From:	Ken Shimko <kshimko.meridianenv@gmail.com></kshimko.meridianenv@gmail.com>
Sent:	Monday, April 18, 2022 9:02 AM
То:	Saari, Christopher A - DNR
Cc:	Stoltz, Carrie R - DNR
Subject:	Doug's Tire (#03-55-000408) - Ladysmith: Closure Packet Addendum
Attachments:	Closure Addendum - April 18, 2022 - compressed.pdf

CAUTION: This email originated from outside the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Chris.

Attached is an Addendum to the Closure Packet for the Doug's Tire site in Ladysmith.

This Addendum is in response to the DNR letter (referenced below) and subsequent telephone conversations with DNR staff.

The Addendum provides additional information and discussion regarding the plume stability including ground water velocity estimates, contaminant travel time comparison, a discussion of the LNAPL characterization and modeling work completed during the remedial alternatives analysis, and our recommendations for No Further Action based on the immobility of the residual LNAPL and proposed Cap Maintenance Plan. In addition, the building is identified as a Structural Impediment. Should the building be removed in the future, this may allow additional excavation (if warranted at that time).

Please contact me with any questions.

Thanks

Kenneth Shimko, PG Meridian Environmental Consulting, LLC 2711 North Elco Road Fall Creek, Wisconsin 54742 (715)832-6608 (office) (715)579-0723 (cell) Email: kshimko.meridianenv@gmail.com

From: Saari, Christopher A - DNR <Christopher.Saari@wisconsin.gov>
Sent: Wednesday, May 12, 2021 10:47 AM
To: Ken Shimko <kshimko.meridianenv@gmail.com>
Cc: Stoltz, Carrie R - DNR <Carrie.Stoltz@wisconsin.gov>; Sager, John E - DNR

<John.Sager@wisconsin.gov>; Shafel, Kathleen S - DNR <Kathleen.Shafel@wisconsin.gov> Subject: Closure Not Recommended - Doug's Tire (#03-55-000

Hi Ken,

As we discussed last month, attached is the letter finalizing the closure not recommended determination for the above named site. Since I don't have an email address for Ms. Richardson, I've dropped a copy of the letter off at the Post Office. Feel free to share the electronic version with her if you have an address.

Please contact Carrie Stoltz or me if you have any questions.

We are committed to service excellence. Visit our survey at <u>http://dnr.wi.gov/customersurvey</u> to evaluate how I did.

Chris Saari Northern Region Team Supervisor – Remediation and Redevelopment Program Wisconsin Department of Natural Resources 2501 Golf Course Rd. Ashland, WI 54806 Phone: (715) 208-4004 Please note that my contact number has changed. You should use this phone number to reach me going forward. Fax: (715) 685-2909 Christopher.Saari@Wisconsin.gov



ADDENDUM TO CLOSURE PACKET

Site Name:Doug's Tire (former)BRRTS No.:03-55-000408Site Address:811 Lake Ave WLadysmith, WI 54848

A Closure Application for this site was submitted in June 2020 and reviewed by the Closure Committee. A revised Closure Application was submitted in March 24, 2021 and reviewed by the Closure Committee April 16, 2021. The Closure Committee denied Closure. Appendix A includes a copy of the DNR letter denying Closure.

Based on follow-up communications, DNR staff requested clarification and documentation regarding two issues:

- Plume Stability
- Evaluate Remediation

The reader is referred to the Closure Packet for supporting figures and tables. Table A.1 (Ground Water Sampling Results), Figure B.1.b.1 (Vicinity Map), Figure B.3.a (Cross-section) and Figure B.3.b (Extent of Ground Water Contamination) are included in Appendix B for ease of reference.

Setting

Adjacent Properties

It is important to note the adjacent properties (Figure B.1.b.1 – Vicinity Map – Appendix B) have significant petroleum contamination of the soil and ground water. The ground water contamination from these sites has comingled at depth beneath all four corners of this intersection (Hwy. 8 & 27). However, the Closure documents for the adjacent Closed sites (e.g., Jennerman and Weisenberger) describe ground water contamination on the source properties only and do not attempt to delineate the comingled plume(s). Figure B.3.b (Appendix B) has been revised to match this approach while recognizing the petroleum contamination at Doug's may contain petroleum impacts from adjacent properties. This is discussed later in the recommendations portion of this document.

Appendix C contains selected tables and maps from these adjacent Closed sites for reference.

Site Hydrogeology

The site hydrogeology consists of heterogenous silty sand with rocks and clay layers (see Figure B.3.a in Appendix B). A coarse sand layer is found about 50 to 60 feet below grade. The depth to water is between 20 - 25 feet below grade (deeper to the north). Ground water flow is northerly with a downward vertical gradient.

Plume Stability

Ground Water Flow Velocity

The plume stability can be studied by estimating the ground water flow velocity and comparing the estimated plume dimensions (assuming non-reactive solute) with the observed contaminant plume.

The average linear ground water flow velocity (V) is estimated as

V = K I/n

Where

V = average linear ground water flow velocity K = hydraulic conductivity (use 3.33 E-4 cm/sec) I = hydraulic gradient (0.01) n = porosity (assume 30%)

The hydraulic conductivity (K) of the silty sand was measured with slug tests in MW-2, MW-4, and MW-6.

MW-2	3.33 E-4 cm/sec
MW-4	5.33 E-4 cm/sec
MW-6	6.99 E -4 cm/sec

The hydraulic gradient (I) (between MW-2 and MW-8A) is 0.01 (measured April 30, 2020).

Using this simple relationship, the average linear ground water flow velocity is estimated as 11.5 ft/year.

Contaminant Transport: Estimated Compared to Observed

The tanks were removed in May 1991 (about 30 years ago). If one assumes the petroleum is a nonreactive solute, then the extent of impacted ground water should be at least 345 ft using the average linear ground water flow velocity calculated above (i.e., 11.5 ft/yr x 30 years (time since tanks were removed)). The release likely occurred before 30 years so the estimated extent is greater than 345 feet. However, the impacted ground water has barely left the site boundaries (Figure B.3.b).

This is due to the properties of the contaminant as well as the saturated soil matrix. The contaminant (petroleum) adsorbs readily to the silty sand matrix. The ground water flow velocity is slowed due to the fine-grained matrix and the poor sorting of the matrix (poorly sorted soils have a lower hydraulic conductivity than well-sorted materials (e.g., "clean sand")). There are thin, fine-grained, clay units in the soil column which further inhibit ground water flow and contaminant transport. Finally, the site is paved which prevents surface water recharge and subsequent dispersal of the petroleum impacts.

Remediation Evaluation

Extent of Ground Water Contamination (LNAPL and Dissolved Phase)

The extent of impacted ground water was defined with the monitoring well network (Figure B.3.b – Appendix B). The plume's components (i.e., LNAPL and dissolved phase) were also well-defined. This additional detail is important when evaluating remedial alternatives and estimating the plume stability.

The extent of ground water contamination and two components are described in more detail below.

LNAPL

The extent of LNAPL (Light Non-Aqueous Phase Liquid or "free product") at the site was investigated using LIF/UVOST technology (Laser Induced Fluorescence/Ultraviolet Optical Screening Tool). The LIF/UVOST investigation identified two separate contaminant plumes (Appendix D: Slides #5 thru #11): a <u>Diesel</u> plume located in the northwest of the site and <u>Gasoline</u> plume located in the southwest of the site. The reader is referred to file reports for detailed descriptions of this work.

Appendix D contains a presentation prepared by DNR staff (Swimm) during the Remedial Alternatives Analysis completed for this site. The presentation illustrates the results of LDRM modeling (LNAPL Distribution and Recovery Model). The modeling used site specific data to evaluate the relative mobility (Appendix D: Slide #20) of the two petroleum products (i.e., diesel and gasoline). The relative mobility of the diesel plume was shown to be low and non-recoverable (except by excavation). The gasoline impacts could be recovered to a limited extent due to the relative mobility of the gasoline (as well as the volatility of the gasoline versus low volatility of diesel).

The modeling results were compared to field measurements. As described in Slide #6 (Appendix D), the LNAPL thickness measurements in a monitoring well are not true representations of the LNAPL thickness in the formation. Typically, the thickness in the monitoring well exaggerates the LNAPL thickness. This is documented in Appendix E which contains the UVOST log for boring A installed adjacent to MW-4. MW-4 has several feet of old, weathered diesel product. The adjacent boring A indicates this is because there is some diesel present in the formation in two thin coarser sediment layers. The LNAPL thickness in the formation is measured in inches but is represented in MW-4 as several feet.

MW-4 accumulated free product (diesel) due to the adjacent remedial excavation which was backfilled with coarse sand. This caused diesel to accumulate in MW-4 and EX-10. These wells were pumped with a vacuum truck in the fall of 2019 which was not cost-effective. Our recommendation is to leave this diesel in place with a remedial cap (pavement) and Cap Maintenance Plan.

Dissolved Ground Water Contamination

Dissolved phase impacts were measured in wells MW-1, MW-5 and PZ-100 as well as the remedial extraction wells (M-1, EX-2, EX-4, EX-5, EX-8, EX-9, EX-10). The graphs in Appendix F illustrate the concentrations in MW-1, MW-103, and PZ-100 over time. The concentrations indicate stable and/or decreasing trends.

Wells MW-1, MW-103, and PZ-100 are located at the intersection of Hwys. 8 and 27. This is DOT property and remediation (e.g., excavation, SVE) was not completed due to proximity to the highways.

The extent of impacts at depth are defined by the deeper monitoring wells (i.e., MW-8C, MW-9, MW-10B, MW-12B, MW-13B, MW-14, MW-15). The only deep wells with impacts are PZ-100 and MW-10B.

PZ-100 is damaged (timing unknown) and the concentrations measured in this well may represent shallow impacts entering the well. The well is currently plugged with bentonite due to the damage.

MW-10B has concentrations significantly lower than PZ-100 and the shallower wells. No other deep wells are impacted which indicates the extent of petroleum impacts in the deeper sand unit has been defined and appears to be limited to the site and vicinity (e.g., Jennerman, Weisenberger).

Overview of Remedial Actions

The Closure Packet summarized the remedial actions taken at the Doug's site. This included:

Year(s)	Remedial Action
1998 - 2005	4,150 gallons product/water mixture removed (reported by Drake Environmental)
2003 - 2010	7,570 gallons free product (and water?) removed (reported by Shaw)
2013	1,675 tons excavated
2015 - 2020	Soil Vapor Extraction (SVE) system (Doug's and Autostop site combined)
	Removed 73,378 lbs VOCs/1,240 lbs Benzene which is an estimated 12,230 gallons
	product

Remediation Evaluation

Diesel

Because of the properties of diesel (i.e., low mobility, high viscosity, non-volatile, readily adsorbs to soil matrix, etc.), the only feasible remedial alternative is excavation. This was completed to the extent practicable (see Figure B.2.b – Appendix B). DNR staff designed the excavation location and dimensions.

The extent and magnitude of the residual diesel contamination is well defined by the LIF/UVOST investigation. The residual diesel is essentially immobile at depth (greater than 20 feet below grade) and will remain in place.

The site has been paved (asphalt) since the 1980's (earlier?) which has restricted surface water recharge and subsequent mobility of the diesel contamination. The site will be closed with a Cap Maintenance Plan which will continue to cause the diesel impacts to remain in place.

Gasoline

The gasoline LNAPL was defined at the southern end of the property (see Figure B.3.b – Appendix B) using the LIF/UVOST technology described above. Based on this work, a "LNAPL Focus Area" was identified for remediation using SVE (soil vapor extraction) technology.

The SVE system operated for 5 years (October 2015 to May 2020). Appendix G contains tables (Table A.7.b in the Closure Packet) and graphs which illustrate the SVE performance. The graphs illustrate VOC and benzene recovery from the SVE system decreased significantly over time. In addition, the gasoline LNAPL plume was reduced to a thin layer (see LNAPL graphs in Appendix G).

As noted in the Closure Packet, the SVE system removed an estimated 73,378 lbs of VOCs from the subsurface. This is an estimated 12,230 gallons of gasoline (assuming 6 lbs of VOCs = 1 gallon of gasoline). This is more than the estimated volume of available gasoline (6500 gallons based on LDRM modeling (Appendix D – Slide 20). The reason for the additional product removal is because the system operated at two sites (i.e., Doug's site and adjacent Autostop site).

Further operation of the SVE system was no longer cost-effective and further operation was discontinued June 1, 2020. This action is similar to the SVE systems at the nearby Jennerman and Holiday sites (Appendix C).

Conclusions and Recommendations

- The extent of impacted ground water is well-defined. Well nests (e.g., MW-8A, -8B, -8C, -9, -10A, -10B, -11, -12A, -12B, -13A, -13B, -14, and MW-15) were installed to define the extent of impacted ground water (both the shallow ground water and the deeper sand aquifer).
- Estimates of the horizontal linear ground water flow velocity indicates ground water moves very slowly through the soil matrix. If the petroleum were a non-reactive solute, the plume would have migrated at least 345 feet. However, the diesel and gasoline contamination remained in the immediate vicinity of the site. This is due to the immobility of the petroleum plume. Migration is also inhibited by the pavement which limits recharge at the site.
- The concentrations measured in the monitoring wells document a stable and/or decreasing plume.
- The extent and magnitude of residual LNAPL is defined. The residual diesel LNAPL plume is stable and immobile. The gasoline LNAPL has been reduced substantially due to the SVE system operation (see graphs of LNAPL measurements in Appendix G).
- The residual petroleum contamination is similar to nearby Closed sites.
 - Residual dissolved phase petroleum impacts are similar to adjacent Closed sites (Jennermans, Weisenberger, and Holiday see Appendix C).
 - LNAPL was present at Jennermans when that site was recently Closed. It is likely LNAPL was/is also present at the Weisenberger and Holiday sites.
 - The SVE system at Jennermans and Holiday were turned off when further operation was no longer cost effective. The SVE system at Doug's has reached a similar performance point.

Meridian recommends No Further Action based on the following:

- Source removal (i.e., remedial excavation, LNAPL removal system (by Drake/Envirogen/Shaw), SVE system) has reduced the <u>gasoline</u> LNAPL to a negligible amount (see graphs in Appendix G).
- The remedial excavation removed the source of the diesel contamination. The residual diesel LNAPL should be left in place unless an opportunity (financially and logistically) ever arises to remove the impacted soils (by "mining" the impacted soil matrix to a depth of 30 feet).
- Continuing Obligations will include:
 - The information documenting the location and extent of impacted soil and ground water will be recorded on the DNR BRRTS site for future users of the property.
 - A Cap Maintenance Plan was included as part of the Closure Application. New blacktop was installed over the entire property (in 2020) and sealed in 2021.
 - The onsite building is designated a Structural Impediment.

These Closure tools have been successfully used at other sites with similar contamination.

APPENDIX A

DNR Letter

Tony Evers, Governor Preston D. Cole, Secretary Telephone 608-266-2621 Toll Free 1-888-936-7463 TTY Access via relay - 711



May 12, 2021

MS VICKI RICHARDSON W8392 PARKVIEW RD LADYSMITH WI 54848

SUBJECT: Case Closure Under Wis. Admin. Code ch. NR 726 Not Recommended Doug's Tire (Former), 811 Lake Avenue, Ladysmith, Wisconsin DNR BRRTS Activity #03-55-000408 FID #855039790

Dear Ms. Richardson:

On April 16, 2021, the Wisconsin Department of Natural Resources (DNR) reviewed the closure request for the case identified above. As you are aware, the DNR reviews environmental remediation cases for compliance with applicable laws, including Wis. Stat. ch. 292 and Wis. Admin. Code chs. NR 700 – 754 and whether any further threat to public health, safety or welfare or the environment exists at the site or facility, per Wis. Admin. Code § NR 726.13 (2) (b). As discussed with you and your consultant on April 22, 2021, case closure is not recommended because additional legal requirements must be met. The purpose of this letter is to inform you of the remaining requirements for obtaining closure. We request that within 60 days of this letter, you provide us with the information requested or your written response regarding the necessary work and a schedule for completion of this work.

Additional Requirements Needed for Case Closure Under Wis. Admin. Code ch. NR 726

As noted above, additional work is necessary to meet the requirements for case closure because there are apparent increasing contaminant trends in analytical results from groundwater samples collected from several monitoring wells, and light aqueous phase liquid (LNAPL) is present. Based on the information available it is unclear if the remaining groundwater contamination will migrate, and/or if LNAPL will continue to contribute dissolved phase contaminants to groundwater. Additional groundwater monitoring as well as additional assessment of the stability of the remaining LNAPL is necessary. Also, the viability of continued operation of the soil vapor extraction (SVE) system should be evaluated.

Need to Conduct Additional Groundwater Monitoring

Additional groundwater monitoring is needed to establish compliance with the closure criteria of Wis. Admin. Code § NR 726.05 (6). If monitored natural attenuation is to be used as a remedial action, additional work/documentation is needed to demonstrate that natural attenuation is applicable and effective in this case, in compliance with Wis. Admin. Code §§ NR 726.05 (6) (a) 6., (b), (c) and (d). Annual groundwater monitoring should be considered.

<u>Schedule</u>

Within 60 days of the date of this letter, respond in writing with a schedule of your plans to meet these requirements.



Until requirements are met, your site will remain "open" and you are required to submit semi-annual progress reports, per Wis. Admin. Code § NR 700.11. You are also responsible for any operation and maintenance activities required under Wis. Admin. Code § NR 724.13. Once the additional work has been completed, documentation should be submitted to the DNR to demonstrate that the applicable requirements have been met, per the timelines above. For more information on the closure reconsideration process, please see DNR publication, RR-102, "Wis. Admin. Code ch. NR 726 Case Closure Reconsideration Process" by visiting https://dnr.wisconsin.gov/, search: RR102, for more information.

We appreciate your efforts to restore the environment at this site. If you have any questions regarding the information in this letter, please contact Carrie Stoltz at (715) 360-1966 or by email at <u>Carrie.Stoltz@Wisconsin.gov</u>. You can also contact me at (715) 208-4004 or by email at <u>Christopher.Saari@Wisconsin.gov</u>.

Sincerely,

the lesam

Christopher A. Saari Northern Region Team Superior Remediation and Redevelopment Program

cc: Ken Shimko – Meridian Environmental (via email) Carrie Stoltz – DNR Rhinelander (via email)

APPENDIX B

Selected Table and Figures from Closure Packet

Well	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total TMB	MTBE	Naphthalene
NR 140 ES		5	800	700	2,000	480	60	100
NR 140 PAL	-	0.5	160	140	400	96	12	10
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
MW-1								
	10/29/91	19,000	19,000	1,100	7.600	NA	NA	NA
	02/03/92	17,000	14.000	1,100	5.600	NA	NA	NA
	05/30/97	19,000	13.000	1.300	5,000	740	<80	<3200
	01/20/98	21,000	14.000	1.000	5,100	530	<110	<500
	07/15/98	18,000	13.000	1,200	5,900	860	37	220
	12/15/00	4.410	1.590	<50	1.310	108.5	45.5	<80.0
	04/05/01	24.000	15.000	1.200	6.200	800	<47	230
	05/06/03	9.800	2.800	140	2.320	390	75	52
	08/12/03	24,000	15,000	1.300	6.000	560	<120	180
	11/18/03	20,000	13.000	1,500	5,900	890	<120	300
	05/11/04	23,000	18,000	1,400	5,900	500	<120	160
	11/16/04	25.000	15.000	1,100	6.100	570	<120	150
	06/07/05	17,000	14,000	1.200	6.700	1.040	<120	260
	01/09/08	20,000	14.000	1,200	5,200	420	<150	<180
	05/28/08	19,300	14,200	1,350	5,870	641	<122	204
	01/21/09	18,600	13,500	1,330	5,560	877	<122	197
	05/20/09	20,600	16,900	1.870	7,780	1.207	<122	312
	03/18/10	10,400	8,590	762	3,369	334	<122	<178
	01/16/12	19,000	15,900	1,880	7,840	1,368	<61.0	288J
	04/05/12	22,100	13,900	1,370	5,570	629	<122	<178
	05/15/18	13,400	653	1,510	4,180	1,087	<32	284
	05/30/19	6,270	232	790	2,577	576	<1.2	173
	04/30/20	20,600	669	1,950	6,180	1,487	<311	342J
MW-2								
	10/29/91	<5	<5	<5	<5	NA	NA	NA
	02/03/92	<5	<5	<5	<5	NA	NA	NA
	01/20/98	< 0.21	<1.5	< 0.68	<1.78	<1.86	2.1	<1
	07/15/98	< 0.32	< 0.35	< 0.34	< 0.98	< 0.99	< 0.31	< 0.88
	12/15/00	3.58	< 5.00	<5.00	< 5.00	<10.00	< 0.500	<8.00
	04/05/01	5.3	< 0.37	<0.4	<1.43	<1.03	< 0.47	< 0.53
	07/26/01	40.0	1.2	2.2	5.6	0.35	< 0.46	< 0.69
	05/06/03	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	08/12/03	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	11/18/03	<0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
ļļ	05/11/04	<0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	11/16/04	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	< 0.74
	06/07/05	<0.41	<0.67	<0.54	<2.63	<1.8	< 0.61	<0.74
	01/31/06	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	06/20/06	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	01/22/07	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	0//10/07	<0.41	<0.67	< 0.54	<2.63	<1.80	< 0.61	<0.74
	01/10/08	<0.41	<0.6/	<0.54	<2.63	<1.80	< 0.61	<0.74
	05/28/08	<0.41	<0.67	< 0.54	<2.63	<1.80	< 0.61	<0.74
	01/21/09	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	03/20/09	<0.41	<0.67	<0.54	<2.03	<1.80	<0.61	<0.74
	01/16/10	<0.41	1.4	<0.54	~2.03	~1.80	<0.61	<0.74
	01/10/12	<0.41	0.701	<0.54	<2.03	<1.80	<0.61	<0.89
	04/03/12	~0.41	0.70J	~0.34	~2.03	~1.80	< 22	~0.89
	05/10/10	<.31	~.49	<pre>>.33</pre>	< 72	<1.0/	<1.2	<1.2
	03/30/19	< 25	~.1/	~.22	~./3	<1.71	<1.2	<1.2
	04/30/20	>.23	to paving	<u>>.32</u>	<u>\./3</u>	<u><u></u>\1./1</u>	<u>~1.2</u>	<u>\1.2</u>
	07/02/20	abanuoneu ulle						

Well	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total TMB	MTBE	Naphthalene
NR 140 ES		5	800	700	2,000	480	60	100
NR 140 PAI		0.5	160	140	400	96	12	10
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
MW-3		0	0	0	0	0	0	<u> </u>
101 00 -5	02/03/92	18,000	48,000	10.000	52.000	NA	NA	NA
	04/05/01	21,000	23,000	2,900	17,900	3,200	<24	610
	05/30/19	Could not locate	e - payed over	-,,, oo	1,9,00	0,200		010
	07/02/20	abandoned due	to paving					
MW-4								
	02/24/98	500	8	6.3	1.6	2.8	< 0.21	110
	07/15/98	3,200	190	25	35	<20	<6.2	110
	12/15/00	2,730	23.1	206	22.6	<10.0	3.87	59.0
	04/05/01	1,200	20	140	<29	<21	<9.4	26
	07/26/01	1,900	300	240	170	<30	<23	68
	05/06/03	7,800	680	900	830	196	<30	150
	08/12/03	7,500	590	720	800	94	<30	120
	11/18/03	6,800	1,000	830	1,180	160	<61	220
	05/11/04	6,000	680	630	900	178	<24	150
	11/16/04	8,000	690	850	980	196	<30	150
	06/07/05	5,200	100	730	<272	<90	<30	170
	01/31/06	6,100	230	790	443	135	<30	200
	06/20/06	5,500	130	750	279	87	<15	140
	01/22/07	5,500	<84	550	<320	<220	<76	140
	07/10/07	1,800	<17	290	<66	<45	<15	50
	01/10/08	5,600	360	760	436	79	<15	120
	05/28/08	2,690	82.4	413	<131.5	<90	<30.5	62.1
	01/21/09	5,740	1,240	753	707	<225	<76.2	126
	05/20/09	2,150	48.0	405	73.2	24.8	<15.2	86.3
	03/18/10	1,660	25.5	404	<52.6	<36.0	<12.2	48.0
	01/16/12	5,210	4,190	1,070	1,603	374	<30.5	178J
	04/12/12	7,180	4,350	1,040	1,525	397	<30.5	155J
	August 2013	INADI (2 FT	DIECEL D	Kemedi	al Excavatio	n		
	05/30/19	LNAPL (3FT	DIESEL -B	AILS TO 8 INC	HES)			
	04/30/20	LNAPL (3FI	DIESEL)					
MW 5								
IVI VV-5	02/24/08	16	<1.5	<0.68	<1.79	<1.96	<0.21	2.2
	02/24/98	40	1.5	<0.08	<1.78	<0.00	<0.21	1.2
	12/15/00	50 1	1.4 <5.00	0.70	<5.00	<0.99	<0.51	1.2
	04/05/01	<u> </u>	<5.00 1.4	<0.4	<1.43	<1.03	<0.300	<0.53
	05/11/04	59	1.7	<0.54	<2.63	<1.80	<0.61	<0.74
	11/16/04	56	0.91	< 0.54	<2.63	<1.80	< 0.61	<0.74
	06/07/05	44	0.76	< 0.54	<2.63	<1.80	< 0.61	<0.74
	01/31/06	57	0.79	< 0.54	<2.63	<1.80	< 0.61	<0.74
	06/20/06	45	<1.3	<1.1	<5.3	<3.6	<1.2	<1.5
	01/22/07	24	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	07/10/07	36	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	01/10/08	37	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	05/28/08	18.4	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	01/21/09	32.4	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.89
	05/20/09	18.3	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.89
	03/22/10	18.7	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.89
	01/16/12	19.7	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.89
	04/05/12	20.3	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.89
	05/15/19	.93J	3.30	1.0J	5.8	5.2	<.32	3.7
	05/30/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
	09/30/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
	12/19/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
	04/30/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
1		1					1	

Well	Date	Date Benzene		Ethylbenzene	Total Xylenes	Total TMB	MTBE	Naphthalene				
NR 140 ES		5	800	700	2,000	480	60	100				
NR 140 PA	L	0.5	160	140	400	96	12	10				
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l				
MW-6 (on A Autostop re	Autostop prop esults)	erty - labelled	"W-6" on A	utostop Table)(r	esults from	Doug's sam	pling - do	es not match				
	02/24/98	6,500	7,500	1,400	5,500	1,140	<11	390				
	04/05/01	5,600	8,200	1,700	7,900	2,510	<9.4	610				
	05/30/19	2,630	414	964	2,069	918	<62.3	224J				
	09/30/19	2,460	502	1,320	4,460	1,308	<12.5	325				
	12/19/19	1,380	369	929	2,660	552	<24.9	189				
	04/29/20	2,060	716	1,400	5,200	1,246	<49.8	348				
MW-7 (on Autostop property - labelled "W-7" on Autostop Table)(results from Doug's sampling - does not mat Autostop results)												
Autostop IC	stop results) 04/05/01 3,000 7,600 2,200 13,700 3,240 <9.4											
	05/06/03	6.300	740	420	2.040	3,600	<30	180				
	08/12/03	580	62	73	191	280	<3.0	22				
	11/18/03	410	40	66	160	219	<6.1	18				
	05/11/04	470	55	45	143	170	<3.0	14				
	11/16/04	530	30	63	125.4	215	<3.0	16				
	06/07/05	480	41	66	101	142	<6.1	16				
	01/31/06	580	42	51	75	143	<3.0	22				
	06/20/06	500	30	47	81	127	<3.0	15				
	01/22/07	430	43	37	43	84	<6.1	9.8				
	07/10/07	320	38	26	41.2	59	<3.0	6.8				
	01/10/08	500	44	40	70.0	59	<6.1	7.8				
	05/28/08	634	85.1	31.3	83.5	65.9	<3.0	6.5				
	01/21/09	507	69.2	35.0	32.1	49.2	<3.0	6.3				
	05/20/09	437	29.6	27.2	24.1	33.9	<3.0	4.9				
	03/18/10	685	93.8	50.4	73.3	55.6	<3.0	8.1				
	01/16/12	289	14.4	49.5	38.0	51.6	< 0.61	/.1				
	05/30/19	149	21.9	5.4	51.4	10.7	<1.2	4.6J				
	12/10/10	.0/J 261	.0J	<.22	5.6	44.9	<1.2	2.2J				
	04/29/20	.205	.2J 641	621	17.4	50.0	<1.2	1.2J 2.4I				
	04/29/20	~.2J	.04J	.023	1/.4	50.9	<u> \1.2</u>	5.4J				
MW-8A (in	stalled 9/19/1	9)										
	09/30/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2				
	12/19/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2				
	04/30/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
MW OD (:	stallad 0/10/1/	0)										
191 99-8B (IN	09/30/10	< 25	< 17	< 22	< 72	<1 71	<1 ?	<1.2				
	12/19/19	< 25	< 17	< 22	< 73	<1 71	<1.2	<1.2				
	04/30/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
MW-8C (in	stalled 4/14/2	020)										
	04/30/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2				
MW 0 Grand	allod 4/15/202											
1v1 vv -9 (inst	aneu 4/15/202	< 25	< 27	< 27	< 72	<1 71	<12	<1 2				
	05/28/20	< 25	441	< 32	621	<1 71	<1.2	<1.2				
	03/20/20	~.23	L.T.J	~.32	.023	~1./1	×1.2	~1.2				
MW-10A (i	nstalled 5/21/	2020)										
(05/28/20	5.2	<.27	<.32	<.73	<1.71	<1.2	<1.2				
				-								
MW-10B (i	nstalled 4/16/2	2020)										
	04/30/20	2,010	94.8	79.1	76.6	26.4	<1.2	43.5				
	05/28/20	2,460	288.0	157.0	161.0	38.3	<1.2	68.6				

Well	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total TMB	МТВЕ	Naphthalene
NR 140 ES	•	5	800	700	2,000	480	60	100
NR 140 PA	L	0.5	160	140	400	96	12	10
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
MW-11 (ins	stalled April 2	2020)						
	04/30/20	.85J	<.27	<.32	<.73	<1.71	<1.2	<1.2
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-12A (i	nstalled May	2020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-12B (i	nstalled Apri	2020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-13A (i	nstalled May	2020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-13B (i	nstalled May	2020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-14 (ins	stalled May 2	020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-15 (ins	stalled May 2	020)						
	05/28/20	<.25	<.27	<.32	<.73	<1.71	<1.2	<1.2
MW-100 (o	n Dairy Quee	n property - L	OST/DESTI	ROYED)				
	07/26/01	< 0.21	< 0.41	< 0.22	< 0.69	< 0.60	< 0.46	<0.69
	05/06/03	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	08/12/03	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	11/18/03	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	05/11/04	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	11/16/04	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	06/07/05	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/31/06	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	06/20/06	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/22/07	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	07/10/07	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/10/08	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	05/28/08	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	05/20/09	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	03/22/10	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	01/16/12	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.89
	04/05/12	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.89
	05/30/19	COULD NOT I	LOCATE - P.	KESUMED LOS	1/DESTROY	ED		
11	1	1	1		1	1	1	1

Well	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total TMB	MTBE	Naphthalene
NR 140 ES		5	800	700	2,000	480	60	100
NR 140 PAI	_	0.5	160	140	400	96	12	10
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
MW-101	05/06/01		.0.41		0.00	-0.60	-0.46	.0.60
	07/26/01	<0.21	<0.41	<0.22	<0.69	<0.60	<0.46	<0.69
	03/06/03	<0.41	<0.67	<0.34	<2.03	<1.80	< 0.61	<0.74
	11/18/03	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	05/11/04	< 0.41	<0.67	< 0.54	<2.63	<1.80	< 0.61	<0.74
	11/16/04	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	06/07/05	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/31/06	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.74	< 0.74
	06/20/06	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/22/07	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.74
	01/10/07	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/10/08	<0.41	<0.07	<0.54	<2.03	<1.80	<0.01	<0.74
	01/21/09	<0.41	< 0.67	<0.54	<2.63	<1.80	<0.61	<0.89
	05/20/09	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	<0.89
	03/22/10	< 0.41	<0.67	< 0.54	<2.63	<1.80	< 0.61	<0.89
	01/16/12	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.89
	04/05/12	<0.41	< 0.67	<0.54	<2.63	<1.80	< 0.61	< 0.89
ļ	05/30/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
	09/30/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
	12/19/19	<.25	<.17	<.22	<.73	<1.71	<1.2	<1.2
MW 102								
NIW-102	07/26/01	<0.21	<0.41	<0.22	<0.69	<0.60	<0.46	<0.69
	08/12/03	<0.21	<0.41	<0.22	<2.63	<1.80	<0.40	<0.74
	11/18/03	<0.41	<0.67	<0.54	<2.63	<1.80	<0.61	< 0.74
	05/11/04	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	11/16/04	<0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	06/07/05	< 0.41	< 0.67	< 0.54	<2.63	<1.80	< 0.61	< 0.74
	01/31/06	<0.41	< 0.67	/ <0.54	<2.63	<1.80 <1.80	<0.61	< 0.74
	06/20/06	<0.41	<0.67	<0.54	<2.63		< 0.61	<0.74
	01/22/07	<0.41	1.6	<0.54	<2.63	<1.80	< 0.61	<0.74
	07/10/07	<0.41	<0.67	<0.54	<2.63	<1.80	< 0.61	<0.74
	01/21/09	<0.41	<0.07	<0.54	<2.03	<1.80	<0.01	<0.74
	05/30/19	DAMAGED	-0.07	-0.54	~2.05	-1.00	-0.01	-0.09
	09/20/19			ABA	NDONED			
MW-103								
	07/26/01	27,000	31,000	2,200	12,500	1,780	<230	<350
	05/30/19	LNAPL (8 INC	CH OF GAS	OLINE - BAILS	S READILY	TO FILM)		
D7 100								
F Z-100	07/26/01	3 200	260	54	123	20	<230	45
	05/06/03	4,900	<17	74	<66	<45	<15	<18
	08/12/03	14,000	290	370	670	<180	<61	<74
	11/18/03	12,000	810	440	940	<180	<61	<74
	05/11/04	16,000	1,100	480	960	<180	<61	<74
	11/16/04	16,000	2,600	420	1,040	<360	<120	<150
	06/07/05	16,000	4,100	870	3,070	<360	<120	<150
	01/31/06	13,000	4,200	660	2,410	<180	<61	<74
	06/21/06	14,000	4,300	690	2,680	332	<30	84
	01/22/07	12,000	25,000	3,400 750	18,100	220	<120	4,200 7.8
	01/09/08	14,000	15,000	2,400	14,400	5.240	<150	2,700
	05/28/08	16.100	20.100	4.410	25.230	11.820	<76.2	3.200
	05/29/09	11,800	21,000	6,280	37,800	30,440	<122	8,430
	01/16/12	11,800	6,300	1,440	7,360	2,436	<61.0	390J
	04/05/12	14,400	5,330	1,100	5,570	1,536	<152	257J
	05/30/19	DAMAGED/P	LUGGED V	VITH BENTON	ITE			

Table A.1: Ground Water Analytical Results

Doug's Tire

Well	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total TMB	мтве	Naphthalene
NR 140 ES		5	800	700	2,000	480	60	100
NR 140 PAI		0.5	160	140	400	96	12	10
Units		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Remediatio	n Wells							
M-1								
	04/30/20	1,260	5,230	557	8,090	5,061	<156	1,910
EX-4								
	04/30/20	2,850	4,270	886	7,050	3,448	<62.3	628
	07/09/20	abandoned du	e to paving					
EX-5								
<u> </u>	04/30/20	2 inches LNA	L (gasoline)				
EX-8								
	04/30/20	24,600	33,900	1,900	17,550	3,001	<623	<588
	07/02/20	abandoned du	e to paving					
EVA								
EA-9	04/20/20	(10	022	3 100	0.9(0	1.007	-(2.2	40.4
	04/30/20	610	932	2,180	9,860	1,907	<62.3	404
	07/02/20	abandoned du	e to paving					
EX-10								
	04/30/20	8 inches LNA	L (diesel)					
	•				•	•		



File: FJASS_LadysmithWI_2000.dwg Date: 8/2/19



File: FJASS_LadysmithWI_2000.dwg Date: 8/2/19

APPENDIX C

Summary Information from Nearby Sites:

Jennerman Amoco – 03-55-000592 Weisenberger Realty – BRRTS 03-55-000210 Holiday Station Store #176 – BRRTS 03-55-00446

A.l.a. Groundwater Analytical Results Table MW-1 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>	CTS	Mi	dwest Engin	eering Serv	ices	ECCI*	Northern Environmental								
	Submerg	ed Screen	(Yes/No)>	-	-	-	-	-	-	No	No	No	No	No	No	No	No	No
			Date>	5/3/1994	9/6/1994	2/20/1995	7/3/1996	11/20/1996	9/25/1997	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units															
Diesel Range Organics			mg/l	-	3.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-
PVOC's																		
Benzene	5	0.5	µg/l	18,000	-	-	-	-	-	5,300	7,500	5,700	4,300	4,100	5,000	4,100	5,100	4,700
Toluene	800	160	µg∕l	32,400	-	-	-	-	-	11,000	14,000	23,000	13,000	17,000	20,000	19,000	26,000	19,000
Ethylbenzene	700	140	µg/1	3,140	-	-	-	-	-	3,000	2,100	4,600	1,500	1,600	2,500	2,200	3,200	2,700
Xylenes (Total)	2,000	400	µg/1	12,450	-	-	-	-	-	18,100	13,900	24,800	11,000	11,000	17,000	12,000	15,000	15,000
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	A	-	-	-	-	-	<120	<72	150	<58	<92	<46	<46	<55	<11
Trimethylbenzenes (Total)	480	96	µg/l	2,068	-	-	-	-	-	12,000	5,400	13,200	5,900	3,140	8,500	3,110	3,670	5,000
Naphthalene	100	10	µg/1	317	-	-	-	-	-	1,400	670	1,900	4,100	340	690	450	<600	570
1,2-Dichloroethane	5	0.5	µg/l	406	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																		
Lead (Dissolved)	15	1.5	µg/1	440	-	-	-	-	-	30	24	41	160	27	32	27	31.2	98
Field Measurements																		
Temperature			°F	-	61.0	-	-	-	-	14.7 °C	9.1 °C	11.1 °C	13.3 °C	8.8°C	7.9 °C	9.27 °C	15.2 °C	13.5 °C
Conductivity			µS/cm	-	-	-	-	-	-	640	590	680	610	700	780	540	350	410
Dissolved Oxygen			mg/l	-	-	-	-	-	-	1.54	1.77	1.99	1.58	2.15	2.24	1.70	1.13	1.49
pH				-	7.8	-	-	-	-	7.5	8.8	8.1	8.3	7.9	9.9	9.3	7.91	9.24
Redox Potential			mV	-	-	-	-	-	-	-5	-57	-21	18	85	106	109	121	12

		Data Rep	orted by>		REI Engineering													
	Submerg	ed Screen	(Yes/No)>	No	No	No	No	No	No	No	No	No	No	No	-	No	-	-
			Date>	10/26/2006	9/27/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/17/2012	6/25/2015	7/22/2015	10/26/2015	1/4/2016
PVOC's	ES	PAL	Units															
Benzene	5	0.5	µg/1	5,210	4,070	1,720	4,460	2,900	3,940	3,330	3,680	3,220	2,390	1,950		1,190	840	
Toluene	800	160	µg/l	27,800	2,660	22,800	20,300	14,800	20,200	18,800	21,500	17,100	13,500	14,000		7,010	4,890	
Ethylbenzene	700	140	μg/l	2,560	3,490	8,000	3,520	2,150	2,840	3,270	3,590	3,120	2,140	1,960		1,430	994	
Xylenes (Total)	2,000	400	µg∕l	16,160	16,100	50,000	21,490	13,390	17,600	21,350	18,350	18,850	13,640	13,540		13,310	9,740	
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	<30.0	<300	<75	174	<300	<150	< 75	< 75	< 75	< 61	< 61	SVE	< 48.5	<12.1	SVE
Trimethylbenzenes (Total)	480	96	µg∕l	4,900	4,400	33,960	7,080	3,840	5,310	10,540	4,820	5,320	3,882	3,104	System	4,240	3,099	System
Naphthalene	100	10	µg∕l	360	1,150	4,290	854	<800	754	1,020	649	1,000	425	446 ^J	Started	433	321	Shut Down
1,2-Dibromoethane	0.05	0.005	µg∕l	-	-	-	-	-	-	-	-	-	43.9 ¹	< 56		-	-	
1,2-Dichloroethane	5	0.5	µg/1	-	-	-	-	-	-	-	-	-	< 18	< 57		-	-	
Isopropylbenzene			µg/1	-	-	-	-	-	-	-	-	-	108	74.4 ^J		-	-	
n-Propylbenzene			µg/l	-	-	-	-	-	-	-	-	-	291	199		-	-	
Inorganics																		
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	-	-	-		-	-	
Field Measurements																		
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-		-	-	
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-		-	-	
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-		-	-	
pH				-	-	-	-	-	-	-	-	-	-	-		-	-	
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-		-	-	

		Data Rep	orted by>				R	EI Engineer	ing			
	Submerg	ed Screen	(Yes/No)>	No	No	No	No	No	Yes	No	No	-
			Date>	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units									
Benzene	5	0.5	µg∕l	914	772	328	424	888	307	337	643	
Toluene	800	160	µg∕l	4,840	4,630	1,020	2,400	7,010	2,890	2,330	7,700	
Ethylbenzene	700	140	µg∕l	1,040	832	213	167	766	432	630	608	
Xylenes (Total)	2,000	400	μg/l	11,100	9,540	3,250	4,550	7,590	6,760	4,590	8,070	Unable
Methyl tert-Butyl Ether (MTBE)	60	12	μg/1	<19.4	<4.8	< 4.8	< 4.8	< 12.1	< 24.2	< 12.1	< 16	to
Trimethylbenzenes (Total)	480	96	μg/1	3,635	2,742	1,173	1,393	1,999	2,284	1,631	2,184	Locate
Naphthalene	100	10	μg/1	437	284	94	92.7	189	215	181	203	Well
1,2-Dibromoethane	0.05	0.005	μg/1		-	-	-	-	-	-	-	
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	
Isopropylbenzene			µg/1	-	-	-	-	-	-	-	-	
n-Propylbenzene			µg/l	-	-	-	-	-	-	-	-	
Inorganics												
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	
Field Measurements												
Temperature			°F	48.4	51.6	51.03	50.34	48.72	48.3	50.57	47.1	
Conductivity			µS/cm	1,075	573	915	675	725	540	660	656	
Dissolved Oxygen			mg/l	0.62	0.22	0.56	0.56	1.41	1.6	2.02	1.87	
pH				6.62	6.99	6.75	6.60	6.68	6.39	7.02	8.47	
Redox Potential			mV	37.3	-82.4	-11.7	-63.4	-10.5	30.3	-49.0	-44.4	

Notes:

ES - Enforcement Standards PAL - Preventive Action Limit NA - Not Analyzed

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

 NA. Not Analyzed
 NI - Not Installed

 ug/l = ppb
 mg/l = ppm

 < - Concentration less than listed detection limit</td>

 - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
 A

 A - Due to background interference specific to sample, reliable identification and quantification of compoind was not possible.
 - = Not Analyzed/Not Sampled

A.l.e. Groundwater Analytical Results Table MW-3R Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>							REI Engi	neering						
	Submerg	ged Screen	(Yes/No)>	No	No	No	No	No	No	-	Yes	Yes	-	No	Yes	Yes	Yes
			Date>	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	4/17/2012	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017
PVOC's	ES	PAL	Units														
Benzene	5	0.5	µg∕l	-	-	-	9,250	11,100	-		1,130	1,220		767	563	568	962
Toluene	800	160	µg∕l	-	-	-	25,800	25,900	-		13,000	12,500		11,400	10,600	8,900	15,100
Ethylbenzene	700	140	µg∕l	-	-	-	2,880	2,680	-		2,250	2,060		2,190	2,190	1,560	2,510
Xylenes (Total)	2,000	400	µg∕l	-	-	-	14,040	14,000	-		19,760	17,360		18,130	18,670	12,510	14,610
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	-	-	-	< 150	147	-	SVE	< 97	<24.2	SVE	<60.6	<48.5	< 24.2	< 24.2
Trimethylbenzenes (Total)	480	96	µg∕l	-	-	-	2,435	2,847	-	System	6,510	4,323	System	5,190	5120	3,967	3,302
Naphthalene	100	10	µg∕l	-	-	-	549 ^J	728	-	Started	4,630	1,220	Shut Down	1,280	1,250	1,050	746
1,2-Dichloroethane	5	0.5	μg/l	-	-	-	-	-	-		-	-		-	-	-	-
Inorganics																	
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-		-	-		-	-	-	-
Field Measurements																	
Temperature			°F	-	-	-	-	-	-		-	-		-	49.71	60.93	49.84
Conductivity			µS/cm	-	-	-	-	-	-		-	-		-	340	316	484
Dissolved Oxygen			mg/l	-	-	-	-	-	-		-	-		-	0.03	0.20	0.39
pH				-	-	-	-	-	-		-	-		-	8.50	7.01	6.74
Redox Potential			mV	-	-	-	-	-	-		-	-		-	0.00	-80.40	-54.10

		Data Rep	orted by>		R	EI Engineerii	ng	
	Submerg	ged Screen	(Yes/No)>	No	Yes	Yes	No	Yes
			Date>	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units					
Benzene	5	0.5	μg/l	288	573	530	580	230
Toluene	800	160	µg∕l	5,800	13,900	13,000	14,200	8,610
Ethylbenzene	700	140	µg∕l	913	2,460	2,380	2,570	1,820
Xylenes (Total)	2,000	400	μg/l	5,110	14,800	13,000	14,780	12,120
Methyl tert-Butyl Ether (MTBE)	60	12	μg/l	< 60.6	< 24.2	< 48.5	< 40	< 40
Trimethylbenzenes (Total)	480	96	μg/l	1,114	3,009	3,541	3,234	3,395
Naphthalene	100	10	μg/l	255	757	826	695	756
1,2-Dichloroethane	5	0.5	μg/l	-	-	-	-	-
Inorganics								
Lead (Dissolved)	15	1.5	μg/l	-	-	-	-	-
Field Measurements								
Temperature			°F	48.81	54.88	57.04	44.82	-
Conductivity			µS/cm	1,001	470	593	557	-
Dissolved Oxygen			mg/l	0.84	2.20	1.00	5.10	-
pH				6.69	7.06	6.84	7.80	-
Redox Potential			mV	-0.50	-23.20	-10.20	36.60	-

Notes: ES - Enforcement Standards

PAL - Preventive Action Limit

 BOLD
 - Exceeds Enforcement Standard (ES)

 Italic
 - Exceeds Preventative Action Limit (PAL)

NI - Not Installed

NA - Not Analyzed

 $\label{eq:main_relation} \mu g/l = ppb \qquad \qquad mg/l = ppm \\ < - Concentration less than listed detection limit$ mg/l = ppm

^J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

- - = No Standard/Not Applicable

- = Not Analyzed/Not Sampled

A.l.g. Groundwater Analytical Results Table MW-5 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>	Midwest	Engineering	Services	ECCI*				Nortl	nern Environ	mental			
	Submerg	ed Screen	(Yes/No)>	No	No	No	No	No	No	No	No	No	No	No	No	No
			Date>	2/20/1995	7/3/1996	11/20/1996	9/25/1997	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units													
Diesel Range Organics			mg/l	-	-	-	31,000	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	18,500	-	-	-	-	-	-	-	-	-
PVOC's																
Benzene	5	0.5	µg/l	11,300	1,000	3,700	3,670	650	2,000	1,300	230	540	1,400	1,000	370	520
Toluene	800	160	µg/l	4,350 ^D	430	390	732	160	560	720	150	28	100	720	80	280
Ethylbenzene	700	140	µg/l	2,790 ^D	1,100	1,000	1,280	380	890	730	240	77	200	410	190	380
Xylenes (Total)	2,000	400	µg/l	10,550 ^D	1,520	1,353	2,160	1,130	2,740	3,500	1,200	910	1,500	3,700	970	1,700
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	-	<10	<25	72.3	<5.8	<14	17	<4.6	<4.6	<2.3	<9.2	<1.1	<1.1
Trimethylbenzenes (Total)	480	96	µg∕l	2,222 ^{B Z}	910	790	1,239	840	1,950	2,350	1,820	1,100	2,340	2,470	1,430	1,610
Naphthalene	100	10	µg/l	322	150	140	128	95	200	230	190	95	230	240	120	130
1,2-Dichloroethane	5	0.5	µg∕l	186	<10	75	104	-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg∕l	<50	<0.0001	11	<	<1.3	-	-	-	-	-	-	-	
Field Measurements																
Temperature			°F	-	46.2	-	-	14.0 °C	9.7 °C	9.2 °C	12.3 °C	8.5 °C	8.1 °C	12.2 °C	15.7 °C	15.0 °C
Conductivity			µS/cm	-	590	-	-	700	590	760	590	860	680	530	300	320
Dissolved Oxygen			mg/l	-	-	-	-	1.76	1.67	2.35	1.67	2.24	2.88	1.43	1.60	2.71
pH				-	7.1	-	-	7.9	8.7	8.4	8.8	7.7	9.0	9.5	7.90	9.08
Redox Potential			mV	-	-	-	-	-63	-53	-51	-6	87	93	104	125	40

		Data Rep	orted by>							REI Engi	ineering					
	Submer	ged Screen	(Yes/No)>	No	No	No	No	No	No	No	No	No	No	No	No	
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	4/17/2012	6/25/2013
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/l	364	5,130	9,320	7,420	5,490	3,400	1,780	2,070	2,470	7,190	7,530	3,700	
Toluene	800	160	µg/l	92.1	9,790	18,500	21,800	18,500	10,800	7,170	9,760	10,100	24,700	20,200	15,200	
Ethylbenzene	700	140	µg/l	531	2,400	3,840	5,180	4,300	2,800	1,600	1,800	1,700	6,490	4,480	2,360	
Xylenes (Total)	2,000	400	µg/l	1,709	9,140	15,020	22,820	21,830	17,600	12,190	15,960	13,870	30,610	19,550	11,460	
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	<3.00	<30.0	<150	<60.0	<60.0	139	<75.0	<60.0	<60.0	372	235	< 61	SVE
Trimethylbenzenes (Total)	480	96	µg/l	1,291	2,765	4,143	8,180	8,370	4,644	3,943	4,960	6,260	10,710	5,590	2,250	System
Naphthalene	100	10	µg/l	12	295	518	1,270	1,040	655	348	463	749	1,050	1,000	326 ^J	Started
1,2-Dibromoethane	0.05	0.005	µg/l	-	-	-	-	-	-	-	-	-	-	-	< 56	
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	< 75	
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-		-	-	-	-	-	-	-	-	-	
Field Measurements																
Temperature			°F	-	-		-	-	-	-	-	-	-	-	-	
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	
pH				-	-	-	-	-	-	-	-	-	-	-	-	
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	

		Data Rep	orted by>					RE	I Engineerin	g				
	Submer	ged Screen	(Yes/No)>	No		No	No	No	No	No	No	No	No	No
			Date>	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/24/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units											
Benzene	5	0.5	µg/l	309		374	275	28.4	52.6	444	21.6	26.7	409	416
Toluene	800	160	µg∕l	806		1,070	973	68	650	1,550	84.4	150	1,930	1,540
Ethylbenzene	700	140	µg/l	166		250	228	76	435	256	66.7	202	387	528
Xylenes (Total)	2,000	400	µg/l	2,920		3,720	2,940	686	1,563	3,590	707	756	5,980	7,650
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	<4.8	SVE	<9.7	5.1	3.2*	3.2*	6.2	4.7	< 2.4	< 8.0	< 12.8
Trimethylbenzenes (Total)	480	96	µg/l	1,045	System	1,402	971	655	419	877	512	328.3	1,531	1,819
Naphthalene	100	10	µg/1	66.8	Shut Down	83.4	60.3	37.6	68.7	54.2	24.7	32.4	63.9	85.6
1,2-Dibromoethane	0.05	0.005	µg/l	-		-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	0.5	µg∕l	-		-	-	-	-	-	-	-	-	-
Inorganics														
Lead (Dissolved)	15	1.5	µg/l	-		-	-	-	-	-	-	-	-	-
Field Measurements														
Temperature			°F	-		47.80	48.37	53.23	49.84	47.47	49.06	50.95	47.49	49.3
Conductivity			µS/cm	-		610	606	666	484	686	428	512	1,089	689.2
Dissolved Oxygen			mg/l	-		0.62	0.46	1.72	0.39	0.63	4.37	1.21	0.66	0.39
pH				-		7.09	6.80	6.91	6.74	6.90	6.31	6.86	7.47	6.73
Redox Potential			mV	-		27.1	33.5	107.5	-64.1	-45.2	27.1	-79.3	_91.7	14.6

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

<u>Notes :</u> ES - Enforcement Standards PAL - Preventive Action Limit

 Image: Proventive Action limit
 Image: I

Concentration resistant isset detection limit
 Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
 Not Standard/Not Applicable
 Not Analyzed/Not Sampled

A.l.m. Groundwater Analytical Results Table MW-9A Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>							RE	I Engineeri	ng						
	Submerg	ed Screen	(Yes/No)>	Yes	Yes	-	-	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			Date>	1/16/2012	4/5/2012	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/24/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units															
Benzene	5	0.5	µg∕l	231	298.0		-	501.0		282	79.1	363	330	333	1,530	851	35.2	1,260
Toluene	800	160	μg/l	47.8	99.2		-	15.1		1.2^{J}	< 0.39	2.1	20	2.1 ^J	122	12.1	< 0.49	314
Ethylbenzene	700	140	µg∕l	40.1	40.9		-	432		339	64.6	451	525	380	583	452	70.2	592
Xylenes (Total)	2,000	400	µg∕l	93.9	108.6		-	224.5		2.9	2.33 ^J	6.2	397.8	58.5	608.7	198.1	< 0.66	2,476
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	<1.5	<3.0	SVE	-	3.9	SVE	8.8	3.0	2.6	4.6	5.2	5.8	5.9 ^J	0.47 ^J	6.4 ^J
Trimethylbenzenes (Total)	480	96	µg∕l	34.0	38.5	System	-	230.9	System	<0.84	0.44 ^J	2.2	379.8	22.9	323.9	303.2	< 0.34	894
Naphthalene	100	10	µg∕l	6.6 ^J	5.8	Started	-	120	Shut Down	104	42.2	138	184	123	186	169	13.3	206
n-Propylbenzene			µg∕l	5.6	5.9		-	-		-	-	-	-	-	-	-	-	-
Isoproylbenzene			μ g /l	1.9 ^J	<3.0		-	-		-	-	-	-	-	-	-	-	-
Inorganics																		
Lead (Dissolved)	15	1.5	µg∕l	-	-		-	-		-	-	-	-	-	-	-		-
Field Measurements																		
Temperature			°F	-	-		-	-		49.0	49.2	58.74	51.61	49.14	53.07	57.8	42.28	52.80
Conductivity			µS/cm	-	-		-	-		1,881	2,057	2,528	1,411	1,555	33	2,808	353.3	365.6
Dissolved Oxygen			mg/l	-	-		-	-		0.4	0.4	0.16	1.09	1.21	2.16	1.29	0.61	0.30
pH				-	-		-	-		6.8	6.5	6.84	6.57	6.83	6.85	6.77	6.53	6.39
Redox Potential			mV	-	-		-	-		-8.5	-3.5	-98.5	-47.5	-60.9	-95.2	-100.7	95.90	113.9

Notes:

ES - Enforcement Standards

PAL - Preventive Action Limit

NA - Not Analyzed

BOLD - Exceeds Enforcement Standard (ES) Italic - Exceeds Preventative Action Limit (PAL)

NI - Not Installed

µg/l = ppb mg/l = ppm < - Concentration less than listed detection limit

 $^{\rm J}$ - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

--= No Standard/Not Applicable

- = Not Analyzed/Not Sampled

OR = Out of Range

* = Laboratory analytical results not included in report. Data based on tables presented in report.

CTS = Central Testing Services

ECCI - Environmental Compliance Consultants Inc.

A.l.n. Groundwater Analytical Results Table MW-9B Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>							RI	EI Engineeri	ng						
	Submerg	ed Screen	(Yes/No)>	Yes	Yes	-	-	Yes	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
			Date>	1/16/2012	4/5/2012	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/24/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units															
Benzene	5	0.5	µg/l	1,930	482		-	259		27.3	407	549	2,130	1,180	4,290	2,590	1,040	1,070
Toluene	800	160	µg/l	811	170		-	146		0.90	224	234	582	300	1,940	1,150	274	259
Ethylbenzene	700	140	µg/l	410	73.2		-	46.2		1.0	87.9	114	1,190	599	2,000	1,830	229	418
Xylenes (Total)	2,000	400	µg/l	1,167	234.6		-	148		3.68 ^j	272.1	281.6	2,829	2,189	6,060	5,563	2,183	2,441
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	<12.2	<3.0		-	0.76 ^J		0.84 ^J	1.4	< 1.9	< 9.7	10.1	21.3	< 19.4	9.8	6.0 ^j
Trimethylbenzenes (Total)	480	96	µg/l	251.6	51.1	SVE	-	33.3	SVE	1.8	72.1	68.5	1,128	976	1,276	1,600	654	888
Naphthalene	100	10	µg/l	55.3 ⁷	11.1	System	-	9.1	System	0.71 ^J	18.5	29	252	223	376	397	196	213
n-Propylbenzene			µg/l	32.3	6.9	Started	-	-	Shut Down	-	-	-	-	-	-	-	-	-
Isoproylbenzene			µg/l	<11.8	<3.0		-	-		-	-	-	-	-	-	-	-	-
Chloroethane	400	80	µg/l	32.2	<4.8		-	-		-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	0.5	µg/l	121	<2.8		-	-		-	-	-	-	-	-	-	-	-
Inorganics																		
Lead (Dissolved)	15	1.5	µg/l	-	-		-	-		-	-	-	-	-	-	-	-	-
Field Measurements																		
Temperature			°F	-	-		-	-		51.45	50.45	58.37	53.15	49.99	52.21	56	46.30	52.00
Conductivity			µS/cm	-	-		-	-		1,182	1,037	1,420	1,091	1,918	12	1,479	1,191	1,743
Dissolved Oxygen			mg/l	-	-		-	-		0.47	1.29	0.48	1.01	0.73	1.46	0.75	0.49	0.86
pH				-	-		-	-		6.64	6.52	6.63	6.49	6.69	6.54	6.92	7.90	6.78
Redox Potential			mV	-	-		-	-		-26.10	-41.50	-68.2	-55.6	-31.9	-107.4	-97.2	-51.70	-29.3

Notes:

ES - Enforcement Standards

PAL - Preventive Action Limit

NA - Not Analyzed

BOLD - Exceeds Enforcement Standard (ES) Italic - Exceeds Preventative Action Limit (PAL)

NI - Not Installed

mg/l = ppm

^J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

- = No Standard/Not Applicable
 - = Not Analyzed/Not Sampled

A. l.r. Groundwater Analytical Results Table PZ-2 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>					REI Engi	neering				
	Submer	ged Screen	(Yes/No)>	Yes	Yes	Yes	Yes	-	Yes	Yes	-	Yes	Yes
			Date>	11/12/2009	8/12/2010	1/16/2012	4/5/2012	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016
PVOC's	ES	PAL	Units										
Benzene	5	0.5	µg/l	5,730	6,160	4,370	4,860		3,070	2,240		2,320	2,240
Toluene	800	160	µg/l	41.4	88.8 ^j	54.9	74.4		69.8	48.6		47.7	48.0
Ethylbenzene	700	140	µg/l	1,270	1,190	1,970	1,620		1,070	1,120		1,160	1,090
Xylenes (Total)	2,000	400	µg/l	846.37	578	1,060	684		220	429		433	409
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	< 0.50	88.5 ⁷	< 24.4	< 15.2		20.3 ⁷	<12.1		<19.4	13.0 ⁷
Trimethylbenzenes (Total)	480	96	µg/l	205.2	168.7	251.1	159	SVE	107	131.5 ⁷	SVE	118	112
Naphthalene	100	10	µg/l	137	298	256	244	System	203	239	System	218	202
n-Propylbenzene			µg/l	-	-	187	195	Started	-	-	Shutdown	-	-
Isopropylbenzene			µg/l	68.5	-	80.3	92.9		-	-		-	-
Styrene			μg/l	0.99	-	< 34.4	-		-	-		-	-
Inorganics													
Lead (Dissolved)	15	1.5	μg/l	-	-	-	-	-	-	-	-	-	-
Field Measurements													
Temperature			°F	-	-	-	-	-	-	-	-	48.59	48.01
Conductivity			µS/cm	-	-	-	-	-	-	-	-	1,212	1,226
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	0.76	0.39
pH				-	-	-	-	-	-	-	-	6.90	6.85
Redox Potential			mV	-	-	-	-	-	-	-	-	14.1	-23.8

		Data Demonstrad has N DET Environment											
		Data Rer	orted by>			RI	I Engineerir	ng					
	Submer	ged Screen	(Yes/No)>	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
			Date>	9/21/2016	1/24/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018			
PVOC's	ES	PAL	Units										
Benzene	5	0.5	µg∕l	2,420	2,130	1,960	2,070	1,490	1,100	791			
Toluene	800	160	µg/l	55.5	44.1	45.5	53.5	30.6	23.7	20.7			
Ethylbenzene	700	140	µg/l	1,240	1,340	1,080	1,320	762	252	432			
Xylenes (Total)	2,000	400	µg/l	451	377	323	356	213	162	68.3			
Methyl tert-Butyl Ether (MTBE)	60	12	μg/1	13.7 ¹	11.1 ^J	22.2	< 9.7	< 9.7	16.1	9.8 ^j			
Trimethylbenzenes (Total)	480	96	µg/l	116	74	98.1	66.1	57.7	44.3	20.1			
Naphthalene	100	10	µg∕l	233	184	191	202	146	119	99.8			
n-Propylbenzene			μg/1	-	-	-	-	-	-	-			
Isopropylbenzene			μg/l	-	-	-	-	-	-	-			
Styrene			μg/1	-	-	-	-	-	-	-			
Inorganics													
Lead (Dissolved)	15	1.5	μg/l	-	-	-	-	-	-	-			
Field Measurements													
Temperature			°F	50.69	49.94	47.93	48.11	50.3	44.37	49.0			
Conductivity			µS/cm	1,288	948	1,356	971	1,212	491	1,464			
Dissolved Oxygen			mg/l	0.19	0.54	0.62	1.37	1.44	0.69	0.66			
pH				6.89	6.73	7.00	6.62	6.89	7.96	6.87			
Redox Potential			mV	-89.5	-117.5	-64.0	-158.9	-136.6	-88.1	-47.6			

Notes :

ES - Enforcement Standards

PAL - Preventive Action Limit

BOLD - Exceeds Enforcement Standard (ES)

NA - Not Analyzed

µg/l = ppb

Italic - Exceeds Preventative Action Limit (PAL) NI - Not Installed mg/l = ppm

< - Concentration less than listed detection limit

^J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

- - = No Standard/Not Applicable

- = Not Analyzed/Not Sampled

A.l.s. Groundwater Analytical Results Table RW-2 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>	Midwest	Engineering	Services	ECCI*				Nort	uern Environ	mental			
			Date>	2/20/1995	7/3/1996	11/20/1996	9/25/1997	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units													
Diesel Range Organics			mg/l	-	-	-	7,100	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	9,200	-	-	-	-	-	-	-	-	-
PVOC's																
Benzene	5	0.5	µg∕l	-	-	11,000	698	610	830	1,400	1,500	1,500	1,800	1,500	2,400	3,300
Toluene	800	160	µg∕l	-	-	14,000	2,760	2,400	3,600	4,800	5,300	5,600	6,500	5,600	7,500	8,200
Ethylbenzene	700	140	µg∕l	-	-	1,400	365	550	720	870	920	910	940	1,000	1,200	1,380
Xylenes (Total)	2,000	400	µg∕l	-	-	7,100	1,530	2,210	2,930	3,400	3,900	3,700	4,000	4,000	4,800	5,570
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	-	-	<100	35.4	<14	38 ^J	53	<23	<9.2	<23	<46	<5.5	<5.5
Trimethylbenzenes (Total)	480	96	µg∕l	-	-	1,390	490	1,180	1,220	940	1,020	1,020	1,140	1,380	1,770	2,030
Naphthalene	100	10	µg/l	-	-	-	17	79	110	96	92	110	120	180	160 ^J	198 ⁷
1,2-Dichloroethane	5	0.5	µg∕l				<	-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg∕l	-	-	-	<	<1.3	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F	-	-	-	-	16.7 °C	9.0 °C	10.1 °C	12.6 °C	10.5 °C	8.5 °C	12.4 °C	14.7 °C	15.3 °C
Conductivity			µS/cm	-	-	-	-	350	440	470	410	700	620	490	360	320
Dissolved Oxygen			mg/l	-	-	-	-	2.50	1.24	1.81	1.50	1.91	1.96	1.39	1.15	1.10
pH				-	-	-	-	7.7	8.3	8.1	8.0	7.5	9.9	8.6	7.77	8.90
Redox Potential			mV	-	-	-	-	49	-35	-30	17	80	69	121	111	55

		Data Rep	orted by>						R	EI Engineer	ing					
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/5/2012
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/l	4,120	5,180	7,560	9,830	9,910	8,000	6,250	7,100	-	8,080	9,490	-	-
Toluene	800	160	µg∕l	11,900	21,500	22,300	28,400	39,700	33,400	27,600	33,400	-	28,500	33,600	-	-
Ethylbenzene	700	140	µg∕l	1,820	2,780	4,630	3,510	4,940	3,870	3,350	4,090	-	2,960	5,010	-	-
Xylenes (Total)	2,000	400	µg∕l	11,000	12,480	18,800	13,210	19,590	16,270	14,230	17,000	-	12,270	19,490	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	<30.0	<60.0	<300	<150	<60.0	215	<150	261	-	136 ^J	526 ⁷	-	-
Trimethylbenzenes (Total)	480	96	µg∕l	2,884	3,481	9,930	3,380	6,150	3,614	3,990	3,810	-	2,240	6,710	-	-
Naphthalene	100	10	µg∕l	<80.0	344	1,320	714	819	411	419	491	-	299	1,510	-	-
1,2-Dichloroethane	5	0.5	µg∕l	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg∕l	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	-

		Data Rep	orted by>						R	EI Engineer	ing					
			Date>	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/l		2,060	4,670		-	1,810	3,280	2,440	1,540	1,550	1,710	1,020	179
Toluene	800	160	µg/l		18,800	25,600		-	16,400	24,800	19,300	16,400	18,100	18,700	8,580	2,070
Ethylbenzene	700	140	µg/l		2,990	3,060		-	2,610	3,310	2,970	3,060	2,770	2,920	1,320	323
Xylenes (Total)	2,000	400	µg/l		16,300	13,960		-	13,380	15,430	15,080	16,020	13,100	14,360	8,070	2,910
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	SVE	< 97	< 97	SVE	-	< 24.2	< 60.6	< 48.5	< 97	< 97	< 97	< 16	< 8.0
Trimethylbenzenes (Total)	480	96	µg/l	System	4,409	2,696	System	-	4,006	3,429	3,721	4,217	2,492	3,065	2,084	1,005
Naphthalene	100	10	µg/l	Started	414	315	Shut Down	-	416	455	429	426	333	332	194	77.9
1,2-Dichloroethane	5	0.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F		-	-		-	-	-	-	-	-	-	-	-
Conductivity			µS/cm		-	-		-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l		-	-		-	-	-	-	-	-	-		-
pH					-	-		-	-	-	-	-	-	-		-
Redox Potential			mV		-	-			-	-			-			

<u>Notes</u> : ES - Enforcement Standards PAL - Preventive Action Limit

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

NA - Not Analyzed

NA - Not Analyzed NI - Not Installed µg/l = ppb mg/l = ppm < - Concentration less than listed detection limit ¹ - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit. - - No Standard/Not Applicable - = Not Analyzed/Not Sampled

A.1.t. Groundwater Analytical Results Table RW-4 RW-4 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>				Northe	ern Environm	iental			
			Date>	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units									
Diesel Range Organics			mg/l	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	-	-	-	-	-	-
PVOC's												
Benzene	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Toluene	800	160	µg/l	-	-	-	-	-	-	-	-	-
Ethylbenzene	700	140	µg/l	-	-	-	-	-	-	-	-	-
Xylenes (Total)	2,000	400	µg/l	-	-	-	-	-	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	-	-	-	-	-	-	-	-	-
Trimethylbenzenes (Total)	480	96	µg/l	-	-	-	-	-	-	-	-	-
Naphthalene	100	10	µg/l	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Inorganics												
Lead (Dissolved)	15	1.5	µg∕l	-	-	-	-	-	-	-	-	-
Field Measurements												
Temperature			°F	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-

		Data Rep	orted by>						R	EI Engineeri	ng					
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/5/2012
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg∕l	-	-	-	-	-	-	-	-	-	1,680	1,500	-	-
Toluene	800	160	µg/l	-	-	-	-	-	-	-	-	-	7,090	6,700	-	-
Ethylbenzene	700	140	µg∕l	-	-	-	-	-	-	-	-	-	2,590	2,310	-	-
Xylenes (Total)	2,000	400	µg∕l	-	-	-	-	-	-	-	-	-	15,990	15,290	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕1	-	-	-	-	-	-	-	-	-	190	195 ⁷	-	-
Trimethylbenzenes (Total)	480	96	µg/l	-	-	-	-	-	-	-	-	-	5,440	4,560	-	-
Naphthalene	100	10	µg/l	-	-	-	-	-	-	-	-	-	828	1,020	-	-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-		-	-	-	-	-	-	-
Field Measurements																
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-	-	_
Conductivity			µS/cm	-	-	-	-	-		-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	
pH				-	-	-	-	-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	-

		Data Rep	orted by>	(RI	EI Engineeri	ng					
			Date>	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units													
Benzene	5	0.5	μg/1	(187	243		157	129	33.1	164	125	112	1,230	111	47
Toluene	800	160	µg/l		2,610	3,590		2,120	1,660	121	2,440	1,610	328	696	1,220	238
Ethylbenzene	700	140	µg/l	[]	1,320	1,500		1,260	1,210	368	1,290	886	942	677	869	677
Xylenes (Total)	2,000	400	μg/1		8,500	9,130		7,890	7,810	2,407	7,250	6,800	5,590	7,620	5,540	2,208
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	SVE	23.1	<12.1	SVE	22.4	18.6	9.3 ^j	14.5	26.1	24.4	< 12.1	18.1 ⁾	< 8.0
Trimethylbenzenes (Total)	480	96	µg/l	System	2,445	2,476	System	2,523	2,553	1,599	2,296	2,581	2,030	3,463	2,239	1,783
Naphthalene	100	10	µg/l	Started	494	608	Shut Down	599	547	496	552	548	577	1,060	468	431
1,2-Dichloroethane	5	0.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F		-	-		-	-	-	-	-	-	-	-	-
Conductivity			µS/cm		-	-		-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l		-	-		-	-	-	-	-	-	-	-	-
pH					-	-		-	-	-	-	-	-	-	-	-
Redox Potential			mV		-	-		-	-	-	-	-	-	-	-	-

<u>Notes</u> : ES - Enforcement Standards PAL - Preventive Action Limit

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

NA - Not Analyzed

Concentration less than listed detection limit
 Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
 To Standard/Not Applicable
 Not Analyzed/Not Sampled
 * Laboratory analytical results not included in report. Data based on tables presented in report.
 CTS = Central Testing Services
 ECCI - Environmental Compliance Consultants Inc.

A.l.u. Groundwater Analytical Results Table RW-5 RW-5 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>				Northe	ern Environm	iental			
			Date>	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units									
Diesel Range Organics			mg/l	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	-	-	-	-	-	-
PVOC's												
Benzene	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Toluene	800	160	µg/l	-	-	-	-	-	-	-	-	-
Ethylbenzene	700	140	µg/l	-	-	-	-	-	-	-	-	-
Xylenes (Total)	2,000	400	µg/l	-	-	-	-	-	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	-	-	-	-	-	-	-	-	-
Trimethylbenzenes (Total)	480	96	µg/l	-	-	-	-	-	-	-	-	-
Naphthalene	100	10	µg/l	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Inorganics												
Lead (Dissolved)	15	1.5	µg∕l	-	-	-	-	-	-	-	-	-
Field Measurements												
Temperature			°F	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-

		Data Rep	orted by>						RJ	EI Engineeri	ng					
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/5/2012
PVOC's	ES	PAL	Units													
Benzene	5	0.5	μg/l	-	-	-	-		-	-	-	-	22,100	21,600		
Toluene	800	160	µg/l	-	-	-	-		-	-	-	-	36,600	33,900		-
Ethylbenzene	700	140	µg/l	-	-	-	-		- 1	-	-	-	3,340	3,270		-
Xylenes (Total)	2,000	400	µg/l	-	-	-	-		-	-	-	-	17,570	16,740		- 1
Methyl tert-Butyl Ether (MTBE)	60	12	μg/l	-	-	-	-			-	-	-	223	261 ^J		-
Trimethylbenzenes (Total)	480	96	μg/l	-	- 1		-			-	-	-	3,578	3,366		-
Naphthalene	100	10	µg/l	-	-	-	-		-	-	-	-	711	900		-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-			-	-	-	-	-	-	
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	- 1	-	-		-	-	-	-		-	-	- 1
Field Measurements																
Temperature			°F	-	- 1	-				-	-	-	-	_	_	
Conductivity			µS/cm	-	- 1	-	-			-	-	-		_	-	- 1
Dissolved Oxygen		I	mg/l	-	<u> </u>		-				-			-		
pH		I	<u> </u>	-	<u> </u>		-	<u> </u>	- 1	-	-	-	- 1	-		
Redox Potential		·	mV	-	<u> </u>		-			-	-	-				

		Data Rep	orted by>						R	EI Engineeri	ing					
			Date>	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg∕l		677	485		363	1,660	2,190	2,100	1,660	2,220	75.6	483	213
Toluene	800	160	µg∕1		3,860	4,340		1,590	2,430	3,410	4,190	2,200	2,470	444	343	141
Ethylbenzene	700	140	µg/l		912	1,010		384	389	623	1,210	625	538	792	170	141
Xylenes (Total)	2,000	400	µg∕l		16,300	14,850		8,170	7,190	2,407	14,100	8,060	6,270	4,340	3,260	2,192
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	SVE	< 19.4	< 19.4	SVE	< 19.4	< 24.2	< 12.1	16.3 ^J	< 48.5	< 24.2	< 12.1	< 8.0	< 8.0
Trimethylbenzenes (Total)	480	96	µg/l	System	13,660	11,230	System	6,520	3,863	1,599	11,280	4,690	2,767	1,905	2,302	2,059
Naphthalene	100	10	µg∕1	Started	3,830	3,030	Shut Down	1,700	1,060	496	2,700	1,230	899	504	675	676
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F	-	-	-	-	1	-	-	-	-	-	1	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	-

<u>Notes</u> : ES - Enforcement Standards PAL - Preventive Action Limit

NA - Not Analyzed

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

C - Concentration less than listed detection limit
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
- = No Standard/Not Applicable
= Not Analyzed/Not Sampled
* = Laboratory analytical results not included in report. Data based on tables presented in report.
CTS = Central Testing Services
ECCI - Environmental Compliance Consultants Inc.

A.l.v. Groundwater Analytical Results Table RW-6 RW-6 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>				Northe	ern Environn	iental			
			Date>	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units									
Diesel Range Organics			mg/l	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	-	-	-	-	-	-
PVOC's												
Benzene	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Toluene	800	160	µg/l	-	-	-	-	-	-	-	-	-
Ethylbenzene	700	140	µg∕l	-	-	-	-	-	-	-	-	-
Xylenes (Total)	2,000	400	µg/l	-	-	-	-	-	-	-	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	-	-	-	-	-	-	-	-	-
Trimethylbenzenes (Total)	480	96	µg∕l	-	-	-	-	-	-	-	-	-
Naphthalene	100	10	µg/l	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Inorganics												
Lead (Dissolved)	15	1.5	µg∕l	-	-	-	-	-	-	-	-	-
Field Measurements												
Temperature			°F	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-

		Data Rep	orted by>						R	EI Engineeri	ng					
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/5/2012
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg∕l	-	-	-	-	-	-	-	-	-	22,900	21,700		-
Toluene	800	160	µg/l	-	-	-	-	-	-	-	-	-	32,000	29,900	-	-
Ethylbenzene	700	140	µg/l	-	-	-	-	-	-	-	-	-	2,670	2,740		-
Xylenes (Total)	2,000	400	µg/l	-	-	-	-	-	-	-	-	-	16,060	16,280		
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕1	-	-	-	-	-	-	-	-	-	132	141 ^J	-	-
Trimethylbenzenes (Total)	480	96	µg/l	-	-	-	-	-	-	-	-	-	2,920	4,145		-
Naphthalene	100	10	µg/l	-	-	-	-	-	-	-	-	-	618	1,020		-
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	- 1
Field Measurements																
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-	_	- 1
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	- 1
Dissolved Oxygen			mg/l	-	-	-	-	_	-	-	-	-	-	-		
pH				-	-	-	-	-	-	-	-	-	-	-	-	- 1
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	

		Data Rep	orted by>						R	EI Engineeri	ing					
		_	Date>	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/1		2,230	1,770		1,810	2,940	3,810	5,880	6,740	7,100	4,250	3,510	3,930
Toluene	800	160	µg∕l		10,400	8,320		11,300	10,300	12,400	14,100	16,400	15,600	12,600	10,600	11,100
Ethylbenzene	700	140	µg/l		1,190	1,110		1,560	1,250	1,350	1,480	1,660	1,470	1,220	1,220	1,040
Xylenes (Total)	2,000	400	µg/l		13,850	12,440		14,860	13,300	14,870	12,100	12,880	11,930	11,740	10,960	10,030
Methyl tert-Butyl Ether (MTBE)	60	12	µg∕l	SVE	< 48.5	<24.2	SVE	<48.5	<12.1	< 48.5	< 24.2	< 60.6	< 60.6	< 60.6	< 40	< 40
Trimethylbenzenes (Total)	480	96	µg/l	System	4,980	5,800	System	5,140	5,820	5,230	3,511	3,527	2,838	3,108	3,433	2,626
Naphthalene	100	10	µg/l	Started	1,380	1,490	Shut Down	1,090	1,310	1,240	893	888	785	801	796	634
1,2-Dichloroethane	5	0.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l		-	-		-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F		-	-		-	-	-	-	-	-	-		-
Conductivity			µS/cm		-	-		-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l		-	-		-	-	-	-	-	-	-	-	-
pH					-	-		-	-	-	-	-	-	-	-	-
Redox Potential			i mV	1	-	-				-						

Notes:

ES - Enforcement Standards PAL - Preventive Action Limit

NA - Not Analyzed

BOLD Italic - Exceeds Enforcement Standard (ES) - Exceeds Preventative Action Limit (PAL) NI - Not Installed

mg/l = ppm

<- Concentration less than listed detection limit ¹ - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit. -- = No Standard/Not Applicable -= Not Analyzed/Not Sampled * = Laboratory analytical results not included in report. Data based on tables presented in report. CTS = Central Testing Services ECCI - Environmental Compliance Consultants Inc.

A.l.w. Groundwater Analytical Results Table RW-7 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

		Data Rep	orted by>				North	ern Environn	nental			
			Date>	10/9/2003	1/13/2004	4/22/2004	7/16/2004	10/14/2004	1/20/2005	4/19/2005	7/19/2005	10/18/2005
	ES	PAL	Units									
Diesel Range Organics			mg/l	-	-	-	-	-	-	-	-	-
Gasoline Range Organics			mg/l	-	-	-	-	-	-	-	-	-
PVOC's												
Benzene	5	0.5	µg∕l	3,300	2,600	2,800	5,900	3,200	7,400	950	3,800	7,400
Toluene	800	160	µg/l	1,200	720	3,900	10,000	5,500	6,000	510	3,100	4,100
Ethylbenzene	700	140	µg/l	1,700	1,300	1,000	1,500	890	1,300	280	1,000	1,920
Xylenes (Total)	2,000	400	µg/l	8,000	5,600	3,650	6,100	3,900	4,800	770	3,100	4,280
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	<58	<29	28	<18	<9.2	<23	<2.3	<5.5	<5.5
Trimethylbenzenes (Total)	480	96	µg/l	1,650	1,200	850	1,190	900	1,080	204	720	1,116
Naphthalene	100	10	µg/1	390	280	200	280	240	240	77	200 ^J	330
1,2-Dichloroethane	5	0.5	µg/l	-	-	-	-	-	-	-	-	-
Inorganics												
Lead (Dissolved)	15	1.5	µg/l	14	13	7.8	13	11	8.6	2.5	4.3	4.7
Field Measurements												
Temperature			°F	18.2 °C	8.6 °C	9.5 °C	12.8 °C	9.4 °C	8.0 °C	11.7 °C	15.8 °C	14.2 °C
Conductivity			µS/cm	510	490	100	480	760	610	250	260	280
Dissolved Oxygen			mg/l	2.94	1.52	2.02	1.58	2.03	2.53	1.64	1.18	0.95
pH				7.5	8.5	7.9	7.8	7.7	9.4	9.2	7.80	8.55
Redox Potential			mV	56	-42	-69	0	90	77	112	119	75

		-														
		Data Rep	orted by>						R	EI Engineeri	ng					
			Date>	10/26/2006	6/20/2007	9/27/2007	12/20/2007	3/19/2008	5/28/2008	9/18/2008	12/8/2008	4/7/2009	11/12/2009	8/12/2010	1/16/2012	4/5/2012
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/l	6,960	<0.310	-	-	-	5,290	5,420	6,140	3,740	5,110	3,980	-)	-
Toluene	800	160	µg/l	4,220	0.509	-	-	-	1,490	2,130	1,740	461	680	1,090	- 1	-
Ethylbenzene	700	140	µg∕l	2,310	<0.500	-	-	-	2,110	2,410	2,760	1,750	2,860	2,640	-	-
Xylenes (Total)	2,000	400	µg/l	5,422	0.807	-	-	-	4,120	4,930	5,020	2,713	3,748	3,930	-	-
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	<30.0	<0.300	-	-	-	164	<30.0	<30.0	< 30	161	135 ^J	- 1	-
Trimethylbenzenes (Total)	480	96	µg/l	1,348	5.66	-	-	-	1,399	1,528	1,630	1,052	1,234	1,271	-	-
Naphthalene	100	10	µg∕l	438	3.12	-	-	-	567	450	506	353	473	604	-	-
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-)	-
Field Measurements																
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-		-

		-														
		Data Rep	orted by>						RI	EI Engineeri	ng					
			Date>	6/25/2013	7/22/2015	10/26/2015	1/4/2016	2/8/2016	5/23/2016	9/21/2016	1/27/2017	4/5/2017	7/27/2017	10/23/2017	5/15/2018	11/13/2018
PVOC's	ES	PAL	Units													
Benzene	5	0.5	µg/l		2,230	533		519	535	145	452	491	208	224	253	207
Toluene	800	160	μg/l		10,400	105		129	162	13.4	260	192	41.8	155	205	380
Ethylbenzene	700	140	µg/l		1,190	843		895	1,020	430	919	1,070	717	890	932	1,380
Xylenes (Total)	2,000	400	µg∕l	SVE	13,850	1,841	SVE	1,704	1,808	825	1,930	1,985	1,107	1,635	1,632	2,708
Methyl tert-Butyl Ether (MTBE)	60	12	µg/l	System	< 48.5	< 4.8	System	< 12.1	< 9.7	< 2.4	< 4.8	6.4 ^J	4.9 ^J	4.9 ^J	8.9 ^J	6.8 ^J
Trimethylbenzenes (Total)	480	96	µg/l	Started	4,980	1,909	Shut Down	2,243	2,102	1,465	1,487	1,502	1,044	1,267	873	1,124
Naphthalene	100	10	µg/l	-	1,380	441	-	488	412	296	324	320	277	357	214	320
Inorganics																
Lead (Dissolved)	15	1.5	µg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
Field Measurements																
Temperature			°F	-	-	-	-	-	-	-	-	-	-	-	-	-
Conductivity			µS/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved Oxygen			mg/l	-	-	-	-	-	-	-	-	-	-	-	-	-
pH				-	-	-	-	-	-	-	-	-	-	-	-	-
Redox Potential			mV	-	-	-	-	-	-	-	-	-	-	-	-	-

<u>Notes</u>: ES – Enforcement Standards

PAL - Preventive Action Limit

BOLD - Exceeds Enforcement Standard (ES) Italic - Exceeds Preventative Action Limit (PAL) NI - Not Installed

 NA - Not Analyzed NI - Not Instal yzed

 yq/l = ppb mq/l = ppm

 < - Concentration less than listed detection limit</td>

< - Concentration less than listed detection limit</p>
^J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
- - = No Standard/Not Applicable
= Not Analyzed/Not Sampled
* = Laboratory analytical results not included in report. Data based on tables presented in report.
CTS = Central Testing Services
ECC1 - Environmental Compliance Consultants Inc.

A.7.a.3. Other - Free Product Measurments and Recovery MW-3R Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

Data	Approximate Free Product	Free Product	Data
Date	Thinkness (feet)	Recovered (gal)	Reported by
5/28/2008	0.96	20.00	REI
6/27/2008	1.03	20.00	REI
8/27/2008	1.38	11.00	REI
9/18/2008	1.31	11.00	REI
10/16/2008	1.29	50.00	REI
11/4/2008	1.46	40.00	REI
12/8/2008	1.47	15.00	REI
4/7/2009	1.27	6.00	REI
9/9/2009	1.17	29.00	REI
9/17/2009	1.21	20.00	REI
9/24/2009	1.27	20.00	REI
10/2/2009	1.39	25.00	REI
10/9/2009	1.00	30.00	REI
10/15/2009	1.10	25.00	REI
10/22/2009	1.08	25.00	REI
10/29/2009	0.75	15.00	REI
11/12/2009	1.03	7.50	REI
8/12/2010	0.98	7.50	REI
6/25/2013	Remedial System Started		
6/25/2013	0.50	-	REI
6/26/2013	2.84	-	REI
6/27/2013	3.30	-	REI
7/9/2013	2.40	-	REI
7/12/2013	0.61	-	REI
7/17/2013	0.87	-	REI
7/25/2013	1.50	-	REI
9/9/2013	0.42	-	REI
9/24/2013	0.78	-	REI
10/2/2013	-	133*	REI
11/13/2013	-	350*	REI
4/9/2014	0	-	REI
5/12/2014	0.02	-	REI
6/22/2015	-	115*	REI
1/4/2016	Remedial System Shut Down		
Minimum	0.00	6.00	
Maximum	3.30	50.00	

- = Not Measured/Collected

* = Total recover from wells MW-35, RW-5, & RW-6 by remedial system.

A.7.a.7. Other - Free Product Measurments and Recovery RW-2 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

Date	Approximate Free Product Thinkness (feet)	Free Product Recovered (gal)	Data Reported by
8/1-12/31/1997	0	0	ECCI
6/20/2007	0.26	0.17	REI
9/27/2007	0.66	0.43	REI
10/23/2007	0.53	0.35	REI
12/20/2007	0.20	0.13	REI
3/19/2008	0.29	0.19	REI
5/28/2008	0.25	0.16	REI
9/18/2008	-	-	REI
12/8/2008	0.35	0.23	REI
4/7/2009	0.55	0.36	REI
11/12/2009	1.37	7.50	REI
8/12/2010	0.93	1.00	REI
Minimum	0.00	0.00	
Maximum	1.37	7.50	
A.7.a.9. Other - Free Product Measurments and Recovery RW-5 Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

Data	Approximate Free Product	Free Product	Data
Date	Thinkness (feet)	Recovered (gal)	Reported by
10/9/2003	1.17	3.00	Northern
1/13/2004	1.25	3.00	Northern
4/22/2004	0.50	1.00	Northern
7/16/2004	1.33	3.00	Northern
10/14/2004	1.00	3.00	Northern
1/20/2005	1.17	2.50	Northern
4/19/2005	1.00	1.50	Northern
7/19/2005	2.00	1.61	Northern
10/8/2005	0.58	1.12	Northern
11/8/2005	0.67	1.02	Northern
12/13/2005	0.50	0.67	Northern
10, 10, 2000		0101	Hormon
10/26/2006	1.47	1.95	REI
6/20/2007	1.31	1.52	REI
8/7/2007	1.41	1.53	REI
9/27/2007	1.44	1.54	REI
10/23/2007	1.30	1.75	REI
11/29/2007	1.50	1.13	REI
12/20/2007	1.52	1.40	REI
3/19/2008	0.90	0.81	REI
4/24/2008	1.24	1.27	REI
5/28/2008	1.22	1.03	REI
6/27/2008	1.28	1.10	REI
8/27/2008	1.53	1.55	REI
9/18/2008	1.54	1.42	REI
10/16/2008	1.56	1.46	REI
11/4/2008	1.62	1.68	REI
12/8/2008	1.58	1.71	REI
4/7/2009	1.46	6.00	REI
9/9/2009	1.30	4.75	REI
9/17/2009	1.30	7.00	REI
9/24/2009	1.38	4.50	REI
10/2/2009	1.46	8.00	REI
10/9/2009	1.40	10.00	REI
10/15/2009	1.32	9.50	REI
10/22/2009	1.30	8.00	REI
10/29/2009	1.30	6.50	REI
11/12/2009	1.26	12.00	REI
8/12/2010	1.27	2.00	REI
6/25/2013	Remedial System Started	2100	
6/25/2013	1.32	_	REI
6/26/2013	1.31	_	REI
6/27/2013	1.30	_	REI
7/9/2013	4 80	_	REI
7/12/2013	1 00	_	REI
7/17/2013	1 18	_	REI
1, 11, 2010	1110	-	

3.00	-	REI
2.98	-	REI
-	-	REI
-	133*	REI
-	350*	REI
3.10	-	REI
1.66	-	REI
-	115*	REI
Remedial System Shut Down		
0.50	0.67	
4.80	12.00	
	3.00 2.98 - - 3.10 1.66 - Remedial System Shut Down 0.50 4.80	3.00 - 2.98 - - 133* - 350* 3.10 - 1.66 - - 115* Remedial System Shut Down 0.50 0.67 4.80 12.00

- = Not Measured/Collected

* = Total recover from wells MW-35, RW-5, & RW-6 by remedial system.

A.7.d Other - SVE System Benzene and VOC Emission Data Jennerman AMOCO 901 W Lake Avenue Ladysmith, Wisconsin

	Vacuum		Days		Cumulative	Benzene	VOC		Benzene	voc	Benzene	VOC
	Pump	Cumulative	System	System	System	Concentration	Concentration	Air Flow Rate	Emission Rate*	Emission Rate*	Cumulative	Cumulative
Date	Hour Meter	Days	Operational	Efficiency	Efficiency	(ug/l)	(ug/l)	(SCFM)	(lbs/hr)	(lbs/hr)	Pounds Emitted	Pounds Emitted
6/25/13 16:30	23,480	official start	0.00									
6/25/13 17:30	23,481	0.07	0.04	100.00%	100.00%	66.7	6,333	50	0.012	1.184	0.01	0.59
6/26/13 12:45	23,500	0.87	0.85	101.30%	98.46%	31.7	6,667	100	0.012	2.492	0.24	36.43
6/27/13 14:00	23,526	2	1.91	100.12%	99.37%	366.7	16,333	120	0.164	7.326	2.47	160.53
7/1/13 10:40	23,618	6	5.77	100.05%	99.82%	73.3	15,000	110	0.030	6.167	11.49	786.02
7/9/13 0:00	23,808	13	13.67	104.56%	102.51%	203.3	16,333	110	0.084	6.716	22.28	2,007.40
7/11/13 7:00	23,855	16	15.63	85.64%	100.03%							
7/12/13 8:30	23,870	17	16.26	59.22%	97.44%		Issues with float	s fouling on moist	ure separator due t	o sediment recove	ery under vacuum	•
7/17/13 17:41	23,871	22	16.31	0.93%	73.90%		Repla	ced floats, determ	ined that intrinsic	ally safe relay had	failed	
7/25/13 10:00	24,056	30	24.00	100.05%	80.65%	176.7	19,667	110	0.073	8.086	30.94	2,911.09
7/26/13 17:15	24,056	31	31.03	100.00%	99.92%	s	ystem operational	, hour meter not w	orking. Hour met	er tied to failed int	rinsically safe rela	y
8/19/13 10:00	24,056	55	31.03	100.00%	56.67%		System d	lown on arrival and	d left off until intri	nsically safe relay	replaced	
9/3/13 15:45	24,060	70	31.03	1.09%	44.33%			Installed repl	acement intrinsica	ully safe relays		
9/9/13 10:45	24,199	76	36.82	99.93%	48.58%	256.7	21,666.7	130.0	0.1	10.5	37.3	3,614.70
9/9/13 14:45	24,203	76	37.14	92.50%	48.89%		Syste	m Down, AST full	(extracted 30 gallo	ns of product in 3	hours)	
9/14/13 10:45	24,203	81	37.14	0.00%	45.97%			Pulled stinger	extensions and re	started system		
9/14/13 17:40	24,210	81	37.43	99.76%	46.16%	Extr	acted 30 gallons o	f product in 7 hour	s, opened dilution	valve to reduce ra	te of product extra	ction
9/24/13 10:45	24,443	91	47.14	100.05%	51.93%		System run	ning, installed rela	ay on SVE system t	o allow proper pur	npout to AST	
10/2/13 11:50	24,478	99	48.60	18.13%	49.17%		AST full an	d system shut dow	n - AST pumped or	n 10-2-13 and syste	m restarted	
10/9/13 11:15	24,645	106	55.57	99.93%	52.52%	200	23,000	125	0.09	10.75	59.70	5,862.18
11/14/13 18:30	25,316	142	83.53	77.02%	58.78%	240	19,000	125	0.11	8.88	149.25	14,410.70
12/6/13 9:10	25,838	164	105.28	100.64%	64.30%	140	19,000	125	0.07	8.88	195.30	19,015.08
1/23/14 12:45	26,989	212	153.24	99.60%	72.33%	140	7,500	130	0.07	3.64	272.40	26,250.02
01/23/14				I	ncreased exhaust	stack height to gre	ater than 25 feet a	nd restarted system	m			
1/23/14 15:15	26,989	212	153.24	0.00%	72.29%	11	960	170	0.01	0.61	272.49	26,255.33
2/4/14 12:15	27,275	224	165.16	100.35%	73.78%	55	4,400	150	0.03	2.47	277.88	26,693.80
3/3/14 10:50	27,917	251	191.91	99.29%	76.52%	96	11,000	120	0.04	4.93	301.77	29,086.45
4/9/14 10:30	28,808	288	229.03	100.38%	79.59%	65	5,000	110	0.03	2.06	332.74	32,188.73
5/12/14 13:20	29,600	321	262.03	99.64%	81.66%	79	13,000	110	0.03	5.35	356.27	35,129.96
6/16/14 15:00	30,378	356	294.45	92.44%	82.72%	240	39,000	60	0.05	8.75	392.59	41,060.18
7/9/14 0:00	30,385	378	294.72	1.21%	77.90%		AST full and sy	stem shut down - j	oumped from AST i	into 3 drums and re	estarted system	
7/30/14 8:30	30,898	400	316.13	100.25%	79.09%	18	3,200	150	0.01	1.79	409.63	43,868.37
7/30/14 15:45	30,906	400	316.43	100.00%	79.11%	33	8,300	100	0.01	3.10	409.71	43,886.12
8/24/14 9:30	31,499	425	341.15	99.93%	80.32%	32	7,700	100	0.01	2.88	416.93	45,661.58
9/17/14 11:30	32,077	449	365.24	100.02%	81.38%	21	4,400	100	0.01	1.64	422.65	46,968.66
10/29/14 12:30	33,085	491	407.22	99.85%	82.96%	5.5	5,500	110	0.00	2.26	427.75	48,939.25
12/3/14 11:15	33,924	526	442.21	100.11%	84.10%	9.2	2,300	80	0.00	0.69	429.85	50,176.05
12/19/14 10:15	34,308	542	458.18	100.08%	84.57%	32	7,300	80	0.01	2.18	432.21	50,725.78
1/16/15 11:45	34,981	570	486.24	100.00%	85.33%	25	6,700	90	0.01	2.25	438.27	52,219.87
2/5/15 9:15	35,459	590	506.14	100.02%	85.83%	24	7,900	100	0.01	2.95	442.42	53,462.99
3/26/15 11:30	36,641	639	555.38	100.31%	86.94%	18	3,500	110	0.01	1.44	452.06	56,050.40
4/16/15 10:00	37,146	660	576.45	100.60%	87.37%	9.5	3,800	110	0.00	1.56	454.90	56,804.52
5/12/15 13:15	37,771	686	602.49	99.64%	87.84%	9.4	3,000	100	0.00	1.12	457.23	57,646.21
6/15/15 0:00	38,578	719	636.13	100.58%	88.43%	3.5	1,300	60	0.00	0.29	458.96	58,213.31
7/22/15 10:25	39,481	757	673.74	100.47%	89.03%	1.07	1,183	100	0.00	0.44	459.49	58,542.97
	1					1	1	1	1	1	1	

Notes:

na = No Samples Collected (1) System Shut Down (2) System Restart Cumulative Pounds Emitted is the Average of Sampling Events *Formula Used When Vapor Sample Collected: ER = (Q x C x 3.7378 e-6) Where: ER = Emission Rate (lbs/hr) Q = Pumping Rate (SCFM) C =Soil Gas Concentration (ug/l) Ibs/hr = Pounds per hour SCFM = Standard Cubic Feet Per Minute





Table 5Summary of Post-Remediation Groundwater Monitoring DataWeisenberger Reality, Ladysmith, Wisconsin

ſ	Sat	male I D	r	·······		140		·			BAV	17.0	· · ·	······
Samnl		ion Date	02/42/02	40145100	111 4		04/04/04	44/02/04	03340100	40145100	IVI V	¥=2	04/04/04	44/00/04
Top of	Caeina F	-lour Dawy		10/10/02	04/22/03	10/00/03	04/01/04	11/05/04	03/12/02	10/15/02	04/22/03	10/00/03	04/01/04	11/03/04
Donti	to Grou	industar	11 00	E 20	114 6 4 E	0.40	6 47	e 40	44.04	0.67	113	3.78 0.57	0.55	0.04
Grour	dwator F	Flovation	1120.24	1125.01	4424.25	4422 45	4424.22	4434.00	11.74	10.0	4420.26	9.07	9.00	3.01
ANALYTICAL PARAMETERS	INR 140	NR 140	1123.31	1133.01	1134.23	1133.43	1134.23	1134.00	1127.04	1151.11	1130.40	1130.21	1130.23	1130.17
Volatile Organic Compounds*	ES	PAL												
Benzene	5	0.5	0.87	127	236	20,1	194	2.89	1.600	5,810	3.310	2.820	6.130	3.340
Ethylbenzene	700	140	1.7	0.60	1.9	< 0.5	9.02	1.61	36	1.040	364	279	567	252
Methyl tert butyl ether	60	12	< 0.49	< 0.3	0.64	< 0.3	<3.00	<0.3	< 10	< 15.0	< 30	< 150	<60.0	<75.0
Toluene	1,000	200	< 0.63	0.71	1.6	< 0.3	12.0	3.0	170	2,130	1,030	191	962	258
1,2,4-Trimethylbenzene			5.3	1.0	2.0	< 0.4	<4.00	3.1	28	632	247	273	379	210
1,3,5-Trimethylbenzene	!		2.7	< 0.31	< 0.31	< 0.31	<3.10	0.726	21	152	82	<155	100	<77.5
Total Trimethylbenzene	480	96	8.0	1.0	2.0	< 0.71	<7.10	3.826	49	784	329	273	479	210
o- Xylene	!	'	1.5	0.68	2.9	< 0.3	8.40	2.58	230	1,640	792	823	1,130	608
m- & p- Xylenes			6.3	1.51	2.1	< 0.62	<6.20	4.17	220	3,450	1,540	1,410	2,710	1,060
Total Xylenes	10,000	1,000	7.8	2.2	5.0	< 0.92	8.40	6.75	450	5,090	2,332	2,233	3,840	1,668
sec-Butylbenzene	!		0.51		· '	[]		***	< 9.2					
n-Butylbenzene			1.1		í'				< 6.8					
1,2-Dichloroethane	5	0.5	< 0.54	**	[]	0.656	<4.00	<0.4	< 11			< 85.0	<80.0	<100
EDB (1,2-Dibromoethane)	0.05	0.005	< 0.48			< 1.10	<11.0	<1.10	< 10			< 550	<220	<275
Naphthalene	40	8	< 1.4	4.3	2.9	< 0.8	<8.00	1.32	< 28	105	< 80	< 400	<160	<200
n-Propylbenzene		!	1.1					ai 10	< 6.8					
Organic Parameters														
Gasoline Range Organics			< 100	270	413			**	3,200	20,300	11,500			
Inorganic Parameters														
Alkalinity (mg/l)				207										
Nitrogen-Nitrate/Nitrite (mg/l)	10	2		< 0.3	·'		****	***	***					
Iron (mg/l)	0.3	0.15		0.18	[]									
Sulfate (mg/l)	250	125		18	!			*-						
Lead (µg/l)	15	1.5		< 1.00		9.68						2.46		
Temperature (°C)				12.2					***	11.6				
Conductivity (µmho/cm)		·'	(T	411	, <u> </u>	<u> </u>		**		7,100				

Results in micrograms per liter (µg/L), unless otherwise stated.

*VOCs not listed were not identified above MDLs.

29 NR140 Enforcement Standards (ES) exceedance.

3 NR140 Preventive Action Limits (PAL) exceedance.

-- Not analyzed, not sampled, or not applicable.

 Table 5

 Summary of Post-Remediation Groundwater Monitoring Data

 Weisenberger Reality, Ladysmith, Wisconsin

	Sa	mple I.D.			MV	N-3			Τ		M١	N-5	<u>,</u>	
Sampl	e Collect	ion Date	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04
Top of	Casing E	levation		• •	113	7.05				<u> </u>	114	0.09	<u> </u>	
Depti	n to Grou	Indwater	11.17	7.51	6.38	10.77	7.22		16.54	11.65	16.12	15.00	16.80	14.95
Groun	idwater E	levation	1125.88	1129.54	1130.67	1126.28	1129.83		1123.55	1128.44	1123.97	1125.09	1123.29	1125.14
ANALYTICAL PARAMETERS	NR 140	NR 140							1					
Volatile Organic Compounds*	ES	PAL												1
Benzene	5	0.5	< 0.43	< 0.31	< 0.31	< 0.31	< 0.31		27,000	15,000	21.300	18.900	28,200	21.500
Ethylbenzene	700	140	< 0.49	< 0.5	< 0.5	< 0.5	< 0.5	**	1,800	4,540	4.220	3.230	3.710	1.950
Methyl tert butyl ether	60	12	< 0.49	< 0.3	< 0.3	< 0.3	<0.3	***	< 100	< 1.500	< 75	< 1.500	<300	<300
Toluene	1,000	200	< 0.63	< 0.3	< 0.3	< 0.3	<0.3		30.000	19,700	33,400	27,700	37,800	28,700
1,2,4-Trimethylbenzene			< 0.42	< 0.4	< 0.4	< 0.4	<0.4		1.200	4.650	9.040	< 2,000	6.620	1 410
1,3,5-Trimethylbenzene			< 0.72	< 0.31	< 0.31	< 0.31	< 0.31		630	< 1.550	2.450	< 1.550	1.650	356
Total Trimethylbenzene	480	96	< 1.14	< 0.71	< 0.71		<0.71		1.830	4.650	11.490	<3.550	8.270	1,766
o- Xylene			< 0.45	< 0.3	< 0.3	< 0.3	< 0.3		4.600	4.300	8,940	3,030	6,610	3 050
m- & p- Xylenes			< 1	< 0.62	< 0.62	< 0.62	<0.62		8.000	9.370	19,700	7,190	17 400	6 990
Total Xylenes	10,000	1,000	< 1.45	< 0.92	< 0.92	< 0.92	<0.92		12,600	13.670	28.640	10,220	24 010	10 040
sec-Butylbenzene			< 0.46						< 92				<u>A-7, V 1 V</u>	10,040
n-Butylbenzene			< 0.34						130	***				
1,2-Dichloroethane	5	0.5	< 0.54				<0.4		340	< 850		< 850	<400	<400
EDB (1,2-Dibromoethane)	0.05	0.005	< 0.48				<1.10		680	< 5 500		< 5 500	<1 100	<1 100
Naphthalene	40	8	< 1.4	< 0.8	< 0.8	< 0.8	<0.8		< 280	< 4.000	1.370	< 4 000	<800	<800
n-Propylbenzene			< 0.34						190	.,				
Organic Parameters		1		t	<u>I</u>	1						,	1	
Gasoline Range Organics	T		< 100	< 50	< 50				100.000	100.000	144 000		T	
Inorganic Parameters			du						10010001	100,0001	1-11000		L	
Alkalinity (mg/l)				[[435				
Nitrogen-Nitrate/Nitrite (mg/l)	10	2								< 0.3				
Iron (mg/I)	0.3	0.15								2.86				
Sulfate (mg/l)	250	125								5.6				
Lead (µg/l)	15	1.5								325		335		
Temperature (°C)				12.2						12.6		<u> </u>		
Conductivity (µmho/cm)				119						1 680				

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Results in micrograms per liter (µg/L), unless otherwise stated.

*VOCs not listed were not identified above MDLs.

29 NR140 Enforcement Standards (ES) exceedance.

3 NR140 Preventive Action Limits (PAL) exceedance.

Not analyzed, not sampled, or not applicable.

 Table 5

 Summary of Post-Remediation Groundwater Monitoring Data

 Weisenberger Reality, Ladysmith, Wisconsin

	Sa	mple I.D.			M١	V-6]		MV	N-7		***
Sampl	e Collect	tion Date	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04
Top of	Casing E	Elevation			113	7.93					113	8.70	h	
Dept	h to Grou	Indwater		9.27	13.13	11.62	13.55			11.69	15.03	14.51	15.70	14.18
Groun	ndwater E	levation		1128,66	1124.80	1126.31	1124.38	tion		1127.01	1123.67	1124.19	1123.00	1124.52
ANALYTICAL PARAMETERS	NR 140	NR 140											**************************************	
Volatile Organic Compounds*	ES	PAL												
Benzene	5	0.5		< 0.31	< 0.31	<0.31	<0.31			1,880	3,670	2,900	4,080	2,540
Ethylbenzene	700	140		< 0.5	< 0.5	< 0.5	< 0.5			1,520	1,650	1,730	1.930	930
Methyl tert butyl ether	60	12		< 0.3	< 0.3	< 0.3	< 0.3		+-	< 150	< 30	< 150	<300	<75.0
Toluene	1,000	200		< 0.3	< 0.3	< 0.3	< 0.3			929	1,240	737	1.300	812
1,2,4-Trimethylbenzene				< 0.4	< 0.4	< 0.4	< 0.4	***	· · ·	2,610	2,740	4.730	3,180	1.740
1,3,5-Trimethylbenzene			•••	< 0.31	< 0.31	< 0.31	< 0.31			608	707	1.200	787	384
Total Trimethylbenzene	480	96		< 0.71	< 0.71	< 0.71	< 0.71			3.218	3.447	5.930	3.967	2.124
o- Xylene			**	< 0.3	< 0.3	< 0.3	< 0.3			1.270	1.580	1,480	1,480	818
m- & p- Xylenes		1		< 0.62	< 0.62	< 0.62	< 0.62		· · ·	4.320	4,790	5.050	5 350	2 680
Total Xylenes	10,000	1,000		< 0.92	< 0.92	< 0.92	< 0.92		B179	5.590	6.370	6.530	6,830	3 458
sec-Butylbenzene				< 0.33					***	< 165				
n-Butylbenzene		**		< 0.36			[***	395				
1,2-Dichloroethane	5	0.5		< 0.51			< 0.4	**		< 255		< 85.0	<400	<100
EDB (1,2-Dibromoethane)	0.05	0.005		< 1.10			<1.10			< 550		< 550	<1 100	<275
Naphthalene	40	8		< 0.8	< 0.8	< 0.8	< 0.8			562	361	580	<800	227
n-Propylbenzene				< 0.3					***	318				
Organic Parameters										<u> </u>	1		1	
Gasoline Range Organics			[< 50	< 50]	T			27 600	24 800			
Inorganic Parameters							<u>-</u>				21,0001			
Alkalinity (mg/l)														
Nitrogen-Nitrate/Nitrite (mg/l)	10	2		+										
Iron (mg/I)	0.3	0.15												
Sulfate (mg/l)	250	125												
Lead (µg/l)	15	1.5										35		
Temperature (°C)				12.1		<u> </u>				12.6		<u> </u>		
Conductivity (µmho/cm)				4,810						1.480				

Results in micrograms per liter (µg/L), unless otherwise stated.

*VOCs not listed were not identified above MDLs.

29 NR140 Enforcement Standards (ES) exceedance.

3 NR140 Preventive Action Limits (PAL) exceedance.

--- Not analyzed, not sampled, or not applicable.

 Table 5

 Summary of Post-Remediation Groundwater Monitoring Data

 Weisenberger Reality, Ladysmith, Wisconsin

	Sa	mple I.D.			MV	N-8			Ι		MV	V-9		
Sampl	e Collect	tion Date	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04	03/12/02	10/15/02	04/22/03	10/06/03	04/01/04	11/03/04
Top of	Casing F	Elevation			113	4.82					113	4.85	<u>La 1. and 1</u>	L
Depti	n to Grou	Indwater	11.55	7.97	10.07	10.77	10.42	10.01	13.97	12.36	Dry		13.91	[
Groun	Idwater F	Elevation	1123.27	1126.85	1124.75	1124.05	1124.40	1124.81	1120.88	1122.49		1134.85	1120.94	[
ANALYTICAL PARAMETERS	NR 140	NR 140				<u> </u>			1					
Volatile Organic Compounds*	ES	PAL	L					ļ						
Benzene	5	0.5	2,200	2,710	815	2,310	940	1,960]			
Ethylbenzene	700	140	28	93	18	53.8	7.62	70.9						[]
Methyl tert butyl ether	60	12	< 10	< 15	< 3	< 30.0	< 0.3	<15.0						
Toluene	1,000	200	53	80	24	< 30.0	29.7	45.6						
1,2,4-Trimethylbenzene			10	35	7.6	< 40.0	6.03	25.9						[]
1,3,5-Trimethylbenzene			< 14	< 15.5	< 3.1	< 31.0	1.29	<15.5						[]
Total Trimethylbenzene	480	96	10	35	7.6	< 71.0	7.32	29.5						
o- Xylene			22	74	47	< 30.0	33.7	35.2	-					
m- & p- Xylenes			43	219	61	< 62.0	44.8	106						i
Total Xylenes	10,000	1,000	65	293	108	< 92.0	78.5	141.2						
sec-Butylbenzene			< 9.2			t								
n-Butylbenzene		1	< 6.8				†							
1,2-Dichloroethane	5	0.5	< 11			< 17.0	3.05	<20.0						
EDB (1,2-Dibromoethane)	0.05	0.005	< 10			< 110	<1.10	<55.0	<u> </u>					
Naphthalene	40	8	< 28	< 40	< 8	< 80.0	<0.8	<40.0						
n-Propylbenzene			< 6.8											
Organic Parameters		Ī	·····	·····	·····				iiiiii	l.		L	l	
Gasoline Range Organics]	3,000	5,470	1,470									
Inorganic Parameters		T	j								<u>-</u>			
Alkalinity (mg/l)			, T	409]	T								
Nitrogen-Nitrate/Nitrite (mg/l)	10	2		< 0.3										
Iron (mg/i)	0.3	0.15	· ·[246										
Sulfate (mg/l)	250	125		< 1.00		1		t						
Lead (µg/l)	15	1.5		4.1		4.07								
Temperature (°C)			,	12.4						**				
Conductivity (µmho/cm)		1		8,900										

Results in micrograms per liter (µg/L), unless otherwise stated.

*VOCs not listed were not identified above MDLs.

29 NR140 Enforcement Standards (ES) exceedance.

3 NR140 Preventive Action Limits (PAL) exceedance.

-- Not analyzed, not sampled, or not applicable.



											TA	BLE A.1 (p	age 2 of 1	2)												
										AI	NALYTICA	L RESULI	'S - GROU	NDWATE	ર											
										HOLIDAY	STATION	I #176 SITI	E, LADYSI	MITH, WIS	CONSIN											
												M	N-2													
Date	6/20/96	11/25/97	5/21/98	7/15/99	9/24/99	7/25/06	1/24/07	6/4/07	9/4/07	3/5/08	5/12/09	1/26/11	7/19/11	10/19/12	9/3/14	12/3/14	3/31/15	6/24/15	3/11/16	6/2/16	9/15/16	12/1/16	4/17/17	7/27/17	NR 140 Ren Lin	nedial Action nits
Elevation (ft)	1117.44	1116.42	1116.50	1115.92	1116.70	1116.11	1115.39	1115.45	1115.77	1115.65	1115.17	1116.41	1117.73	1116.01	1118.25	1117.31	1116.41	1117.01	1116.85	1117.62	1118.09	1117.18	1116.58	1118.07		
ANALYTE	•			•	•	•					•	•									•				ES	PAL
Lead (ppb)	31					20	15												1.5	1.3					15	1.5
GRO (ppb)	63,000	77,000	110,000	120,000																						
VOCs/PVOCs (ppb)																										
Benzene	20,000	17,000	22,000	17,000	23,000	16,600	600	5,300	12,000	11,700	15,700	19,800	15,000	17,000	9,300	10,000	11,000	9,500	7,300	6,000	6,600	6,300	6,700	6,500	5	0.5
Ethylbenzene	1,800		3,900	3,200	2,100	1,430	670	1,300	1,710	1,170	2,330	7,770	3,200	2,800	2,100	1,900	2,600	5,100	2,300	2,500	2,500	1,800	2,400	2,300	700	140
МТВЕ						< 52	< 104	< 53	< 62	< 62	206	1,260	< 23	960	810	460	< 12	< 0.24	< 2.4	1,200	610	38	640	670	60	12
Naphthalene						540	< 440				871	3,250	1,400	750	990	740	660	39,000	870	900	930	740	860	810	100	10
Toluene	20,000	22,000	33,000	20,000	26,000	17,800	2,940	6,700	11,400	8,200	11,700	28,100	16,000	16,000	11,000	9,700	9,500	11,000	10,000	7,900	8,100	6,400	7,000	8,400	800	160
1,2, 4- & 1,3,5 - TMB						1,780	1,600	2,220	2,170	1,910	4,277	17,770	6,000	3,060	2,850	2,180	2,640	58,000	2,270	2,830	2,970	2,850	2,140	2,200	480	96
Total Xylenes	9,400	11,800	18,300	15,400	11,600	10,200	5,810	8,380	10,800	8,750	13,180	42,810	18,000	16,000	12,000	11,000	12,000	43,000	13,000	12,000	14,000	14,000	12,000	11,000	2,000	400

---- = not analyzed or no standard MTBE = methyl-tert-butylether

TMB = trimethylbenzene

Well Depth (feet): 39

Bold italic numbers indicate concentrations above the ES outlined in NR 140.10.

 $\ensuremath{\textbf{Bold}}$ numbers indicate concentrations above the PAL outlined in NR 140.10.

TOC Elevation (feet): 1144.41

Date Installed: 18-Jun-96

Screen Length (feet): 10

								т	ABLE A.1 (p	age 3 of 12)										
								ANALYTIC	CAL RESULT	S - GROUND	WATER									
							HOL	IDAY STATIO	ON #176 SITE	E, LADYSMIT	H, WISCONS	SIN								
									MW	-2R										
Date	7/15/99	9/24/99	1/24/07	3/5/08	5/12/09	1/26/11	7/19/11	10/19/12	9/3/14	12/3/14	3/31/15	6/24/15	3/11/16	6/2/16	9/15/16	12/1/16	4/17/17	7/27/17	NR 140 Rem Lim	nedial Action hits
Elevation (ft)		-	1115.05	1115.98	1115.21	1116.29	1118.08	1114.69	1118.09	1117.89	1116.63	1117 <u>.</u> 44	1117.78	1117.97	1118.39	1117.80	1116.95	1118.59		
ANALYTE					-														ES	PAL
Lead (ppb)		-	5.6		-								15	48			11	-	15	1.5
GRO (ppb)	130,000	97,000	-						I	-			-	I	-	-		-		
VOCs/PVOCs (ppb)																				
Benzene	14,000	17,000	610	7,300	7,840	7,290	3,700	10,000	5,000	900	1,000	1,100	610	950	1,500	480	920	980	5	0.5
Ethylbenzene	2,200	2,900	237	2,280	4,420	2,710	2,000	4,500	1,300	620	1,100	820	920	1,600	820	780	760	2,100	700	140
MTBE			< 52	< 62	504	< 150	< 23	< 4.8	630	430	< 12	450	1,100	2,000	250	170	240	1,500	60	12
Naphthalene			< 220		2,150	1,630	2,300	1,800	710	700	600	3,400	620	1,900	710	390	700	1,500	100	10
Toluene	28,000	29,000	1,780	19,000	22,000	17,200	12,000	25,000	7,800	4,800	6,100	4,800	3,700	4,400	5,300	3,300	4,300	6,600	800	160
1,2,4- & 1,3,5-TMB			1,440	2,460	14,200	4,220	11,000	9,100	2,280	2,910	3,340	7,800	3,360	8,300	3,690	3,170	2,680	6,300	480	96
Total Xylenes	12,400	15,800	4,560	12,200	31,160	15,250	24,000	27,000	9,800	9,700	12,000	18,000	10,000	17,000	13,000	9,300	10,000	19,000	2,000	400

---- = not analyzed or no standard MTBE = methyl-tert-butylether

TMB = trimethylbenzene

4 inch diameter well

Well Depth (feet): 34.5

TOC Elevation (feet): 1144.09

Date Installed: 13-Jul-99

Screen Length (feet): 10

Bold italic numbers indicate concentrations above the ES outlined in NR 140.10.

Bold numbers indicate concentrations above the PAL outlined in NR 140.10.

															TAE	BLE A.1 (p	age 10 of	12)																
														A	NALYTICA	L RESULT	'S - GROU	NDWATER	R															
														HOLIDA	STATION	#176 SIT	E, LADYSI	NITH, WIS	CONSIN															
																M	N-9																	
Date	11/25/97	5/21/98	7/15/99	9/23/99	11/17/99	2/22/00	6/23/00	12/9/00	4/9/01	7/30/01	7/18/05	1/26/06	7/25/06	1/24/07	6/4/07	9/4/07	12/10/07	3/5/08	5/12/09	1/26/11	7/19/11	10/19/12	9/3/14	12/3/14	3/30/15	6/24/15	3/11/16	6/2/16	9/15/16	12/1/16	4/17/17	7/27/17	NR 140 Ren Lin	iedial Action its
Elevation (ft)	1116.36	1116.55	1116.01	1116.48	1116.03	1115.22	1115.71	1115.88	1115.68	1117.51	1116.08	1116.10	1116.05	1116.34	1115.64	1115.70	1116.48	1115.69	1115.70	1116.56	1117.23	1115.78	1117.56	1116.98	1117.28	1117.08	1116.76	1117.42	1117.61	1116.87	1116.49	1117.57		
ANALYTE																																	ES	PAL
Lead (ppb)		-											< 0.7	< 0.7													7.5	6.8			< 2.7		15	1.5
GRO (ppb)	2,900	9,500	11,000			20,000	59,000	12,000	18,000	5,300																								
VOCs/PVOCs (ppb)															•																			
Benzene	550	2,000	3,000	2,500	3,900	4,500	2,700	2,600	3,200	1,800	1,800	2,300	2,240	< 0.47	1,850	2,890	273	2,480	1,860	784	430	1,100	1,100	1,500	< 18	2,100	2,200	1,700	2,400	1,800	2,000	1,500	5	0.5
Ethylbenzene	81	570	460	350	680	890	1,200	570	780	260	620	570	510	< 0.38	630	680	86	690	819	208	120	300	470	700	760	1,300	1,500	780	1,100	1,200	1,800	1,200	700	140
МТВЕ						110	1,300	< 10	< 50	< 50	< 2.8	< 1.1	< 5.2	< 0.52	< 26.5	< 26.5	< 53	< 31	41.7	12.1	< 0.23	76	98	230	< 12	< 0.24	< 2.4	320	370	27	550	240	60	12
Naphthalene											110	100	89	< 2.2					163	47.4	26	59	130	180	510	< 2400	390	250	240	260	520	360	100	10
Toluene	480	1,900	2,600	1,400	3,900	5,700	3,100	2,500	4,600	490	2,600	2,690	3,300	< 0.59	2,370	2,520	< 26	2,780	3,420	47.6	100	970	1,600	4,200	66	8,500	10,000	6,200	7,100	6,600	10,000	8,100	800	160
1,2,4- & 1,3,5-TMB						770	7,500	394	710	212	470	445	468	< 1.59	576	575	74	686	733	165.5	104	208	344	519	3,000	1,000	1,170	810	870	980	1,330	1,160	480	96
Total Xylenes	400	1,380	1,580	900	2,020	3,430	7,220	1,920	2,950	704	2,000	2,040	2,300	< 1.42	2,150	2,290	163	2,550	3, 393	363.5	330	1,100	1,600	3,000	3,200	6,500	7,500	4,200	5,800	5,900	9,000	7,000	2,000	400

---- = not analyzed or no standard MTBE = methyl-tert-butylether

Well Depth (feet): 53.5

1145.38

Bold italic numbers indicate concentrations above the ES outlined in NR 140.10.

TMB = trimethylbenzene

Bold numbers indicate concentrations above the PAL outlined in NR 140.10.

Date Installed: 27-Oct-97

Screen Length (feet): 5

TOC Elevation (feet):

A.7.e. Soil Vacuum Extraction Data - HOLIDAY STORE #176 SVE Pilot Test Monitoring AET Project No. 03-04495

SVE CONTAMINANT MASS REMOVAL

					SVE ei	mission rate - ι	ıg/sec				
Date	2/12/2013	02/13/13	2/14/2013	2/19/2013	2/25/2013	3/7/2013	4/8/2013	5/6/2013	6/10/2013	7/1/2013	8/1/2013
Total PVOCs	3 175	5 058	/ 1/0	5 825	6 446	5 383	A 126	5 587	907	702	654
THC as gasoline	5,175	5,050	7,170	109,538	130,953	103,307	66,057	54,683	13,158	10,482	12,939
SVE Stack Flow Rate (SCFM)	136	151	138	131	165	154	177	156	173	172	166
Period	2/12-2/13	2/13-2/14	2/14-2/19	2/19-2/25	2/25-3/7	3/7-4/8	4/8-5/6	5/6-6/10	6/10-7/1	7/1-8/1	
Days	1	1	5	6	12	31	28	34	21	30	
Average PVOC emission rate (ug/sec) per period	4,116	4,599	4,983	6,136	5,915	4,754	4,856	3,247	850	723	
Average TH as gasoline emission rate (ug/sec) per period	0	0	0	120,245	117,130	84,682	60,370	33,920	11,820	11,711	
							· · ·	· · · ·			Total
PVOC mass removed (lbs) per period	0.78	0.87	4.74	7.00	13.49	28.01	25.85	20.98	3.39	4.12	109
TH as gasoline mass removed (lbs) per period	0.00	0.00	0.00	137.14	267.17	498.99	321.30	219.22	47.18	66.78	1,558
Gallons of TH as Gasoline removed											
per period ¹	0.00	0.00	0.00	22.58	43.99	82.17	52.91	36.10	7.77	11.00	257

1 - based on THC as gasoline density of: 6.073 lbs/gals

Calculations Methods

Emission rate (ug/sec) = emission concentration $(ug/m^3) \times (0.3049 m/ft)^3 \times stack flow rate (SCFM) / 60 (sec/min).$ Mass removed (lbs) = emission rate (ug/sec) x period (days) x 864,000 (sec/day) x 0.000000001 (kg/ug) x 2.2 (lbs/kg). Gallons removed = mass removed (lbs) / density (lbs/gal).



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APPENDIX D

LDRM Modeling Presentation

Slide 1 Pre-Assessment 2006 LNAPL Distribution (one of three adjacent sites)

- 7-Well Extraction System
- Compressed Air Pumps
- Operated 2003-07
- Extracted Diesel and Gasoline
- 7K gals. LNAPL reportedly removed
- Relative water proportion uncertain (IMO)
- \$670K reimbursed (PECFA)
- MWs contain 2-4 ft. LNAPL post-remedy



LNAPL Assessments conducted during 2011-12 on all three adjacent corner PECFA sites

- Significant LNAPL volumes remained on-site (3) and beneath the ROW.
- No modern assessments attempted.
- Active treatments (2) had effectively ended 4-5 years earlier.
- Remaining product was obviously "potent" (relatively unweathered)
- Coordinated groundwater sampling showed a significant dissolved plume, including heavily impacted piezometers

-15.0-

-20.0

-25.0-

-30.0

10% RE

Laser Induced Fluorescence (LIF) Survey Logs

(geophysical tools needing interpretation)



Lessons Learned

LIF Survey Log results need to be *interpreted and integrated*:

- They cost >>\$
- Fluorescence results provide thickness maps independent of wells. They also distinguish between products.
- Conductivity results provide detailed smear zone geology.
- Integrated results show LNAPL distributions that are far more detailed than any prior effort using boring log data.

Additional Hint:

Well LNAPL thicknesses should be measured the same day/start of survey. LNAPL plume expression may not be obvious on LIF logs (e.g. LNAPL below water table, vadose zone contamination, plume changes over short distances, etc.).



Lessons Learned

LIF results can show disconnect between true LNAPL plume thickness/distribution and that suggested by well data.

Well data is subject to artifacts related to vertical LNAPL movement (i.e., drainage and imbibition effects in the near wellbore environment).











Lessons Learned

LIF survey-based distribution maps allow:

- Improved means to estimate in-place volumes and mobility estimates (i.e., better LNAPL h).
- Ability to focus LNAPL remedial efforts (location).
- Determine if LNAPL volumes are present below the water table.

LNAPL Assessment Reports -

Data Integration Is Necessary for Meaningful Assessments



LDRM: LNAPL Distribution and Recovery Model (API) HC: aquifer hydraulic conductivity VG: vertical gradient





Baildown Results EX-1



Slide 15

Lessons Learned

LNAPL Baildown Tests:

- As conducted, difficult to obtain accurate raw data five of six were problematic, based on inspection alone (i.e., inaccurate LNAPL/water interface measurements).
- Analyses provided relative mobility (T_n) results. Allowed comparisons between wells, but data accuracy severely limited use as a LDRM model calibration tool.
- Sufficient LNAPL must be present (> 1 foot) analysis assumes only LNAPL removed.
- Baildown analysis tool provides three T_n estimates and their associated statistical qualifications.
- Consideration needed for field techniques to improve data quality.
- Consideration needed for temporal effects on T_n.



API van Genuchten-Burdine Model of LNAPL Distribution and Realtive Permeability (Single Layer)¹

	t (yr)	Rc (ft)
Skimmer well: Q _w = 0	2	20
Vertical Gradient (site)	-0.05	/
HC groundwater (ft/d) (site)	1.42	

Aquifer Hydraulics

Ri (ft)

20

LNAPL Fluid Properties

		icicu			
Fluid Parametes		gas	site gas	site diesel	
LNAPL density (gm/cc)	ρο	0.73	0.754	0.79	١,
LNAPL viscosity at 60°F (cP	μ	0.62	0.6	1.1	``
air water tension (dunce (and		C.F.	F7 9	50.2	,
air-water tension (dynes/cm)	0 _{aw}	65	57.8	59.5	
air-oil tension (dynes/cm)	σ _{aw}	21	21.3	24.3	
oil-water tension (dynes/cm)		50	15.1	- 15	

Individual, Site-Specific Model Run (Inputs)

Slide 17

Geologic Subareas

							Site - Smear Z	Zone (gasoline)			BWT (g	(asoline)	Site -	Smear & BWT (diesel)	
	Dupde D Dhaco Soil	and			Burc	line1	V		Mu	ualem	Bur	dine		Mualem		
	Saturation Para	mete	Ideal Sand	Ideal Sand w/site fluids,grad,h	>50% RE SW/GW	>50% RE SW/GW	10-50% SW/GW	10-50% 5W/GW/SM	10-50% SM	10-50% SM	10-50% SW/GW - BW1	10-50% SW/GW - BWT	5M	SM	SM	
	ENAPL h		3	1.5	1.25	0.5	0.5	0.5	1	0.5	2	0.75	4	2	1	
	vertical gradient		0	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	
	porosity	n	0.43	0.43	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
	aquifer conductivity (ft/d)	K _w	23	23	23	23	23	11	1.4	1.4	23	23	1.4	1.4	1.4	
	van Genuchten "N"	N	2.68	2.68	2.68	2.68	2.68	2.28	1.5	1.5	2.68	2.68	1.5	1.5	1.5	
	van Genuchten "α"	α	4.4	4.4	4.4	4.4	4.4	3.8	1.4	1.4	4.4	4.4	1.4	1.4	1.4	
	irreducible water saturation	S _{wr}	0.1	0.1	0.1	0.1	0.15	0.25	0.3	0.3	0.15	0.15	0.3	0.3	0.3	
-	LNAPL Residual Saturation (f-Factor) ¹		0.18	0.18	0.20	0.20	0.50	0.55	0.6	0.6	0.5	0.5	0.6	0.6	0.6	
	1	- · · ·														
	Recovery Model Results.					-										
	in-place specific volume (ft)		0.55	0.33	0.24	0.07	0.06	0.03	0.09	0.03	0.52	0.13	0.67	0.24	0.07	
	recovery efficiency		78%	71%	67%	34%	35%	11%	20%	11%	49%	44%	31%	21%	5 12%	
	relative mobility ³ (reduction from ideal sd.)		-9%	-14%	-56%	-55%	-86%	-74%	-86%	-37%	-44%	-60%	-73%	-85%	
	Initial T(ft²/d)		15.5	9.2	6.5	5.8	0.9	0.8	0.33		18.5	2.7	1.7	0.55	6 0.14	
	T(ft²/d) - 1yr		3.5	2.5	1.3	0.5	0.18	0.18	0.08		7.0	0.7	0.7	0.18	3 0.04	
	Initial Sn		0.65	0.65	0.6	0.35	0.42	0.2	0.25	0.15	0.7	0.55	0.5	0.35	0.25	

Model Outputs (next slide)

LDRM Model Outputs for Gasoline Smear Zone – Various Sub-Areas

Model Type **Burdine** Mualem **Geologic Subarea** Ideal w/site >50% RE Ideal Sand >50% RE 10-50% 10-50% w/uw fluids fluids,grad,h SW/GW SW/GW SW/GW SW/GW/SM 10-50% SM 0.5 3 1.5 1.25 0.5 0.5 1 LNAPL h

Site - Smear Zone (gasoline)

<u>Recovery model Results</u> :							
in-place specific volume (ft)	0.55	0.33	0.24	0.07	0.06	0.03	0.09
recovery efficiency	78%	71%	67%	34%	35%	11%	20%
relative mobility (reduced f/ideal)	-	-9%	-14%	-56%	-55%	-86%	-74%
Trans./LNAPL Sat. Results:							
Initial Tn (ft²/d)	15.5	9.2	6.5	5.8	0.9	0.8	0.33
Tn (ft²/d) - 1yr	3.5	2.5	1.3	0.5	0.18	0.18	0.08
Initial S _n	0.65	0.65	0.6	0.35	0.42	0.2	0.25

Recovery Efficiency can not be used in an <u>absolute</u> sense!

- No real world effects: radial drainage, anisotropy, relative permeability, vertical equilibrium, BWT access, etc.
- At a *minimum* needs pilot testing calibration, but still not real in terms of time (medium and long-term recovery)

Recovery Efficiency Relative mobility (reduced f/ideal)

	-9%	-14%	-56%	-55%	-86%	-74%
78%	71%	67%	34%	35%	11%	20%

Hence, <u>relative</u> mobility measure

- a comparison metric.

S										
In-Place LNAPL Vo	Relative Mobility	LNAPL (gal.)								
	LNAPL In-Place Volume – Gasoline Related									
Total Estimated On-Site	Vadose	NA	300							
In-Place LNAPL:	Smear Zone >50% RE	-14% to -56%	1,600							
28,000 gallons	Smear Zone 10-50% RE	-55% to -86%	1,400							
	Below Water Table (BWT)	-37% to -44%*	3,200							
	LNAPL In-Place Volume – Diesel Related									
	Vadose	NA	2,500							
	Smear Zone	-60% to -85%	10,200							
	BWT	-60 to -85%*	9,100							
	* BWT relative mobility values only applicable at exceedingly low water levels (i.e., smear zone much deeper than 26' bgs.)									

Gasoline Related Smear Zone extents beneath ROW and likely reflects 2-5X or more volume in-place (i.e., 6-15K additional gallons in place)
Slide 21

Lessons Learned

We <u>can</u> integrate a wide range of site-specific, LNAPLrelated data to provide estimates of in-place LNAPL volumes (i.e., modeled specific volume factors).

We <u>can</u> use relative mobility results (from above integration/modeling) together with the in-place estimates to drive LNAPL remedial strategies.

Consideration is needed regarding dual phase flow parameters for gravel dominated soils (heterogeneous and homogeneous).

APPENDIX E

UVOST Log – Boring A





APPENDIX F

Ground Water Sampling Graphs from MW-1, MW-5, PZ-100







APPENDIX G

SVE Performance Charts & LNAPL Thickness Charts

DOUGS SVE WELLS

M-1 (install	ed June 11, 2	015)								
Surface Eleva	tion (approx)			1145						
Top of Casing	g Elevation (sur	veyed)		1144.89	1144.89					
Top of screer	n elevation			1130						
Bottom of Sc	reen Elevation			1115						
Meas. Date	DTP(ft)	DTW(ft)	PT (ft) (IP)	PT(inch)(bailer)	TOF Elev (ft)	GW Elev (ft)				
10/26/2015	NM	NM		NM						
7/30/2016	21.84	23.3	1.46	9	1123.05	1121.59				
11/3/2016	NM	NM		14						
4/8/2017	22.65	23.7	1.05	6	1122.24	1121.19				
6/14/2017	20.63	22	1.37	8	1124.26	1122.89				
9/27/2017	22.82	23.78	0.96	2	1122.07	1121.11				
12/20/2017	23.12	24.18	1.06	NM	1121.77	1120.71				
3/21/2018	24.21	24.8	0.59	1	1120.68	1120.09				
6/6/2018	23.7	24.7	1	0.25	1121.19	1120.19				
9/27/2018	23.31	24	0.69	1.5	1121.58	1120.89				
12/20/2018	23.54	24.15	0.61	1	1121.35	1120.74				
5/14/2019	22.51	22.55	0.04	0	1122.38	1122.34				
10/7/2019	21.46	21.53	0.07	0	1123.43	1123.36				
11/9/2019	21.1	21.25	0.15	0	1123.79	1123.64				



EX-2 (instal	led 1/19/199	2)				
Surface Eleva	ation (approx)			1144.25		
Top of Casin	g Elevation (sur	veyed)		1144.08		
Top of scree	n elevation			1128		
Bottom of Sc	reen Elevation			1113		
Meas. Date	DTP(ft)	DTW(ft)	PT (ft) (IP)	PT(inch)(bailer)	TOF Elev (ft)	GW Elev (ft)
10/26/2015	NM	NM		NM		
7/30/2016	21.1	21.5	0.4	2	1122.98	1122.58
11/3/2016	NM	NM		0		
4/8/2017	21.85	22.3	0.45	1	1122.23	1121.78
6/14/2017	19.44	19.6	0.16	0.5	1124.64	1124.48
9/27/2017	21.92	22.09	0.17	0.25	1122.16	1121.99
12/20/2017	INACCESSIBLE	- FROZEN				
3/21/2018	22.93	24.4	1.47	14	1121.15	1119.68
6/6/2018	22.77	23.6	0.83	0.15	1121.31	1120.48
9/27/2018	22.5	22.55	0.05	0	1121.58	1121.53
12/20/2018	frozen					
5/14/2019	NOT MEASUR	ED				
10/7/2019	car					
11/9/2019	NOT MEASUR	ED				



EX-4 (insta	lled 11/2/200)2)								
Surface Eleva	ation (approx)			1145						
Top of Casing	g Elevation (sur	veyed)		1144.89						
Top of screer	n elevation			1131						
Bottom of Sc	reen Elevation			1111						
Meas. Date	DTP(ft)	DTW(ft)	PT (ft) (IP)	PT(inch)(bailer)	TOF Elev (ft)	GW Elev (ft)				
10/26/2015	NM	NM		NM						
7/30/2016	21.25	23	1.75	17	1123.64	1121.89				
11/3/2016	NM	NM		12						
4/8/2017	22.48	24.6	2.12	24	1122.41	1120.29				
6/14/2017	20.93	21.2	0.27	0.5	1123.96	1123.69				
9/27/2017	22.18	26.6	4.42	>36	1122.71	1118.29				
12/20/2017	22.89	25.45	2.56	NM	1122	1119.44				
3/21/2018	water flooding	g well area								
6/6/2018	23.51	25	1.49	2	1121.38	1119.89				
9/27/2018	23.23	24.7	1.47	1	1121.66	1120.19				
12/20/2018	water flooding	g well area								
5/14/2019	22.56	22.6	0.04	0	1122.33	1122.29				
10/7/2019	21.46	21.53	0.07	0	1123.43	1123.36				
11/9/2019	20.93	20.98	0.05	0	1123.96	1123.91				



EX-5 (install	ed 11/2/199	2)								
Surface Eleva	ation (approx)			1145						
Top of Casing	g Elevation (sur	veyed)		1144.77						
Top of screer	n elevation			1130						
Bottom of Sc	reen Elevation			1110						
Meas. Date	DTP(ft)	DTW(ft)	PT (ft) (IP)	PT(inch)(bailer)	TOF Elev (ft)	GW Elev (ft)				
10/26/2015	NM	NM		NM						
7/30/2016	21.75	24.05	2.3	7	1123.02	1120.72				
11/3/2016	NM	NM		12						
4/8/2017	22.52	23.9	1.38	8	1122.25	1120.87				
6/14/2017	20.55	21.7	1.15	6	1124.22	1123.07				
9/27/2017	22.8	23.5	0.7	1.5	1121.97	1121.27				
12/20/2017	inaccessible -	frozen								
3/21/2018	24.08	25.3	1.22	1	1120.69	1119.47				
6/6/2018	23.68	23.73	0.05	0	1121.09	1121.04				
9/27/2018	23.3	23.34	0.04	0	1121.47	1121.43				
12/20/2018	2018 23.45 23.75		0.3	0.5	1121.32	1121.02				
5/14/2019	22.4	22.45	0.05	0	1122.37	1122.32				
10/7/2019	21.35	22.21	0.86	2	1123.42	1122.56				
11/9/2019	20.93	21.5	0.57	1	1123.84	1123.27				



DTP - depth to product (interface probe)

DTW - depth to water (interface probe)

PT (IP) - product thickness using interface probe (IP) (feet)

NOTE: Interface probe (IP) measurements result in "False Positive" of 0.04 ft. Therefore, PT less than 0.04 will still measure 0.04 ft.

PT (bailer) - product thickness measured visually with bailer (inches)

TOF - top of fluid elevation (LNAPL and/or GW)

GW - ground water elevation using interface probe





SVE System - Dougs/Autostop





Table A.7.b: SVE Operation DataAutostop/Dougs SVE System

	Sample	Lab Result	Hour Meter	Hours Operation During	Discharge Flow Rate	Emission Rate	Emission Rate	Cumulative Ma (before	ss Removed (lbs) oxidizer)	(X = 0 Flow	Vents (X = Open, Blank = Closed, F = Frozen/No Flow) (Not recorded until October 2016)								VFD (%)
Sample Date	e Parameters (ug/m3)		Reporting Period	(SCFM)	(ug/sec)	(lbs/hr)	Benzene	Gasoline*	R1 R	2 R3	3 R	:4 R	5 E2	2 E4	E5	M1			
10/26/2015	Benzene	1,100,000	4	4	160	83,072	0.66	2.63											
	Gasoline*	43,000,000				3,247,360	25.72		102.88						_				
10/27/2015	Benzene	650,000	12.55	8.55	160	49,088	0.39	5.96						_	_				
	Gasoline*	34,000,000				2,567,680	20.34		276.75					_	_				
10/28/2015	Benzene	43,000	24.23	11.68	160	3,247	0.03	6.26	470.24				+	—	+-				
11/5/2015	Gasoline*	29,000,000	220.62	211.22	10.5	2,190,080	17.35		479.34				+	+	+-				
11/6/2015	Benzene Caralina*	360,000	238.62	214.39	125	21,240	0.17	42.32	2592.12		_	_	+	+	+	$\left \right $			
11/16/2015	Gasoline*	21,000,000	401.5	242.00	125	1,239,000	9.81	77.07	2585.15		_	_		_	_				
11/16/2015	Benzene Gasoline*	290,000	481.5	242.88	135	18,479	0.15	//.8/	5024.59		_	-		—	—				
11/18/2015	Dasonne	20,000,000	525.22	42.92	144	1,274,400	0.11	92.59	5054.58		_	-		—	—				
11/18/2013	Gasoline*	200,000	525.52	45.82	144	747.648	5.92	82.38	5294.05		-	+	+	+-	+				
12/17/2015	Benzene	220,000	1222.7	697.38	135	14 018	0.11	160.01	5294.05		_		+	+-	+				
12/17/2015	Gasoline*	12 000 000	1222.7	097.58	155	764 640	6.06	100.01	9517 35			+							
1/4/2016	Benzene	290,000	15377	315	170	23 270	0.00	218.06	7517.55		_		+	+	+				
1/4/2010	Gasoline*	15 000 000	1557.7	515	170	1 203 600	9.53	210.00	12520.09			+		+	+				
1/22/2016	Benzene	76.000	1925.3	387.6	138	4 950	0.04	233.26	12520.09			+							
1/22/2010	Gasoline*	4 700 000	1725.5	567.0	150	306 139	2 42	255.20	13459.87			+		+	-				
2/15/2016	Benzene	340,000	2499	573 7	125	20.060	0.16	324.41	15 15 7.67			+		+	+	$\left \right $			
2/13/2010	Gasoline*	23,000,000	2499	575.7	125	1 357 000	10.75	524.41	19625.68		-	+							
	Oxidizer Offgas	Treatment R	emoved 2/29	/16 - Replace	d with 25 ft s	tack		Cumulative Disc (begin at ze	harge (untreated) ro - March 1)										
		-			-	-		Benzene	Gasoline*				\perp						
3/29/2016	Benzene	420,000	3529	1030	90	17,842	0.14	146					\perp	\perp	—				
	Gasoline*	8,800,000				373,824	2.96		3050				\perp	_					
4/20/2016	Benzene	120,000	4055	526	110	6,230	0.05	171						_					
	Gasoline*	10,000,000				519,200	4.11		5212					_					
5/23/2016	Benzene	99,000	4765.8	710.8	65	3,037	0.02	189			_	_	+	—	—				
	Gasoline*	7,300,000				223,964	1.77		6473		_	_	+	—	—				
6/30/2016	Benzene	71,000	5675.1	909.3	44	1,475	0.01	199	7.5.50		_	_	_	—	—				
	Gasoline*	7,200,000				149,530	1.18		/550		_	_		_	_				
8/1/2016	Benzene	150,000	6181	505.9	50	3,540	0.03	213	0074		_	+	+	+	+				
0/26/2015	Gasoline"	14,000,000	7521	12.40	54	330,400	2.62	251	88/4		+	+	+	+	+				
9/26/2016	Geogline*	140,000	7521	1340	54	3,568	0.03	251	14012		+	+	+	+	+	$\left \right $			
10/10/2016	Gasoline*	19,000,000		201	<i>co</i>	484,272	3.84		14013				+	_					
10/12/2016	Benzene Caralina*	46,000	7907	386	60	1,303	0.01	255	14629			-	$+^{x}$	└──	+	$\left \right $	Х		
11/2/2016	Gasoline*	/,100,000	0.125		120	201,072	1.39	200	14628				_	—					100
11/3/2016	Benzene	140,000	8435	528	120	7,930	0.06	288	17470	>			_	—		X	Х	32	100
10/01/2015	Gasoline*	12,000,000	0200	0.7.7		0/9,680	5.38	200	1/4/0			-	+	+	+			20	
12/21/2016	Benzene	130,000	9290	855	50	3,068	0.02	309	10700	>		_	_	—		X	X	20	50
1/10/2015	Gasoline*	14,000,000	0.500	200		330,400	2.62		19/08		+		+	+	+			6	
1/19/2017	Benzene	210,000	9580	290	50	4,956	0.04	321	20692			-	+	+	+x	X	Х	8	60
2/0/2015	Gasoline*	18,000,000	00000	410	6.0	424,800	3.36		20683	-	-	-	+	+	+				(2)
2/9/2017	Benzene Caralina*	100,000	9999	419	90	4,248	0.03	335	21080			-	+	+	+x	X	X	25	60
2/0/2017	Dasoline*	9,200,000	10642	(11	00	390,810	5.10	255	21980		+.	-	+	+	+	37	v	26	70
3/8/2017	Benzene Caralina*	95,000	10643	644	90	4,036	0.03	355	22562			· _	+	+	+x	X	X	26	70
4/0/2017	Dasoline*	/,500,000	11207	744	0.0	510,104	2.40	250	23302		+.	-	+	+	+	$\left \right $		22	70
4/8/2017	Geogline*	16,000	1138/	/44	80	604	0.00	359	24074			-	+	+	$+^{x}$	$\left \right $		35	/0
	Gasoline*	2,500,000				00,848	0.09		24074			1							

Table A.7.b: SVE Operation DataAutostop/Dougs SVE System

	Sample	Lab Result	Hour Meter	Hours Operation During	Discharge Flow Rate	Emission Rate	Emission Rate	Cumulative Ma (before	ss Removed (lbs) oxidizer)	(X F	Vents (X = Open, Blank = Closed, F = Frozen/No Flow) (Not recorded until October 2016)							Vacuum (in H2O)	VFD (%)	
Sample Date	Parameters	(ug/m3)		Reporting Period	(SCFM)	(ug/sec)	(lbs/hr)	Benzene	Gasoline*	R1	R2	R3	R4	R5	E2	E4	E5	M1		
5/15/2017	Benzene	230,000	12274	887	90	9,770	0.08	427			Х	Х			Х	Х	Х	Х	30	70
	Gasoline*	5,700,000				242,136	1.92		25775	┞										
6/14/2017	Benzene	32,000	12994	720	110	1,661	0.01	437	27127			X				X	X	X	25	80
7/11/2017	Basoline	4,600,000	12(20	(2)	110	238,832	1.89	514	2/15/	–					v	v	v	v	20	00
//11/2017	Gasoline*	500,000	13620	626	110	15,576	0.12	514	28810						A	Λ	A	<u> </u>	30	90
8/9/2017	Banzana	220,000	1/310	600	125	12 980	0.10	586	20010	-		v			v	v	v	v	38	100
0/9/2017	Gasoline*	4 900 000	14319	099	123	289 100	2.29	580	30410			л			л	Λ		-	30	100
9/12/2017	Benzene	270.000	15135	816	130	16 567	0.13	693		—	x	x		x	x	x	x	x	22	90
9/12/2017	Gasoline*	7 100 000	15155	010	150	435 656	3.45	075	33226		Λ	A				Λ		-	22	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	Shut system down to measure	.,				,				1-										
9/22/2017	GW/LNAPL		15366	231																
9/27/2017	Restart system		15366	0				693	33226											
10/21/2017	Benzene	290,000	15940	574	120	16,426	0.13	768				Х		Х	Х	Х	X	X	NM	90
	Gasoline*	10,000,000				566,400	4.49		35801											
11/8/2017	Benzene	110,000	16369	429	100	5,192	0.04	785				Х		Х	Х	Х		Х	20	70
	Gasoline*	2,600,000				122,720	0.97		36218											
12/8/2017	Benzene	53,000	17090	721	120	3,002	0.02	802			Х	Х		Х	Х	Х	Х	Х	18	80
	Gasoline*	7,600,000				430,464	3.41		38676											
1/12/2018	Benzene	32,000	17594	504	140	2,115	0.02	811		X	Х	Х		X	X	Х	X	X	25	100
1/21/2010	Gasoline*	3,500,000	15001	200		231,280	1.83		39599						-	-	-	-		
1/24/2018	Benzene	5,000	17884	290	90	212	0.00	811	20640	X	X	F		X	F	F	F	F	32	70
2/0/2018	Gasoline*	420,000	19264	290	80	17,842	0.14	012	39640	v	v	Г		v	Г	Г	E	F	22	70
2/9/2018	Gasoline*	12,000	18264	380	80	453	0.00	813	20833		А	г		A	r	Г	г	Г	32	/0
2/26/2018	Banzana	5,000	18640	376	90	212	0.00	813	59855	v	v	F		v	F	F	F	F	30	70
2/20/2018	Gasoline*	480,000	18040	570	90	20 390	0.00	615	39894		л	г			I.	r	ľ	-	50	70
3/3/2018	Benzene	10,000	18759	119	120	566	0.00	814	57071	x	x	x		x	x	x	x	x	25	80
5/5/2010	Gasoline*	1.700.000	10,00	119	120	96.288	0.76	011	39985	<u> </u>	- 11			- 11	1	1	1		25	00
3/14/2018	Benzene	90,000	19023	264	115	4,885	0.04	824			Х	Х			Х	Х	X	X	20	80
	Gasoline*	5,800,000				314,824	2.49		40643											
3/21/2018	Benzene	90,000	19192	169	115	4,885	0.04	831			Х	Х			Х	Х	X	X	18	90
	Gasoline*	5,800,000				314,824	2.49		41064											
4/12/2018	Benzene	5,000	19715	523	120	283	0.00	832							Х	X	X	Х	30	90
	Gasoline*	440,000				24,922	0.20		41168											
4/26/2018	Benzene	50,000	20048	333	130	3,068	0.02	840				Х			Х			Х	34	90
	Gasoline*	5,700,000				349,752	2.77		42090											
5/6/2018	Benzene	53,000	20287	239	115	2,877	0.02	845				Х			Х			Х	35	90
	Gasoline*	7,600,000				412,528	3.27		42871											
5/30/2018	Benzene	17,000	20868	581	135	1,083	0.01	850				Х			Х	Х	X	Х	28	100
	Gasoline*	2,700,000				172,044	1.36		43663	╟										
6/6/2018	Benzene	86,000	20868	0	90	3,653	0.03	850	12.52				-		-			Х	38	80
	Gasoline*	11,000,000				467,280	3.70	-	43663				<u> </u>		<u> </u>		Ļļ	_		
7/6/2018	Benzene	26,000	21584	716	90	1,104	0.01	857	44600				-		-			Х	42	80
0/0/2010	Gasoline*	4,300,000			100	182,664	1.45		44698	╟—							Ļļ			
8/2/2018	Benzene	33,000	22230	646	100	1,558	0.01	865	46606				-		-			X	43	80
0/10/2019	Dasoline*	7,900,000	22160	029	00	372,880	2.95	071	40000	∥—		-	-		-	\square	\vdash	v	46	00
9/10/2018	Benzene Gasolino*	20,000	23108	938	90	850	0.01	8/1	18405	⊪—			-	-	-		$\left \right $	X	46	80
	Gasoline	5,700,000				242,130	1.92		40403	111			1	1	1	1				

Table A.7.b: SVE Operation DataAutostop/Dougs SVE System

	Sample	Lab Result	Hour Meter	Hours Operation During	Discharge Flow Rate	Emission Rate	Emission Rate	Cumulative Ma (before	ss Removed (lbs) oxidizer)	Vents (X = Open, Blank = Closed, F = Frozen/No Flow) (Not recorded until October 2016)							Vacuum (in H2O)	VFD (%)	
Sample Date	Parameters ate	(ug/m3)		Reporting Period	(SCFM)	(ug/sec)	(lbs/hr)	Benzene	Gasoline*	R1	R2	R3	R4	R5	E2	E4 E	25 M1		
10/4/2018	Benzene	20,000	23502	334	90	850	0.01	873									X	49	80
	Gasoline*	4,100,000				174,168	1.38		48866										
11/2/2018	Benzene	5,000	24220	718	90	212	0.00	874									X	44	75
	Gasoline*	370,000				15,718	0.12		48955										
12/4/2018	Benzene	5,000	24968	748	80	189	0.00	875									X	48	80
	Gasoline*	30,000				1,133	0.01		48962										
5/15/2019	Benzene	110,000	24971	3	115	5,971	0.05	876				Х		Х			X	48	90
	Gasoline*	8,900,000				483,092	3.83		48973										
6/2/2019	Benzene	13,000	25352	381	90	552	0.00	877				Х		Х			X	48	90
	Gasoline*	2,100,000				89,208	0.71		49243										
6/17/2019	SYSTEM SHUT DOWN - VFD FAILED																		
7/29/2019	REPLACED VFD - SYSTEM RESTARTED																		
7/29/2019	Benzene	120,000	25708	356	90	5,098	0.04	892				Х		Х			X X	33	80
	Gasoline*	9,900,000				420,552	3.33		50428										
8/3/2019	Benzene	14,000	25828	120	115	760	0.01	892			Х	Х		Х	Х	X	X X	26	90
	Gasoline*	2,600,000				141,128	1.12		50562										
9/3/2019	Benzene	19,000	26571	743	65	583	0.00	896								X	X X	33	70
	Gasoline*	5,100,000				156,468	1.24		51483										
9/30/2019				Turn System	off for vapor int	rusion samplin	g, ground wate	er sampling, and LN	APL measurements										
11/8/2019						Re	start system												
11/8/2019	Benzene	5,000	27734	1163	105	248	0.00	898						Х		X	X X	24	70
	Gasoline*	1,600,000				79,296	0.63		52214										
12/6/2019	Benzene	5,000	28378	644	105	248	0.00	899						Х		X	X X	24	70
	Gasoline*	1,900,000				94,164	0.75		52694										
1/6/2020	Benzene	16,000	29025	647	100	755	0.01	903						Х		X	X X	24	70
	Gasoline*	2,400,000				113,280	0.90		53274										
1/6/2020						Shut	System OFF												
3/24/2020						Re	start system												
4/10/2020	Benzene	5,000	29431	406	110	260	0.00	904			Х	Х		Х		X	X X	20	80
	Gasoline*	1,000,000				51,920	0.41		53441										
5/2/2020	Benzene	50,000	29955	524	85	2,006	0.02	912			Ť	X	Ì	ĺ	Ī	XI	X X	28	72
	Gasoline*	980,000				39,318	0.31		53604										
5/30/2020	Benzene	16,000	30623	668	90	680	0.01	916			Х	X	Ì	X	Ī	X	X X	40	83
	Gasoline*	660,000				28,037	0.22		53753										
5/30/2020						Shut	System OFF												

5,000 Italics - concentration estimated as 1/2 of detection limit

Total Benzene (lbs) Total Gasoline (lbs) 1240 73378