lab ID# 344
ISO/IEC 17025-2005 A2LA Cert # 3806.01
DoD-ELAP A2LA 3806.01
GA EPD Stipulation ID ACC20190002

REDOX TECH, LLC

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422

CHAIN C

Folder #: 147422

Company: TRC ENVIRONMENTA

Project: WAULECO

Logged By: JRB PM: BM

1

Client/Reporting Information			Project Information			
Company Name	Redox Tech LLC		Project Name	Wauleco - TRC		
Address	200 Quade Drive					
City	Cary	State NC Zip 27513	Sampling Location			
Project Contact	Jonathan Sawyer		Turnaround Time			
Phone #	9196334964		Contaminants of Concern			
email address	Sawyer@Redox-Tech.com					
Samplers Name	Jonathan Sawyer					

Field ID	Collection Date	Collection Time	Matrix	# of bottles	# of bottles preserved	preservative	PCP - polychlorophenol	TPH - mineral spirits	Moisture Content				Comments
MO4-Pre	8/19/19	1200	SO	1	NA	None	X	X	X				317385
MO5-Pre	8/19/19	1200	SO	1	NA	None	X	X	X				317386
MO6-Pre	8/19/19	1200	SO	2	NA	None	X	X	X				317387

WW-Waste Water
SW-Surface Water
SO-Soil

Sample unpacked by:
Sample received in good condition? (Y) or N 1.3°C ice present JRB 8/20/19 940
If no, explain:
Relinquished by: Redox Jonathan Sawyer 8/19/19 1216
Received by: JRB Date/Time: 8/20/19 947

Comments: Bill to TRC

App. B Post - Treatment Analytical Results 9/25/19

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ANALYTICAL REPORT

REDOX TECH LLC
JONATHAN SAWYER
200 QUADE DR
CARY, NC 27513

Project Name: WAULECO INC: 2019 REMEDIATION SERVICES
Project Phase:
Contract #: 2399
Project #: 189597.0008.0000
Folder #: 147945
Purchase Order #: 139413

Arrival Temperature: 3.1
Report Date: 09/24/2019
Date Received: 09/10/2019
Reprint Date: 09/24/2019

CT LAB Sample#: 325112 Sample Description: M0430 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**74.3**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**25.7**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**220**	mg/kg	8.6	29	1		09/18/2019 12:30	09/23/2019 13:47	AJZ	EPA 8015
Pentachlorophenol	**6.63**	mg/kg	0.068	0.23	1	Y	09/18/2019 12:30	09/20/2019 01:33	JJY	EPA 8270D

CT LAB Sample#: 325122 Sample Description: M0460 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**63.1**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**36.9**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

CT LAB Sample#: 325122 Sample Description: M0460 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
TPH as Mineral Spirits	**590**	mg/kg	9.9	33	1		09/18/2019 12:30	09/23/2019 14:21	AJZ	EPA 8015
Pentachlorophenol	**6.10**	mg/kg	0.077	0.26	1	Y	09/18/2019 12:30	09/20/2019 01:52	JJY	EPA 8270D

CT LAB Sample#: 325123 Sample Description: M0530 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**71.6**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**28.4**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**70.8**	mg/kg	8.8	29	1		09/18/2019 12:30	09/23/2019 14:55	AJZ	EPA 8015
Pentachlorophenol	<0.069	mg/kg	0.069	0.23	1	Y	09/18/2019 12:30	09/20/2019 02:10	JJY	EPA 8270D

CT LAB Sample#: 325124 Sample Description: M0560 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**84.2**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**15.8**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**47.6**	mg/kg	7.4	25	1		09/18/2019 12:30	09/23/2019 15:29	AJZ	EPA 8015
Pentachlorophenol	<0.058	mg/kg	0.058	0.20	1	Y	09/18/2019 12:30	09/20/2019 02:29	JJY	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

CT LAB Sample#: 325125 Sample Description: M0630 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**86.2**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**13.8**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**103**	mg/kg	7.4	25	1		09/18/2019 12:30	09/23/2019 16:02	AJZ	EPA 8015
Pentachlorophenol	**1.30**	mg/kg	0.057	0.19	1	Y	09/18/2019 12:30	09/20/2019 02:47	JJY	EPA 8270D

CT LAB Sample#: 325126 Sample Description: M0660 Sampled: 09/08/2019 1400

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Solids, Percent	**70.2**	%	0.1	0.1	1			09/18/2019 14:13	BMM	EPA 8000C
Percent Moisture	**29.8**	%	0.1	0.1	1			09/18/2019 14:13	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**124**	mg/kg	8.9	30	1		09/18/2019 12:30	09/23/2019 16:37	AJZ	EPA 8015
Pentachlorophenol	**1.27**	mg/kg	0.071	0.24	1	Y	09/18/2019 12:30	09/20/2019 03:06	JJY	EPA 8270D

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Submitted by: Eric T. Korthals
Project Manager
608-356-2760

QC Qualifiers

Code	Description
B	Analyte detected in the associated Method Blank.
C	Toxicity present in BOD sample.
D	Diluted Out.
E	Safe, No Total Coliform detected.
F	Unsafe, Total Coliform detected, no E. Coli detected.
G	Unsafe, Total Coliform detected and E. Coli detected.
H	Holding time exceeded.
I	Incubator temperature was outside acceptance limits during test period.
J	Estimated value.
L	Significant peaks were detected outside the chromatographic window.
M	Matrix spike and/or Matrix Spike Duplicate recovery outside acceptance limits.
N	Insufficient BOD oxygen depletion.
O	Complete BOD oxygen depletion.
P	Concentration of analyte differs more than 40% between primary and confirmation analysis.
Q	Laboratory Control Sample outside acceptance limits.
R	See Narrative at end of report.
S	Surrogate standard recovery outside acceptance limits due to apparent matrix effects.
T	Sample received with improper preservation or temperature.
U	Analyte concentration was below detection limit.
V	Raised Quantitation or Reporting Limit due to limited sample amount or dilution for matrix background interference.
W	Sample amount received was below program minimum.
X	Analyte exceeded calibration range.
Y	Replicate/Duplicate precision outside acceptance limits.
Z	Specified calibration criteria was not met.

Current CT Laboratories Certifications

Wisconsin (WDNR) Chemistry ID# 157066030
Wisconsin (DATCP) Bacteriology ID# 289
Louisiana NELAP (primary) ID# ACC20190002
Illinois NELAP Lab ID# 200073
Kansas NELAP Lab ID# E-10368
Virginia NELAP Lab ID# 460203
Maryland Lab ID# 344
ISO/IEC 17025-2005 A2LA Cert # 3806.01
DoD-ELAP A2LA 3806.01
GA EPD Stipulation ID ACC20190002

Folder #: 147945
Company: TRC ENVIRONMENTA
Project: WAULECO
Logged By: JRB PM: BM

REDOX TECH, LLC

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Cary, NC 27513
Phone: 919-678-0140

Page 01 of 01

Client/Reporting Information			Project Information				Requested Analysis (include method and bottle type)						Matrices
Company Name: Redox Tech LLC			Project Name: Wauleco TRC				PCB Aroclor Lead	TPH - Mineral Spirits	Moisture Content				GW-Groundwater
Address: 200 Quade Drive													WW-Waste Water
City: CARY State: NC Zip: 27513			Sampling Location										SW-Surface Water
Project Contact: SAWYER@Redox-Tech.com			Turnaround Time										SO-Soil
Phone #: 919 633 4964			Contaminants of Concern: VOC - LNARL										
email address													
Samplers Name													
Field ID	Collection Date	Collection Time	Matrix	# of bottles	# of bottles preserved	preservative							Comments
MO430	9/08/19	1400	SO	1			x		x				325112
MO460	9/08/19	1400	SO	1		NA	x		x				325122
MO530	9/8/19	1400	SO	1			x		x				325123
MO560	9/8/19	1400	SO	1			x		x				325104
MO630	9/8/19	1400	SO	1			x		x				325125
MO660	9/8/19	1400	SO	1			x		x				325126

Sample unpacked by: PG
Sample received in good condition? Y or N
If no, explain:
Relinquished by: Jonathan Sawyer Redox 21 Date/Time: JRB 9/10/19 1115
Received by: Date/Time: 9/10/19 10:45
3.1° #23

Comments:

App. C Pre-Treatment Analytical Results 10/14/19

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ANALYTICAL REPORT

TRC ENVIRONMENTAL
KEN QUINN
708 HEARTLAND TRAIL
MADISON, WI 53717

Project Name: WAULECO INC: 2019 REMEDIATION SERVICES
Project Phase:
Contract #: 2399
Project #: 189597.0008.0000
Folder #: 148473
Purchase Order #: 139413

Arrival Temperature: 5.4
Report Date: 10/11/2019
Date Received: 10/01/2019
Reprint Date: 10/14/2019

CT LAB Sample#: 334831 Sample Description: M01PRE Sampled: 09/26/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**13.4**	%	0.1	0.1	1			10/09/2019 14:38	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**15.6**	mg/kg	7.2 *	24	1		10/04/2019 15:00	10/10/2019 12:54	AJZ	EPA 8015
Pentachlorophenol	**0.550**	mg/kg	0.057	0.19	1		10/04/2019 15:00	10/08/2019 18:55	RPN	EPA 8270D

CT LAB Sample#: 334844 Sample Description: M07PRE Sampled: 09/26/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**14.5**	%	0.1	0.1	1			10/09/2019 14:38	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**232**	mg/kg	7.5	25	1		10/04/2019 15:00	10/10/2019 12:21	AJZ	EPA 8015
Pentachlorophenol	**4.31**	mg/kg	0.059	0.20	1		10/04/2019 15:00	10/08/2019 19:14	RPN	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

Notes: * Indicates a value in between the LOD (limit of detection) and the LOQ (limit of quantitation). All LOD/LOQs are adjusted to reflect dilution and also any differences in the sample weight / volume as compared to standard amounts.

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Submitted by: Brett M. Szymanski
Project Manager
608-356-2760

Current CT Laboratories Certifications
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Wisconsin (DATCP) Bacteriology ID# 289
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Illinois NELAP Lab ID# 200073
Kansas NELAP Lab ID# E-10368
Virginia NELAP Lab ID# 460203
Maryland Lab ID# 344
ISO/IEC 17025-2005 A2LA Cert # 3806.01
DoD-ELAP A2LA 3806.01
GA EPD Stipulation ID ACC20190002

Folder # 148473

Company: TRC ENVIRONMENTA

Project: WAULECO

Logged By: JRB PM: BM

REDOX TECH, LLC

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"Providing Innovative In Situ Soil and Groundwater Treatment"

Cary, NC 27513
Phone: 919-678-0140

Page 1 of 1

Client/Reporting Information			Project Information				Requested Analysis (include method and bottle type)						Matrices
Company Name: Redox Tech LLC			Project Name: Wauleco				PCP, Pentachlorophenol	TPH - as mineral spirits	% Moisture content				GW-Groundwater
Address: 200 Quade Drive													WW-Waste Water
City: Cary State: NC Zip: 27513			Sampling Location										SW-Surface Water
Project Contact: Jonathan Sawyer			Turnaround Time										SO-Soil
Phone #: 919.633.4964			Contaminants of Concern: PCP, LNAPL										
email address: Sawyer@Redox-Tech.com													
Samplers Name: Jonathan Sawyer													
Field ID	Collection Date	Collection Time	Matrix	# of bottles	# of bottles preserved	preservative							Comments
MO1 Pre	9/26	1500	SO	1			x	x	x				334831
MO7 Pre	9/26	1500	SO	1			x	x	x				334844

Sample unpacked by:	Comments:
Sample received in good condition? Y or N	
If no, explain:	
Relinquished by: Redox Tech	Date/Time: 9/26/19
Received by: JRB	Date/Time: 9/11/19 1141

melt water only sp 25 (probe)
5.4°
10/1/19 1100 jls
xxxx

Post-Treatment Analytical Results 10/30/19

App. D

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ANALYTICAL REPORT

TRC ENVIRONMENTAL
KEN QUINN
708 HEARTLAND TRAIL
MADISON, WI 53717

Project Name: WAULECO
Project Phase: 2019 REMEDIATION SERVICES
Contract #: 2399
Project #: 189597.0008.0000
Folder #: 148672
Purchase Order #: 139413

Arrival Temperature: 2.9
Report Date: 10/30/2019
Date Received: 10/08/2019
Reprint Date: 10/30/2019

CT LAB Sample#: 337661 Sample Description: M0130 Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**19.5**	%	0.1	0.1	1			10/09/2019 14:56	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**66.1**	mg/kg	8.0	26	1		10/14/2019 13:45	10/19/2019 05:35	AJZ	EPA 8015
Pentachlorophenol	<0.060	mg/kg	0.060	0.20	1	M	10/14/2019 13:45	10/17/2019 12:59	RPN	EPA 8270D

CT LAB Sample#: 337662 Sample Description: M0160 Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**19.3**	%	0.1	0.1	1			10/09/2019 14:56	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**75.3**	mg/kg	7.9	26	1		10/14/2019 13:45	10/19/2019 03:55	AJZ	EPA 8015
Pentachlorophenol	<0.059	mg/kg	0.059	0.20	1		10/14/2019 13:45	10/17/2019 13:20	RPN	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

CT LAB Sample#: 337663 Sample Description: M0730 Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**16.5**	%	0.1	0.1	1			10/09/2019 14:56	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**85.3**	mg/kg	7.2	24	1		10/14/2019 13:45	10/19/2019 04:28	AJZ	EPA 8015
Pentachlorophenol	<0.058	mg/kg	0.058	0.20	1		10/14/2019 13:45	10/17/2019 13:40	RPN	EPA 8270D

CT LAB Sample#: 337664 Sample Description: M0760 Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Inorganic Results										
Percent Moisture	**13.7**	%	0.1	0.1	1			10/09/2019 14:56	BMM	ASTM D2974-87
Organic Results										
TPH as Mineral Spirits	**92.3**	mg/kg	7.1	24	1		10/14/2019 13:45	10/19/2019 05:01	AJZ	EPA 8015
Pentachlorophenol	<0.057	mg/kg	0.057	0.20	1		10/14/2019 13:45	10/17/2019 14:00	RPN	EPA 8270D

CT LAB Sample#: 337665 Sample Description: M0130W Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Organic Results										
TPH as Mineral Spirits	<130	ug/L	130	440	1		10/11/2019 13:00	10/18/2019 10:05	AJZ	EPA 8015
Pentachlorophenol	**39**	ug/L	2.1	7.1	1		10/11/2019 14:30	10/15/2019 15:48	RPN	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

CT LAB Sample#: 337666 Sample Description: M0160W Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Organic Results										
TPH as Mineral Spirits	<140	ug/L	140	460	1		10/11/2019 13:00	10/18/2019 10:38	AJZ	EPA 8015
Pentachlorophenol	**44**	ug/L	2.0	6.8	1		10/11/2019 14:30	10/15/2019 16:07	RPN	EPA 8270D

CT LAB Sample#: 337667 Sample Description: M0730W Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Organic Results										
TPH as Mineral Spirits	**90000**	ug/L	1400	4600	10		10/11/2019 13:00	10/18/2019 11:11	AJZ	EPA 8015
Pentachlorophenol	**810**	ug/L	43	150	20		10/11/2019 14:30	10/15/2019 17:20	RPN	EPA 8270D

CT LAB Sample#: 337668 Sample Description: M0760W Sampled: 10/04/2019 1500

Analyte	Result	Units	LOD	LOQ	Dilution	Qualifier	Prep Date/Time	Analysis Date/Time	Analyst	Method
Organic Results										
TPH as Mineral Spirits	**95000**	ug/L	1300	4400	10		10/11/2019 13:00	10/18/2019 11:45	AJZ	EPA 8015
Pentachlorophenol	**830**	ug/L	43	150	20		10/11/2019 14:30	10/15/2019 17:39	RPN	EPA 8270D

Unless specifically stated to the contrary, soil/sediment/sludge sample results/LOD/LOQ/RLs were reported on a Dry Weight Basis

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Submitted by: Brett M. Szymanski
Project Manager
608-356-2760

QC Qualifiers

Code	Description
B	Analyte detected in the associated Method Blank.
C	Toxicity present in BOD sample.
D	Diluted Out.
E	Safe, No Total Coliform detected.
F	Unsafe, Total Coliform detected, no E. Coli detected.
G	Unsafe, Total Coliform detected and E. Coli detected.
H	Holding time exceeded.
I	Incubator temperature was outside acceptance limits during test period.
J	Estimated value.
L	Significant peaks were detected outside the chromatographic window.
M	Matrix spike and/or Matrix Spike Duplicate recovery outside acceptance limits.
N	Insufficient BOD oxygen depletion.
O	Complete BOD oxygen depletion.
P	Concentration of analyte differs more than 40% between primary and confirmation analysis.
Q	Laboratory Control Sample outside acceptance limits.
R	See Narrative at end of report.
S	Surrogate standard recovery outside acceptance limits due to apparent matrix effects.
T	Sample received with improper preservation or temperature.
U	Analyte concentration was below detection limit.
V	Raised Quantitation or Reporting Limit due to limited sample amount or dilution for matrix background interference.
W	Sample amount received was below program minimum.
X	Analyte exceeded calibration range.
Y	Replicate/Duplicate precision outside acceptance limits.
Z	Specified calibration criteria was not met.

Current CT Laboratories Certifications

Wisconsin (WDNR) Chemistry ID# 157066030
Wisconsin (DATCP) Bacteriology ID# 289
Louisiana NELAP (primary) ID# ACC20190002
Illinois NELAP Lab ID# 200073
Kansas NELAP Lab ID# E-10368
Virginia NELAP Lab ID# 460203
Maryland Lab ID# 344
ISO/IEC 17025-2005 A2LA Cert # 3806.01
DoD-ELAP A2LA 3806.01
GA EPD Stipulation ID ACC20190002

148672

Folder # 148672
Company TRC ENVIRONMENTA
Project WAULECO
Logged By JRB PM BM

REDOX TECH, LLC

"Providing Innovative In Situ Soil and Groundwater Treatment"

CHAIN OF CUST

200 Quade Drive
Cary, NC 27513
Phone: 919-678-0140

Page 1 of 1

Client/Reporting Information		Project Information		Requested Analysis (include method and bottle type)							Matrices
Company Name: Redox Tech LLC		Project Name: Wauleco - TRC		DRO - Petrochlorophenol	TPH - Mineral Spirits	Moisture					GW-Groundwater
Address: 200 Quade Drive											WW-Waste Water
City: Cary State: NC Zip: 27513		Sampling Location									SW-Surface Water
Project Contact: Joe Rossabi		Turnaround Time: Standard									SO-Soil
Phone #: 919-678-0140		Contaminants of Concern: LNAPL									
email address: rossabi@Redox-Tech.com											
Samplers Name: Jonathan Sawyer											
Field ID	Collection Date	Collection Time	Matrix	# of bottles	# of bottles preserved	preservative					Comments
MO130	10/4/19	1500	SO	1			x	x	x		337661
~~MO130~~ MO160		1500	SO	1			x	x	x		662
MO730		1500	SO	1			x	x	x		663
MO760		1500	SO	1			x	x	x		664
MO130W		1500	GW	2			x	x	x		665
MO160W		1500	GW	2			x	x	x		666
MO730W		1500	GW	2			x	x	x		667
MO760W	10/4/19	1500	GW	2			x	x	x		668

Sample unpacked by:
Sample received in good condition? Y or N
If no, explain:
Relinquished by: Jonathan Sawyer — Date/Time: 10/4/19 1600
Received by: — Date/Time: 10/8/19 11:05

Comments: JRB 10/8/19 1108