2004/2005 Annual Monitored Natural Attenuation Report for The

Onalaska Municipal Landfill Site Onalaska, Wisconsin

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1.0 INTRODUCTION

This annual report for the Onalaska Municipal Landfill (Site) includes monitoring data from four quarterly sampling events (September 2004, December 2004, March 2005 and June 2005). The groundwater monitoring and reporting was completed in accordance with ENSR's proposal dated July 7, 2004. The monitoring schedule was developed by the Wisconsin Department of Natural Resources (WDNR) and was based upon the Monitored Natural Attenuation (MNA) Plan, dated December 4, 2001. Additonal activities at the Site include the limited operation and maintenance of the groundwater extraction system, including all physical structures, electrical systems, compressors, and related equipment to insure that the system remains functional in the event it is determined necessary to restart the system. A summary of operation and maintenance activities is provided in **Attachment A**.

The MNA Plan was prepared for Region 5 of the U.S. Environmental Protection Agency (USEPA) per Revision 1 of the Statement of Work dated July 30, 2001. The USEPA decided, at the recommendation of the WDNR, to temporarily discontinue active groundwater extraction and to evaluate natural attenuation of contaminants in the groundwater. The groundwater extraction system was shut down on November 26, 2001 and remains off during the MNA study. This report presents the purpose of MNA, background information on the Site, details on the MNA study, a summary of current contaminant concentrations and distribution, and a discussion of the effect natural attenuation has on controlling the spread of contaminants in groundwater.

1.1 Purpose

The MNA program was implemented in the fall of 2001 to replace the original groundwater monitoring program. The primary objectives of the MNA program are to assess:

- Whether there are meaningful trends of contaminant mass decreasing over time at appropriate monitoring points;
- Whether there are indicators of active natural attenuation at the site based on hydrogeological and geochemical data; and
- Whether natural attenuation is an acceptable modification to the remedy for the Site.

The extraction wells and treatment system have been placed on "stand by" and will remain off for the duration of the MNA study. The study is expected to continue through 2006, while the effectiveness of natural attenuation is further evaluated. If it is determined that natural attenuation will achieve the cleanup objectives, then MNA would be implemented, once approved, as a modification to the Record of Decision (ROD) remedy.

1.2 Background

1.2.1 Physical Background

The Site is approximately 10 miles north of the city of La Crosse, Wisconsin, near the confluence of the Mississippi and Black rivers. **Figure 1-1**, attached, illustrates the Site Location. Prior to 1969, the Site was mined as a sand and gravel quarry. Between 1969 and 1980, the site was used as a municipal and industrial waste landfill. Unconsolidated deposits at the site are 135 to 142 feet thick and consist primarily of sand and gravel. Beneath the unconsolidated deposits lies sandstone bedrock. The natural groundwater flow direction in the unconsolidated material (documented prior to groundwater extraction) is predominantly south-southwesterly toward the wetlands that border the Black River. During high river stages (i.e. spring), the groundwater flow direction is toward the south-southeast. Average groundwater flow velocity beneath the Site was estimated during the Remedial Investigation (RI) to range between 55 and 110 feet per year, with an estimated average of 70 feet per year.

1.2.2 Contaminant Background

Industrial, commercial, and municipal wastes are reportedly mixed throughout the landfill deposits. For a time, open burning occurred at the site. Until early 1971, when open burning was banned, industrial solvents were burned regularly, at apparently random locations throughout the landfill. Some refuse was also burned periodically. Open burning reportedly continued until as late as 1979, even though it was banned.

Previous Site investigations determined that liquid industrial wastes disposed of at the landfill consisted primarily of naphtha-based solvents used in a metal cleaning process, solvent wastes from paint spray gun cleaning, and machine shop cleaning fluids. At least two kinds of naphtha were disposed of at the site; high-flash naphtha and VM&P or Stoddard naphtha. These naphtha's were probably used in a paint cleaning process at one of the nearby plants and as general solvents.

In September 1982, the DNR sampled and analyzed water from Site monitoring wells and nearby private wells for compliance with drinking water standards for organic and inorganic constituents. The investigations indicated that groundwater contamination had occurred. The barium concentrations in the water from a residential well south of the Site exceeded the drinking water standard, and five organic compounds were detected above background levels.

On May 2, 1983, an EPA Potential Hazardous Waste Site inspection report was submitted. In September 1984, the Onalaska Landfill was placed on the National Priorities List.

The original groundwater monitoring program at the Site was implemented in 1995 and included collecting groundwater samples from monitoring wells, extraction wells, and nearby residential wells.

In addition to sampling, groundwater elevations were measured in monitoring wells, air injection wells (i.e. Bioventing wells), and piezometers. From March 1995, through December 1996, sampling was conducted quarterly. From 1997 to 2004, sampling was completed semiannually, from 2004 to 2005 sampling was completed quarterly. The wells included in the groundwater-monitoring program, as well as the parameters analyzed, have changed on several occasions since the groundwater monitoring program was implemented in 1995. The rationale for the changes prior to the MNA plan and previous groundwater monitoring results are documented in the Annual Groundwater Quality and Capture Reports. Each change was approved by the USEPA prior to being implemented.

Preliminary investigations conducted at the Site determined that contaminant concentrations in the groundwater at individual monitoring well locations exceeded one or more Federal or State standard or criteria. The Safe Drinking Water Act maximum contaminant levels (MCLs) for arsenic, barium, benzene, 1,1-dichloroethene (1,1 DCE), toluene, 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene, and xylenes were exceeded at one or more monitoring well locations. Concentrations of toluene were observed as high as 43,000 ug/L. Of the three chlorinated compounds initially analyzed for, 1,1,1-TCA was the most prevalent, and was found at concentrations as high as 730 ug/L. The majority of the VOCs detected were found in shallow monitoring wells (MW-5S and MW-3S and B4S) and consisted of benzene, toluene, ethylbenzene and xylenes (BTEX). The vertical extent of BTEX and chlorinated compounds contamination was found to be confined to the upper 10 to 20 feet of the aquifer. However, ethylbenzene,1,1-DCA and chloroethane were detected at depths up to 50 to 60 feet into the water table. The vertical extent of semi-volatile organic compounds (SVOCs) contamination was also mostly confined to the upper 10 to 20 feet of the aquifer. There were no SVOCs detected in any of the deep monitoring wells.

Monitoring wells along the southwestern edge of the landfill and southwest of the landfill most commonly exhibited inorganic chemicals above background. These wells were primarily shallow and medium wells that included MW-2S, MW-2M, MW-3S, MW-4S, MW-B4S, MW-5S, and MW-8S. Four chemicals (barium, iron, manganese, and sodium) were detected above background with greater frequency than the other inorganic chemicals

1.3 Cleanup And Criteria

The ROD, signed August 14, 1990, defines the selected remedy and addresses the goals of the remedial action. The selected action for the remedy includes the following remedial actions for groundwater:

- Extraction and treatment of the groundwater contaminant plume to meet Federal Safe Drinking Water Act (SDWA) drinking water standards and State of Wisconsin groundwater quality

standards;

- Periodic monitoring of the groundwater contaminant plume;
- Deed restrictions limiting surface and groundwater use at the Onalaska Municipal Landfill site; and
- Continued reliance on state institutional controls governing groundwater use within the proximity of landfills.

The groundwater extraction and treatment system is on stand-by while Natural Attenuation is being evaluated as a potential modification to the ROD. The groundwater extraction and treatment system consisted of five extraction wells capable of extracting approximately 750 gallons per minute, treating the groundwater and discharging the groundwater to the Black River under a Wisconsin Pollution Discharge Elimination System permit. Treatment of the groundwater was achieved by conveying the water to an air stripper to remove volatile contaminates followed by the addition of chemicals to precipitate our metals (e.g. iron and manganese) and to adjust the ph after metals removal.

Additional remedial actions are currently ongoing (e.g. Natural Attenuation Monitoring) or are in place (e.g. institutional controls).

Under the remedy selected in the ROD, the following cleanup standards were adopted:

- The contaminant plume located at any point beyond the property boundary or design management zone (DMZ) must meet the following criteria:
  - Preventive Action Limits (PALs) from Wisconsin Administrative Code Chapter NR 140;
- The groundwater contaminant plume located at the landfill waste boundary must meet the following criteria:
  - Maximum Contaminant Levels (MCLs) from the Safe Drinking Water Act, 40 CFR 141.61 and 40 CFR 143
  - Non-zero Maximum Contaminant Level Goals (MCLGs) from the Safe Drinking Water Act, 40 CFR 141.50

The DMZ defined for the Onalaska site extends 250 feet horizontally from the waste boundary as shown in **Figure 1-2**. The MCLs and nonzero MCLGs must be met at the landfill waste boundary and the more stringent Wisconsin standards (PALs) must be met at any point beyond the property boundary or the DMZ. The DMZ, as defined in NR 140, is a 3-dimensional boundary surrounding a regulated facility and extends from the ground surface through all saturated geological strata.

Specific cleanup standards (i.e., chemical-specific concentrations) were established in the ROD for 11 indicator chemicals (e.g. Chemicals of Concern).

The USEPA amended the ROD on October 10, 2000, by an Explanation of Significant Differences (ESD) to revise the cleanup standards for these chemicals to the latest NR 140 PALs and Enforcement Standards (ESs). The list of contaminants included in the MNA Plan consists of the original 11 indicator chemicals, other contaminants detected at concentrations above PALs during the Remedial Investigation, and contaminants identified above Wisconsin PALs since the groundwater monitoring program was implemented in 1995. This list and the applicable cleanup standards are presented in **Table 1-1**.

If it becomes apparent that it is not technically or economically feasible to achieve a PAL, then a Wisconsin Alternative Concentration Limit (WACL) may be established. Except where the background concentration of a compound exceeds the ES, the WACL established may not exceed the ES for that compound. A WACL is calculated using procedures defined by the WDNR.

If it becomes apparent that it is technically impracticable to achieve the groundwater cleanup standards, including potential WACLs, then USEPA in consultation with the WDNR may consider the use of alternate methods to control the groundwater contaminant plume or source to achieve the standards. If those alternate methods cannot attain groundwater cleanup standards, including potential WACLs, then a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waiver may be considered.

2.0 NATURAL ATTENUATION MONITORING PROGRAM

The MNA Plan was developed to address the first two lines of evidence as provided in "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (USEPA, 1999). The first two lines of evidence are:

- The demonstration of meaningful trends of decrease of contaminant mass over time at appropriate monitoring points; and
- The demonstration of active natural attenuation at the site with hydrogeological and geochemical data and the calculation of degradation rate processes.

As recommended in the USEPA document, the third line of evidence, field or bench scale studies, could be done in the future, but is only recommended for consideration if the first two lines of evidence are inconclusive.

2.1 Monitoring Well Network

Selected groundwater monitoring wells (MW's), piezometers (PZ's) , and air injection wells (AW's) are currently used to monitor groundwater during the natural attenuation study. The current monitoring schedule was developed by the WDNR but for the most part mimicked the MNA Plan.

All wells scheduled to be monitored, as identified in ENSR's July 7, 2005 proposal, were sampled. Four additional wells were monitored during the June 2005 sampling event. Four extraction wells (EW-2 through EW-5) were sampled at the request of the WDNR. **Table 2-1** summarizes the completed monitoring.

Select monitoring wells were sampled for the first MNA sampling event the week of October 29, 2001, to establish baseline conditions at the time the groundwater extraction system was shut down. The system was shut down prior to sampling and was restarted after sampling to use up the remaining treatment chemicals. The system then was put on standby on November 26, 2001 and remains on standby except for monthly "bumping of the system". Bumping of the system includes the operation of the extraction wells for several minutes and the collection and temporary storage of the extracted groundwater.

Groundwater level measurements were gauged from 23 monitoring wells during each quarterly sampling event. The wells that were gauged include the wells listed in **Table 2-1**.

2.2 Monitoring Rationale

Monitoring for this reporting period (September 2004 through June 2005) followed the sampling schedule as described in the MNA Plan, with modifications provided by the WDNR. In general, wells monitored quarterly included wells immediately downgradient of the landfill (e.g. inner ring wells) and four residential wells. The monitoring wells were selected to provide approximately equally spaced sampling locations downgradient of the landfill; and were selected so that they traverse the entire historical limits of the contaminated groundwater plume from the landfill. As a secondary consideration, wells were selected so that there is a sampling location near each idle extraction well. Additionally, MW-1SR (upgradient monitoring well) was sampled quarterly, in order to gather sufficient data for statistical evaluation of background groundwater characteristics.

Wells sampled semi annually included wells located toward the outer periphery (e.g. outer ring wells) of the estimated historical limits of contamination from the landfill. Groundwater data from the periphery wells will allow determination of whether natural attenuation processes are resulting in the decrease of contaminant mass when compared with results from the "inner ring wells". The primary emphasis will be the comparison of contaminant concentrations between inner ring wells and outer ring wells for evaluating the suitability of natural attenuation processes for the Site.

Monitoring, piezometer, and air injection wells are 2 inches in diameter, but the screen length and elevation relative to the water table vary between wells. The screen length on the monitoring wells and piezometers is 10-feet. The screen length on the air injection wells is 5-feet. Most of the screened intervals for the shallow monitoring points straddle the water table except for two of the piezometers and one monitoring well. Most of the screened intervals for the medium depth wells are positioned approximately 30 feet into the water table.

2.3 Monitoring Analytes

Analytes for the four sampling rounds included VOCs, metals, and natural attenuation parameters as listed in **Table 2-2**. Currently, at the request of the WDNR, results for 36 VOC are reported by the laboratory and include all of the relevant VOCs identified on **Table 2-2**. **Table 2-2** includes the parameters monitored, rationale for inclusion, and the respective Wisconsin groundwater PAL and ES criteria.

2.4 Sampling Methodology

Groundwater sampling methodology followed the guidelines presented in specific Site documents including the MNA Plan, the Quality Assurance Project Plan (QAPP) and addendums, the Sampling and Analyses Plan, and followed the WDNR Groundwater Sampling Desk Reference.

Prior to purging each monitoring point, the depth to groundwater in each monitoring point was gauged and recorded in the project field book and on sample collection data sheets.

Field parameters were measured using a flow-through cell (when possible) and were collected during the purging process. If using a flow cell was not possible, then field parameters were measured from purge water collected in a container. Purging techniques consisted of using either a dedicated Whaler pump and tubing, a peristaltic pump and disposable tubing, or a single use disposable bailer. The wells were purged until all parameters, including the more sensitive parameters of dissolved oxygen (DO) and oxidation reduction potential (ORP), stabilized to within 10 percent between two consecutive well volumes of purge water. At a minimum, three well volumes were purged from each monitoring point prior to the collection of groundwater samples. Data collected during the purging process, including specific conductivity, temperature, pH, DO and ORP, were recorded on the sample collection data sheets.

When pumps were used for purging and sampling the pump intake was positioned approximately half way down the submerged screened interval. The pump rate was reduced to a low level after purging in order to simulate low flow sampling.

The residential wells were sampled from an outside spigot after the well had run for approximately 15 minutes immediately prior to sampling. Generally, according to the residential well owners, the wells had been running intermittently throughout the day prior to sampling.

Groundwater samples were collected using the respective purging equipment and placed directly in laboratory-supplied containers. The samples were stored on ice in a cooler and sent overnight under chain-of-custody to Severn Trent Laboratories in Canton, Ohio.

3.0 NATURAL ATTENUATION MONITORING RESULTS

Groundwater samples were collected from 31 monitoring points comprised of six air-injection wells, four piezometers, 13 monitoring wells, four residential wells and four extraction wells. As discussed further below, the past years monitoring program has shown that three organic contaminants, trimethylbenzenes, benzene and methylene chloride, were detected above the ES established by the State of Wisconsin in one or more sampling points. Three metals, lead, manganese and iron, were detected above the ES in one or more sampling points. The following paragraphs discuss the results of the groundwater monitoring completed during the September 2004, December 2004, March 2005, and June 2005 monitoring events.

3.1 Groundwater Flow

Groundwater levels were gauged during the four monitoring events and groundwater elevation data are presented in **Table 3-1**. Coulee Region Land Surveyors of La Crosse, Wisconsin surveyed the top of casing elevations and locations of each monitoring point on April 22, 2003. Coulee Region Land Surveyors surveyed the new residential well (Pretasky) and MW-1SR on April 13, 2004. Groundwater elevation contours from the four quarterly monitoring events for the shallow and medium zones are shown on **Figures 3-1** through **Figure 3-8**, respectively. Groundwater elevations, gradients, and flow directions are discussed below.

No free product was detected in any of the monitoring wells gauged during this reporting period. No free product has been during any gauging events ENSR has conducted (e.g. since December 2002).

The inferred groundwater flow direction in the shallow groundwater at the Site is towards the southwest. The inferred direction of groundwater flow in the medium zone is also towards the southwest and south.

The hydraulic gradient in the shallow zone ranged from 0.0002 to 0.0004 feet/foot.

The hydraulic gradient in the medium zone ranged from was 0.0002 to 0.0004 feet/foot.

The groundwater flow at the site may be affected by the water level in the nearby Black River and the landfill. For example, during high river levels the groundwater flow is more southerly. During low river levels the groundwater flow is more directly towards the river (southwesterly).

3.2 Groundwater Quality

Monitoring for Natural Attenuation began in October 2001 (baseline natural attenuation monitoring

event). This baseline sampling event was completed immediately after the system was turned off. The system was reactivated (for approximately one month) after the baseline sampling event was completed to use up remaining process treatment chemicals.

Since the baseline sampling event, eight rounds of natural attenuation monitoring have been completed by ENSR. This report discusses the results from the four most recent groundwater sampling events (September 2004, December 2004, March 2005 and June 2005 monitoring events). Also included is a discussion on the general trends in groundwater quality since the October 2001 sampling event. The VOC and metals results from the last for monitoring events are summarized below and presented in **Table 3-2**. Table 3-2 also includes the historical groundwater results since the December 2002 monitoring event. The results for the natural attention parameters are discussed in Section 4.0. The complete analytical data packages for the sampling events are stored in ENSR's Minneapolis office.

3.3 Groundwater Monitoring Data

The following bullets summarize the results of the last four monitoirng events:

- No VOCs above the PAL were detected in the four residential wells monitored (Miller, Pretasky, Johnson and Ackerman) except methylene chloride was detected at a concentration of 0.58 ug/l in the Pretasky well. Other VOCs detected in the residential wells include chloromethane and toluene but at concentrations below the PAL. Concentrations of iron and manganese above the ES were detected in all four residential wells. Concentrations of arsenic exceeded the PAL in the Miller and Pretasky well. No other metals exceeded the PAL (except for the ES exceedences mentioned above).
- Of the 37 VOCs analyzed, 19 VOCs were detected. The following is a list of detected VOCs.

1,2,4-trimethylbenzene	naphthalene	1,1-dichloroethane
1,3,5-trimethylbenzene	toluene	cis-1,2-dichloroethene
acetone	benzene	2-butanone
methylene chloride	chlorobenzene	carbon disulfide
xylenes (total)	ethylbenzene	trichloroethene
chloromethane	bromomethane	4-methyl-2-pentanone
chloroethane		

- The most common VOC contaminants detected were the trimethylbenzenes (1,2,4 & 1,3,5), naphthalene and xylenes. The concentrations of trimethylbenzenes for four most recent sampling events are depicted on **Figures 3-9 through 3-12**, respectively. Concentrations of trimethylbenzenes and methylene chloride exceeded the ES in MW-4S and MW-5S. Naphthalene exceeded the ES in MW-5S. No other VOC exceeded the ES.
- The PAL was exceeded for trimethylbenzenes (AW-20, MW-4S, and MW-5S), benzene (MW-2S, and MW-8M), and naphthalene (MW-14S, MW-4S and MW-5S). Methylene chloride exceeded the PAL in 13 wells during the December 2005 sampling event. No methylene chloride was detected in any well during the other three monitoring events. No other VOC exceeded the PAL.
- Methylene chloride, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, toluene, 1,1-dichloroethane and acetone were detected in one or more of the trip blanks. Methylene chloride and acetone are common laboratory artifacts. The occurrence of VOC in the trip blanks is further discussed in Section 5 – Data Validation.
- All nine metals tested were detected in one or more of the samples collected. Barium, mercury, iron and manganese were the most prevalent metals detected. Concentrations of iron exceeded the ES in 24 monitoring wells, manganese exceeded the ES in 30 monitoring wells, and arsenic exceeded the ES in 10 monitoring wells. Concentrations of lead and cadmium exceeded the ES in AW-13. No other ES were exceeded for metals. The concentration of iron in the monitoring points for the June 2005 sampling event is illustrated on **Figure 3-13**.
- The PAL was exceeded for seven of the metals tested. The PAL for manganese was exceeded in 30 wells, the PAL for iron was exceeded in 26 wells, and the PAL for arsenic was exceeded in 16 wells. Concentrations of barium and lead exceeded the PAL in eight wells. Concentrations of cadmium (AW-13) and cobalt (AW-20 and MW-5S) exceeded the PAL. No other PALs for metals were exceeded.
- Four of the five extraction wells (EW-2 through EW-5) were monitored for VOCs and metals during the June 2005 sampling event at the request of the WDNR. The ES (and PAL) for arsenic, iron and manganese were exceeded in the four extraction wells. No other metals exceeded the ES were observed. Several VOCs were detected in EW-2, EW-3 and EW-4. The highest detected VOC was detected in EW-4 (86 ug/l of 1,2,4-trimethylbenzene). Other VOCs detected include acetone, carbon disulfide, naphthalene, benzene, xylenes, chlorobenzene and chloroethane.

Table 3-3 below, provides a comparison of groundwater quality over time from three wells. Wells MW-5S and MW-4S were selected to evaluate water quality immediately downgradient of the landfill. MW-5S and MW-4S have historically been two of the most impacted wells. MW-6S was selected as a well downgradient of the extraction system. All three of these monitoring wells were installed prior to activation of the groundwater extraction system.

Data from three different eras (pre-pumping, pumping and post pumping) are included in **Table 3-3**. The VOCs listed in the table were identified during the RI as the predominant organic compounds of concern.

4.0 NATURAL ATTENUATION EVALUATION

This section discusses the analytical results for the MNA parameters for the samples collected during the September 2004, December 2004, March 2005 and June 2005 monitoring events. Presented below is a discussion on the natural attenuation status at the Site. Future MNA data will be evaluated for trends in contaminants using a WDNR approved statistical model.

The results of the laboratory-analyzed and field-collected natural attenuation parameters from the four most recent sampling events are summarized below and contained in **Table 3-2**. The field-collected parameters reported in **Table 3-2** were obtained from the final purge volume.

Concentration isopleth contours, using data from the June 2005 sampling event were completed for oxidation/reduction potential (ORP) (**Figure 4-1**), dissolved oxygen (**Figure 4-2),** chloride **(Figure 4-3)** and sulfate **(Figure 4-4),** are discussed below.

The field-collected parameters included the following:

- Oxidation/Reduction Potential (ORP)
- Dissolved Oxygen (DO)
- Temperature
- pH
- Specific Conductance

The laboratory analyzed natural attenuation parameters included the following:

- Nitrate
- Total iron (also discussed in the previous section)
- Sulfate
- Chloride

The following is a summary of findings from the natural attenuation monitoring:

- ORP in the monitoring points ranged from -137.2 mV to 217 mV. An ORP value less than 50mV indicate reductive dechlorination can occur. Decreasing concentration of ORP in groundwater may indicate an increase in biological activity. ORP values measured during the June 2005 sampling round were significantly less than previous ORP in the majority of wells. ORP in the groundwater for the June 2005 sampling event are illustrated on **Figure 4-1**.

- DO in the monitoring points ranged from 0.18 mg/l to 11.92 mg/l. Generally, DO concentrations less than 1 mg/l indicate anaerobic conditions and concentrations greater than 1 mg/l indicate aerobic conditions. A majority of DO readings exhibited DO concentrations greater than 1 mg/l thus indicating groundwater in aerobic conditions. It appears that groundwater at most monitoring points was in aerobic conditions, except for the shallow groundwater encountered in the AW series of wells and several other wells which exhibited DO concentrations of less than 1 mg/l. The concentrations of DO in the groundwater for the June 2005 sampling event are illustrated in **Figure 4-2**.
- The pH, conductivity and temperature data were used to evaluate when stagnant water had been removed during the purging process.
- Chloride can be used as a measure of degradation and dechlorination of chlorinated volatile organic compounds. The chloride concentration ranged from 1.3 to 34.5 mg/l. The PAL for chloride is 125 mg/l. The concentrations of chloride in the groundwater for the June 2005 sampling event are illustrated on **Figure 4-3**. The highest chloride concentrations were found in the two wells located within the landfill (MW-2S and MW-2M).
- Nitrate can be used as a terminal electron acceptor when oxygen is depleted. The concentrations of nitrate ranged from below detection limits to 12.3 mg/l. The PAL for nitrate is 2 mg/l and was exceeded in AW-20, AW-25. The ES for nitrate is 10 mg/l and was exceeded in AW-25. No other nitrate exceedences were observed in the other wells. All other wells exhibited a nitrate concentration of 1.3 mg/l or less.
- Sulfate can be used as an electron acceptor once oxygen, nitrate, and iron have been reduced. The concentration of sulfate is expected to decrease with an increase in biological activity. The concentrations of sulfate in the groundwater for the June 2005 sampling event are illustrated on **Figure 4-4**. The highest concentrations of sulfate were detected in the upgradient well (MW-1SR) or wells outside the plume and were typically lower in wells with contaminants (petroleum and non-petroleum VOCs) present.

5.0 DATA VALIDATION

Full validation was performed on the data for seven groundwater samples and one trip blank for the site-specific volatile organic compounds (VOCs) by SW-846 method 8260B. Full validation was performed on the data for eight groundwater samples analyzed for all the following parameters.

- Selected total metals by SW-846 methods 6010B and 7470A
- Chloride by Methods for the Chemical Analysis of Water and Wastes (MCAWW) 300.0
- Nitrate by MCAWW 300.0, and
- Sulfate by MCAWW 300.0

The samples were collected at the Site on December 2 and 3, 2004 and submitted to Severn Trent Laboratory (STL) in North Canton, OH for analysis. STL processed and reported the samples under Lot # A4L040121.

The metals sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Validation of Inorganic Data", February 1994. Modification of the Functional Guidelines was done to accommodate the non-Contract Laboratory Program (CLP) methodologies. The VOC sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (2/99). Modification of the Functional Guidelines was done to accommodate the non-CLP methodologies.

In general, the data appear to be valid as reported and may be used for decision making purposes. See the discussion below for specific issues observed.

5.1 Metals Data Validation

Samples included in the metals data validation are listed below:

Sample IDs	Sample IDs
Pretasky	MW-5S
MW-4S	MW-5SDuplicate (field duplicate of MW-5S)
MW-4SDuplicate (field duplicate of MW-4S)	MW-1SR
AW-20	PZ-2

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with chain-of-custody (COC) requests
- Holding times/sample preservation
- Initial and continuing calibrations
- Laboratory blanks/equipment blanks/field blanks
- Inductively coupled plasma (ICP) interference check sample (ICS) results (metals only)
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Laboratory duplicate results
- Field duplicate results
- Laboratory control sample (LCS) results
- Serial dilution results (metals only)
- Sample quantitation/detection limit results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the COC. No discrepancies were noted.

Holding Times/Sample Preservation

The samples were analyzed within the method specified holding time for total metals, chloride, nitrite and sulfate with the following exceptions:

- Samples PZ-2, MW-4S and MW-4-Duplicate were analyzed for nitrate several hours outside of the method specified holding time of 48 hours. The nitrite results reported for these samples should be considered as estimated.
- The cooler temperatures ranged from 1.3-1.9°C, all of which fell slightly below the acceptable range of 4°C ± 2°C. No validation action was required for this minor nonconformance.
- All samples were preserved to a pH <2 for metals.

Initial and Continuing Calibrations

All criteria were met for the calibration curves and the initial and continuing calibration verification (ICV/CCV) standards for metals.

Although a Contract Required Detection Limit (CRDL) standard is not applicable to SW-846 methods, STL chose to analyze a similar standard (CRI for ICP and CRA for AA analyses). An acceptance limit of 100 + 20% recovery (%R) was used to evaluate these standards. All CRI and CRA standards met the acceptance criteria.

Laboratory Blanks/Equipment Blanks/Field Blanks

No equipment or field blanks were submitted with this sample set. No validation action was taken other than this notation.

No target analytes were detected in the laboratory blanks for chloride, nitrite or sulfate.

No target analytes were detected in the laboratory preparation blank for metals. Various analytes were detected in the continuing calibration blanks (CCBs) associated with these samples. The presence of blank contamination indicates that false positive results or false negative results (for negative blanks) may exist for these analytes in the associated samples. An Action Level (AL) was established for each analyte at 5x the highest concentration detected in the blanks and should be considered for the evaluation of blank contamination in the sample data. The following table summarizes these ALs and the associated samples.

Blank Type	Analytes	Conc. Detected (µg/L)	AL (µg/L)
CCB	Cadmium	0.30	1.5
	Cobalt	0.90	4.5
	Iron	+21.2/-16.0	+106/-80
	Manganese	0.30	1.5
	Vanadium	1.3	6.5
	Mercury	-0.10	-0.50
Associated samples: Pretasky, MW-4S, MW-4SDuplicate, MW-5S, MW-5SDuplicate, AW-20, PZ-2 and MW-1SR			

Positive cadmium, cobalt, manganese and vanadium results less than the value of a positive blank AL in the associated samples should be considered false positives.

Mercury results less than the absolute value of a negative blank AL should be considered biased low or potential false negatives.

Positive and nondetect results for iron in the associated samples should be considered estimated.

Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Results

All criteria were met for the analysis of the ICS A and ICS AB solutions.

Matrix Spike/ Matrix Spike Duplicate Results

MS/MSD analyses were performed on sample MW-4S for all analyses. The percent recoveries and relative percent differences (RPDs) were within acceptance limits for all analytes except nitrate and sulfate. The RPDs for nitrate (21%) and sulfate (23%) slightly exceeded the QC acceptance limit of 20%; therefore all results for nitrate and sulfate should be considered estimated.

Laboratory Duplicate Results

Laboratory duplicate analyses were not performed. Precision in the laboratory was demonstrated by the MS/MSD analyses as discussed above.

Field Duplicate Results

Samples MW-4S/MW-4SDuplicate and MW-5S/MW-5S-Duplicate were submitted as field duplicate pairs with this sample set. The following tables summarize the RPDs of the detected analytes in the field duplicate pairs.

Analytes	MW-4S (mg/L)	MW-4SDuplicate (mg/L)	RPD (%)
Arsenic	0.0095	0.010	5
Barium	0.32	0.33	3
Iron	22.9	23.2	1
Manganese	2.5	2.5	0
Vanadium	0.007 U	0.0012	NC
Chloride	5.9	6.1	3
Sulfate	0.14	0.44	103

The RPD for vanadium was reported as not calculable (NC) due to a nondetect value in the sample. The NC result was deemed acceptable since the detected value was <10 x the laboratory reporting limit (RL). The RPD for sulfate was acceptable since the results of the sample and duplicate were <10x the RL with the absolute difference being <4x the RL. The RPD for the remaining analytes met the QC acceptance criteria of 30% for an aqueous matrix.

Analytes	MW-5S (mg/L)	MW-5SDuplicate (mg/L)	RPD (%)
Arsenic	0.12	0.012	0
Barium	0.31	0.29	7
Cadmium	0.00032	0.00033	3
Cobalt	0.0094	0.0091	3
Iron	34.7	31.9	8
Manganese	3.3	3.1	6
Chloride	5.0	5.0	0
Nitrate	0.47	0.45	4
Sulfate	0.77	0.81	5

The RPDs met the QC acceptance criteria of +30% for an aqueous matrix.

Laboratory Control Sample Results

The percent recoveries of all spiked analytes met the QC acceptance criteria in the LCS analyses for all parameters.

Serial Dilution Results

The laboratory performed serial dilution analyses on sample MW-4S. The percent differences (%Ds) for all analytes met the QC acceptance criteria of <10% and no validation action was required on this basis.

Sample Quantitation/Detection Limit Results

No dilutions were required for the samples in this data.

Result calculations were spot checked; no discrepancies were noted.

Nondetects were reported at the reporting limit. Detected results were reported to the method detection limit (MDL) and were flagged by the laboratory with a "B" as estimated. The MDLs and/or RLs for all analytes except arsenic were at or below the project Enforcement Standards and Preventative Action Limits. The MDL for lead was 0.0017 mg/L which slightly exceeds the Preventative Action Limit of 0.0015 mg/L for this analyte.

5.2 VOC Data Validation

Samples included in this review are listed below:

Sample IDs	Sample IDs
Pretasky	MW-5S
MW-4S	MW-5SDuplicate (field duplicate of MW-5S)
MW-4SDuplicate (field duplicate of MW-4S)	MW-1SR
AW-20	Trip Blank

Sample data were reviewed for the following parameters:

- Agreement of analyses conducted with the chain of custody (COC) requests
- Holding times/sample preservation
- Gas chromatography/mass spectrometry (GC/MS) tunes
- Initial and continuing calibrations
- Method blanks/trip blanks
- Surrogate spike recoveries
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) results
- Matrix spike/matrix spike duplicate (MS/MSD) results
- Internal standard performance
- Field duplicate results
- Quantitation limits and sample results

DISCUSSION

Agreement of Analyses Conducted with COC Requests

Sample reports were checked to verify that the results corresponded to analytical requests as designated on the chain-of-custody (COC). There were no discrepancies noted.

Holding Times/Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures ranged from 1.3-1.9°C, all of which fell slightly below the acceptable range of 4°C ± 2°C. No validation action was required for this minor nonconformance.

All samples were preserved at a pH <2.

GC/MS Tunes

The frequency and abundance of all bromofluorobenzene (BFB) tunes were within the QC acceptance criteria. The samples were analyzed within the method specified tune times.

Initial and Continuing Calibrations

The percent relative standard deviations (% RSDs) or correlation coefficients, the response factors (RFs), the percent differences (% Ds) and percent drifts of all compounds were within the QC acceptance limits in the initial and continuing calibration standards associated with these samples with the exceptions noted in the tables below. The following tables summarize the nonconformance. All positive and nondetect results for the listed compounds should be considered estimated (J and UJ, respectively). It may be appropriate to review results for this analyte in the other samples in this data package.

Associated ICAL 10/28/04

Calibration	Compound	%D or Drift
CCAL (12/10/04) Instrument A3UX11	Acetone	-31.8
	2-Hexanone	-25.5
	Naphthalene	-52.1
Associated samples: Pretasky, AW-20, MW-1SR		

Associated ICAL 10/28/04

Calibration	Compound	%D or Drift
CCAL (12/13/04) Instrument A3UX11	2-Butanone	-26.4
	2-Hexanone	-38.4
	Naphthalene	-45.6
Associated samples: MW-4S		

Associated ICAL 10/28/04

Calibration	Compound	%D or Drift
CCAL (12/14/04) 08:06 Instrument A3UX11	Acetone	-41.9
	2-Hexanone	-31.1
	Naphthalene	-57.9
Associated samples: MW-4SDuplicate, MW-5S, MW-5SDuplicate		

Associated ICAL 11/24/04

Calibration	Compound	%D or Drift
CCAL (12/14/04) 11:29 Instrument A3UX10	Bromomethane	25.3
	Acetone	33.1
	2-Butanone	28.3
	Naphthalene	43.9
Associated samples: Trip Blank		

Method Blanks/Trip Blanks

A field blank was not submitted with this sample set. No validation action was taken other than this notation.

Several target analytes were detected in the laboratory method blanks and/or the trip blank. The presence of blank contamination indicates that false positives may exist for these analytes in the associated samples. Action Levels (ALs) were established at 5x the highest concentration detected in the blanks for 2-hexanone and toluene, and at 10x the highest concentration detected in the blanks for acetone, 2-butanone, and methylene chloride, and should be considered for the evaluation of blank contamination in the sample data. The following tables summarize the ALs and the associated samples.

Type of Blank	Compound	Detected Conc. (µg/L)	AL (µg/L)
Laboratory Method Blank (12/10/04)	Acetone	0.77	7.7
	Methylene Chloride	0.50	5.0
Associated samples: Pretasky, AW-20, MW-1SR			

Type of Blank	Compound	Detected Conc. (µg/L)	AL (µg/L)
Laboratory Method Blank (12/13/04)	Methylene Chloride	0.64	6.4
Associated sample: MW-4S			

Type of Blank	Compound	Detected Conc. (µg/L)	AL (µg/L)
Laboratory Method Blank (12/14/04)	Acetone	0.77	7.7
	Methylene Chloride	1.1	11
Associated samples: MW-5S, MW-5SDuplicate, MW-4SDuplicate			

Type of Blank	Compound	Detected Conc. (µg/L)	AL ((µg/L)
Trip Blank	Acetone	5.0	50
	2-Butanone	2.5	25
	Methylene Chloride	1.9	19
	2-Hexanone	0.42	2.1
	Toluene	0.21	1.05
Associated samples: All groundwater samples			

Sample results would be qualified as follows:

- If the sample result is ≤ AL and ≤ the sample quantitation limit (SQL), the result is considered nondetect (U) at the SQL.
- If the sample result is ≤ AL and > SQL, the result is considered nondetect (U) at the reported concentration.
- If the sample result is > AL, the result is not qualified.

It may be appropriate to review results for these analytes in other samples for false positive results.

Surrogate Spike Recoveries

The surrogate percent recoveries were within the QC acceptance limits in all sample analyses.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Results

The laboratory only spiked a subset of the target compounds. The percent recoveries and relative percent differences were within the laboratory's QC acceptance criteria in the LCS/LCSD associated with all samples in this data set for the compounds spiked.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results

MS/MSD analyses were performed on sample MW-4S. The percent recoveries and relative percent differences were all within the laboratory's QC acceptance criteria except for benzene. The MSD percent differences (120%) for benzene slightly exceeded the QC acceptance criteria of 78-118%; however benzene was nondetect in sample MW-4S and the sample result was considered to be acceptable.

Internal Standard Performance

The internal standard performance was within the QC acceptance criteria in all sample analyses.

Field Duplicate Results

Samples MW-4S/MW-4S-Duplicate and MW-5S/MW-5S-Duplicate were submitted as field duplicate pairs with this sample set. The following tables summarize the RPDs of the detected analytes in the field duplicate pairs. All RPDs were all within the QC acceptance criteria of 30% for an aqueous matrix.

Compound	MW-4S (µg/L)	MW-4S-Duplicate (µg/L)	RPD (%)
Ethylbenzene	26 J	27 J	4
Methylene Chloride	49 J	42 J	15
1,2,4-Trimethylbenzene	1600	1500	6
1,3,5-Trimethylbenzene	410	360	13
Xylene (total)	93	87	7

Compound	MW-5S (µg/L)	MW-5SDuplicate (µg/L)	RPD (%)
Ethylbenzene	60	54	10
Methylene Chloride	41 J	41 J	0
1,2,4-Trimethylbenzene	1300	1200	8
1,3,5-Trimethylbenzene	3500	330	6
Xylene (total)	160	160	0

Quantitation Limits and Sample Results

The following samples were analyzed as dilutions due to target analytes which would have exceeded the calibration range and would have produced inaccurate results. The laboratory elevated sample quantitation limits accordingly.

Sample	Dilution
MW-4S	50
MW-4S Duplicate	50
MW-5S	50
MW-5S Duplicate	50

Nondetects were reported at the laboratory reporting limit. Detected results were reported to the method detection limit (MDL) and were flagged by the laboratory with a "J" as estimated. The MDLs and/or RLs for all compounds except 1,1,2,2,-tetrachloroethane, bromodichloromethane, cis-1,3-dichloropropene, and vinyl chloride were at or below the project Enforcement Standards (ESs) and Preventative Action Limits (PALs). Detection limit exceedences of the ESs and/or PALs are listed in the table below.

Compound	Reporting Limit (µg/L)	MDL (µg/L)	PAL (µg/L)	ES (µg/L)
1,1,2,2-Tetrachloroethane	1.0	0.22	0.02	0.2
Bromodichloromethane	1.0	0.14	0.06	0.6
cis-1,3-Dichloropropene	1.0	0.12	0.2	0.02
Vinyl chloride	1.0	0.21	0.02	0.2
Trans-1,3-dichloropropene	1.0	0.17	0.020	0.20

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions are based upon the monitoring results from the September 2004, December 2004, March 2005, and June 2005 monitoring events.

- The natural attenuation data indicates that natural attenuation may be an effective modification to the ROD. Review of the groundwater quality suggests that natural attenuation is preventing the further spread of contaminants. Specifically, the concentrations of chloride demonstrate reductive dechlorination is occurring, the concentrations of sulfate indicate that biodegradation is occurring, and other natural attenuation parameters (DO and ORP) suggests that the environment is amenable for natural attenuation.
- The most common VOC contaminants detected were trimethylbenzenes (1,2,4 & 1,3,5), naphthalene, and xylenes. Concentrations of the trimethylbenzenes and methylene chloride exceeded the ES in MW-4S and MW-5S. Naphthalene exceeded the ES in MW-5S. No other VOC exceeded the ES. The concentrations of trimethylbenzenes in MW-4S and MW-5S appear to exhibit an increasing trend while the concentrations of naphthalene could be considered stable. The limited list of chemicals of concern from the ROD did not include the trimethylbenzenes (1,2,4-trimethlbenzene and 1,3,5-trimethylbenzene). Testing for trimethylbenzenes did not begin until 2001 and thus were not evaluated in the Preliminary Health Assessment. The current natural attenuation monitoring program analyzes for 37 VOC including all site chemicals of concern.
- Several VOCs (acetone, 2-hexanone, 2-butonone, toluene, and methylene chloride) were detected in the trip blanks potentially indicating false positives in other samples.
- Concentrations of iron and manganese in groundwater samples collected at the Site (including the upgradient monitoring well) have exceeded the Enforcement Standards. Background levels of iron and manganese in shallow groundwater throughout Wisconsin and especially in the vicinity of the Site are similar to the concentrations detected at the Site. The concentrations of arsenic exceeded the PAL in 14 wells tested (including upgradient wells) indicating that the presence of arsenic may be attributed to naturally occurring arsenic.
- The residential wells do not appear to be significantly impacted by site contaminants. The presence of low concentrations of several VOCs in the residential wells may be attributed to laboratory artifacts (e.g. methylene chloride). Concentrations of iron, manganese and arsenic found in the residential wells can be attributed to background concentrations. No VOCs above the PAL were detected in the four residential wells monitored (Miller, Pretasky, Johnson and Ackerman) except methylene chloride was detected at a concentration of 0.58 ug/l in the Pretasky well. Other VOCs detected in the residential wells include chloromethane and toluene but at concentrations below the PAL. Concentrations of iron and manganese above the ES

were detected in all four residential wells. Concentrations of arsenic exceeded the PAL in the Miller and Pretasky well. No other metals exceeded the PAL (except for the ES exceedences mentioned above).

- The air wells (AWs) were installed as part of the air sparging remediation system. On occasions there is less than 1 foot of water of water present in the air wells. Thus, the integrity and quality of the groundwater samples collected from the air wells may be questionable.

The following are recommendations for this Site resulting from the recent monitoring events.

- Continue with natural attenuation monitoring to evaluate groundwater quality and determine if natural attenuation can be an effective modification to the ROD remedy that remains protective of human health and the environment (e.g. modify the ROD so that the final remedy is natural attenuation).
- Evaluate monitoring data to determine if the presence of the trimethylbenzenes requires an additional health analysis. Further evaluate the presence of the trimethylbenzenes and the concentration trends of theses two compounds. Potential future activities may include evaluating the presence of trimethylbenzenes immediately downgradient of the landfill through additional testing.
- Work with the laboratory to reduce the occurrence of false positives in the samples. Request that the laboratory reduce method detection limits for VOCs and metals to below their respective Preventive Action Limits. The data validation results should be detailed in a separate stand alone report. Future monitoring reports should include a summary of the data validation effort.
- Complete additional studies to evaluate the occurrence of arsenic, iron and manganese (as well as other metals) in the groundwater with respect to background levels and develop Wisconsin Alternative Concentration Limits (WACLs) for arsenic, iron and manganese, if applicable.
- Modify the sampling schedule to continue to effectively monitor changes in groundwater quality and natural attenuation. Specifically, monitor on a semiannually basis at select key monitoring points and include key natural attenuation parameters.
- Replace the Air Wells as monitoring points with one or more sets of nested wells (shallow and medium depth wells).

7.0 REFERENCES

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ENSR INTERNATIONAL

TABLES

ONALASKA LANDFILL
2004/2005
ANNUAL MONITORING REPORT

TABLE 1-1
Contaminants Included in the Natural Attenuation Plan
Onalaska Municipal Landfill

Contaminants	Wisconsin NR140 PAL [ug/L][1]	Wisconsin NR140 ES [ug/L]	Federal MCL [ug/L]
Organic Contaminants			
BETX			
Benzene	0.5	5	5
Ethylbenzene	140	700	700
Toluene	200	1,000	1,000
Total Xylenes	1,000	10,000	10,000
Chlorinated VOC[2]			
1,1-Dichioroethane	85	850	N.A.3
1,1-Dichloroethene	0.7	7	7
1,1,1-Trichloroethane	40	200	200
Cis-1,2-Dichloroethene	7	70	70
Trans-1,2-Dichloroethene	20	100	100
Trichloroethene	0.5	5	5
Tetrachloroethene	0.5	5	5
Methylene Chloride	0.5	5	N.A.
Vinyl Chloride (Chloroethene)	0.02	0.2	2
Other VOC			
1,2,4 and 1,3,5 Trimethylbenzene	96	480	N.A.
Naphthalene	8	40	N.A.
Metal Contaminants			
Arsenic	5	50	10
Barium	400	2,000	2,000
Iron	150	300	N.A.
Lead	1.5	15	15
Manganese	25	50	N.A.
Cadmium	0.5	5	5
Cobalt	8	40	N.A.
Mercury	0.2	2	2
Vanadium	6	30	N.A.

Notes:

1. ug/L= micrograms per liter, equivalent to parts to billion
2. VOC = Volatile Organic Compounds
3. N.A.= Not applicable

TABLE 2-1
Completed Groundwater Monitoring Schedule
Wells Listed by Sampling Event
Onalaska Municipal Landfill – Remedial Action Site

Residential Wells Sampled Quarterly[1]

Pretasky	Hubley	Ackerman	Smith

Monitoring Wells Sampled Quarterly[2]

MW-4S	MW-5S	AW-9	AW-13
AW-20	AW-25	AW-28	MW-1SR

Monitoring Wells Sampled Semi-Annually[3]

PZ-2	PZ-3	PZ-5	AW-1	MW-2S	MW-2M
MW-6S	MW-6M	MW-8S	MW-8M	MW-14S	MW-15M

Monitoring Wells Sampled Annually[4]

PZ-4	MW-10M	MW-12S

Extraction Wells Sampled Once [5]

EW-2	EW-3	EW-4	EW-5

Notes:

1. Residential wells will be sampled quarterly for VOC and metals.
2. Wells will be sampled quarterly for VOC and metals and semi-annually for VOC, metals, chloride, nitrate and sulfate.
3. Wells will be sampled semi-annually for VOC, metals, chloride, nitrate and sulfate.
4. Wells will be sampled annually for VOC, metals, chloride, nitrate and sulfate.
5. Extraction wells sampled during June 2005 sampling event at the request of the WDNR.

a) Source: Sampling schedule and testing requirements established by the WDNR.

TABLE 2-2
Parameter List and Relevant Criteria for Monitored Natural Attenuation
Onalaska Municipal Landfill

Parameter	Rationale	State of WI Groundwater Criteria PAL (ug/L)	State of WI Groundwater Criteria WI ES (ug/L)
Organic Constituents			
BETX			
Benzene	COC	0.5	5
Ethylbenzene	COC	140	700
Toluene	COC	200	1,000
Total Xylenes	COC	1,000	10,000
Chlorinated VOCs			
1,1-Dichloroethane	COC	85	850
1,1-Dichloroethene	COC	0.7	7
1,1,1 –Trichloroethane	COC	40	200
cis-1,2-Dichloroethene	COC	7	70
trans-1,2-Dichloroethene	COC	20	100
Trichloroethene	COC	0.5	5
Tetrachloroethene	COC	0.5	5
Methylene Chloride (MW-4S only)	COC	0.5	5
Vinyl Chloride (Chloroethene)	COC	0.02	0.2
Other VOCs			
1,2,4-and 1,3,5-Trimethylbenzene	COC	96	480
SVOCs			
Naphthalene	COC	8	40
Inorganic Constituents (Metals)			
Arsenic	COC	5	50
Barium	COC	400	2,000
Iron	COC	150	300
Lead	COC	1.5	15
Manganese	COC	25	50
Cadmium	COC	0.5	5
Cobalt	COC	8	40
Mercury	COC	0.2	2
Vanadium	COC	6	30

Table 2-2 (Continued)
Parameter List and Relevant Criteria for Monitored Natural Attenuation
Onalaska Municipal Landfill

Parameter	7.1.1.1 Rationale	State of WI Groundwater Criteria	
		PAL (ug/L)	WI ES (ug/L)
Natural Attenuation Parameters			
Field Parameters			
Oxidation-Reduction Potential	Optimal values of < 50 mV indicate reductive dechlorination may be occurring.	N.A	N.A
Dissolved Oxygen	Concentrations in groundwater < 1,000 ug/L dissolved oxygen indicate anaerobic conditions present. > 1mg/L indicate aerobic conditions.	N.A	N.A
pH	Optimum range of pH is 5 to 9.	N.A	N.A
Temperature		N.A	N.A
Specific Conductance		N.A	N.A
Laboratory Parameters			
Nitrate	Concentrations in groundwater > 1,000 ug/L nitrate may compete with reductive processes of chlorinated VOC.	2,000	10,000
Sulfate	Can be used as electron acceptor once oxygen, nitrate, and iron have been depleted or reduced. Concentrations > 20,000 ug/L may compete with reductive pathway.	125,000	250,000
Iron (already included above)	Concentrations in groundwater > 1,000 ug/L may indicate iron reduction has occurred and reductive dechlorination of CVOCs is possible.	150	300
Manganese (already included above)	Concentrations in groundwater > 1,000 ug/L may indicate manganese reduction has occurred and reductive dechlorination of CVOCs is possible.	25	50
Methane, ethane, ethane (dissolved gasses)	Higher concentrations of methane may indicate methanogenesis is occurring, ethane and ethane degradation products of vinyl chloride.	N.A	N.A

Table 2-2 (Continued)
Parameter List and Relevant Criteria for Monitored Natural Attenuation
Onalaska Municipal Landfill

Parameter	7.1.1.2 Rationale	State of WI Groundwater Criteria	
		PAL (ug/L)	WI ES (ug/L)
Alkalinity	Reflects higher concentrations of calcium and magnesium, indicating the microbial respiration is releasing CO2 into the groundwater.	N.A	N.A
Chloride	A measure of CVOC degradation.	125,000	250,000
Total Organic Carbon	A general measure of organics' concentration, including those naturally occurring.	N.A	N.A

a. State of Wisconsin Groundwater Quality Standards as specified in NR 140.
b. Natural Attenuation Parameters recommended in Technical Protocols cited in Final OSWER Directive (USEPA April 1999)

Note: The dissolved gases (methane, ethane, ethane) alkalinity, and total organic carbon were not analyzed during the last four sampling events. These compounds were omitted at the request of the WDNR.

Table 3-1
Groundwater Elevation Table
Onalaska Landfill
Onalaska, Wisconsin

Date of Water Level Measurements: September 23, 2004			
Well Number	**Elevation Top of Casing[1]**	**Depth to Groundwater**	**Elevation of Groundwater**
Ackerman Well	658.28	NM[2]	NM
AW-1	663.62	20.08	643.54
AW-13	658.85	14.82	644.03
AW-20	652.71	9.31	643.40
AW-25	657.26	13.83	643.43
AW-28	660.91	17.47	643.44
AW-9	660.12	16.58	643.54
EW-1	666.86	NM	NM
EW-2	660.94	NM	NM
EW-3	657.61	NM	NM
EW-4	659.98	NM	NM
EW-5	659.07	NM	NM
Johnson Well	657.20	NM	NM
Miller well	NM	NM	NM
MW-10M	657.74	14.45	643.29
MW-11M	658.35	14.95	643.40
MW-12S	664.22	20.73	643.49
MW-14S	656.05	12.49	643.56
MW-15M	656.98	14.58	642.40
MW-1SR	660.54	16.88	643.66
MW-2D	673.90	NM[3]	NM
MW-2M	673.64	30.02	643.62
MW-2S	672.85	29.24	643.61
MW-4S	665.84	22.22	643.62
MW-5S	657.11	13.48	643.63
MW-6M	649.71	6.31	643.40
MW-6S	647.86	4.46	643.40
MW-7M	663.74	20.21	643.53
MW-8D	660.60	17.12	643.48
MW-8M	660.71	17.10	643.61
MW-8S	660.74	17.29	643.45
MW-9M	657.32	14.00	643.32
Pretasky Well	662.95	NM	NM
PZ-1	656.40	12.90	643.50
PZ-2	651.36	7.86	643.50
PZ-3	648.96	5.32	643.64
PZ-4	649.13	5.68	643.45
PZ-5	661.98	18.39	643.59
PZ-6	660.78	17.26	643.52

Notes:

1. Top of Casing elevation surveyed by Coulee Region Land Surveyors, Inc. on April 22, 2003. MW-1SR and Pretasky well were surveyed on April 13, 2004.
2. NM = Water level was not measured.
3. Obstruction at a depth of 29.41 feet.

Table 3-1
Groundwater Elevation Table
Onalaska Landfill
Onalaska, Wisconsin

Date of Water Level Measurements: December 2, 2004			
Well Number	Elevation Top of Casing[1]	Depth to Groundwater	Elevation of Groundwater
Ackerman Well	658.28	NM[2]	NM
AW-1	663.62	19.99	643.63
AW-13	658.85	15.00	643.85
AW-20	652.71	9.21	643.50
AW-25	657.26	13.73	643.53
AW-28	660.91	17.36	643.55
AW-9	660.12	16.50	643.62
EW-1	666.86	NM	NM
EW-2	660.94	NM	NM
EW-3	657.61	NM	NM
EW-4	659.98	NM	NM
EW-5	659.07	NM	NM
Johnson Well	657.20	NM	NM
Miller well	NM	NM	NM
MW-10M	657.74	14.40	643.34
MW-11M	658.35	14.92	643.43
MW-12S	664.22	20.70	643.52
MW-14S	656.05	12.34	643.71
MW-15M	656.98	13.50	643.48
MW-1SR	660.54	16.63	643.91
MW-2D	673.90	NM[3]	NM
MW-2M	673.64	29.94	643.7
MW-2S	672.85	29.15	643.7
MW-4S	665.84	22.20	643.64
MW-5S	657.11	13.46	643.65
MW-6M	649.71	6.23	643.48
MW-6S	647.86	4.39	643.47
MW-7M	663.74	20.17	643.57
MW-8D	660.60	17.10	643.5
MW-8M	660.71	17.21	643.50
MW-8S	660.74	17.28	643.46
MW-9M	657.32	13.96	643.36
Pretasky Well	662.95	NM	NM
PZ-1	656.40	12.81	643.59
PZ-2	651.36	4.77	646.59
PZ-3	648.96	5.21	643.75
PZ-4	649.13	5.61	643.52
PZ-5	661.98	18.35	643.63
PZ-6	660.78	17.20	643.58

Notes:

1. Top of Casing elevation surveyed by Coulee Region Land Surveyors, Inc. on April 22, 2003. MW-1SR and Pretasky well were surveyed on April 13, 2004.
2. NM = Water level was not measured.
3. Obstruction at a depth of 29.41 feet.

Table 3-1
Groundwater Elevation Table
Onalaska Landfill
Onalaska, Wisconsin

Date of Water Level Measurements: March 2, 2005			
Well Number	**Elevation Top of Casing[1]**	**Depth to Groundwater**	**Elevation of Groundwater**
Ackerman Well	658.28	NM	NM
AW-1	663.62	19.74	643.88
AW-13	658.85	14.95	643.9
AW-20	652.71	9.00	643.71
AW-25	657.26	13.53	643.73
AW-28	660.91	17.15	643.76
AW-9	660.12	16.25	643.87
EW-1	666.86	NM	NM
EW-2	660.94	NM	NM
EW-3	657.61	NM	NM
EW-4	659.98	NM	NM
EW-5	659.07	NM	NM
Johnson Well	657.20	NM	NM
Miller well	NM	NM	NM
MW-10M	657.74	14.19	643.55
MW-11M	658.35	14.70	643.65
MW-12S	664.22	20.49	643.73
MW-14S	656.05	12.14	643.91
MW-15M	656.98	13.33	643.65
MW-1SR	660.54	16.42	644.12
MW-2D	673.90	NM [3]	NM
MW-2M	673.64	29.73	643.91
MW-2S	672.85	28.95	643.9
MW-4S	665.84	22.00	643.84
MW-5S	657.11	13.27	643.84
MW-6M	649.71	6.02	643.69
MW-6S	647.86	4.18	643.68
MW-7M	663.74	19.98	643.76
MW-8D	660.60	16.89	643.71
MW-8M	660.71	16.99	643.72
MW-8S	660.74	17.05	643.69
MW-9M	657.32	13.75	643.57
Pretasky Well	662.95	NM	NM
PZ-1	656.40	12.55	643.85
PZ-2	651.36	7.59	643.77
PZ-3	648.96	5.02	643.94
PZ-4	649.13	5.40	643.73
PZ-5	661.98	18.14	643.84
PZ-6	660.78	17.01	643.77

screened 649-639

644-634
578-568

Notes:

1. Top of Casing elevation surveyed by Coulee Region Land Surveyors, Inc. on April 22, 2003. MW-1SR and Pretasky well were surveyed on April 13, 2004.

2. NM = Water level was not measured.

3. Obstruction at a depth of 29.41 feet.

Table 3-1
Groundwater Elevation Table
Onalaska Landfill
Onalaska, Wisconsin

Date of Water Level Measurements: June 2005			
Well Number	Elevation Top of Casing[1]	Depth to Groundwater	Elevation of Groundwater
Ackerman Well	658.28	NM	NM
AW-1	663.62	19.76	643.86
AW-13	658.85	14.85	644
AW-20	652.71	8.87	643.84
AW-25	657.26	13.40	643.86
AW-28	660.91	17.05	643.86
AW-9	660.12	16.25	643.87
EW-1	666.86	NM	NM
EW-2	660.94	NM	NM
EW-3	657.61	NM	NM
EW-4	659.98	NM	NM
EW-5	659.07	NM	NM
Johnson Well	657.20	NM	NM
Miller well	NM	NM	NM
MW-10M	657.74	14.20	643.54
MW-11M	658.35	14.66	643.69
MW-12S	664.22	20.49	643.73
MW-14S	656.05	12.13	643.92
MW-15M	656.98	13.37	643.61
MW-1SR	660.54	16.66	643.88
MW-2D	673.90	NM	NM
MW-2M	673.64	29.73	643.91
MW-2S	672.85	28.92	643.93
MW-4S	665.84	22.01	643.83
MW-5S	657.11	13.10	644.01
MW-6M	649.71	6.11	643.6
MW-6S	647.86	4.28	643.58
MW-7M	663.74	19.95	643.79
MW-8D	660.60	16.90	643.7
MW-8M	660.71	16.97	643.74
MW-8S	660.74	17.07	643.67
MW-9M	657.32	13.73	643.59
Pretasky Well	662.95	NM	NM
PZ-1	656.40	12.55	643.85
PZ-2	651.36	7.70	643.66
PZ-3	648.96	5.11	643.85
PZ-4	649.13	5.46	643.67
PZ-5	661.98	18.15	643.83
PZ-6	660.78	17.01	643.77

Notes:
Groundwater elevations were collected on June 8, 9 and 10, 2005

1. Top of Casing elevation surveyed by Coulee Region Land Surveyors, Inc. on April 22, 2003. MW-1SR and Pretasky well were surveyed on April 13, 2004.

2. NM = Water level was not measured.

3. Obstruction at a depth of 29.41 feet.

Table 3-2
AW-1
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/23/2003	4/13/2004	12/3/2004	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	25	8.4	2.3	7.8	14	96	480
1,3,5-Trimethylbenzene	22	6.1	2.1	6	7.1	96	480
Acetone	6	< 1.1	< 0.66	0.82	<0.74	200	1000
Benzene	< 0.37	< 0.37	0.45	<0.22	<0.22	0.5	5
Methylene chloride	3.8	< 0.29	0.35	0.44	<0.19	0.5	5
Xylenes (total)	4	4.7	< 0.45	1.2	2	1,000	10,000
Metals, mg/L							
Arsenic	< 0.0021	< 0.0021	< 0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.25	0.13	0.18	0.25	0.15	0.4	2
Cadmium	0.0032	< 0.00028	< 0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0043	< 0.00074	< 0.00096	0.0033	0.0016	0.008	0.04
Iron	**4.5**	**0.39**	0.23	**2.2**	**1.5**	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	**6**	**0.7**	**0.72**	**3.9**	**2.14**	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000029	<0.000029	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00071	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L							
Ethane	< 3	< 3	< 0.7	---	---	----	----
Ethene	< 2.9	< 2.9	< 0.65	---	---	----	----
Methane	1500	690	630	---	---	----	----
Natural Attenuation Parameters, mg/L							
Chloride	2.1	5.6	4.6	1.8	1.6	125	250
Nitrate as N	< 0.0076	0.83	8.6	0.098	0.3	2	10
Sulfate	9.1	6.2	17.2	10.8	6.5		250
Total Alkalinity	290	210	270	---	---	----	----
Total Organic Carbon	6	2	5	---	---	----	----
pH	---	6.98	---	6.56	6.47	----	----
Conductivity (mS/cm)	---	0.441	---	0.707	270	----	----
Temperature (C)	---	7.87	---	10.98	9.59	----	----
ORP (mV)	---	1.78	---	217	-17.8	----	----
Dissolved Oxygen (mg/L)	---	4.5	---	0.63	0.33	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
AW-9
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/23/2003	10/8/2003	4/13/2004	9/24/2004	12/3/2004	3/10/2005	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	1.6	< 0.37	< 0.14	< 0.14	<0.12	0.21	<0.12	<0.12	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.4	< 0.18	< 0.18	<0.16	<0.16	<0.16	<0.16	96	480
Acetone	2.9	< 1.1	< 0.66	< 0.66	0.85	<0.74	<0.74	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 0.2	0.39	<0.22	<0.22	<0.22	<0.22	0.5	5
Chloromethane	< 0.49	< 0.49	< 0.26	< 0.26	0.26	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	3.8	0.34	< 0.28	< 0.28	<0.19	0.53	<0.19	<0.19	0.5	5
Xylenes (total)	< 0.44	< 0.44	0.61	< 0.45	<0.44	<0.44	<0.44	<0.44	1,000	10,000
Metals, mg/L										
Arsenic	< 0.0021	< 0.0021	< 0.0029	< 0.0026	<0.0026	<0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.072	0.051	0.19	0.043	0.068	0.068	0.0771	0.0583	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.0011	< 0.00096	<0.00096	0.0011	0.0027	0.0011	0.008	0.04
Iron	0.067	< 0.042	0.11	< 0.049	0.24	0.33	0.444	0.44	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	<0.0017	0.0027	0.0015	0.015
Manganese	0.041	0.016	0.24	0.15	0.63	1.3	2.41	1.52	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000067	< 0.000029	0.000065	<0.000029	<0.000029	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00096	< 0.00071	<0.00071	<0.00071	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L										
Ethane	< 0.3	< 0.6	< 0.6	< 0.14	---	---	---	---	----	----
Ethene	< 0.29	< 0.58	< 0.58	< 0.13	---	---	---	---	----	----
Methane	260	220	340	110	---	---	---	---	----	----
Natural Attenuation Parameters, mg/L										
Chloride	3.1	3	6.9	2.6	---	4.2	---	3.4	125	250
Nitrate as N	0.42	1.1	0.07	2	---	0.36	---	0.41	2	10
Sulfate	3.5	3.1	5.4	3.7	---	3.2	---	3.2	125	250
Total Alkalinity	220	170	190	170	---	---	---	---	----	----
Total Organic Carbon	1	0.8	2	1	---	---	---	---	----	----
pH	7.07	---	7.23	---	6.46	6.82	7.42	6.68	----	----
Conductivity (mS/cm)	0.36	---	0.406	---	0.442	0.395	0.423	229	----	----
Temperature (C)	7.35	---	15.24	---	13.64	11.37	7.68	9.93	----	----
ORP (mV)	190	---	209	---	217	214	183	7.7	----	----
Dissolved Oxygen (mg/L)	6.67	---	6.02	---	3.15	1.57	2.18	4.34	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
AW-13
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	Duplicate 12/12/2002	4/22/2003	4/14/2004	9/23/2004	12/3/2004	3/11/2005	6/10/2005	PAL	ES
1,2,4-Trimethylbenzene	2	1.8	860	250	0.43	3.2	18	12	96	480
1,3,5-Trimethylbenzene	< 0.4	1.1	32	11	<0.16	<0.16	0.41	0.49	96	480
Acetone	2.5	5.9	< 24	< 6.6	0.84	<0.74	<0.74	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 8.2	3.8	<0.22	<0.22	<0.22	<0.22	0.5	5
Methylene chloride	3.6	3.6	< 6.4	< 2.8	<0.19	0.48	<0.19	<0.19	0.5	5
Naphthalene	< 0.42	< 0.42	< 9.3	2.4	<0.15	<0.15	0.39	0.25	8	40
Toluene	< 0.39	< 0.39	< 8.7	5.3	0.19	0.36	<0.17	<0.17	200	1,000
Xylenes (total)	< 0.44	< 0.44	10	< 4.5	<0.44	<0.44	<0.44	<0.44	1,000	10,000
Metals, mg/L										
Arsenic	0.0033	< 0.0021	0.0048	0.0038	<0.0026	0.0033	<0.0026	0.0047	0.001	0.01
Barium	0.28	0.27	0.2	0.28	0.26	0.3	0.306	0.333	0.4	2
Cadmium	< 0.00028	< 0.00028	0.00034	< 0.00028	<0.00028	<0.00028	<0.0014	<0.00028	0.0005	0.005
Cobalt	0.0043	0.0044	< 0.00074	0.0049	0.0053	0.0063	0.0055	0.0049	0.008	0.04
Iron	4.7	5.1	34.8	10.4	5.6	7.5	9.18	11.2	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	< 0.0017	0.004	0.003	<0.0085	0.005	0.0015	0.015
Manganese	24.3	23.7	11.4	22.7	19.7	28.2	32.9	35.2	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000087	< 0.000029	0.000059	<0.000029	<0.000029	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	0.00084	0.0039	<0.00071	<0.00071	0.0012	0.006	0.03
Dissolved Gases, ug/L										
Ethane	< 1.5	< 0.6	< 3	< 1.4	---	---	---	---	----	----
Ethene	< 1.4	< 0.58	< 2.9	< 1.3	---	---	---	---	----	----
Methane	300	340	2200	1800	---	---	---	---	----	----
Natural Attenuation Parameters, mg/L										
Chloride	2.6	2.3	6.7	3.5	---	1.6	---	2	125	250
Nitrate as N	0.2	0.28	0.01	< 0.016	---	0.064	---	0.06	2	10
Sulfate	3.1	2.7	0.49	0.69	---	0.21	---	<0.11	125	250
Total Alkalinity	550	550	260	560	---	---	---	---	----	----
Total Organic Carbon	5	4	5	12	---	---	---	---	----	----
pH	---	---	7.08	---	6.35	6.7	7.37	6.47	----	----
Conductivity (mS/cm)	---	---	0.585	---	1.096	1.027	1.115	695	----	----
Temperature (C)	---	---	8.78	---	16.07	12.13	7.35	12.13	----	----
ORP (mV)	---	---	87	---	193	184	170	-71.5	----	----
Dissolved Oxygen (mg/L)	---	---	0.32	---	3.32	0.42	0.45	0.23	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
AW-20
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/22/2003	Duplicate 4/23/03	10/8/2003	4/14/2004	9/24/2004	12/3/2004	3/11/2005	6/10/2005	PAL	ES
1,2,4-Trimethylbenzene	22	450	450	170	3.4	34	34	4.3	130	96	480
1,3,5-Trimethylbenzene	17	200	190	120	0.5	6.6	2.5	<0.16	8.4	96	480
2-Butanone	< 0.59	< 9.1	< 9.1	< 7.2	< 0.36	0.7	<0.39	<0.39	<1.5	90	460
Acetone	3.6	< 17	< 17	< 13	< 0.66	2.5	0.78	<0.74	<2.8	200	1000
Benzene	< 0.37	< 5.7	< 5.7	< 4	0.39	<0.22	<0.22	<0.22	<0.85	0.5	5
Chloromethane	< 0.49	< 7.5	< 7.5	< 5.2	< 0.26	0.23	<0.14	<0.14	<0.54	0.3	3
Ethylbenzene	< 0.41	< 6.3	< 6.3	< 3.8	< 0.19	0.28	0.21	<0.19	1	140	700
Methylene chloride	3.4	< 4.5	< 4.5	< 5.6	< 0.28	<0.19	0.55	<0.19	<0.73	0.5	5
Naphthalene	0.64	8.2	8.9	6.8	0.97	1.2	0.98	0.22	4.2	8	40
Toluene	< 0.39	< 6	< 6	< 3.4	< 0.17	0.33	0.33	<0.17	<0.65	200	1,000
Xylenes (total)	1.1	30	28	12	< 0.45	1.5	1.4	<0.44	14	1,000	10,000
Metals, mg/L											
Arsenic	0.0088	< 0.0021	< 0.0021	0.021	0.003	0.0083	0.0068	<0.0026	0.0117	0.001	0.01
Barium	0.29	0.13	0.23	0.38	0.2	0.22	0.22	0.145	0.264	0.4	2
Cadmium	0.00037	< 0.00028	< 0.00028	< 0.00036	0.00029	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.011	< 0.00074	0.01	0.011	0.0023	0.0053	0.0052	0.0043	0.0086	0.008	0.04
Iron	23.3	0.39	5.4	50	0.44	25.1	20.3	7.75	39.9	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	< 0.0023	< 0.0017	0.0026	0.0021	<0.0017	0.0027	0.0015	0.015
Manganese	17	0.7	11.8	16.1	2.6	15.8	14.9	9.25	14.9	0.025	0.05
Mercury	0.000087	< 0.000087	< 0.000087	< 0.000067	< 0.000029	0.000047	<0.000029	<0.000029	0.000062	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	0.0029	< 0.00071	<0.00071	<0.00071	<0.00071	0.00091	0.006	0.03
Dissolved Gases, ug/L											
Ethane	< 3	< 3	< 3	< 3	< 0.7	---	---	---	---	----	----
Ethene	< 2.9	< 2.9	< 2.9	< 2.9	< 0.65	---	---	---	---	----	----
Methane	1600	690	830	2200	890	---	---	---	---	----	----
Natural Attenuation Parameters, mg/L											
Chloride	1.8	5.6	7.1	5.5	2.4	---	1.3	---	4.2	125	250
Nitrate as N	< 0.0076	0.83	1.9	0.24	25.7	---	2.1	---	<0.016	2	10
Sulfate	1.1	6.2	3.9	0.22	20.4	---	8.9	---	0.3	125	250
Total Alkalinity	600	210	400	520	420	---	---	---	---	----	----
Total Organic Carbon	15	2	10	21	12	---	---	---	---	----	----
pH	---	6.98	6.98	6.71	---	6.12	6.44	7.58	5.2	----	----
Conductivity (mS/cm)	---	0.445	0.445	1.09	---	0.992	0.849	0.633	566	----	----
Temperature (C)	---	7.61	7.61	15.46	---	15.11	10.62	6.14	11.53	----	----
ORP (mV)	---	147	147	141	---	154	168	174	-80.5	----	----
Dissolved Oxygen (mg/L)	---	0.23	0.23	2.32	---	0.18	0.54	0.46	0.21	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
AW-25
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/22/2003	10/8/2003	4/14/2004	9/24/2004	12/3/2004	3/11/2005	6/10/2005	PAL	ES
1,2,4-Trimethylbenzene	240	52	**760**	2.5	<0.12	0.71	<0.12	0.24	96	480
1,3,5-Trimethylbenzene	38	9.1	**210**	0.28	<0.16	<0.16	<0.16	<0.16	96	480
Acetone	< 8.6	< 2.8	< 13	1.4	0.74	0.83	<0.74	<0.74	200	1000
Benzene	< 2.9	< 0.92	< 4	0.4	<0.22	<0.22	<0.22	<0.22	0.5	5
Chloromethane	< 3.8	< 1.2	< 5.2	< 0.26	0.26	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	**5.1**	< 0.72	**7.6**	< 0.28	<0.19	0.5	<0.19	<0.19	0.5	5
Naphthalene	4.5	< 1	6.8	< 0.16	<0.15	<0.15	<0.15	<0.15	8	40
Xylenes (total)	5.6	2.9	18	< 0.45	<0.44	<0.44	<0.44	<0.44	1,000	10,000
Metals, mg/L										
Arsenic	0.0034	< 0.0021	**0.013**	< 0.0026	<0.0026	<0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.43	0.23	0.32	0.29	0.32	0.28	0.235	0.261	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	<0.00028	0.0003	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0049	0.0021	0.002	0.0015	<0.00096	0.0022	0.0025	0.0017	0.008	0.04
Iron	**13.8**	**3.6**	**19.6**	0.098	<0.049	0.22	0.132	<0.049	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	**6.6**	**2.3**	**3.4**	**0.9**	**1.3**	**2.7**	**2.94**	**2.43**	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000067	< 0.000029	<0.000029	<0.000029	<0.000029	0.000086	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00096	< 0.00071	<0.00071	<0.00071	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L										
Ethane	< 3	< 3	< 3	< 0.28	---	---	---	---	----	----
Ethene	< 2.9	< 2.9	< 2.9	< 0.26	---	---	---	---	----	----
Methane	570	1400	2200	530	---	---	---	---	----	----
Natural Attenuation Parameters, mg/L										
Chloride	---	15.2	2.1	4.9	---	1.4	---	4.5	125	250
Nitrate as N	0.97	2.2	< 0.019	**20.8**	---	3.3	---	**12.3**	2	10
Sulfate	4.4	1.9	0.77	25.4	---	6.8	---	12	125	250
Total Alkalinity	520	320	290	460	---	---	---	---	----	----
Total Organic Carbon	7	6	5	11	---	---	---	---	----	----
pH	---	7.02	6.71	---	6.16	6.52	7.24	5.28	----	----
Conductivity (mS/cm)	---	0.644	0.576	---	0.953	0.906	0.804	536	----	----
Temperature (C)	---	7.67	15.47	---	14.94	12.27	7.9	11.22	----	----
ORP (mV)	---	156	147	---	219	185	188	174	----	----
Dissolved Oxygen (mg/L)	---	0.88	2.78	---	0.16	0.35	1.15	0.74	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
AW-28
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/22/2003	4/14/2004	9/24/2004	12/3/2004	3/11/2005	6/10/2005	PAL	ES
1,2,4-Trimethylbenzene	45	44	10	2.2	34	35	11	96	480
1,3,5-Trimethylbenzene	21	18	2.6	0.24	9.7	11	3.6	96	480
2-Butanone	< 0.74	< 1.2	< 0.36	<0.39	<0.39	0.46	0.96	90	460
4-Methyl-2-pentanone	< 0.32	< 0.52	< 0.34	<0.32	<0.32	<0.32	0.35	50	500
Acetone	5.4	< 2.2	1.2	<0.74	1	<0.74	1.8	200	1000
Benzene	< 0.46	< 0.74	0.44	<0.22	<0.22	<0.22	<0.22	0.5	5
Methylene chloride	4.6	< 0.58	< 0.28	<0.19	0.52	<0.19	<0.19	0.5	5
Naphthalene	< 0.52	< 0.84	0.25	<0.15	<0.15	<0.15	<0.15	8	40
Toluene	0.83	< 0.78	< 0.17	<0.17	<0.17	<0.17	<0.17	200	1,000
Xylenes (total)	2.9	1.6	0.57	<0.44	0.66	1.4	0.6	1,000	10,000
Metals, mg/L									
Arsenic	0.0026	< 0.0021	< 0.0026	<0.0026	<0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.26	0.22	0.22	0.19	0.25	0.254	0.239	0.4	2
Cadmium	< 0.00028	< 0.00028	0.00034	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0064	0.0036	0.0059	<0.00096	0.003	0.0029	0.0024	0.008	0.04
Iron	9.8	3.7	0.74	0.66	5.6	8.89	6.8	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0017	<0.0017	<0.0017	<0.0017	0.002	0.0015	0.015
Manganese	5	2.4	2.5	1.1	3.7	4.32	3.32	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000029	0.000032	<0.000029	<0.000029	0.00006	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00071	<0.00071	<0.00071	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L									
Ethane	< 3	< 3	< 0.14	---	---	---	---	----	----
Ethene	< 2.9	< 2.9	0.18	---	---	---	---	----	----
Methane	1200	1700	2800	---	---	---	---	----	----
Natural Attenuation Parameters, mg/L									
Chloride	10.8	14	19.7	---	2.6	---	4.9	125	250
Nitrate as N	1.1	1.7	8.9	---	0.29	---	0.52	2	10
Sulfate	1.4	2.7	9.6	---	3.4	---	5.3	125	250
Total Alkalinity	370	360	390	---	---	---	---	----	----
Total Organic Carbon	9	11	33	---	---	---	---	----	----
pH	---	7.02	---	6.15	6.54	7.16	6.01	----	----
Conductivity (mS/cm)	---	0.7	---	0.67	0.722	0.764	447	----	----
Temperature (C)	---	8.35	---	14.29	12.34	9.23	11.14	----	----
ORP (mV)	---	166	---	214	184	189	-35.3	----	----
Dissolved Oxygen (mg/L)	---	1.36	---	0.43	3.01	0.92	0.71	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
EW-2
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	68	96	480
Acetone	1.7	200	1000
Carbon disulfide	1.5	200	1000
Naphthalene	1.4	8	40
Xylenes (total)	1.6	1,000	10,000

Metals, mg/L			
Arsenic	**0.0353**	0.001	0.01
Barium	0.918	0.4	2
Cadmium	<0.00028	0.0005	0.005
Cobalt	<0.00096	0.008	0.04
Iron	**13.2**	0.15	0.3
Lead	<0.0017	0.0015	0.015
Manganese	**2.16**	0.025	0.05
Mercury	0.000076	0.0002	0.002
Vanadium	<0.00071	0.006	0.03

Natural Attenuation Parameters, mg/L			
Chloride	11.9	125	250
Nitrate as N	<0.016	2	10
Sulfate	0.61	125	250
Total Alkalinity	----	----	----
Total Organic Carbon	----	----	----

pH	----	----	----
Conductivity (mS/cm)	----	----	----
Temperature (C)	----	----	----
ORP (mV)	----	----	----
Dissolved Oxygen (mg/L)	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
EW-3
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	6/9/2005	Duplicate 6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	9.3	9.2	96	480
1,3,5-Trimethylbenzene	1.6	1.7	96	480
Acetone	0.91	0.91	200	1000
Benzene	0.44	0.43	0.5	5
Carbon disulfide	0.72	0.77	200	1000
Chlorobenzene	0.66	0.65	-----	-----
Chloroethane	1	<0.24	80	400
Naphthalene	0.37	0.38	8	40
Xylenes (total)	0.92	0.88	1,000	10,000
Metals, mg/L				
Arsenic	**0.0335**	**0.0314**	0.001	0.01
Barium	1.1	1.1	0.4	2
Cadmium	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.00098	0.0013	0.008	0.04
Iron	**11.6**	**11.5**	0.15	0.3
Lead	<0.0017	<0.0017	0.0015	0.015
Manganese	**2.98**	**2.98**	0.025	0.05
Mercury	0.00012	0.000051	0.0002	0.002
Vanadium	<0.00071	<0.00071	0.006	0.03
Natural Attenuation Parameters, mg/L				
Chloride	19.4	19.1	125	250
Nitrate as N	<0.016	<0.016	2	10
Sulfate	0.15	<0.11	125	250
Total Alkalinity	----	----	----	----
Total Organic Carbon	----	----	----	----
pH	----	----	----	----
Conductivity (mS/cm)	----	----	----	----
Temperature (C)	----	----	----	----
ORP (mV)	----	----	----	----
Dissolved Oxygen (mg/L)	----	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
EW-4
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	86	96	480
1,3,5-Trimethylbenzene	3	96	480
Acetone	2.6	200	1000
Carbon disulfide	2	200	1000
Naphthalene	1.1	8	40
Xylenes (total)	2.5	1,000	10,000

Metals, mg/L			
Arsenic	**0.0282**	0.001	0.01
Barium	0.896	0.4	2
Cadmium	<0.00028	0.0005	0.005
Cobalt	<0.00096	0.008	0.04
Iron	**11.9**	0.15	0.3
Lead	<0.0017	0.0015	0.015
Manganese	**2.11**	0.025	0.05
Mercury	0.00011	0.0002	0.002
Vanadium	0.00083	0.006	0.03

Natural Attenuation Parameters, mg/L			
Chloride	11.9	125	250
Nitrate as N	<0.016	2	10
Sulfate	<0.11	125	250
Total Alkalinity	----	----	----
Total Organic Carbon	----	----	----

pH	----	----	----
Conductivity (mS/cm)	----	----	----
Temperature (C)	----	----	----
ORP (mV)	----	----	----
Dissolved Oxygen (mg/L)	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
EW-5
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	6/9/2005	PAL	ES
(No VOC Compounds Detected Above MDL)			
Metals, mg/L			
Arsenic	**0.0152**	0.001	0.01
Barium	0.384	0.4	2
Cadmium	<0.00028	0.0005	0.005
Cobalt	<0.00096	0.008	0.04
Iron	**1.7**	0.15	0.3
Lead	<0.0017	0.0015	0.015
Manganese	**1.07**	0.025	0.05
Mercury	0.000053	0.0002	0.002
Vanadium	<0.00071	0.006	0.03
Natural Attenuation Parameters, mg/L			
Chloride	7.9	125	250
Nitrate as N	<0.016	2	10
Sulfate	4.2	125	250
Total Alkalinity	----	----	----
Total Organic Carbon	----	----	----
pH	----	----	----
Conductivity (mS/cm)	----	----	----
Temperature (C)	----	----	----
ORP (mV)	----	----	----
Dissolved Oxygen (mg/L)	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-1SR
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	10/8/2003	4/13/2004	9/23/2004	12/2/2004	3/10/2005	6/8/2005	PAL	ES
1,2,4-Trimethylbenzene	1.1	< 0.14	<0.12	0.13	<0.12	<0.12	96	480
1,3,5-Trimethylbenzene	0.3	< 0.18	<0.16	<0.16	<0.16	<0.16	96	480
Benzene	< 0.2	0.5	<0.22	<0.22	<0.22	<0.22	0.5	5
Bromomethane	< 0.16	< 0.16	0.45	<0.36	<0.36	<0.36	1	10
Chloromethane	< 0.26	< 0.26	0.18	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	< 0.28	< 0.28	<0.19	0.41	<0.19	<0.19	0.5	5
Naphthalene	0.34	< 0.16	<0.15	<0.15	<0.15	<0.15	8	40
Xylenes (total)	0.64	< 0.45	<0.44	<0.44	<0.44	<0.44	1,000	10,000
Metals, mg/L								
Arsenic	< 0.0029	< 0.0026	<0.0026	<0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.18	0.047	0.12	0.085	0.0644	0.0455	0.4	2
Cadmium	< 0.00036	< 0.00028	<0.00028	0.00029	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.003	0.00099	<0.00096	0.0016	0.0011	0.0014	0.008	0.04
Iron	6.2	0.76	2.8	2.8	3.63	1.3	0.15	0.3
Lead	0.0024	< 0.0017	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	2.1	1.8	4.3	4	2.88	2.41	0.025	0.05
Mercury	< 0.000067	< 0.000029	<0.000029	<0.000029	<0.000029	0.00007	0.0002	0.002
Vanadium	0.008	0.0018	<0.00071	0.0013	0.003	0.002	0.006	0.03
Dissolved Gases, ug/L								
Ethane	< 0.3	< 0.14	---	---	----	----	----	----
Ethene	< 0.29	< 0.13	---	---	----	----	----	----
Methane	250	87	---	---	----	----	----	----
Natural Attenuation Parameters, mg/L								
Chloride	8.9	7.3	---	9.3	----	6.9	125	250
Nitrate as N	< 0.019	0.23	---	<0.016	----	0.042	2	10
Sulfate	7	4.6	---	5.2	----	10.9	125	250
Total Alkalinity	95	97	---	---	----	----	----	----
Total Organic Carbon	5	5	---	---	----	----	----	----
pH	6.95	---	6.33	7.08	7.8	7.07	----	----
Conductivity (mS/cm)	0.254	---	0.363	0.359	0.241	136	----	----
Temperature (C)	11.93	---	13.74	12.06	8.82	8.67	----	----
ORP (mV)	162	---	182	203	195	54	----	----
Dissolved Oxygen (mg/L)	6.6	---	1.11	1.67	2.26	4.6	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-2M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	4/22/2003	10/7/2003	4/13/2004	12/2/2004	6/9/2005	PAL	ES
Acetone	5.5	< 1.1	< 0.66	< 0.66	<0.74	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 0.2	0.46	<0.22	<0.22	0.5	5
Methylene chloride	3.1	< 0.29	< 0.28	< 0.28	0.4	<0.19	0.5	5
Metals, mg/L								
Arsenic	0.019	0.019	0.02	0.021	0.019	0.0234	0.001	0.01
Barium	0.37	0.66	0.42	0.35	0.43	1.07	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.0011	< 0.00096	<0.00096	<0.00096	0.008	0.04
Iron	5	9.6	6.4	4.9	5.7	16.8	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	0.41	0.64	0.41	0.49	0.47	1.02	0.025	0.05
Mercury	0.000092	< 0.000087	< 0.000067	0.00084	<0.000029	0.000056	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00096	< 0.00071	0.00089	<0.00071	0.006	0.03
Dissolved Gases, ug/L								
Ethane	< 0.3	< 0.6	< 0.3	< 0.14	---	----	----	----
Ethene	< 0.29	< 0.58	< 0.29	< 0.13	---	----	----	----
Methane	22	310	130	73	---	----	----	----
Natural Attenuation Parameters, mg/L								
Chloride	4.8	16	6.9	5.5	6.7	28.2	125	250
Nitrate as N	< 0.0076	< 0.0076	< 0.019	< 0.016	<0.016	<0.016	2	10
Sulfate	0.13	< 0.11	< 0.14	< 0.11	<0.11	<0.11	125	250
Total Alkalinity	100	160	110	100	---	----	----	----
Total Organic Carbon	4	4	4	4	---	----	----	----
pH	6.98	7.26	7.02	---	7.24	6.92	----	----
Conductivity (mS/cm)	0.231	0.391	0.26	---	0.271	370	----	----
Temperature (C)	10.01	10.61	10.6	---	9.64	10.78	----	----
ORP (mV)	107	89	140	---	147	-137.2	----	----
Dissolved Oxygen (mg/L)	0.41	1.11	0.99	---	1.12	1.24	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-2S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	4/22/2003	10/7/2003	4/13/2004	12/2/2004	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	< 0.37	< 0.37	0.14	< 0.14	0.21	0.29	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.4	< 0.18	< 0.18	<0.16	<0.16	96	480
Acetone	3.8	< 1.1	< 0.66	4.1	<0.74	<0.74	200	1000
Benzene	0.91	0.45	1.3	1.2	1.3	0.82	0.5	5
Carbon disulfide	< 0.24	< 0.24	< 0.21	0.44	<0.28	<0.28	200	1000
Chlorobenzene	19	1.5	13	7.1	23	19	-----	-----
Chloroethane	< 0.29	< 0.29	< 0.22	< 0.22	<0.24	0.27	80	400
Methylene chloride	2.8	< 0.29	< 0.28	< 0.28	0.42	<0.19	0.5	5
Naphthalene	< 0.42	< 0.42	< 0.16	< 0.16	<0.15	0.21	8	40
Metals, mg/L								
Arsenic	0.012	0.012	0.011	0.013	0.012	0.0123	0.001	0.01
Barium	0.17	0.14	0.18	0.14	0.18	0.2	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	0.00041	<0.00028	0.0005	0.005
Cobalt	0.008	0.0013	0.0019	0.0039	0.0022	0.0033	0.008	0.04
Iron	29.5	29.3	40	36.2	42.1	42.2	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	1.9	2.8	3	2.3	2.2	2.36	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000067	< 0.000029	<0.000029	0.000061	0.0002	0.002
Vanadium	0.00084	0.002	0.0013	0.0022	0.0019	0.001	0.006	0.03
Dissolved Gases, ug/L								
Ethane	< 1.5	< 1.5	< 3	< 1.4	---	----	----	----
Ethene	< 1.4	< 1.4	< 2.9	< 1.3	---	----	----	----
Methane	520	540	870	3200	---	----	----	----
Natural Attenuation Parameters, mg/L								
Chloride	26.1	18.4	12.8	9.2	34.5	14.9	125	250
Nitrate as N	< 0.0076	0.01	< 0.019	< 0.016	<0.016	<0.016	2	10
Sulfate	< 0.11	0.22	0.25	0.23	0.12	< 0.11	125	250
Total Alkalinity	180	170	230	160	---	----	----	----
Total Organic Carbon	6	4	5	6	---	----	----	----
pH	6.47	6.74	6.47	---	6.29	6.01	----	----
Conductivity (mS/cm)	0.563	0.476	0.56	---	10.43	366	----	----
Temperature (C)	10.65	11.36	10.83	---	10.43	10.98	----	----
ORP (mV)	133	96	168	---	176	-53	----	----
Dissolved Oxygen (mg/L)	3.35	0.9	1.93	---	2.49	1.95	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-4S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	Duplicate 12/12/2002	4/22/2003	10/8/2003	4/13/2004	Duplicate 4/13/2004	9/24/2004	12/2/2004	Duplicate 12/3/2004	3/10/2005	Duplicate 3/10/2005	6/9/2005	Duplicate 6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	540	570	780	1100	1100	1000	1900	1600	1500	1100	1100	1500	1700	96	480
1,3,5-Trimethylbenzene	120	130	170	230	310	280	390	410	360	260	270	380	420	96	480
Benzene	< 9.2	< 9.2	< 11	< 17	13	17	<16	<11	<11	<7.3	<7.3	<11	<11	0.5	5
Ethylbenzene	10	< 10	16	38	9.4	8.4	50	26	27	21	21	32	27	140	700
Methylene chloride	< 7.2	< 7.2	< 8.3	< 23	< 11	< 8	<14	49	42	<6.3	<6.3	<9.5	<9.5	0.5	5
Naphthalene	< 10	< 10	14	20	< 6.4	7.6	<11	<7.5	<7.5	14	13	32	25	8	40
Xylenes (total)	29	27	54	160	52	39	210	93	87	77	79	140	120	1,000	10,000
Metals, mg/L															
Arsenic	0.0089	0.009	0.0065	0.0091	0.0066	0.0083	0.0066	0.0095	0.01	0.0083	0.0101	0.0091	0.0092	0.001	0.01
Barium	0.3	0.32	0.26	0.29	0.33	0.33	0.29	0.32	0.33	0.315	0.313	0.361	0.342	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00028	< 0.00036	< 0.00028	< 0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.00074	< 0.0011	< 0.00096	< 0.00096	<0.00096	<0.00096	<0.00096	<0.00096	<0.00096	<0.00096	<0.00096	0.008	0.04
Iron	16.9	17.2	15.4	18.9	24.7	25.4	18	22.9	23.2	23.8	23.3	27.5	25.9	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0016	< 0.0023	< 0.0017	< 0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	2.1	2.1	1.8	2.1	2.1	2.2	2.1	2.5	2.5	2.14	2.13	2.29	2.14	0.025	0.05
Mercury	< 0.000087	< 0.000087	< 0.000087	< 0.000067	< 0.000029	< 0.000029	0.000045	<0.000029	<0.000029	<0.000029	<0.000029	0.000087	0.000042	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00067	< 0.00096	< 0.00071	0.00088	<0.00071	<0.00071	0.0012	0.0011	0.00074	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L															
Ethane	< 3	< 3	< 3	< 3	< 2.8	< 2.8	---	---	---	----	----	----	----	----	----
Ethene	< 2.9	< 2.9	< 2.9	< 2.9	< 2.6	< 2.6	---	---	---	----	----	----	----	----	----
Methane	1200	750	1700	1400	160	500	---	---	---	----	----	----	----	----	----
Natural Attenuation Parameters, mg/L															
Chloride	13.5	13.5	10.2	7.7	11.4	11	---	5.9	6.1	----	----	15.9	15.6	125	250
Nitrate as N	< 0.0076	< 0.0076	< 0.0076	< 0.019	< 0.016	< 0.016	---	<0.016	<0.016	----	----	<0.016	<0.016	2	10
Sulfate	0.98	0.92	0.22	0.15	1		---	0.14	0.44	----	----	0.16	0.18	125	250
Total Alkalinity	280	280	260	290	310	310	---	---	---	----	----	----	----	----	----
Total Organic Carbon	5	6	5	4	12	14	---	---	---	----	----	----	----	----	----
pH	6.66	7.15	---	6.825	---	---	6.34	6.61	---	7.22	---	6.44	----	----	----
Conductivity (mS/cm)	0.612	0.543	---	0.611	---	---	0.635	0.645	---	0.596	----	391	----	----	----
Temperature (C)	12.02	10.15	---	11.72	---	---	11.88	12.44	---	11.19	----	10.49	----	----	----
ORP (mV)	117	132	---	133	---	---	181	173	---	179	----	-78.3	----	----	----
Dissolved Oxygen (mg/L)	4.49	0.58	---	7.49	---	---	3.02	1.13	---	2.08	----	1.43	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-5S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/22/2003	10/7/2003	4/14/2004	Duplicate 4/14/2004	9/23/2004	Duplicate 9/23/2004	12/2/2004	Duplicate 12/2/2004	3/10/2005	6/10/2005	Duplicate 6/10/2005	PAL	ES
1,2,4-Trimethylbenzene	210	180	750	67	51	210	150	1300	1200	490	1300	1200	96	480
1,3,5-Trimethylbenzene	47	38	200	2.7	2.4	19	15	350	330	48	390	370	96	480
Benzene	< 2.8	< 2.1	< 13	1.5	0.56	<1.3	<1.7	<11	<11	<2.8	<9.2	<9.2	0.5	5
Ethylbenzene	6.2	5.1	29	1.5	1.2	5.9	5.7	60	54	17	57	51	140	700
Methylene chloride	3.9	< 1.7	< 19	< 0.93	< 0.56	<1.1	<1.5	41	41	<2.4	<7.9	<7.9	0.5	5
Naphthalene	6.2	5.4	28	2.2	1.6	7.7	14	<7.5	<7.5	19	41	40	8	40
Xylenes (total)	12	13	150	2	1.8	120	94	160	160	61	250	240	1,000	10,000
Metals, mg/L														
Arsenic	0.0098	0.011	0.022	0.01	0.012	0.0053	0.0047	0.012	0.012	0.0151	0.0231	0.0227	0.001	0.01
Barium	0.18	0.28	0.27	0.27	0.28	0.29	0.29	0.31	0.29	0.391	0.5	0.519	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	< 0.00028	<0.00028	<0.00028	0.00032	0.00033	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0025	0.0041	0.0058	0.0045	0.0041	0.0056	0.0054	0.0094	0.0091	0.0088	0.0126	0.0127	0.008	0.04
Iron	10.2	19.4	30.5	11.2	11.7	15.9	16.3	34.7	31.9	39.7	60.7	59.1	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	< 0.0017	<0.0017	0.003	<0.0017	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	1.6	2	2.3	1.3	1.3	2.5	2.6	3.3	3.1	2.83	3.86	3.83	0.025	0.05
Mercury	0.000088	< 0.000087	0.000075	< 0.000029	< 0.000029	<0.000029	<0.000029	<0.000029	<0.000029	<0.000029	0.00009	0.000058	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00096	< 0.00071	< 0.00071	<0.00071	<0.00071	<0.00071	<0.00071	<0.00071	0.0013	<0.00071	0.006	0.03
Dissolved Gases, ug/L														
Ethane	< 3	< 0.3	< 3	< 1.4	< 2.8	---	---	---	---	----	----	----	----	----
Ethene	< 2.9	< 0.29	< 2.9	< 1.3	< 2.6	---	---	---	---	----	----	----	----	----
Methane	130	230	910	1100	490	---	---	---	---	----	----	----	----	----
Natural Attenuation Parameters, mg/L														
Chloride	5.8	5.7	4.3	4.6	4.5	---	---	5	5	----	4.8	4.6	125	250
Nitrate as N	0.1	0.62	0.02	0.94	1.3	---	---	0.47	0.45	----	<0.016	<0.016	2	10
Sulfate	0.34	3.3	0.16	1.8	2.3		---	0.77	0.81	----	0.2	0.18	125	250
Total Alkalinity	140	160	180	160	160	---	---	---	---	----	----	----	----	----
Total Organic Carbon	5	4	9	6	6	---	---	---	---	----	----	----	----	----
pH	6.99	7.12	6.65	---	---	6.1	---	6.42	---	7.12	6.08	----	----	----
Conductivity (mS/cm)	0.333	0.379	0.425	---	---	0.645	---	0.549	---	0.489	340	----	----	----
Temperature (C)	12.4	9.66	12.77	---	---	13.51	---	12.73	---	10.51	10.5	----	----	----
ORP (mV)	106	117	151	---	---	192	---	178	---	183	-75.2	----	----	----
Dissolved Oxygen (mg/L)	1.75	0.74	5.12	---	---	2.27	---	1.17	---	2.51	0.76	----	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-6M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	10/7/2003	12/2/2004	6/8/2005	PAL	ES
1,1-Dichloroethane	< 0.3	0.61	0.27	0.21	85	850
1,2,4-Trimethylbenzene	< 0.37	< 0.14	0.23	26	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.18	<0.16	<0.16	96	480
Acetone	2.1	< 0.66	<0.74	<0.74	200	1000
cis-1,2-Dichloroethene	< 0.35	0.42	0.35	0.42	7	70
Ethylbenzene	< 0.41	< 0.19	<0.19	0.22	140	700
Methylene chloride	2.1	< 0.28	0.44	<0.19	0.5	5
Metals, mg/L						
Arsenic	0.0024	< 0.0029	<0.0026	<0.0026	0.001	0.01
Barium	0.75	0.89	0.77	1.07	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	<0.00096	0.008	0.04
Iron	< 0.042	0.12	<0.049	<0.049	0.15	0.3
Lead	< 0.0016	0.0024	0.0023	<0.0017	0.0015	0.015
Manganese	1.7	2.8	2	2.48	0.025	0.05
Mercury	0.000097	< 0.000067	<0.000029	0.000055	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.3	< 0.3	---	----	----	----
Ethene	< 0.29	< 0.29	---	----	----	----
Methane	1.1	6.6	---	----	----	----
Natural Attenuation Parameters, mg/L						
Chloride	6	4.7	5	7.4	125	250
Nitrate as N	< 0.0076	0.02	<0.016	<0.016	2	10
Sulfate	0.42	1.8	0.2	0.21	125	250
Total Alkalinity	100	140	---	----	----	----
Total Organic Carbon	4	3	---	----	----	----
pH	7.49	7.44	7.64	7.53	----	----
Conductivity (mS/cm)	0.227	0.289	0.3	199	----	----
Temperature (C)	10.5	10.71	10.25	10.51	----	----
ORP (mV)	96	140	195	25.4	----	----
Dissolved Oxygen (mg/L)	0.42	4.41	3.22	1.42	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-6S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	10/7/2003	12/2/2004	6/8/2005	PAL	ES
1,1-Dichloroethane	0.55	0.71	0.29	0.31	85	850
Acetone	2.6	< 0.66	<0.74	<0.74	200	1000
cis-1,2-Dichloroethene	< 0.35	0.59	0.36	0.49	7	70
Methylene chloride	2.2	< 0.28	0.54	<0.19	0.5	5
Trichloroethene	< 0.42	0.37	<0.28	<0.28	0.5	5
Metals, mg/L						
Arsenic	< 0.0021	< 0.0029	<0.0026	<0.0026	0.001	0.01
Barium	0.17	0.13	0.22	0.265	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0022	< 0.0011	0.0025	0.0019	0.008	0.04
Iron	0.065	< 0.044	0.25	0.16	0.15	0.3
Lead	< 0.0016	< 0.0023	<0.0017	<0.0017	0.0015	0.015
Manganese	2.7	2.7	3.6	4.68	0.025	0.05
Mercury	< 0.000087	< 0.000067	<0.000029	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.3	< 0.3	---	----	----	----
Ethene	< 0.29	< 0.29	---	----	----	----
Methane	2.9	7.9	---	----	----	----
Natural Attenuation Parameters, mg/L						
Chloride	6.7	5.6	11	12.7	125	250
Nitrate as N	< 0.0076	< 0.019	<0.016	<0.016	2	10
Sulfate	4	3.6	9.7	0.99	125	250
Total Alkalinity	160	150	---	----	----	----
Total Organic Carbon	6	5	---	----	----	----
pH	7.45	7.37	7.25	6.97	----	----
Conductivity (mS/cm)	0.342	0.307	0.506	316	----	----
Temperature (C)	11.1	10.28	11.4	9.17	----	----
ORP (mV)	113	127	191	31	----	----
Dissolved Oxygen (mg/L)	2.86	3.08	0.84	7.47	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-8M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	10/7/2003	12/2/2004	6/8/2005	PAL	ES
1,2,4-Trimethylbenzene	< 0.37	0.36	1.7	4.1	96	480
1,3,5-Trimethylbenzene	< 0.4	0.22	<0.16	1.6	96	480
Acetone	2.9	< 0.66	<0.74	<0.74	200	1000
Benzene	< 0.37	< 0.2	0.3	0.53	0.5	5
Chloroethane	< 0.29	< 0.22	0.43	<0.24	80	400
cis-1,2-Dichloroethene	< 0.35	< 0.25	0.41	0.39	7	70
Ethylbenzene	< 0.41	< 0.19	2.4	2.6	140	700
Methylene chloride	3.2	< 0.28	0.55	<0.19	0.5	5
Naphthalene	< 0.42	< 0.16	<0.15	0.43	8	40
Trichloroethene	< 0.42	0.23	0.3	<0.28	0.5	5
Metals, mg/L						
Arsenic	< 0.0021	< 0.0029	0.0027	0.0047	0.001	0.01
Barium	0.68	0.73	0.7	0.997	0.4	2
Cadmium	< 0.00028	< 0.00036	0.0003	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	<0.00096	0.008	0.04
Iron	< 0.042	0.045	0.12	**0.4**	0.15	0.3
Lead	< 0.0016	< 0.0023	0.002	<0.0017	0.0015	0.015
Manganese	**2.7**	**2.8**	**3.3**	**4.34**	0.025	0.05
Mercury	0.00009	< 0.000067	<0.000029	0.000063	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.3	< 0.3	---	----	----	----
Ethene	< 0.29	< 0.29	---	----	----	----
Methane	2	110	---	----	----	----
Natural Attenuation Parameters, mg/L						
Chloride	2.6	12.8	14	21.9	125	250
Nitrate as N	< 0.0076	< 0.019	<0.016	<0.016	2	10
Sulfate	5.7	1.1	0.84	0.48	125	250
Total Alkalinity	220	240	---	----	----	----
Total Organic Carbon	2	3	---	----	----	----
pH	7.41	7.31	7.37	7.3	----	----
Conductivity (mS/cm)	0.422	0.479	0.558	393	----	----
Temperature (C)	9.95	10.44	10.21	10.88	----	----
ORP (mV)	105	150	194	-49.1	----	----
Dissolved Oxygen (mg/L)	1.74	0.92	1.02	0.79	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-8S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	10/7/2003	12/2/2004	6/8/2005	PAL	ES
Acetone	2.2	< 0.66	<0.74	<0.74	200	1000
Methylene chloride	2.6	< 0.28	0.5	<0.19	0.5	5
Metals, mg/L						
Arsenic	< 0.0021	< 0.0029	<0.0026	<0.0026	0.001	0.01
Barium	0.088	0.093	0.073	0.0637	0.4	2
Cadmium	< 0.00028	< 0.00036	0.00029	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	<0.00096	0.008	0.04
Iron	0.052	< 0.044	**0.45**	<0.049	0.15	0.3
Lead	< 0.0016	< 0.0023	<0.0017	<0.0017	0.0015	0.015
Manganese	**0.59**	**0.32**	**0.79**	**0.33**	0.025	0.05
Mercury	< 0.000087	< 0.000067	<0.000029	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	0.001	<0.00071	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.3	< 0.3	---	---	----	----
Ethene	< 0.29	< 0.29	---	---	----	----
Methane	0.58	6.2	---	---	----	----
Natural Attenuation Parameters, mg/L						
Chloride	9.5	17.2	7.1	6.8	125	250
Nitrate as N	1.5	0.15	0.21	0.087	2	10
Sulfate	12.3	5.6	12.2	9.4	125	250
Total Alkalinity	190	230	---	---	----	----
Total Organic Carbon	0.9	2	---	---	----	----
pH	7.32	7.15	7.41	7.15	----	----
Conductivity (mS/cm)	0.44	0.497	0.373	237	----	----
Temperature (C)	11.73	11.96	12.14	9.5	----	----
ORP (mV)	124	177	208	163	----	----
Dissolved Oxygen (mg/L)	7.07	4.3	3.34	6.64	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-10M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	6/8/2005	PAL	ES
Acetone	1	200	1000
Carbon disulfide	0.71	200	1000
cis-1,2-Dichloroethene	0.34	7	70
Trichloroethene	0.37	0.5	5

Metals, mg/L			
Arsenic	<0.0026	0.001	0.01
Barium	0.104	0.4	2
Cadmium	<0.00028	0.0005	0.005
Cobalt	0.0012	0.008	0.04
Iron	0.068	0.15	0.3
Lead	<0.0017	0.0015	0.015
Manganese	2.33	0.025	0.05
Mercury	0.000048	0.0002	0.002
Vanadium	0.00095	0.006	0.03

Natural Attenuation Parameters, mg/L			
Chloride	1.6	125	250
Nitrate as N	<0.016	2	10
Sulfate	6.2	125	250
Total Alkalinity	----	----	----
Total Organic Carbon	----	----	----

pH	7.22	----	----
Conductivity (mS/cm)	232	----	----
Temperature (C)	11.06	----	----
ORP (mV)	126	----	----
Dissolved Oxygen (mg/L)	1.45	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-12S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	10/7/2003	6/9/2005	PAL	ES
Acetone	3	< 0.66	<0.74	200	1000
Methylene chloride	2.7	< 0.28	<0.19	0.5	5
Naphthalene	< 0.42	< 0.16	0.17	8	40
Metals, mg/L					
Arsenic	< 0.0021	< 0.0029	<0.0026	0.001	0.01
Barium	0.021	0.021	0.0158	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	0.008	0.04
Iron	< 0.042	< 0.044	<0.049	0.15	0.3
Lead	0.0034	< 0.0023	<0.0017	0.0015	0.015
Manganese	0.0023	0.0017	0.0025	0.025	0.05
Mercury	< 0.000087	< 0.000067	<0.000029	0.0002	0.002
Vanadium	< 0.00067	0.0013	<0.00071	0.006	0.03
Dissolved Gases, ug/L					
Ethane	< 0.3	< 0.3	---	---	---
Ethene	< 0.29	< 0.29	---	---	---
Methane	< 0.39	< 0.39	---	---	---
Natural Attenuation Parameters, mg/L					
Chloride	24.3	9.1	3.5	125	250
Nitrate as N	1.6	1.4	1	2	10
Sulfate	7.2	5	4.4	125	250
Total Alkalinity	170	210	---	---	---
Total Organic Carbon	1	0.8	---	---	---
pH	7.29	7.44	6.81	---	---
Conductivity (mS/cm)	0.444	0.438	197	---	---
Temperature (C)	12.04	11.97	9.34	---	---
ORP (mV)	132	190	185.5	---	---
Dissolved Oxygen (mg/L)	5.86	9.0	11.92	---	---

Note: Please see notes provided at the end of this table.

Table 3-2
MW-14S
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/23/2003	10/8/2003	4/13/2004	12/2/2004	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	1.7	0.97	5.5	2.1	3.1	2.5	96	480
1,3,5-Trimethylbenzene	0.64	< 0.4	1.8	0.8	1.3	0.96	96	480
Acetone	4.3	< 1.1	< 3.3	< 0.66	2	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 1	0.43	<0.37	<0.22	0.5	5
Ethylbenzene	< 0.41	< 0.41	1.2	0.4	0.78	0.76	140	700
Methylene chloride	2.1	< 0.29	< 1.4	< 0.28	1.2	<0.19	0.5	5
Naphthalene	5	2.2	18	6	11	13	8	40
Xylenes (total)	1.4	0.47	2.3	1.1	2.1	2.3	1,000	10,000
Metals, mg/L								
Arsenic	< 0.0021	< 0.0021	< 0.0029	< 0.0026	0.0029	<0.0026	0.001	0.01
Barium	0.18	0.084	0.19	0.11	0.16	0.168	0.4	2
Cadmium	0.00045	< 0.00028	< 0.00036	< 0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0052	0.0015	< 0.0011	0.0017	0.0013	0.0018	0.008	0.04
Iron	11.6	2.5	17.8	5.4	12.1	12.9	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	3.7	0.83	7	1.9	3.1	2.88	0.025	0.05
Mercury	0.000088	< 0.000087	< 0.000067	< 0.000029	<0.000029	0.000069	0.0002	0.002
Vanadium	< 0.00067	< 0.00067	< 0.00096	< 0.00071	0.0011	<0.00071	0.006	0.03
Dissolved Gases, ug/L								
Ethane	< 3	< 0.6	< 3	< 1.4	---	---	----	----
Ethene	< 2.9	< 0.58	< 2.9	< 1.3	---	---	----	----
Methane	450	430	1200	1700	---	---	----	----
Natural Attenuation Parameters, mg/L								
Chloride	5	5.4	7.3	5.7	3.4	4.4	125	250
Nitrate as N	0.01	0.34	< 0.019	0.21	0.082	0.13	2	10
Sulfate	3	5.4	0.18	8.4	4.3	3.9	125	250
Total Alkalinity	210	150	170	160	---		----	----
Total Organic Carbon	14	5	12	10	---		----	----
pH	6.88	6.96	6.89	---	6.41	6.45	----	----
Conductivity (mS/cm)	0.441	0.328	0.404	---	0.385	229	----	----
Temperature (C)	11.13	7.7	12.24	---	11.6	9.3	----	----
ORP (mV)	114	166	162	---	188	-45.5	----	----
Dissolved Oxygen (mg/L)	3.22	5.02	6.03	---	2.11	4.08	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
MW-15M
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	10/7/2003	Duplicate 10/7/2003	12/2/2004	6/8/2005	PAL	ES
1,1-Dichloroethane	1	< 0.26	< 0.26	<0.21	<0.21	85	850
1,2,4-Trimethylbenzene	< 0.37	0.29	0.28	<0.12	<0.12	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.18	< 0.18	<0.16	<0.16	96	480
Chlorobenzene	< 0.38	< 0.16	< 0.16	<0.2	0.26	-----	-----
cis-1,2-Dichloroethene	0.56	0.29	0.26	<0.21	<0.21	7	70
Methylene chloride	3	< 0.28	< 0.28	0.44	<0.19	0.5	5
Metals, mg/L							
Arsenic	0.0054	< 0.0029	< 0.0029	<0.0026	0.0026	0.001	0.01
Barium	0.86	0.74	0.75	0.44	0.958	0.4	2
Cadmium	0.00031	0.00092	< 0.00036	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0012	< 0.0011	< 0.0011	<0.00096	<0.00096	0.008	0.04
Iron	1.1	4.1	1.6	0.51	0.64	0.15	0.3
Lead	0.0049	0.13	0.043	<0.0017	0.002	0.0015	0.015
Manganese	3.6	3.4	3.5	2.2	4.65	0.025	0.05
Mercury	0.000092	< 0.000067	< 0.000067	<0.000029	0.0001	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	< 0.00096	<0.00071	<0.00071	0.006	0.03
Dissolved Gases, ug/L							
Ethane	< 0.3	< 0.3	< 0.3	---	---	-----	----
Ethene	< 0.29	< 0.29	< 0.29	---	---	-----	----
Methane	12	19	21	---	---	-----	----
Natural Attenuation Parameters, mg/L							
Chloride	5.2	5.1	5.2	3.8	12.3	125	250
Nitrate as N	0.03	< 0.019	< 0.019	<0.016	<0.016	2	10
Sulfate	2.4	5.8	5.6	5.5	3.6		250
Total Alkalinity	240	230	230	---	---	-----	----
Total Organic Carbon	3	2	2	---	---	-----	----
pH	7.25	7.2	---	7.44	7.2	-----	----
Conductivity (mS/cm)	0.466	0.469	---	0.299	320	-----	----
Temperature (C)	10.65	10.76	---	10.31	10.64	-----	----
ORP (mV)	93	100	---	172	-59.2	-----	----
Dissolved Oxygen (mg/L)	0.51	2.3	---	0.68	0.66	-----	----

Note: Please see notes provided at the end of this table.

Table 3-2
PZ-2
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	10/7/2003	12/2/2004	6/9/2005	PAL	ES
Acetone	2.6	< 0.66	2.9	<0.74	200	1000
Carbon disulfide	< 0.24	< 0.21	<0.28	0.56	200	1000
Methylene chloride	2.4	< 0.28	0.64	<0.19	0.5	5
Metals, mg/L						
Arsenic	**0.056**	< 0.0029	**0.011**	0.007	0.001	0.01
Barium	0.66	0.071	0.14	0.117	0.4	2
Cadmium	< 0.00028	< 0.00036	0.00033	<0.00028	0.0005	0.005
Cobalt	0.011	< 0.0011	0.0024	0.0046	0.008	0.04
Iron	**98.8**	**20.8**	**39.6**	**17.3**	0.15	0.3
Lead	0.0062	< 0.0023	<0.0017	<0.0017	0.0015	0.015
Manganese	**5.2**	**1.5**	**3.4**	**3.59**	0.025	0.05
Mercury	0.00013	< 0.000067	<0.000029	0.00005	0.0002	0.002
Vanadium	0.026	0.0016	0.0017	0.0014	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.6	< 3	---	---	----	----
Ethene	< 0.58	< 2.9	---	---	----	----
Methane	98	490	---	---	----	----
Natural Attenuation Parameters, mg/L						
Chloride	8.6	6.6	9.1	6.7	125	250
Nitrate as N	< 0.0076	< 0.019	<0.016	<0.016	2	10
Sulfate	2.4	< 0.14	3.2	2	125	250
Total Alkalinity	160	77	---	---	----	----
Total Organic Carbon	15	7	---	---	----	----
pH	6.68	6.67	6.41	5.72	----	----
Conductivity (mS/cm)	0.432	0.239	0.412	235	----	----
Temperature (C)	11.03	11.08	10.89	8.85	----	----
ORP (mV)	116	149	173	-68.1	----	----
Dissolved Oxygen (mg/L)	5.14	4.43	1.6	0.92	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
PZ-3
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/11/2002	10/7/2003	12/2/2004	6/8/2005	PAL	ES
1,2,4-Trimethylbenzene	< 0.37	< 0.14	<0.12	4.3	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.18	<0.16	<0.16	96	480
Acetone	3.1	< 0.66	1.3	<0.74	200	1000
cis-1,2-Dichloroethene	< 0.35	< 0.25	<0.21	0.26	7	70
Methylene chloride	2.5	< 0.28	1.1	<0.19	0.5	5
Metals, mg/L						
Arsenic	0.0038	< 0.0029	<0.0026	<0.0026	0.001	0.01
Barium	0.097	0.081	0.16	0.166	0.4	2
Cadmium	0.00099	< 0.00036	<0.00028	<0.00028	0.0005	0.005
Cobalt	0.0018	< 0.0011	0.0014	0.0016	0.008	0.04
Iron	**1.2**	**0.58**	**1.5**	**2.4**	0.15	0.3
Lead	< 0.0016	< 0.0023	<0.0017	<0.0017	0.0015	0.015
Manganese	**2.7**	**2.2**	**3.9**	**4.14**	0.025	0.05
Mercury	0.00012	0.00007	<0.000029	0.000055	0.0002	0.002
Vanadium	0.0028	< 0.00096	0.00092	0.0012	0.006	0.03
Dissolved Gases, ug/L						
Ethane	< 0.3	< 0.3	---	---	----	----
Ethene	< 0.29	< 0.29	---	---	----	----
Methane	2.4	51	---	---	----	----
Natural Attenuation Parameters, mg/L						
Chloride	6.3	5.5	7.8	6.9	125	250
Nitrate as N	< 0.0076	< 0.019	<0.016	<0.016	2	10
Sulfate	1.2	3.5	0.74	1.5	125	250
Total Alkalinity	160	180	---	---	----	----
Total Organic Carbon	---	6	---	---	----	----
pH	7.06	6.96	6.97	6.89	----	----
Conductivity (mS/cm)	0.33	0.363	0.558	304	----	----
Temperature (C)	10.98	10.18	11.09	9.46	----	----
ORP (mV)	133	191	179	-18.9	----	----
Dissolved Oxygen (mg/L)	4.48	3.83	0.78	1.39	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
PZ-4
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	10/7/2003	6/8/2005	PAL	ES
1,1-Dichloroethane	< 0.3	0.33	0.25	85	850
Acetone	3.5	< 0.66	<0.74	200	1000
cis-1,2-Dichloroethene	< 0.35	0.46	0.55	7	70
Methylene chloride	2.6	< 0.28	<0.19	0.5	5
Trichloroethene	< 0.42	0.34	<0.28	0.5	5
Metals, mg/L					
Arsenic	< 0.0021	< 0.0029	<0.0026	0.001	0.01
Barium	0.12	0.077	0.145	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	0.0005	0.005
Cobalt	0.001	< 0.0011	0.0029	0.008	0.04
Iron	< 0.042	< 0.044	<0.049	0.15	0.3
Lead	< 0.0016	< 0.0023	<0.0017	0.0015	0.015
Manganese	**2.6**	**2**	**3.84**	0.025	0.05
Mercury	0.000088	< 0.000067	<0.000029	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	<0.00071	0.006	0.03
Dissolved Gases, ug/L					
Ethane	< 0.3	< 0.3	---	---	---
Ethene	< 0.29	< 0.29	---	---	---
Methane	< 0.39	10	---	---	---
Natural Attenuation Parameters, mg/L					
Chloride	5.5	4.5	13.1	125	250
Nitrate as N	< 0.0076	< 0.019	<0.016	2	10
Sulfate	4.2	5.1	1.7	125	250
Total Alkalinity	130	130	---	---	---
Total Organic Carbon	5	4	---	---	---
pH	7.53	7.17	7.11	---	---
Conductivity (mS/cm)	0.278	0.283	239	---	---
Temperature (C)	11.80	11.52	9.68	---	---
ORP (mV)	105	133	67	---	---
Dissolved Oxygen (mg/L)	12	3.89	0.84	---	---

Note: Please see notes provided at the end of this table.

Table 3-2
PZ-5
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	4/23/2003	10/8/2003	4/13/2004	12/2/2004	6/9/2005	PAL	ES
Acetone	3	< 1.1	< 0.66	< 0.66	<0.74	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 0.2	0.49	<0.22	<0.22	0.5	5
Methylene chloride	2.5	0.34	< 0.28	< 0.28	0.48	<0.19	0.5	5
Metals, mg/L								
Arsenic	< 0.0021	< 0.0021	< 0.0029	< 0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.091	0.075	0.082	0.061	0.061	0.0767	0.4	2
Cadmium	< 0.00028	< 0.00028	< 0.00036	< 0.00028	0.00048	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.00074	< 0.0011	0.001	<0.00096	0.0019	0.008	0.04
Iron	0.13	0.12	< 0.044	0.59	0.091	0.074	0.15	0.3
Lead	< 0.0016	< 0.0016	< 0.0023	< 0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	0.18	0.17	0.43	0.67	0.73	1.67	0.025	0.05
Mercury	0.000098	< 0.000087	< 0.000067	< 0.000029	<0.000029	0.000048	0.0002	0.002
Vanadium	0.0011	0.00075	< 0.00096	0.0012	0.0011	<0.00071	0.006	0.03
Dissolved Gases, ug/L								
Ethane	< 0.6	< 0.3	< 0.3	< 0.28	---	----	----	----
Ethene	< 0.58	< 0.29	< 0.29	< 0.26	---	----	----	----
Methane	130	210	47	47	---	----	----	----
Natural Attenuation Parameters, mg/L								
Chloride	9.7	8.6	5.6	2.6	1.4	2.8	125	250
Nitrate as N	0.48	0.37	0.28	0.47	0.088	1.3	2	10
Sulfate	5.7	10.1	5.5	4.6	3.6	6.5	125	250
Total Alkalinity	260	220	260	190	---	----	----	----
Total Organic Carbon	2	1	2	2	---	----	----	----
pH	7.15	7.18	7.16	---	7.31	6.87	----	----
Conductivity (mS/cm)	0.529	0.469	0.492	---	0.361	249	----	----
Temperature (C)	10.98	8.72	10.56	---	10.95	9.11	----	----
ORP (mV)	112	159	157	---	208	164.4	----	----
Dissolved Oxygen (mg/L)	1.21	2.42	3.63	---	4.17	4.32	----	----

Note: Please see notes provided at the end of this table.

Table 3-2
Ackerman
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	4/22/2003	10/7/2003	9/23/2004	6/8/2005	PAL	ES
	(No VOCs Detected)					
Metals, mg/L						
Arsenic	< 0.0021	< 0.0029	<0.0026	<0.0026	0.001	0.01
Barium	0.024	0.023	0.022	0.0217	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	<0.00096	0.008	0.04
Iron	**5.9**	**1.7**	**5.4**	**3.8**	0.15	0.3
Lead	0.0034	< 0.0023	<0.0017	<0.0017	0.0015	0.015
Manganese	**0.12**	**0.085**	**0.13**	**0.105**	0.025	0.05
Mercury	< 0.000087	< 0.000067	0.000061	0.000044	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	<0.00071	<0.00071	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 3-2
Johnson
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	4/22/2003	10/8/2003	9/23/2004	12/2/2004	3/10/2005	6/9/2005	PAL	ES
1,2,4-Trimethylbenzene	< 0.37	0.18	<0.12	<0.12	<0.12	<0.12	96	480
1,3,5-Trimethylbenzene	< 0.4	< 0.18	<0.16	<0.16	<0.16	<0.16	96	480
Chloromethane	< 0.49	< 0.26	0.18	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	< 0.29	< 0.28	<0.19	0.4	<0.19	<0.19	0.5	5
Metals, mg/L								
Arsenic	< 0.0021	< 0.0029	<0.0026	<0.0026	<0.0026	<0.0026	0.001	0.01
Barium	0.084	0.087	0.083	0.089	0.0751	0.116	0.4	2
Cadmium	< 0.00028	< 0.00036	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00074	< 0.0011	<0.00096	<0.00096	<0.00096	<0.00096	0.008	0.04
Iron	0.16	0.16	0.079	0.17	0.0576	0.72	0.15	0.3
Lead	< 0.0016	< 0.0023	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	0.2	0.32	0.35	0.2	0.0424	0.948	0.025	0.05
Mercury	< 0.000087	< 0.000067	<0.000029	<0.000029	<0.000029	0.000086	0.0002	0.002
Vanadium	< 0.00067	< 0.00096	<0.00071	<0.00071	<0.00071	<0.00071	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 3-2
Miller
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	9/24/2004	12/2/2004	3/10/2005	6/9/2005	PAL	ES
Chloromethane	0.18	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	<0.19	0.45	<0.19	<0.19	0.5	5
Toluene	1.5	<0.17	<0.17	<0.17	200	1,000

Metals, mg/L						
Arsenic	0.0072	0.0098	0.0078	0.0092	0.001	0.01
Barium	0.29	0.28	0.279	0.304	0.4	2
Cadmium	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	<0.00096	<0.00096	<0.00096	<0.00096	0.008	0.04
Iron	8.8	9.3	8	8.6	0.15	0.3
Lead	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	5.3	5	4.84	5.12	0.025	0.05
Mercury	0.000038	<0.000029	<0.000029	0.000057	0.0002	0.002
Vanadium	<0.00071	0.0014	<0.00071	0.0013	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 3-2
Pretasky
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	4/14/2004	9/23/2004	12/2/2004	3/10/2005	6/9/2005	PAL	ES
Benzene	0.34	<0.22	<0.22	<0.22	<0.22	0.5	5
Chloromethane	< 0.26	0.16	<0.14	<0.14	<0.14	0.3	3
Methylene chloride	< 0.28	<0.19	0.58	<0.19	<0.19	0.5	5
Metals, mg/L							
Arsenic	0.0082	0.0035	0.0074	0.0068	0.0081	0.001	0.01
Barium	0.083	0.1	0.093	0.0962	0.116	0.4	2
Cadmium	< 0.00028	<0.00028	<0.00028	<0.00028	<0.00028	0.0005	0.005
Cobalt	< 0.00096	<0.00096	<0.00096	<0.00096	<0.00096	0.008	0.04
Iron	0.22	0.51	0.15	0.17	0.19	0.15	0.3
Lead	< 0.0017	<0.0017	<0.0017	<0.0017	<0.0017	0.0015	0.015
Manganese	1.1	1.3	1.2	1.17	1.41	0.025	0.05
Mercury	< 0.000029	0.000061	<0.000029	<0.000029	0.000053	0.0002	0.002
Vanadium	0.0019	<0.00071	0.0015	0.001	0.0012	0.006	0.03

Note: Please see notes provided at the end of this table.

Table 3-2
TRIP BLANK
Summary of Detected Compounds
Former Onalaska Landfill

Volatile Organic Compounds (VOC), ug/L	12/12/2002	12/12/2002	4/22/2003	10/7/2003 (133874)	10/8/2003 (133875)	4/14/2004 (K544)	4/14/2004 (K581)	9/24/2004	12/2/2004	3/10/2005	(029) 6/9/2005	(041) 6/9/2005	PAL	ES
1,1-Dichloroethene	< 0.31	< 0.31	< 0.31	< 0.22	< 0.22	< 0.22	< 0.22	<0.18	<0.18	<0.18	0.3	<0.18	0.7	7
2-Butanone	< 0.59	< 0.59	2.2	0.45	< 0.36	1	1.1	3.3	2.5	<0.39	<0.39	<0.39	90	460
2-Hexanone	< 0.58	< 0.58	< 0.58	< 0.31	< 0.31	< 0.31	< 0.31	<0.35	0.42	<0.35	0.54	0.37	-----	-----
4-Methyl-2-pentanone	< 0.26	< 0.26	< 0.26	< 0.34	< 0.34	< 0.34	< 0.34	<0.32	<0.32	<0.32	0.66	0.51	50	500
Acetone	< 1.1	< 1.1	3.5	1	0.66	1.9	2.1	7.4	5	6.6	4.1	<0.74	200	1000
Benzene	< 0.37	< 0.37	< 0.37	< 0.2	< 0.2	< 0.2	0.32	<0.22	<0.22	<0.22	<0.22	<0.22	0.5	5
Methylene chloride	1.9	2	1	< 0.28	< 0.28	1.4	0.9	5.9	1.9	14	<0.19	<0.19	0.5	5
Toluene	< 0.39	< 0.39	< 0.39	< 0.17	< 0.17	< 0.17	< 0.17	0.19	0.21	<0.17	<0.17	<0.17	200	1,000

Note: Please see notes provided at the end of this table.

Table 3-2
Notes
Summary of Detected Compounds
Former Onalaska Landfill

For the VOC only; the compounds reported are the only VOC that have been detected since the December 2002 sampling event

Shaded cells indicate the compound exceeds the WDNR Preventive Action Level (PAL)

Shaded cell and bold number indicates the compound exceeds the WDNR PAL and Enforcement Standard (ES)

The ES and PAL criteria for trimethylbenzene (TMB) is the sum of 1,2,4-TMB and 1,3,5-TMB

< indicates the compound was not detected at or above the detection limit

--- indicates that there is no available criteria associated with the specified compound or the compound was not analyzed

Residential wells are sampled for VOC and metals only

Note: Please see notes provided at the end of this table.

Table 3-3
Comparison of Concentrations of Certain VOCs in the Groundwater
Onalaska Municipal Landfill

Well Number	Sample Date	Concentration in ppb				
		benzene	toluene	xylenes	1-1, DCA	TCE
MW-4S	10/31/93	0.93	54.64	317	5.71	0.13
	12/19/96	<0.3	7	371.4	<0.2	<1.0
	10/26/98	<8	<8	86	<8	<8
	11/1/01	<0.16	<0.18	30	<0.16	<0.14
	12/12/02	<9.2	<9.8	29	<7.5	<10
	10/8/03	<17	<14	160	<22	<18
	12/2/04	<11	<8.5	93	<10	<14
	6/9/05	<11	<8.5	140	<10	<14
MW-5S	10/31/93	0.78	160	469	3.39	0.29
	12/18/96	0.7	490.5	174.9	0.3	<1.0
	10/26/98	<0.4	28	27	<0.4	<0.4
	11/02/01	<0.16	0.48	180	<0.16	0.14
	12/12/02	<2.8	<3	13	<2.4	<3.2
	10/7/03	<13	<11	150	<15	<15
	12/2/04	<11	<8.5	100	<10	<14
	6/9/05	<9.2	<7.1	250	<8.8	<12
MW-6S	10/31/93	0.5	1.78	0.1	7.1	0.14
	10/2/96	<1	<1	<1	0.3	<1
	10/27/98	<0.4	<0.4	<0.4	<0.4	<0.4
	10/31/01	<0.16	<0.18	<0.33	0.33	0.16
	12/12/02	<0.37	<0.39	<0.44	0.55	<0.42
	10/7/03	<0.2	<0.17	<0.45	0.71	0.37
	12/2/04	<.22	<.17	<.44	.29	<.28
	6/8/05	<.22	<.17	<.44	.31	<.28

FIGURES

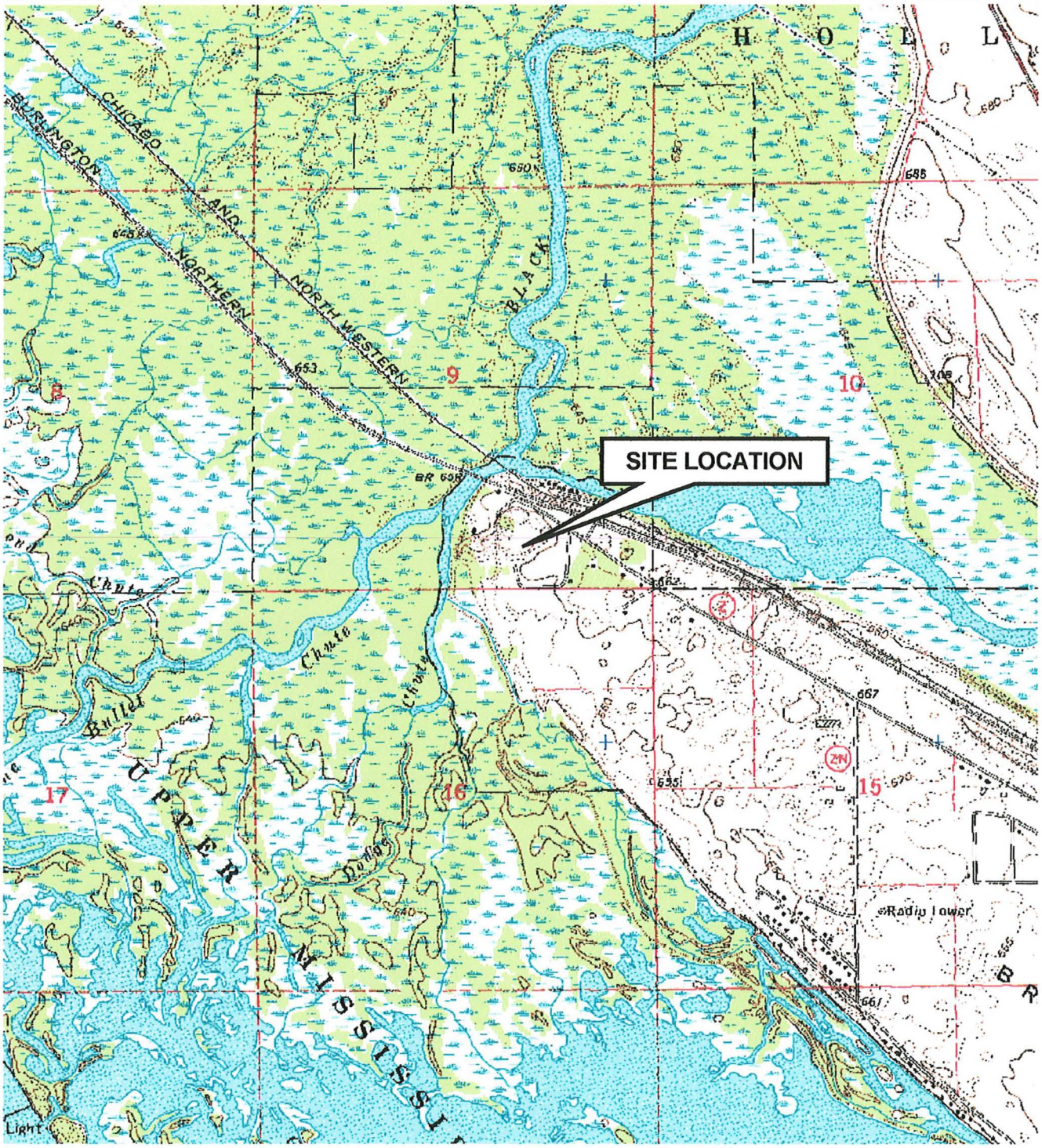
ENSR INTERNATIONAL

FIGURES

ONALASKA LANDFILL
2004/2005
ANNUAL MONITORING REPORT

September, 2005

J:\Projects and Proposal\07349 WDNR\Reporting\2004-2005 Annual Report\2004-2005 report.doc



SOURCE: USGS 7½ Minute Topographic Quadrangle Holmen, Wi-Minn., dated 1973, obtained from DeLorme

SCALE

0 1/4 1/2 1 MILE

N

ENSR INTERNATIONAL

FIGURE 1-1

SITE LOCATION MAP

Onalaska Landfill
Onalaska, Wisconsin

DRAWN: CMB	DATE: Aug 2003	PROJECT NO: 09413-114	REV: 0
FILE NO.: FIG1-1.DOC	CHECKED: PJM		

BLACK RIVER SHORELINE

MILLER

CANOE LANDING

PRETASKY

MW-1SR

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

SHORELINE RIVER BLACK

AW-1

JOHNSON WELL
MW-14S

MW-2
D M S

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 AW-9

MW-5S

EW-5

PROCESS BUILDING

AW-13

EW-4

PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20

AW-25

EW-2

AW-28

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6
M S

MW-7M

MW-15M

GRAVEL DRIVE

MW-8

SPORTSMANS CLUB ROAD

ACKERMAN WELL

S M D

MW-12S

GARDEN SPIGOTS

PZ-4

PASTURE

CROPLAND

MW-10M

MW-9M

MW-11M

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊡ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 1-2
Site Plan
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

SHORELINE

RIVER

BLACK

MILLER

PRETASKY

643.66
MW-1SR

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

643.60

643.54
AW-1

JOHNSON WELL
MW-14S
643.56

643.54
PZ-1
643.50

AW-9

CLARIFIER

AST WITH CONCRETE PIT

MW-5S
643.63

EW-5

PROCESS BUILDING

644.08
AW-13

EW-4

643.50
PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
643.40

AW-25
643.48

EW-2

AW-28
643.44

643.64
PZ-3

MW-2
D M S
643.61

643.62
MW-4S

EW-1

PZ-5
643.52

PZ-6
643.52

643.55

MW-7M

MW-6
M S
643.40

MW-15M

GRAVEL DRIVE

MW-8
S M D
643.45

ACKERMAN WELL

SPORTSMANS CLUB ROAD

MW-12S
643.49

643.50

GARDEN SPIGOTS

PZ-4
643.45

643.45

Inferrred direction of Groundwater Flow

PASTURE

CROPLAND

MW-10M

MW-9M

MW-11M

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- — — — = Approximate Property Boundary
- - - - - - = Approximate extent of landfill cap
- x—x—x— = Fence line
- u — u — u — u = Utility lines
- = Utility pole
- = Hydrant
- 643.45 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-1
Shallow Groundwater Elevation Map
September 23, 2004
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

MILLER

PRETASKY

MW-1SR

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

JOHNSON WELL
MW-14S

AW-1

CLARIFIER

MW-2
D M S
643.62

PZ-1 AW-9

MW-5S

AST WITH CONCRETE PIT

EW-5

PROCESS BUILDING

AW-13

EW-4

PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20

AW-25

EW-2

AW-28

643.60

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6
M S
643.40

642.40
MW-15M

643.53
MW-7M

GRAVEL DRIVE

MW-8

SPORTSMANS CLUB ROAD

643.50

ACKERMAN WELL

S M D
643.61

MW-12S

GARDEN SPIGOTS

PZ-4

PASTURE

CROPLAND

643.29
MW-10M

643.32
MW-9M

643.40
MW-11M

643.40

643.30

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.30 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-2
Medium Groundwater Elevation Map
September 23, 2004
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

SHORELINE

RIVER

BLACK

MILLER

PRETASKY

643.91
MW-1SR

CANOE LANDING

644.0

643.90

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

643.63
AW-1

JOHNSON WELL
MW-14S
643.71

643.62

PZ-1
643.59

AW-9

CLARIFIER

AST WITH CONCRETE PIT

MW-5S
643.65

EW-5

PROCESS BUILDING

643.86
AW-13

EW-4

646.59
PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
643.50

AW-25
643.53

EW-2

AW-28
643.55

643.64
MW-4S

EW-1

643.75
PZ-3

MW-6
M S
643.47

MW-15M

GRAVEL DRIVE

MW-8
S M D
643.47

ACKERMAN WELL

GARDEN SPIGOTS

PZ-4
643.52

PASTURE

MW-2
D M S
643.70

643.80

643.70

PZ-5
643.63

PZ-6
643.58

643.60

MW-7M
643.50

SPORTSMANS CLUB ROAD

643.50

MW-12S
643.52

CROPLAND

MW-10M

MW-9M

MW-11M

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.90 = Groundwater contour

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

N

Approximate Scale
1 inch = 175 feet

0 175 350

Figure 3-3
Shallow Groundwater Elevation Map
December 2, 2004
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

CANOE LANDING

MILLER

PRETASKY

MW-1SR

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

SHORELINE RIVER

COUNTY ROAD "Z"

BLACK RIVER

AW-1

JOHNSON WELL

MW-14S

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 AW-9

MW-5S

EW-5

PROCESS BUILDING

AW-13

EW-4

MW-2

D M S

643.70

PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20

AW-25

EW-2

AW-28

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6

M S

643.48

643.48

MW-15M

GRAVEL DRIVE

MW-8

S M D

643.50

ACKERMAN WELL

GARDEN SPIGOTS

PZ-4

SPORTSMANS CLUB ROAD

MW-12S

648.57

MW-7M

643.60

643.50

PASTURE

CROPLAND

643.34

MW-10M

643.36

MW-9M

643.43

MW-11M

643.40

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- — · — = Approximate Property Boundary
- - - - - - = Approximate extent of landfill cap
- x—x—x— = Fence line
- u — u — u — u = Utility lines
- = Utility pole
- = Hydrant
- ← = Inferred direction of groundwater flow
- 643.30 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-4
Medium Groundwater Elevation Map
December 2, 2004
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

MILLER

PRETASKY

644.12
MW-1SR

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

644

COUNTY ROAD "Z"

643.88
AW-1

JOHNSON WELL
MW-14S
643.91

MW-2
D M S
643.90

643.90

643.87
PZ-1
AW-9
643.59

CLARIFIER

AST WITH CONCRETE PIT

MW-5S
643.84

EW-5

PROCESS BUILDING

643.98
AW-13

EW-4

643.77
PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
643.71

AW-45
643.7

EW-2

AW-28
643.77

643.84
MW-4S

EW-1

643.94
PZ-3

PZ-5
643.84

PZ-6
643.77

643.80

MW-7M

MW-6
M S
643.68

MW-15M

GRAVEL DRIVE

MW-8
S M D
643.69

SPORTSMANS CLUB ROAD

ACKERMAN WELL

GARDEN SPIGOTS

PZ-4
643.73

MW-12S
643.70

643.70

PASTURE

CROPLAND

MW-10M

MW-9M

MW-11M

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.90 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-5
Shallow Groundwater Elevation Map
March 2, 2005
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC	DATE: July 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

SHORELINE RIVER BLACK

MILLER

PRETASKY

MW-1SR

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

AW-1

JOHNSON WELL
MW-14S

MW-2
D M S
643.91

CLARIFIER

643.90

PZ-1 AW-9

AST WITH CONCRETE PIT

MW-5S

EW-5

PROCESS BUILDING

AW-13

EW-4

643.80

PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20

AW-25

EW-2

AW-28

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6
M S
643.69

643.65
MW-15M

GRAVEL DRIVE

MW-7M
643.76

MW-8

SPORTSMANS CLUB ROAD

ACKERMAN WELL

S M D
643.72

MW-12S

GARDEN SPIGOTS

PZ-4

PASTURE

CROPLAND

643.55
MW-10M

643.57
MW-9M

643.65
MW-11M

643.70

643.60

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.60 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-6
Medium Groundwater Elevation Map
March 2, 2005
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: July 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

CANOE LANDING

MILLER

PRETASKY
643.90

MW-1SR
643.88

643.90

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

643.86
AW-1

JOHNSON WELL

MW-14S
643.92

MW-2
D M S
643.93

643.90

CLARIFIER

643.87
AW-9

PZ-1
643.85

AST WITH CONCRETE PIT

MW-5S
644.01

EW-5

PROCESS BUILDING

AW-13
644

EW-4

643.66
PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
643.84

AW-25
643.86

EW-2

643.85

643.83
MW-4S

AW-28
643.86

EW-1

PZ-3
643.85

PZ-5
643.83

643.80

PZ-6
643.77

MW-7M
643.79

MW-6
M S
643.58

MW-15M

GRAVEL DRIVE

MW-8

SPORTSMANS CLUB ROAD

ACKERMAN WELL

S M D
643.67

MW-12S
643.73

GARDEN SPIGOTS

PZ-4
643.67

643.70

PASTURE

CROPLAND

MW-10M

MW-9M

MW-11M

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.90 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-7
Shallow Groundwater Elevation Map
June 9, 2005
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC	DATE: July 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

MILLER

PRETASKY

MW-1SR

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

AW-1

JOHNSON WELL
MW-14S

CLARIFIER

MW-2
D M S
643.91

PZ-1 AW-9

MW-5S

AST WITH CONCRETE PIT

EW-5

PROCESS BUILDING

643.90

AW-13

EW-4

PZ-2

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20

AW-25

EW-2

AW-28

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6
M S
643.60

643.61
MW-15M

GRAVEL DRIVE

MW-8

MW-7M
643.79

643.80

SPORTSMANS CLUB ROAD

ACKERMAN WELL

S M D
643.74

MW-12S

GARDEN SPIGOTS

PZ-4

PASTURE

CROPLAND

643.54
MW-10M

643.59
MW-9M

643.69
MW-11M

643.70

643.60

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- = Approximate Property Boundary
- = Approximate extent of landfill cap
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant
- = Inferred direction of groundwater flow
- 643.60 = Groundwater contour

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-8
Medium Groundwater Elevation Map
June 9, 2005
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: July 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: GW Elev.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

CANOE LANDING

MILLER ⊕ BDL / BDL

PRETASKY ⊕ BDL / BDL

MW-1SR ⊕ BDL / BDL

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

SPLIT RAIL FENCE

COUNTY ROAD "Z"

BLACK RIVER SHORELINE

AW-1 NS

JOHNSON WELL

MW-14S NS BDL / BDL

AW-9 BDL / BDL

CLARIFIER 210 / 19

MW-5S

PZ-1 NS

CONCRETE PIT

EW-5 NS

PROCESS BUILDING

AW-13 0.43 / ND

EW-4

PZ-2 NS

EW-3

AW-20 34 / 6.6

AW-25 BDL / BDL

EW-2

AW-28 2.2 / 0.24

MW-2M NS

MW-2D NS

MW-2S NS

TREES

MW-4S 1,900 / 390

EW-1

PZ-3 NS

MW-6S NS

MW-6M NS

TREES NS

PZ-5 NS

PZ-6

MW-7M NS

MW-15M

GRAVEL DRIVE

MW-8M NS

SPORTSMANS CLUB ROAD

ACKERMAN WELL BDL / BDL

GARDEN SPIGOTS

MW-8S NS

MW-8D

MW-12S NS

PZ-4 NS

CROPLAND

PASTURE

NS MW-9M

NS MW-11M

MW-10M NS

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- × = Extraction Well
- O = Air Well
- = Approximate Property Line
- = Centerline
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant

N

Approximate Scale
1 inch = 175 feet

0 175 350

NOTES

NS = Not sampled
ND = Not Detected

7.8 = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l)
6.0 = 1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)
BDL = Below Detection Limit

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.
Groundwater samples were collected by ENSR on September 23 and 24, 2004.

Figure 3-9
September 2004
Trimethylbenzene Groundwater Analytical Results
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.:analytical.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

CANOE LANDING

MILLER ⊕ BDL / BDL

PRETASKY ⊕ BDL / BDL

MW-1SR ⊕ 0.13 / BDL

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

SPLIT RAIL FENCE

COUNTY ROAD "Z"

BLACK RIVER SHORELINE

AW-1 7.8 / 6.0

JOHNSON WELL BDL / BDL

MW-14S 3.1 / 1.3

AW-9 0.21 / BDL

CLARIFIER 1,300 / 350

PZ-1 NS

MW-5S

CONCRETE PIT

EW-5

PROCESS BUILDING

AW-13 3.2 / BDL

EW-4

MW-2D NS

MW-2M BDL / BDL

MW-2S 0.21 / BDL

TREES

MW 135

PZ-2 BDL / BDL

EW-3

AW-20 34 / 2.5

AW-25 0.71 / BDL

EW-2

AW-28 34 / 9.7

MW-4S 1,600 / 410

EW-1

PZ-3 BDL / BDL

MW-6S BDL / BDL

MW-6M 0.23 / BDL

TREES BDL / BDL

PZ-5 BDL / BDL

PZ-6 NS

MW-7M NS

MW-15M

GRAVEL DRIVE

MW-8M 1.7 / BDL

ACKERMAN WELL NS

SPORTSMANS CLUB ROAD

MW-8S BDL / BDL

MW-8D

MW-12S NS

GARDEN SPIGOTS

PZ-4 NS

CROPLAND

PASTURE

NS MW-9M

NS MW-11M

MW-10M NS

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- × = Extraction Well
- ○ = Air Well
- = Approximate Property Line
- = Centerline
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant

N

Approximate Scale
1 inch = 175 feet

0 175 350

NOTES

NS = Not sampled
ND = Not Detected

7.8 / 6.0 = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l)
1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)
BDL = Below Detection Limit
NS = Not Sampled

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.
Groundwater samples were collected by ENSR on December 2 and 3, 2004.

Figure 3-10
December 2004
Trimethylbenzene Groundwater Analytical Results
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: January 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.:analytical.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

CANOE LANDING

MILLER ⊕ BDL / BDL

PRETASKY ⊕ BDL / BDL

MW-1SR ⊕ BDL / BDL

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

SPLIT RAIL FENCE

COUNTY ROAD "Z"

AW-1 NS

MW-2M NS

MW-2D NS

MW-2S NS

JOHNSON WELL BDL / BDL

MW-14S NS

CLARIFIER

AW-9 BDL / BDL

490 / 48

PZ-1 NS

MW-5S

CONCRETE PIT

EW-5 NS

PROCESS BUILDING

AW-13 18 / 0.41

EW-4

TREES

PZ-2 NS

EW-3

AW-20 4.3 BDL

AW-25 BDL / BDL

EW-2

AW-28 35 / 11

MW-4S 1,100 / 260

EW-1

PZ-3 NS

TREES

BDL / BDL

PZ-5 NS

PZ-6 NS

MW-6S NS

MW-6M NS

MW-15M

GRAVEL DRIVE

MW-8M NS

MW-7M NS

ACKERMAN WELL

SPORTSMANS CLUB ROAD

BDL / BDL

MW-8S NS

MW-8D

MW-12S NS

GARDEN SPIGOTS

PZ-4 NS

CROPLAND

PASTURE

NS MW-9M

NS MW-11M

MW-10M NS

LEGEND

⊕ = Monitoring Well
● = Piezometer
× = Extraction Well
○ = Air Well
= Approximate Property Line
= Centerline
= Fence line
= Utility lines
= Utility pole
= Hydrant

N

Approximate Scale
1 inch = 175 feet

0 175 350

NOTES

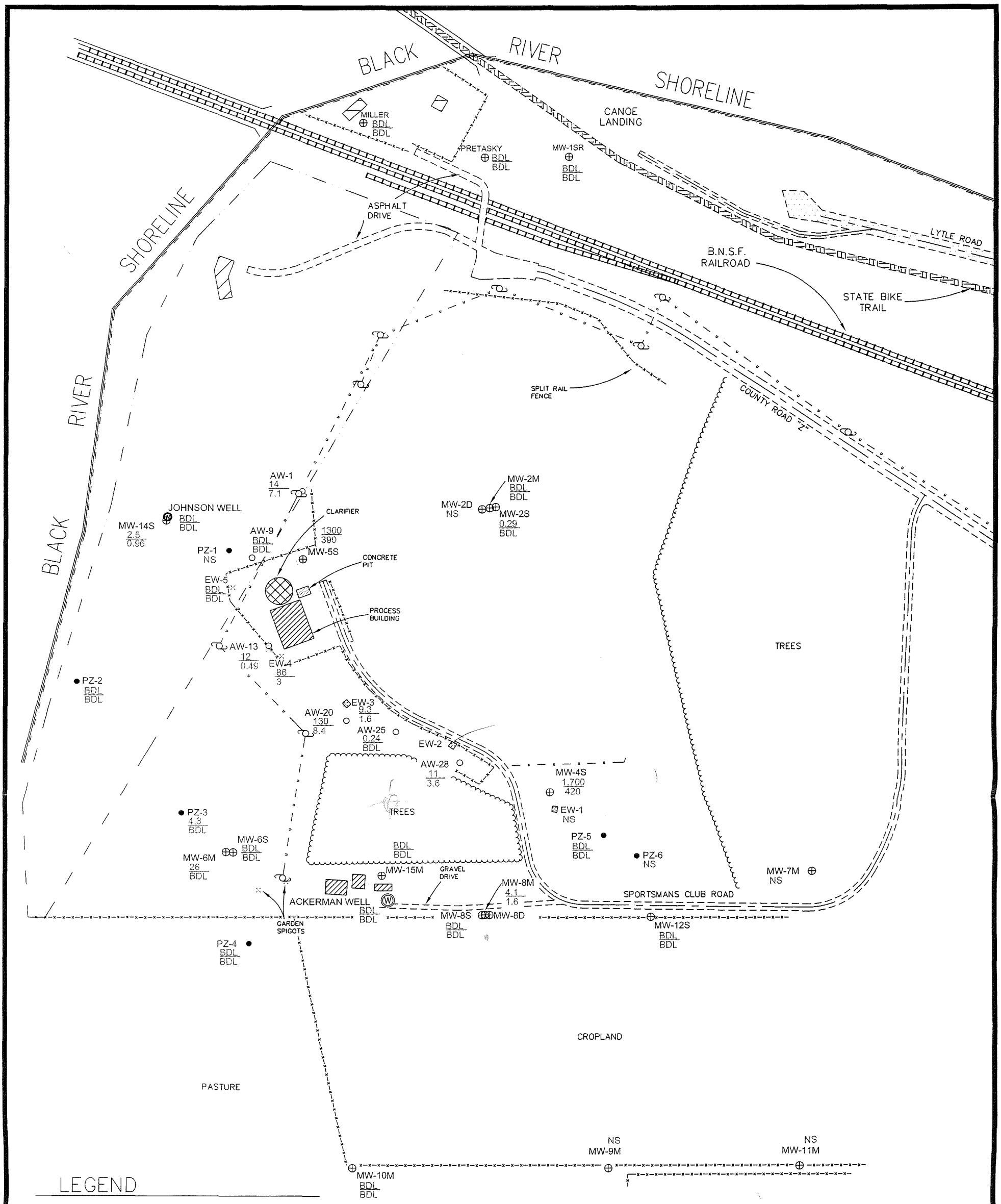
NS = Not sampled
ND = Not Detected

1,100 / 260 = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l)
1,100 / 260 = 1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)
BDL = Below Detection Limit
NS = Not Sampled

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.
Groundwater samples were collected by ENSR on March 10 and 11, 2005.

Figure 3-11
March 2005
Trimethylbenzene Groundwater Analytical Results
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: July 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.:analytical.dwg	CHECKED: PJM		



LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- × = Extraction Well
- O = Air Well
- = Approximate Property Line
- = Centerline
- = Fence line
- = Utility lines
- = Utility pole
- = Hydrant

N

Approximate Scale
1 inch = 175 feet

0 175 350

NOTES

NS = Not sampled
ND = Not Detected

1,700 / 420 = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l) / 1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)

BDL = Below Detection Limit
NS = Not Sampled

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-12
June 2005
Trimethylbenzene Groundwater Analytical Results
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.:analytical.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

CANOE LANDING

MILLER ⊕ 8.6

PRETASKY ⊕ 0.19

MW-1SR ⊕ 1.3

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

SHORELINE

RIVER

BLACK

AW-1 1.5

JOHNSON WELL 0.72

MW-14S 12.9

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 ● AW-9 0.4

MW-5S 60.7

EW-5 1.7

PROCESS BUILDING

AW-13 11.2

EW-4 11.9

PZ-2 ● 17.3

DESIGNATED MANAGEMENT ZONE

EW-3 ◇ 11.6

AW-20 39.9

AW-25 <0.049

EW-2 13.2

AW-28 6.8

MW-2 D M S 42.2 16.8

MW-4S ⊕ 27.5

EW-1 ◇

PZ-3 ● 2.4

MW-6 <0.049 M S 0.16

PZ-5 ● 0.074

PZ-6 ● NS

MW-7M ⊕ NS

MW-15M ⊕

GRAVEL DRIVE

MW-8 ⊕ S M D 0.4

SPORTSMANS CLUB ROAD

ACKERMAN WELL

MW-12S ⊕ <0.049

GARDEN SPIGOTS

PZ-4 ● <0.049

PASTURE

CROPLAND

MW-10M ⊕ 0.068

MW-9M ⊕ NS

MW-11M ⊕ NS

LEGEND

⊕ = Monitoring Well
● = Piezometer
◇ = Extraction Well
○ = Air Well
— · — · — = Approximate Property Boundary
- - - - - = Approximate extent of landfill cap
x—x—x— = Fence line
u — u — u — u = Utility lines
= Utility pole
= Hydrant
NS = Not Sampled
Results in mg/L

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 3-13
June 2005
Iron Concentrations
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

BLACK RIVER SHORELINE

MILLER ⊕ NM

CANOE LANDING

PRETASKY ⊕ NM

MW-1SR ⊕ 54

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

AW-1 -17.8

JOHNSON WELL NM

MW-14S -45.5

CLARIFIER

AST WITH CONCRETE PIT

MW-2 D M S -53 -137.2

PZ-1 ● AW-9 7.7

MW-5S -75.2

EW-5 NM

PROCESS BUILDING

AW-13 -71.5

EW-4 NM

PZ-2 ● -68.1

DESIGNATED MANAGEMENT ZONE

EW-3 NM

AW-20 -80.5

AW-25 174

EW-2 NM

AW-28 -35.3

MW-4S ⊕ -78.3

EW-1

PZ-3 ● -18.9

PZ-5 ● 164.4

PZ-6 ● NS

MW-7M ⊕ NS

MW-6 M S 25.4 31

MW-15M ⊕ -59.2

GRAVEL DRIVE

MW-8 S M D 163 -49.1

ACKERMAN WELL

SPORTSMANS CLUB ROAD

MW-12S ⊕ 185.5

GARDEN SPIGOTS

PZ-4 ● 67

PASTURE

CROPLAND

MW-10M ⊕ 126

MW-9M ⊕ NS

MW-11M ⊕ NS

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- — — — = Approximate Property Boundary
- - - - - - = Approximate extent of landfill cap
- x——x——x—— = Fence line
- u — u — u — u = Utility lines
- = Utility pole
- = Hydrant

NM = Not Monitored
NS = Not Sampled
Results in mV

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 4-1
June 2005
ORP Concentrations
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		

BLACK RIVER

SHORELINE

SHORELINE

RIVER

BLACK

MILLER
NM

CANOE LANDING

PRETASKY
NM

MW-1SR
4.6

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

AW-1
0.33

JOHNSON WELL NM

MW-14S
4.08

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 AW-9
4.3

MW-5S
0.76

EW-5
NM

PROCESS BUILDING

AW-13
0.23

EW-4
NM

PZ-2
0.92

DESIGNATED MANAGEMENT ZONE

EW-3
NM

AW-20
0.21

AW-25
0.74

EW-2
NM

AW-28
0.71

MW-2
NS D M S 1.95
1.24

MW-4S
1.43

EW-1
NS

PZ-3
1.39

PZ-5
4.32

PZ-6
NS

MW-7M
NS

MW-6
M S
1.42 7.47

MW-15M
0.66

GRAVEL DRIVE

MW-8
6.64S M DNS
0.79

ACKERMAN WELL

SPORTSMANS CLUB ROAD

MW-12S
11.95

GARDEN SPIGOTS

PZ-4
0.84

PASTURE

CROPLAND

MW-10M
1.45

MW-9M
NS

MW-11M
NS

LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- — — — = Approximate Property Boundary
- - - - - - = Approximate extent of landfill cap
- x—x—x— = Fence line
- u — u — u — u = Utility lines
- = Utility pole
- = Hydrant

NM = Not Monitored
NS = Not Sampled
Dissolved oxygen concentrations reported in mg/L

Approximate Scale
1 inch = 175 feet

0 175 350

N

Source:

Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 4-2
June 2005
Dissolved Oxygen Concentrations
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		

BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

MILLER ⊕ NM

PRETASKY ⊕ NM

MW-1SR ⊕ 6.9

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

AW-1 1.6

JOHNSON WELL NM

MW-14S 4.4

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 ● AW-9 3.4

MW-5S 60.7

EW-5 7.9

PROCESS BUILDING

AW-13 2.0

EW-4 11.9

PZ-2 ● 6.7

DESIGNATED MANAGEMENT ZONE

EW-3 ◇ 19.4

AW-20 ○ 4.2

AW-25 ○ 4.5

EW-2 11.9

AW-28 4.9

MW-2 NS ⊕ D M S 14.9 28.2

MW-4S ⊕ 15.9

EW-1 ◇ NS

PZ-3 ● 6.9

PZ-5 ● 2.8

PZ-6 ● NS

MW-7M ⊕ NS

MW-6 ⊕ 7.4 M S 12.7

MW-15M ⊕ 12.3

GRAVEL DRIVE

MW-8 ⊕ 6.8 S M D 21.9

ACKERMAN WELL Ⓦ NS

SPORTSMANS CLUB ROAD

MW-12S ⊕ 3.5

GARDEN SPIGOTS

PZ-4 ● 13.1

PASTURE

CROPLAND

MW-10M ⊕ 1.6

MW-9M ⊕ NS

MW-11M ⊕ NS

LEGEND

⊕ = Monitoring Well
● = Piezometer
◇ = Extraction Well
○ = Air Well
— · — = Approximate Property Boundary
- - - = Approximate extent of landfill cap
x—x—x— = Fence line
u — u — u — = Utility lines
= Utility pole
= Hydrant
NS = Not Sampled
NM = Compound not Monitored
Results in mg/L

Approximate Scale
1 inch = 175 feet

0 175 350

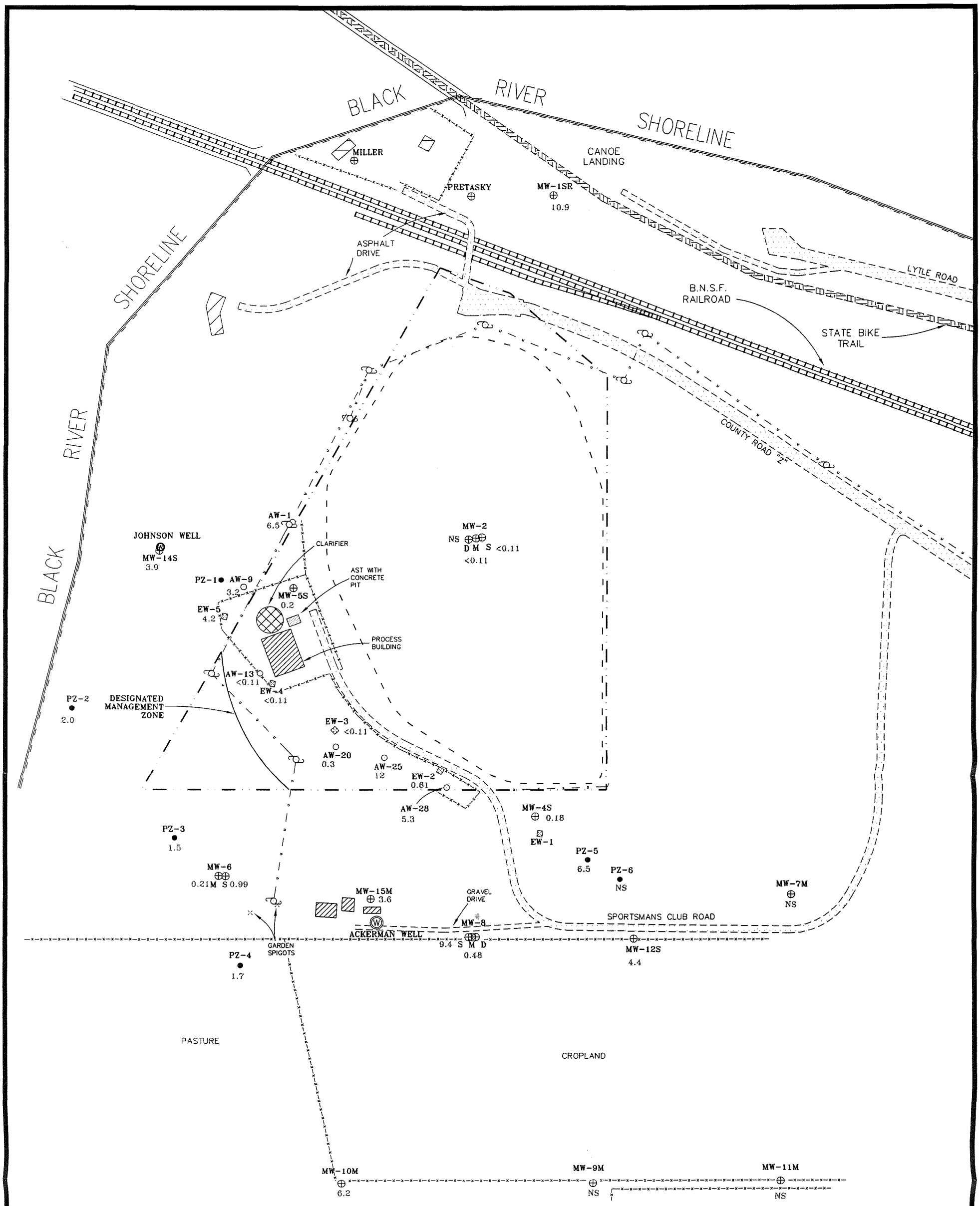
N

Notes:
Groundwater samples collected on June 8, 9 and 10, 2005

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 4-3
June 2005
Chloride Concentrations
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		



LEGEND

- ⊕ = Monitoring Well
- ● = Piezometer
- ⊠ = Extraction Well
- ○ = Air Well
- — · — · — = Approximate Property Boundary
- - - - - - = Approximate extent of landfill cap
- ×—×—×— = Fence line
- u — u — u — = Utility lines
- = Utility pole
- = Hydrant
- NS = Not Sampled
- NM = Compound Not Monitored
- Results in mg/L

Approximate Scale
1 inch = 175 feet

0 175 350

N

Notes:
Groundwater samples collected on June 8, 9 and 10, 2005

Source:
Onalaska Landfill Site Plan Survey, prepared by Coulee Region Land Surveyors, Inc., project no. S-4754, dated 5/14/03.

Figure 4-4
June 2005
Sulfate Concentrations
Onalaska Landfill
Onalaska, Wisconsin

DRAWN: AC/09480	DATE: Sept 2005	PROJECT No.: 07349-001	ENSR INTERNATIONAL
FILE No.: siteplan.dwg	CHECKED: PJM		

ENSR INTERNATIONAL

ATTACHMENT A

SUMMARY OF OPERATIONS AND MAINTENANCE ACTIVITIES

ONALASKA LANDFILL
2004/2005
ANNUAL MONITORING REPORT

SUMMARY OF OPERATION AND MAINTENANCE ACTIVITIES

Mr. Wood of ENSR, the primary operator of the groundwater extractor and treatment system, currently spends approximately six to eight hours per month to complete routine O&M activities. O&M activities conducted at the Site include "bumping" of the system once a month, maintenance of other operational equipment (e.g. compressors) and general housekeeping. The bumping includes the start-up and operation of the system for several minutes. Mr. Wood also spends several hours per month (during the growing season) on grounds keeping activities (e.g. mowing, weeding along fence line and brush control). The current monthly schedule for Mr. Wood is to perform routine maintenance and general housekeeping mid-month and the bumping of the system and general housekeeping at the end of the month.

The groundwater generated during bumping is stored in various on-site storage vessels for subsequent disposal. During the winter months, the generated groundwater is conveyed to storage vessels inside the building and during the non-freezing months the extracted groundwater is stored in vessels located outside of the treatment building.

On November 16, 2004 Olson's Tri-County Transport (Sparta Wisconsin) hauled 16,000 gallons of stored groundwater to the City of La Crosse's Waste Water Treatment Plant for treatment and disposal. Acceptance of the wastewater was granted by Mr. Greg Paul, Superintendent with LaCrosse Wastewater Utility. It is anticipated that currently 12,000 to 16,000 gallons of stored groundwater will need to be transported and disposed by the end of October 2005.

ENSR procured items needed to keep the groundwater collection and treatment system in operating condition to allow start-up and operation of the system should environmental conditions warrant it. These items included (but were not limited to):

- Housekeeping items
- Propane
- Electricity
- Oils and greases
- Grounds keeping equipment and supplies
- Sewage removal
- Cellular telephone service
- Miscellaneous supplies
- Potable water
- Fire extinguishers

In addition to the routine items completed above, ENSR performed several non-routine maintenance items. During June 2005, ENSR replaced the batteries to the emergency lights. On August 25, 2005 ENSR replaced two defective sump pumps. The sump pumps are needed to manage the storage of purge water generated during bumping of the system.