Prepared for:
**Wisconsin Department of Natural Resources**
**Eau Claire, Wisconsin**




# 2007 Annual Monitored Natural Attenuation Report for the Onalaska Municipal Landfill Site Onalaska, Wisconsin

ENSR Corporation
November 2007
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ENSR | AECOM

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# 1.0 Introduction

This annual report for the Onalaska Municipal Landfill (Site) includes monitoring data from four quarterly sampling events (December 2006, March 2007, June 2007, and September 2007). The activities were completed in accordance with ENSR's proposal dated October 18, 2005 (Proposal), Wisconsin Department of Natural Resources (WDNR) Specifications/Scope of work dated September 2005, WDNR's Addendum #1, dated October 3, 2005, and other Site documents. The monitoring schedule was developed by the WDNR and was based upon the Monitored Natural Attenuation (MNA) Plan, dated December 4, 2001. Additional activities at the Site include limited operation and maintenance (O&M) of the groundwater extraction system, including all physical structures, electrical systems, compressors, and related equipment so that the system remains functional in the event it is determined necessary to restart the system. This annual report is inclusive of the groundwater monitoring and O&M activities conducted by ENSR during the period December 2006 through November 2007. A summary of O&M activities is provided in **Appendix A**.

ENSR submitted Groundwater Monitoring Data Certification reports to the WDNR shortly after each of the four quarterly sampling events. These reports included submitting the monitoring data to the DNR in the required GEMS fixed width format, providing a summary of each monitoring event and submittal of the Environmental Monitoring Data Certification Form.

The MNA Plan was prepared for Region V 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, 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).

## 1.2 Background

### 1.2.1 Physical Background

The Site is located approximately 10 miles north of the city of La Crosse, Wisconsin, near the confluence of the Mississippi and Black Rivers. **Figure 1-1** illustrates the Site Location. **Figure 1-2** is a Site Plan illustrating

Site features. 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 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. Both types of naphtha were likely used in a paint cleaning process at one of the nearby plants and as general solvents.

In September 1982, the WDNR 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, and from 2005 to the present sampling has been 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 (prior to fall 2001) 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 micrograms per liter (ug/L). Of the three chlorinated compounds initially detected, 1,1,1-TCA was the most prevalent, and was found at concentrations as high as 730 ug/L. The majority of the volatile organic compounds (VOCs) were found in shallow monitoring wells (MW-5S, MW-3S and B4S) and consisted of benzene, toluene, ethylbenzene and xylenes (BTEX). The majority of VOC 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.

## 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 MNA is being evaluated as a potential modification to the ROD. The groundwater extraction and treatment system consists 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. MNA) 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). Thus, the ES is the cleanup goal for the DMZ and the PAL is the cleanup goal for areas outside the DMZ. The list of contaminants (e.g. contaminants of concern (COC)) 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 of Chemicals of Concern and the applicable cleanup standards are presented in **Table 1-1**.

If it becomes apparent that it is technically impracticable to achieve the groundwater cleanup standards, including potential ACLs, 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 ACLs, 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.

Sampling was completed as outlined in WDNR's September 2005 Statement of Work, except for a modification during the March 2007 sampling event. At the request of the WDNR, there was a modification to the March 2007 sampling event to further evaluate groundwater conditions at the downgradient extent of the plume. Thus, in lieu of sampling AW-13, AW-20, and AW-28; wells MW-6S, MW-6M, MW-8S, and MW-8M were sampled.

**Table 2-1** summarizes the quarterly groundwater monitoring completed from December 2006 through September 2007. Groundwater level measurements were gauged in 33 wells during the March and September 2007 sampling event. Groundwater level measurements were gauged only from the wells sampled during the December 2006 and June 2007 sampling event (four wells).

Monitoring, piezometer, and air injection wells are 2 inches in diameter (except MW-15M which is 2.25' in diameter), but the screen length and elevation relative to the water table varies 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 the piezometers and one monitoring well. Most of the screened intervals for the medium depth wells are positioned approximately 30-feet below the water table.

The first MNA sampling event was completed the week of October 29, 2001, to establish baseline conditions at the time the groundwater extraction system was shutdown. The system was shutdown 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.

## 2.2 Monitoring Rationale

Monitoring for this reporting period followed ENSR's proposal dated October 18, 2005, which was based upon the WDNR Specifications/Scope of Work dated September 2005, WDNR's Addendum #1, dated October 3, 2005, and other Site documents.

A total of four wells were sampled during the December 2006 sampling event, 29 wells were sampled during the March 2006 sampling event, five wells were sampled during the June 2006 sampling event and 16 wells were sampled during the September 2006 sampling event.

## 2.3 Analytical Parameters

Groundwater samples collected during the four groundwater sampling events were submitted for laboratory analysis for VOCs, metals, and natural attenuation indicator parameters as listed in **Table 2-2**. Currently, at the request of the WDNR, a list of 36 VOCs are reported by the laboratory and include all of the relevant VOCs identified on Table 2-2. Table 2-2 includes the analytical parameters, 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 was gauged and recorded in the project field book and on sample collection data sheets.

Field water quality parameters were measured during the purging process using a water quality meter equipped with a flow-through cell (when possible). 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 or a peristaltic pump and disposable tubing. 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. DO and ORP were not used as stabilization indicators when the flow-through cell was not utilized. At a minimum, five 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 at the top of the water table for the water table wells and approximately half way down the submerged screened interval for the wells were the screen interval is positioned below the water table. The pump rate was reduced to a low level after purging in order to simulate low flow 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 Test America, formerly Severn Trent Laboratories (STL), in North Canton, Ohio for analysis. STL has merged with Test America and has assumed the Test America name.

The residential wells were sampled from an outside spigot (e.g. untreated water) 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.

# 3.0 Groundwater Monitoring Results

Groundwater samples were collected from up to 33 monitoring points comprised of five air-injection wells, four piezometers, 16 monitoring wells, four residential wells and four extraction wells. As discussed further below, the historic monitoring data has shown that three organic contaminants, 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene (1,3,5-TMB), and naphthalene, were detected above the ES established by the State of Wisconsin in one or more sampling points. Three metals, arsenic, manganese and iron, were detected above the ES in one or more sampling points. This annual report discusses monitoring data from four quarterly sampling events (December 2006, March 2007, June 2007, and September 2007).

## 3.1 Groundwater Flow

Groundwater levels were gauged from up to 34 wells, except the residential wells and extraction wells, during the March and September 2007 monitoring events. 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. Groundwater elevation contours from the March 2007 and September 2007 monitoring events for the shallow and medium zones are shown on **Figures 3-1** through **Figure 3-4**, respectively. Groundwater elevations, gradients, and flow directions are discussed below.

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

Based upon the September 2007 groundwater elevation data, the inferred groundwater flow direction in the shallow groundwater and medium depth groundwater at the Site is towards the south. Based upon the March 2007 groundwater elevation data, the inferred groundwater flow direction in the shallow groundwater and medium depth groundwater at the Site is towards the west-southwest. The hydraulic gradient in the shallow zone groundwater is approximately 0.0007 based upon the March 2007 data and 0.0003 based upon the September 2007 data. The hydraulic gradient in the medium zone groundwater is approximately 0.008 based upon the March 2007 data and 0.0003 based upon the September 2007 data.

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 (west-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. Since the baseline sampling event, 15 rounds of natural attenuation monitoring have been completed by ENSR. This report discusses the results from the four most recent groundwater sampling 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 four 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 indicator parameters are discussed in Section 4.0. The complete Level IV analytical data packages for the sampling events are stored in ENSR's Minneapolis office, and are available upon request.

## 3.3 Data Validation

Full data validation was performed on analytical data for five groundwater samples and one trip blank (approximately 10 percent of the total number of samples collected during this reporting period). The data validation was completed for the following analyses:

- VOCs by SW-846 method 8260B;
- Selected total metals by SW-846 methods 6010B and 7470A;
- Chloride by Methods for the Chemical Analysis of Water and Wastes (MCAWW) 300.0;
- Sulfate by MCAWW 300.0;
- Nitrate by MCAWW 300.0;
- Alkalinity, by MCAWW 310.1; and
- Total organic carbon by MCAWW 415.1.

The samples selected for validation were collected at the Site on March 22 and March 23, 2007. Test America processed the samples under sample delivery group (SDG) A7C240117.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (10/99). Modification of the Functional Guidelines was done to accommodate the non-CLP methodologies. The results of the data validation are presented in **Appendix B**. In summary, the data appear to be valid as reported and may be used for decision making purposes.

## 3.4 Groundwater Monitoring Data

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

- A total of 12 VOCs were detected in the groundwater samples. The following is a list of detected VOCs.

| | | |
|---|---|---|
| 1,2,4-trimethylbenzene | naphthalene | chloromethane |
| 1,3,5-trimethylbenzene | ethylbenzene | cis-1,2-dichloroethene |
| acetone | benzene | chloroethane |
| methylene chloride | chlorobenzene | xylenes (total) |

- The most common VOCs detected were 1,2,4-TMB and 1,3,5-TMB, benzene, methylene chloride, and naphthalene. The concentrations of 1,2,4-TMB and 1,3,5-TMB for the March 2007 and September 2007 sampling events are depicted on a Site plan in **Figures 3-5 and 3-6**, respectively. The sum of the concentrations of 1,2,4-TMB and 1,3,5-TMB exceeded the ES in MW-4S, MW-5S, MW-16S and MW-17S. Naphthalene exceeded the ES in MW-5S and MW-16S. Methylene chloride exceeded the ES in MW-16S and MW-17S. No other VOC exceeded the ES. **Table 3-3** identifies the range of VOC concentrations detected in the groundwater samples during the last four sampling events.

- The PAL was exceeded for the sum of 1,2,4-TMB and 1,3,5-TMB (MW-4S, MW-5S, MW-16S, MW-16M, and MW-17S), benzene (MW-16M), chloromethane (AW-28), methylene chloride (MW-16S, MW-17S, MW-16M,EW-4, and two trip blanks), and naphthalene (MW-4S, MW-5S, MW-14S, MW-16S and MW-16M). No other VOCs exceeded the PAL.
- 1,2,4-TMB, methylene chloride and acetone were detected in one or more of the trip blanks. Methylene chloride and acetone are common laboratory artifacts. The occurrence of VOCs in the trip blanks is further discussed in **Appendix B** – Data Validation.
- No VOC concentrations above the PAL were detected in the groundwater samples collected from the four residential wells (Miller, Pretasky, Johnson and Ackerman). Methylene chloride was the only VOC detected in the residential wells but at a concentration below the PAL. Concentrations of iron and/or manganese above the ES were detected in all four residential wells. Concentrations of arsenic exceeded the PAL in Pretasky well and the concentration of barium exceeded the PAL in the Miller well. No other metals exceeded the PAL (except for the ES exceedences mentioned above).
- Arsenic, barium, iron and manganese were the most prevalent metals detected in the groundwater samples. Concentrations of iron exceeded the ES in 20 monitoring points, manganese exceeded the ES in 33 monitoring points, and arsenic exceeded the ES in 10 monitoring points. No other ES were exceeded for metals. The concentration of iron and manganese in the monitoring points for the March 2006 sampling event is further discussed in Section 4.0, Natural Attenuation Results.
- The PAL for manganese was exceeded in 33 monitoring points, the PAL for iron was exceeded in 26 monitoring points, and the PAL for arsenic was exceeded in 16 monitoring points. Concentrations of barium exceeded the PAL in 11 monitoring points. Concentrations of cobalt exceeded the PAL in MW-5S. No other PALs for metals were exceeded. **Table 3-4** identifies the range of metals concentrations detected in the groundwater samples during the last four monitoring events.
- Four of the five extraction wells (EW-2 through EW-5) were sampled during the March 2007 sampling event. The ES for arsenic, iron and manganese were exceeded in the four extraction wells. No other metals exceeded the ES in the extraction wells. The PAL was exceeded for methylene chloride EW-4. No other VOC exceeded the PAL in the four extraction wells.

**Table 3-5** provides a comparison of select VOC concentrations over time in select wells. Wells MW-5S and MW-4S were selected to evaluate water quality immediately downgradient of the landfill and because they have historically been two of the most impacted wells at the Site. Wells MW-6S and PZ-3 were selected because they are located downgradient of the extraction system. All four 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 3-5. The VOCs listed in the table were identified during the RI as the predominant organic compounds of concern.

**Figure 3-7** through **Figure 3-10** illustrate the concentrations over time for the sum of 1,2,4-TMB and 1,3,5-TMB in MW-4S, MW-5S, MW-16S, and MW-17S, respectively. Based upon the computer generated trend line, the concentration of the trimethylbenzenes in the four wells appears to exhibit an increasing trend. The historic trimethylbenzenes results for MW-4S, MW-5S, MW-16S, and MW-17S were entered into the Mann-Kendall Statistical model as a tool to further assess concentration trends in the wells. There does not appear to be seasonal variation in 1,2,4-TMB and 1,3,5-TMB concentrations in these wells; therefore, the Mann-Kendall model was selected instead of the Mann-Whitney model. **Appendix C** contains the completed Mann-Kendall forms. The test results indicate an increasing concentration trend at greater than 80% confidence level MW-5S and MW-16S. The test results for MW-4S indicate that the concentrations are stable while the concentrations at MW-17S are considered non-stable.

# 4.0 Natural Attenuation Results

This section discusses the analytical results for the MNA indicator parameters for the samples collected during the previous four quarterly sampling events. Presented below is a discussion on the natural attenuation status at the Site.

The results of the laboratory-analyzed and field-collected natural attenuation parameters from the sampling events are summarized in **Table 3-2** and are discussed below. The field-collected parameters reported in **Table 3-2** were obtained from the final purge volume during the respective well sampling event. Concentration distribution maps, using data from the March 2007 sampling event, were completed for chloride, nitrate, sulfate, total alkalinity, and total organic carbon (**Figure 4-1**), iron and manganese (**Figure 4-2**), and dissolved oxygen, pH, and Oxidation Reduction Potential (ORP) (**Figure 4-3**).

Geochemical indicators are secondary support, after contaminant concentration trends, for demonstrating that natural attenuation through biodegradation is occurring in the Site plume. The biodegradation natural attenuation parameters selected for monitoring are based upon the sequential use of terminal electron acceptors (TEA) by microorganisms. The TEA use sequence is as follows:

Dissolved Oxygen > Nitrate > Manganese (Mn +4) > Ferric Iron (Fe +3) > Sulfate > Carbon

Dissolved oxygen provides the greatest amount of energy to microbes during metabolism and is typically depleted during the biodegradation of organic carbons. Typically, non-chlorinated hydrocarbons are biodegraded in aerobic conditions, but biodegradation of chlorinated hydrocarbons is inhibited in aerobic conditions.

Chlorinated aliphatic hydrocarbons are generally biodegraded through the reductive dechlorination transformation pathway in anaerobic conditions. In an anaerobic environment, microorganisms use nitrate, manganese, ferric iron, and sulfate ions as the terminal electron acceptors or oxidizers in their metabolic activities. Reductive dechlorination has been demonstrated under nitrate- and iron- reducing conditions, but the most rapid dechlorination rates occur under sulfate-reducing and methanogenic conditions. The chlorinated hydrocarbons also are used as terminal electron acceptors so there must be an appropriate source of carbon for microbial growth as well as anaerobic conditions for reductive dechlorination to occur. (EPA 1998)

Chlorinated aliphatic hydrocarbons may also be biodegraded through co-metabolism in an aerobic environment, where the degradation is catalyzed by an enzyme or other co-factor that is fortuitously produced for other purposes, and the microorganism receives no benefit from the metabolism of the chlorinated compound. (EPA 1998)

The following field-collected natural attenuation parameters were measured during the sampling events:

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

The following natural attenuation parameters were collected for laboratory analysis during the sampling events:

- Nitrate
- Iron (also discussed in the previous section)

- Manganese (also discussed in the previous section)
- Sulfate
- Chloride
- Total Organic Carbon (TOC)
- Total Alkalinity

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

- ORP values measured in the monitoring points ranged from -155.3 mV (MW-16M) to 271.5 mV (MW-8S). An ORP value less than 50mV indicates reductive dechlorination can occur while an ORP value of less than -100mV indicates that dechlorination is likely. Wells within the plume exhibit lower ORP values. Decreasing concentration trends of ORP in groundwater overtime may indicate an increase in biological activity as is the case for many of the Site wells. Thus, favorable conditions exist for reductive dechlorination. The ORP values in the groundwater as observed from the March 2007 sampling event are illustrated on Figure 4-3
- DO values measured in the monitoring points ranged from 0.20 mg/l (AW-25) to 6.13 mg/l MW-14S). The concentrations of DO in the groundwater for the March 2007 sampling event are illustrated in Figure 4-3. Generally, DO concentrations less than 1 mg/l indicate anaerobic conditions and concentrations greater than 1 mg/l indicate aerobic conditions. It appears that shallow impacted groundwater at the Site is anaerobic, (except for the shallow groundwater encountered in MW-17S) while shallow non-impacted groundwater is generally aerobic. Deeper groundwater tended to be anaerobic. Anaerobic conditions in wells may indicate that DO was depleted by microorganisms during biodegradation of hydrocarbons or other organic material.
- The pH of the groundwater was within the acceptable range (e.g. pH 6.5 through pH of 7.5) for optimal microbial activity. The values of pH in the groundwater as observed from the March 2007 sampling event are illustrated on Figure 4-3
- Nitrate can be used as a terminal electron acceptor (when oxygen is depleted) through the process of denitrification and nitrate reduction. Figure 4-1 presents the March 2007 concentrations of nitrate on a Site map. The concentrations of nitrate ranged from below detection limits to 14.5 mg/l observed in AW-25. The ES for nitrate is 10 mg/l and was exceeded in AW-25. The PAL is 2 mg/l and was exceeded in AW-25 and MW-17S. No other nitrate exceedences were observed in the other wells. All other wells exhibited a nitrate concentration of less than 1 mg/l. Do to the overall low concentrations of nitrate at the Site, it does not appear that nitrate acts as a significant source for microbial degradation.
- 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 March 2007 sampling event are illustrated on Figure 4-1. The concentrations of sulfate ranged from below method detection limits to 16 mg/l. The PAL for sulfate is 125 mg/l. The concentrations of sulfate across the Site are relatively low and variable and it is unlikely that sulfate acts as a significant influence on natural attenuation of contaminants.
- Chloride can be used as a measure of degradation and dechlorination of chlorinated VOCs. The chloride concentration ranged from 0.2 mg/l (AW-20 and AW-28) to 42.8 mg/l (MW-2M). The PAL for chloride is 125 mg/l. Some of the highest chloride concentrations were found in the two wells located within the landfill (MW-2S and MW-2M) and MW-16S and MW-16M located immediately downgradient of the landfill. It appears that dechlorination may be occurring. However, the concentrations of chlorinated VOCs are low and thus it can be inferred that dechlorination is limited at this Site.

- The concentrations of Total Organic Carbon (TOC) in the groundwater as observed from the March 2007 sampling event are illustrated on Figure 4-1. TOC can be used as a general measure of organics concentration, both natural and man made and must be present in order for reductive chlorination to proceed. The TOC at the Site ranged from 2 mg/l (PZ-1, PZ-5 and MW-10M) to 14 mg/L (MW-4S), with most of the TOC concentrations around 5 mg/l. It can be inferred that there is sufficient carbon present for reductive dechlorination to proceed.
- The concentrations of alkalinity in the groundwater as observed from the March 2007 sampling event are illustrated on Figure 4-1. Increasing concentrations of alkalinity reflects higher concentrations of calcium and magnesium, indicating that microbial respiration is releasing carbon dioxide into the groundwater. Thus, alkalinity can be expected to increase across a site where biological activity is occurring. The concentrations of alkalinity at the Site ranged from 83 mg/L (MW-1SR) to 610 mg/L (MW-16S). It appears that most wells within and downgradient of the plume exhibit higher alkalinity concentrations than the upgradient well, MW-1SR. Thus, it can be inferred that microbial respiration is likely occurring at this Site.
- Iron (ferrous iron $Fe^{+2}$) is a byproduct of microbial metabolism and may increase in concentration within the dissolved hydrocarbon plume especially where there is sufficient availability of ferric iron to serve as a terminal electron acceptor. Figure 4-2 illustrates the concentrations of dissolved iron, the majority of which is assumed to be ferrous iron, in wells sampled during the March 2007 sampling event. Concentrations of iron ranged from below method detection limits (AW-25, MW-6M, MW-6S, MW-8S, and PZ-1) to 43.1 mg/l (MW-16S). Generally, higher concentrations of iron were found in wells that exhibit higher concentrations of VOC. The higher iron concentrations within the plume indicate that microbial metabolism may be occurring, but may also be attributed to background iron concentrations.
- Manganese$^{+2}$ ($Mn^{+2}$) is a byproduct of microbial metabolism and may increase in concentration within the dissolved plume especially where there is sufficient availability of manganese to serve as a terminal electron acceptor. Relatively insoluble $Mn^{+4}$ is reduced to soluble $Mn^{+2}$ during microbial biodegradation of VOCs. Therefore, elevated concentrations of soluble manganese in the groundwater can indicate microbial biodegradation. Figure 4-2 illustrates the concentrations of manganese in wells sampled during the March 2007 sampling event. Concentrations of manganese ranged from 0.0378 mg/l (Johnson well) to 12.6 mg/l (MW-16S). The presence of manganese at the Site is likely attributable to background concentrations. There does not appear to be a strong correlation to the concentration of manganese in wells and the concentration of VOC in wells. Thus, manganese may play a minor role in aiding natural attenuation at this Site.

# 5.0 Conclusions and Recommendations

The following conclusions are based upon the monitoring results from the December 2006, March 2007, June 2007, and September 2007 monitoring events and historic analytical results.

- The magnitude and extent of impacts is defined and does not appear to be migrating. A review of the natural attenuation data suggests that natural attenuation is occurring at the Site and may be preventing the further spread of contaminants.
- The most common VOC contaminants detected were 1,2,4-TMB & 1,3,5-TMB. The concentrations of the sum of 1,2,4-TMB and 1,3,5-TMB in MW-4S, MW-5S, MW-16S, and MW-17S exhibit an increasing trend indicating a possible source area may exist. However, it does not appear that the plume is spreading. Exceedances of the ES and PAL are limited to several wells located immediately downgradient of the landfill.
- Concentrations of iron, arsenic, and manganese in groundwater samples collected at the Site (including the upgradient monitoring well) have exceeded the ES. Background levels of iron, arsenic and manganese in shallow groundwater throughout Wisconsin and especially in the vicinity of the Site are similar to the concentrations detected at the Site. ENSR developed preliminary Alternative Concentration Limits (ACLs) for these three metals and submitted the information to the WDNR.
- The residential wells do not appear to be significantly impacted by Site contaminants. The only detected VOC (methylene chloride) in the residential wells may be attributed as a laboratory artifact. 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 sampled (Miller, Pretasky, Johnson and Ackerman).
- 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 quality of the groundwater samples collected from the air wells may be questionable.
- It may be technically impracticable to achieve the groundwater cleanup standards as specified in the ROD and the October 10, 2000, Explanation of Significant Differences within a reasonable length of time using MNA as the remedy.

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

- Continue with natural attenuation monitoring to evaluate concentration trends and confirm if natural attenuation can be an effective modification to the ROD remedy that remains protective of human health and the environment.
- Evaluate monitoring data to determine if the presence of the trimethylbenzenes requires an additional health analysis (e.g. risk assessment). Continue to evaluate the presence of the trimethylbenzenes and the concentration trends. Potential future activities may include further evaluating the presence of trimethylbenzenes immediately downgradient of the landfill through additional testing.
- Share the results of the data validation with Test America. Continue to work with the laboratory to reduce the occurrence of false positives (e.g. method blank contamination) in the samples. Request that the laboratory attempt to reduce method detection limits for VOCs and metals to below their respective Preventive Action Limits.
- Continue to pursue development of ACLs for arsenic, iron and manganese.

- Modify the sampling schedule to continue to effectively monitor changes in groundwater quality and natural attenuation. Specifically, groundwater monitoring from Site wells could be completed on an annual basis while the residential wells could be monitored on a semiannual basis. Additionally, the air wells could be omitted form the monitoring schedule. In lieu of sampling the air wells, a nested pair (shallow zone and medium zone) of wells could be installed in the vicinity of AW-28. Accordingly, downgradient wells (MW-6S, MW-6M, MW-8S and MW-8M) could be added to the monitoring schedule to better monitor for downgradient migration of contaminants.
- Modify the natural attenuation indicator laboratory analysis parameters to eliminate parameters that do not appear to be pertinent to this Site (such as sulfate, chloride, TOC).
- Initiate discussions with the EPA to consider the use of alternate methods to control the groundwater contaminant plume to achieve the cleanup standards. If those alternate methods cannot attain groundwater cleanup standards, including potential ACLs, then a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waiver could be considered.

# 6.0 References

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# Tables

**TABLE 1-1**
**Contaminants of Concern**
**Former Onalaska 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*** | | | |
| Sum of 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 Program**
**Wells Listed by Sampling Event**
**Former Onalaska Landfill**

| | |
|---|---|
| Quarterly: | MW-16S, MW-16M, MW-17S and MW-17M. (December 2006, March 2007, June 2007 and September 2007) |
| Semiannual: | MW-4S, MW-5S, MW-15M, AW-13, AW-20, AW-25, AW-28, and MW-14S (March 2007 and September 2007) |
| Annual: | AW-1, MW-1SR, MW-2S, MW-2M, MW-10, EW-2, EW-3, EW-4, EW-5, PZ-1, PZ-2, PZ-3, PZ-5 (March 2007) |

Four nearby private water supply wells (Ackerman, Miller, Pretasky, and Johnson) were sampled semiannually (March and September) for organics and metals only. ENSR facilitated access arrangements for the residential wells.

At the request of the WDNR, there was a modification to the March 2007 sampling event. The purpose of the modification was to further evaluate groundwater conditions at the downgradient extent of the plume. Thus, in lieu of sampling AW-13, AW-20, and AW-28; wells MW-6S, MW-6M, MW-8S, and MW-8M were sampled.

Notes:

1. Residential wells were sampled for VOCs and metals.
2. All other wells were sampled for VOCs, metals, chloride, nitrate, sulfate, total alkalinity, and total organic carbon.

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

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

| Parameter | Rationale | Wisconsin Groundwater Criteria [a] | |
|---|---|---|---|
| | | PAL (ug/L) | 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 | 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 |
| Naphthalene | COC | 8 | 40 |
| **Inorganic Constituents (Metals)** | | | |
| Arsenic | COC | 1 | 10 |
| 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**
**Former Onalaska Landfill**

| Parameter | Rationale | Wisconsin Groundwater Criteria [a] | |
|---|---|---|---|
| | | PAL (ug/L) | ES (ug/L) |
| **Natural Attenuation Parameters** [b] | | | |
| **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 mg/L dissolved oxygen indicate anaerobic conditions present. >1 mg/L indicate aerobic conditions. | N.A | N.A |
| pH | Optimum range of pH is 5 to 9. | N.A | N.A |
| Temperature | Purging stabilization criteria. | N.A | N.A |
| Specific Conductance | Purging stabilization criteria. | N.A | N.A |
| **Laboratory Parameters** | | | |
| Nitrate | Concentrations in groundwater >1 mg/L nitrate may compete with reductive processes of chlorinated VOC. Can be used as electron acceptor once oxygen is depleted. | 2,000 | 10,000 |
| Sulfate | Can be used as electron acceptor once oxygen, nitrate, and iron have been depleted or reduced. Concentrations >20 mg/L may compete with reductive pathway. | 125,000 | 250,000 |
| Iron (already included above) | Concentrations in groundwater >1 mg/L may indicate iron reduction has occurred and reductive dechlorination of chlorinated VOCs is possible. Can be used as electron acceptor. | 150 | 300 |
| Manganese (already included above) | Concentrations in groundwater > 1 mg/L may indicate manganese reduction has occurred and reductive dechlorination of chlorinated VOCs is possible. Can be used as electron acceptor. | 25 | 50 |

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

| Parameter | Rationale | Wisconsin Groundwater Criteria | |
|---|---|---|---|
| | | PAL (ug/L) | ES (ug/L) |
| Alkalinity | Reflects higher concentrations of calcium and magnesium, indicating the microbial respiration is releasing $CO_2$ into the groundwater. | N.A | N.A |
| Chloride | A measure of chlorinated VOC degradation. | 125,000 | 250,000 |
| Total Organic Carbon | A general measure of organics' concentration, including man-made and naturally occurring. | N.A | N.A |

Notes:
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)

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

| Date of Water Level Measurements: March 21 and 22, 2007 | | | |
|---|---|---|---|
| **Well Number** | **Elevation Top of Casing[1]** | **Depth to Groundwater** | **Elevation of Groundwater** |
| Ackerman Well | 658.28 | NM[2] | NM |
| AW-1 | 663.62 | 18.21 | 645.41 |
| AW-13 | 658.85 | 13.55 | 645.3 |
| AW-20 | 652.71 | 7.61 | 645.10 |
| AW-25 | 657.26 | 12.14 | 645.12 |
| AW-28 | 660.91 | 15.81 | 645.10 |
| AW-9 | 660.12 | 14.75 | 645.37 |
| 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 | 13.08 | 644.66 |
| MW-11M | 658.35 | 13.83 | 644.52 |
| MW-12S | 664.22 | 19.34 | 644.88 |
| MW-14S | 656.05 | 10.61 | 645.44 |
| MW-15M | 656.98 | 12.06 | 644.92 |
| MW-16S | 658.94 | 13.80 | 645.14 |
| MW-16M | 659.22 | 13.99 | 645.23 |
| MW-17S | 658.51 | 13.18 | 645.33 |
| MW-17M | 658.76 | 13.35 | 645.41 |
| MW-1SR | 660.54 | 14.70 | 645.84 |
| MW-2D | 673.90 | 27.40 | 646.50 |
| MW-2M | 673.64 | 28.21 | 645.43 |
| MW-2S | 672.85 | 27.40 | 645.45 |
| MW-4S | 665.84 | 20.72 | 645.12 |
| MW-5S | 660.50 | 15.13 | 645.37 |
| MW-6M | 649.71 | 4.68 | 645.03 |
| MW-6S | 647.86 | 2.84 | 645.02 |
| MW-7M | 663.74 | 18.83 | 644.91 |
| MW-8D | 660.60 | 15.64 | 644.96 |
| MW-8M | 660.71 | 15.78 | 644.93 |
| MW-8S | 660.74 | 15.81 | 644.93 |
| MW-9M | 657.32 | 12.77 | 644.55 |
| Pretasky Well | 662.95 | NM | NM |
| PZ-1 | 656.40 | 11.03 | 645.37 |
| PZ-2 | 651.36 | 6.01 | 645.35 |
| PZ-3 | 648.96 | 3.65 | 645.31 |
| PZ-4 | 649.13 | 4.14 | 644.99 |
| PZ-5 | 661.98 | 16.92 | 645.06 |
| PZ-6 | 660.78 | 15.80 | 644.98 |

Notes:
Groundwater elevations were collected on September 7 and 8, 2006.
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. MW-16S, MW-16M, MW-17S and MW-17M and MW-5S were surveyed on March 23, 2006.
2. NM = Water level was not measured.

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

| Date of Water Level Measurements:September 10 and 11, 2007 | | | |
|---|---|---|---|
| **Well Number** | **Elevation Top of Casing[1]** | **Depth to Groundwater** | **Elevation of Groundwater** |
| Ackerman Well | 658.28 | NM[2] | NM |
| AW-1 | 663.62 | 20.20 | 643.42 |
| AW-13 | 658.85 | 15.07 | 643.78 |
| AW-20 | 652.71 | 9.28 | 643.43 |
| AW-25 | 657.26 | 13.78 | 643.48 |
| AW-28 | 660.91 | 17.37 | 643.54 |
| AW-9 | 660.12 | 16.67 | 643.45 |
| 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 | 14.33 | 643.41 |
| MW-11M | 658.35 | 14.71 | 643.64 |
| MW-12S | 664.22 | 20.62 | 643.6 |
| MW-14S | 656.05 | 12.60 | 643.45 |
| MW-15M | 656.98 | 13.58 | 643.4 |
| MW-16S | 658.94 | 15.55 | 643.39 |
| MW-16M | 659.22 | 15.75 | 643.47 |
| MW-17S | 658.51 | 15.05 | 643.46 |
| MW-17M | 658.76 | 15.22 | 643.54 |
| MW-1SR | 660.54 | 17.00 | 643.54 |
| MW-2D | 673.90 | NM[3] | NM |
| MW-2M | 673.64 | 30.07 | 643.57 |
| MW-2S | 672.85 | 29.26 | 643.59 |
| MW-4S | 665.84 | 22.21 | 643.63 |
| MW-5S | 660.50 | 16.98 | 643.52 |
| MW-6M | 649.71 | 6.31 | 643.4 |
| MW-6S | 647.86 | 4.44 | 643.42 |
| MW-7M | 663.74 | 20.04 | 643.7 |
| MW-8D | 660.60 | 17.05 | 643.55 |
| MW-8M | 660.71 | 17.12 | 643.59 |
| MW-8S | 660.74 | 17.20 | 643.54 |
| MW-9M | 657.32 | 13.82 | 643.5 |
| Pretasky Well | 662.95 | NM | NM |
| PZ-1 | 656.40 | 12.96 | 643.44 |
| PZ-2 | 651.36 | 7.93 | 643.43 |
| PZ-3 | 648.96 | 5.32 | 643.64 |
| PZ-4 | 649.13 | 5.64 | 643.49 |
| PZ-5 | 661.98 | 18.31 | 643.67 |
| PZ-6 | 660.78 | 17.17 | 643.61 |

Notes:
Groundwater elevations were collected on September 10 and 11, 2007.
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. MW-16S, MW-16M, MW-17S and MW-17M and MW-5S were surveyed on March 23, 2006.
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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 25 | 8.4 | 2.3 | 7.8 | 14 | 13 | 14 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 22 | 6.1 | 2.1 | 6 | 7.1 | 7.5 | 3.6 | 96 | 480 |
| Acetone | 6 | < 1.1 | < 0.66 | 0.82 | <0.74 | 1.3 | <0.74 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | 0.45 | <0.22 | <0.22 | <0.22 | <0.22 | 0.5 | 5 |
| Ethylbenzene | < 0.41 | < 0.41 | < 0.19 | <0.19 | <0.19 | 1 | <0.19 | 140 | 700 |
| Methylene chloride | 3.8 | < 0.29 | 0.35 | 0.44 | <0.19 | 0.37 | <0.19 | 0.5 | 5 |
| Xylenes (total) | 4 | 4.7 | < 0.45 | 1.2 | 2 | 3.7 | 3.5 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0021 | < 0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.25 | 0.13 | 0.18 | 0.25 | 0.15 | 0.227 | 0.167 | 0.4 | 2 |
| Cadmium | 0.0032 | < 0.00028 | < 0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0043 | < 0.00074 | < 0.00096 | 0.0033 | 0.0016 | 0.0019 | <0.0012 | 0.008 | 0.04 |
| Iron | **4.5** | **0.39** | 0.23 | **2.2** | **1.5** | **4.4** | **1.7** | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **6** | **0.7** | **0.72** | **3.9** | **2.14** | **3.26** | **1.32** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000029 | <0.000029 | <0.000029 | 0.0001 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00071 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | 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 | 3.8 | 3.1 | 125 | 250 |
| Nitrate as N | < 0.0076 | 0.83 | 8.6 | 0.098 | 0.3 | 0.59 | 0.76 | 2 | 10 |
| Sulfate | 9.1 | 6.2 | 17.2 | 10.8 | 6.5 | 8.9 | 6.7 | | 250 |
| Total Alkalinity | 290 | 210 | 270 | --- | --- | 360 | 240 | ----- | ----- |
| Total Organic Carbon | 6 | 2 | 5 | --- | --- | 5 | 3 | ----- | ----- |
| pH | --- | 6.98 | --- | 6.56 | 6.47 | 6.92 | 6.98 | ----- | ----- |
| Conductivity (mS/cm) | --- | 0.441 | --- | 0.707 | 270 | 399 | 299 | ----- | ----- |
| Temperature (C) | --- | 7.87 | --- | 10.98 | 9.59 | 8.57 | 8.33 | ----- | ----- |
| ORP (mV) | --- | 1.78 | --- | 217 | -17.8 | -32.3 | 34.3 | ----- | ----- |
| Dissolved Oxygen (mg/L) | --- | 4.5 | --- | 0.63 | 0.33 | 1.44 | 4.56 | ----- | ----- |

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

# 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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 25 | 8.4 | 2.3 | 7.8 | 14 | 13 | 14 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 22 | 6.1 | 2.1 | 6 | 7.1 | 7.5 | 3.6 | 96 | 480 |
| Acetone | 6 | < 1.1 | < 0.66 | 0.82 | <0.74 | 1.3 | <0.74 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | 0.45 | <0.22 | <0.22 | <0.22 | <0.22 | 0.5 | 5 |
| Ethylbenzene | < 0.41 | < 0.41 | < 0.19 | <0.19 | <0.19 | 1 | <0.19 | 140 | 700 |
| Methylene chloride | 3.8 | < 0.29 | 0.35 | 0.44 | <0.19 | 0.37 | <0.19 | 0.5 | 5 |
| Xylenes (total) | 4 | 4.7 | < 0.45 | 1.2 | 2 | 3.7 | 3.5 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0021 | < 0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.25 | 0.13 | 0.18 | 0.25 | 0.15 | 0.227 | 0.167 | 0.4 | 2 |
| Cadmium | 0.0032 | < 0.00028 | < 0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0043 | < 0.00074 | < 0.00096 | 0.0033 | 0.0016 | 0.0019 | <0.0012 | 0.008 | 0.04 |
| Iron | **4.5** | **0.39** | 0.23 | **2.2** | **1.5** | **4.4** | **1.7** | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **6** | **0.7** | **0.72** | **3.9** | **2.14** | **3.26** | **1.32** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000029 | <0.000029 | <0.000029 | 0.0001 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00071 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | 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 | 3.8 | 3.1 | 125 | 250 |
| Nitrate as N | < 0.0076 | 0.83 | 8.6 | 0.098 | 0.3 | 0.59 | 0.76 | 2 | 10 |
| Sulfate | 9.1 | 6.2 | 17.2 | 10.8 | 6.5 | 8.9 | 6.7 | | 250 |
| Total Alkalinity | 290 | 210 | 270 | --- | --- | 360 | 240 | ---- | ---- |
| Total Organic Carbon | 6 | 2 | 5 | --- | --- | 5 | 3 | ---- | ---- |
| pH | --- | 6.98 | --- | 6.56 | 6.47 | 6.92 | 6.98 | ---- | ---- |
| Conductivity (mS/cm) | --- | 0.441 | --- | 0.707 | 270 | 399 | 299 | ---- | ---- |
| Temperature (C) | --- | 7.87 | --- | 10.98 | 9.59 | 8.57 | 8.33 | ---- | ---- |
| ORP (mV) | --- | 1.78 | --- | 217 | -17.8 | -32.3 | 34.3 | ---- | ---- |
| Dissolved Oxygen (mg/L) | --- | 4.5 | --- | 0.63 | 0.33 | 1.44 | 4.56 | ---- | ---- |

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 | 3/23/2006 | 9/8/2006 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 2 | 1.8 | **860** | 250 | 0.43 | 3.2 | 18 | 12 | 400 | 5.1 | 0.99 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | 1.1 | **32** | 11 | <0.16 | <0.16 | 0.41 | 0.49 | <2.3 | 0.18 | <0.096 | 96 | 480 |
| 2-Butanone | < 0.59 | < 0.59 | < 13 | < 3.6 | <0.39 | <0.39 | <0.39 | <0.39 | 8.1 | <0.39 | <0.57 | 90 | 460 |
| Acetone | 2.5 | 5.9 | < 24 | < 6.6 | 0.84 | <0.74 | <0.74 | <0.74 | 20 | <0.74 | 2.6 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | < 8.2 | 3.8 | <0.22 | <0.22 | <0.22 | <0.22 | <3.1 | <0.22 | <0.13 | 0.5 | 5 |
| Methylene chloride | 3.6 | 3.6 | < 6.4 | < 2.8 | <0.19 | 0.48 | <0.19 | <0.19 | <2.7 | <0.19 | <0.33 | 0.5 | 5 |
| Naphthalene | < 0.42 | < 0.42 | < 9.3 | 2.4 | <0.15 | <0.15 | 0.39 | 0.25 | 5.2 | <0.15 | <0.24 | 8 | 40 |
| Toluene | < 0.39 | < 0.39 | < 8.7 | 5.3 | 0.19 | 0.36 | <0.17 | <0.17 | <2.4 | <0.17 | <0.13 | 200 | 1,000 |
| Xylenes (total) | < 0.44 | < 0.44 | 10 | < 4.5 | <0.44 | <0.44 | <0.44 | <0.44 | <6.3 | <0.44 | <0.28 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | | | | |
| Arsenic | 0.0033 | < 0.0021 | 0.0048 | 0.0038 | <0.0026 | 0.0033 | <0.0026 | 0.0047 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.28 | 0.27 | 0.2 | 0.28 | 0.26 | 0.3 | 0.306 | 0.333 | 0.28 | 0.305 | 0.2 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | 0.00034 | < 0.00028 | <0.00028 | <0.00028 | **<0.0014** | <0.00028 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0043 | 0.0044 | < 0.00074 | 0.0049 | 0.0053 | 0.0063 | 0.0055 | 0.0049 | 0.0032 | 0.0047 | 0.0023 | 0.008 | 0.04 |
| Iron | **4.7** | **5.1** | **34.8** | **10.4** | **5.6** | **7.5** | **9.18** | **11.2** | **16.5** | **6** | 0.19 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0016 | < 0.0017 | 0.004 | 0.003 | **<0.0085** | 0.005 | 0.0018 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **24.3** | **23.7** | **11.4** | **22.7** | **19.7** | **28.2** | **32.9** | **35.2** | **23.9** | **23.6** | **6.85** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000087 | < 0.000029 | 0.000059 | <0.000029 | <0.000029 | <0.000029 | 0.00011 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00067 | 0.00084 | 0.0039 | <0.00071 | <0.00071 | 0.0012 | <0.0019 | <0.0019 | <0.0019 | 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 | 2.4 | 0.37 | 0.3 | 125 | 250 |
| Nitrate as N | 0.2 | 0.28 | 0.01 | < 0.016 | --- | 0.064 | --- | 0.06 | <0.015 | <0.031 | 0.5 | 2 | 10 |
| Sulfate | 3.1 | 2.7 | 0.49 | 0.69 | --- | 0.21 | --- | <0.11 | 0.42 | 0.38 | 2.1 | 125 | 250 |
| Total Alkalinity | 550 | 550 | 260 | 560 | --- | --- | --- | --- | 490 | 530 | 430 | --- | --- |
| Total Organic Carbon | 5 | 4 | 5 | 12 | --- | --- | --- | --- | 7 | 5 | 3 | --- | --- |
| pH | --- | --- | 7.08 | --- | 6.35 | 6.7 | 7.37 | 6.47 | 6.79 | 6.75 | 6.49 | --- | --- |
| Conductivity (mS/cm) | --- | --- | 0.585 | --- | 1.096 | 1.027 | 1.115 | 695 | 5.25 | 390 | 0.519 | --- | --- |
| Temperature (C) | --- | --- | 8.78 | --- | 16.07 | 12.13 | 7.35 | 12.13 | 8.19 | 18.97 | 16.09 | --- | --- |
| ORP (mV) | --- | --- | 87 | --- | 193 | 184 | 170 | -71.5 | -50.3 | -80 | 2.9 | --- | --- |
| Dissolved Oxygen (mg/L) | --- | --- | 0.32 | --- | 3.32 | 0.42 | 0.45 | 0.23 | 0.38 | 0.49 | 0.57 | --- | --- |

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 | 3/23/2006 | 9/8/2006 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 22 | **450** | **450** | 170 | 3.4 | 34 | 34 | 4.3 | 130 | 48 | 300 | 0.27 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 17 | **200** | **190** | 120 | 0.5 | 6.6 | 2.5 | <0.16 | 8.4 | <0.27 | <1.6 | <0.096 | 96 | 480 |
| 2-Butanone | < 0.59 | < 9.1 | < 9.1 | < 7.2 | < 0.36 | 0.7 | <0.39 | <0.39 | <1.5 | 1.4 | <3.9 | <0.57 | 90 | 460 |
| Acetone | 3.6 | < 17 | < 17 | < 13 | < 0.66 | 2.5 | 0.78 | <0.74 | <2.8 | 4.5 | <7.4 | <1.1 | 200 | 1000 |
| Benzene | < 0.37 | < 5.7 | < 5.7 | < 4 | 0.39 | <0.22 | <0.22 | <0.22 | <0.85 | <0.37 | <2.2 | <0.13 | 0.5 | 5 |
| Chloromethane | < 0.49 | < 7.5 | < 7.5 | < 5.2 | < 0.26 | 0.23 | <0.14 | <0.14 | <0.54 | <0.23 | <1.4 | <0.3 | 0.3 | 3 |
| Ethylbenzene | < 0.41 | < 6.3 | < 6.3 | < 3.8 | < 0.19 | 0.28 | 0.21 | <0.19 | 1 | 0.46 | 2.6 | <0.17 | 140 | 700 |
| Methylene chloride | 3.4 | < 4.5 | < 4.5 | < 5.6 | < 0.28 | <0.19 | 0.55 | <0.19 | <0.73 | <0.32 | <1.9 | <0.33 | 0.5 | 5 |
| Naphthalene | 0.64 | 8.2 | 8.9 | 6.8 | 0.97 | 1.2 | 0.98 | 0.22 | 4.2 | 2.7 | 15 | <0.24 | 8 | 40 |
| Toluene | < 0.39 | < 6 | < 6 | < 3.4 | < 0.17 | 0.33 | 0.33 | <0.17 | <0.65 | <0.28 | <1.7 | <0.13 | 200 | 1,000 |
| Xylenes (total) | 1.1 | 30 | 28 | 12 | < 0.45 | 1.5 | 1.4 | <0.44 | 14 | 4.1 | 21 | <0.28 | 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** | <0.0043 | **0.0122** | 0.0045 | 0.001 | 0.01 |
| Barium | 0.29 | 0.13 | 0.23 | 0.38 | 0.2 | 0.22 | 0.22 | 0.145 | 0.264 | 0.234 | 0.368 | 0.205 | 0.4 | 2 |
| Cadmium | 0.00037 | < 0.00028 | < 0.00028 | < 0.00036 | 0.00029 | <0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.011 | < 0.00074 | 0.01 | 0.011 | 0.0023 | 0.0053 | 0.0052 | 0.0043 | 0.0086 | 0.0056 | 0.0098 | 0.0062 | 0.008 | 0.04 |
| Iron | **23.3** | **0.39** | **5.4** | **50** | **0.44** | **25.1** | **20.3** | **7.75** | **39.9** | **36.2** | **51.5** | **15.1** | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0016 | < 0.0023 | < 0.0017 | 0.0026 | 0.0021 | <0.0017 | 0.0027 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **17** | **0.7** | **11.8** | **16.1** | **2.6** | **15.8** | **14.9** | **9.25** | **14.9** | **9.52** | **13.4** | **4.08** | 0.025 | 0.05 |
| Mercury | 0.000087 | < 0.000087 | < 0.000087 | < 0.000067 | < 0.000029 | 0.000047 | <0.000029 | <0.000029 | 0.000062 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00067 | 0.0029 | < 0.00071 | <0.00071 | <0.00071 | <0.00071 | 0.00091 | <0.0019 | <0.0019 | <0.0019 | 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 | 1.7 | 2.4 | 0.2 | 125 | 250 |
| Nitrate as N | < 0.0076 | 0.83 | 1.9 | 0.24 | **25.7** | --- | 2.1 | --- | <0.016 | 0.07 | <0.031 | <0.023 | 2 | 10 |
| Sulfate | 1.1 | 6.2 | 3.9 | 0.22 | 20.4 | --- | 8.9 | --- | 0.3 | 4.5 | 3.4 | 3.9 | 125 | 250 |
| Total Alkalinity | 600 | 210 | 400 | 520 | 420 | --- | --- | --- | --- | 410 | 470 | 530 | ---- | ---- |
| Total Organic Carbon | 15 | 2 | 10 | 21 | 12 | --- | --- | --- | --- | 16 | 28 | 9 | ---- | ---- |
| pH | --- | 6.98 | 6.98 | 6.71 | --- | 6.12 | 6.44 | 7.58 | 5.2 | 6.84 | 6.49 | 6.56 | ---- | ---- |
| Conductivity (mS/cm) | --- | 0.445 | 0.445 | 1.09 | --- | 0.992 | 0.849 | 0.633 | 566 | 4.73 | 709 | 0.658 | ---- | ---- |
| Temperature (C) | --- | 7.61 | 7.61 | 15.46 | --- | 15.11 | 10.62 | 6.14 | 11.53 | 6.48 | 16.03 | 15.84 | ---- | ---- |
| ORP (mV) | --- | 147 | 147 | 141 | --- | 154 | 168 | 174 | -80.5 | -86 | -129.1 | -89.4 | ---- | ---- |
| Dissolved Oxygen (mg/L) | --- | 0.23 | 0.23 | 2.32 | --- | 0.18 | 0.54 | 0.46 | 0.21 | 0.6 | -0.07 | 0.22 | ---- | ---- |

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 | 3/23/2006 | 9/8/2006 | 3/23/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 240 | 52 | **760** | 2.5 | <0.12 | 0.71 | <0.12 | 0.24 | 12 | 8.3 | 7.7 | <0.12 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 38 | 9.1 | **210** | 0.28 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | 0.87 | <0.096 | 96 | 480 |
| 2-Butanone | < 4.6 | < 1.5 | < 7.2 | < 0.36 | <0.39 | <0.39 | <0.39 | <0.39 | 0.66 | <0.39 | <0.39 | <0.57 | 90 | 460 |
| Acetone | < 8.6 | < 2.8 | < 13 | 1.4 | 0.74 | 0.83 | <0.74 | <0.74 | 0.88 | <0.74 | <0.74 | 1.1 | 200 | 1000 |
| Benzene | < 2.9 | < 0.92 | < 4 | 0.4 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.13 | 0.5 | 5 |
| Chloromethane | < 3.8 | < 1.2 | < 5.2 | < 0.26 | 0.26 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.3 | 0.3 | 3 |
| Methylene chloride | **5.1** | < 0.72 | **7.6** | < 0.28 | <0.19 | 0.5 | <0.19 | <0.19 | <0.19 | <0.19 | <0.19 | <0.33 | 0.5 | 5 |
| Naphthalene | 4.5 | < 1 | 6.8 | < 0.16 | <0.15 | <0.15 | <0.15 | <0.15 | 0.2 | 0.17 | 0.15 | <0.24 | 8 | 40 |
| Xylenes (total) | 5.6 | 2.9 | 18 | < 0.45 | <0.44 | <0.44 | <0.44 | <0.44 | 0.73 | <0.44 | 0.45 | <0.28 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | | | | | |
| Arsenic | 0.0034 | < 0.0021 | **0.013** | < 0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.43 | 0.23 | 0.32 | 0.29 | 0.32 | 0.28 | 0.235 | 0.261 | 0.206 | 0.312 | 0.207 | 0.261 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | <0.00028 | 0.0003 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0049 | 0.0021 | 0.002 | 0.0015 | <0.00096 | 0.0022 | 0.0025 | 0.0017 | <0.0012 | 0.0024 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **13.8** | **3.6** | **19.6** | 0.098 | <0.049 | 0.22 | 0.132 | <0.049 | **1** | **4.7** | 0.051 | <0.032 | 0.15 | 0.3 |
| Lead | < 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 | **6.6** | **2.3** | **3.4** | **0.9** | **1.3** | **2.7** | **2.94** | **2.43** | **1.56** | **3.04** | **0.929** | **0.384** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000067 | < 0.000029 | <0.000029 | <0.000029 | <0.000029 | 0.000086 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00096 | < 0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 7.7 | 6.6 | 7.2 | 0.5 | 125 | 250 |
| Nitrate as N | 0.97 | 2.2 | < 0.019 | **20.8** | --- | 3.3 | --- | **12.3** | 5.2 | 0.79 | 4.5 | **14.5** | 2 | 10 |
| Sulfate | 4.4 | 1.9 | 0.77 | 25.4 | --- | 6.8 | --- | 12 | 5.7 | 7.6 | 8.7 | 12.7 | 125 | 250 |
| Total Alkalinity | 520 | 320 | 290 | 460 | --- | --- | --- | --- | 400 | 460 | 420 | 440 | ---- | ---- |
| Total Organic Carbon | 7 | 6 | 5 | 11 | --- | --- | --- | --- | 5 | 6 | 6 | 5 | ---- | ---- |
| pH | --- | 7.02 | 6.71 | --- | 6.16 | 6.52 | 7.24 | 5.28 | 6.92 | 6.52 | 6.84 | 6.66 | ---- | ---- |
| Conductivity (mS/cm) | --- | 0.644 | 0.576 | --- | 0.953 | 0.906 | 0.804 | 536 | 465 | 569 | 506 | 0.615 | ---- | ---- |
| Temperature (C) | --- | 7.67 | 15.47 | --- | 14.94 | 12.27 | 7.9 | 11.22 | 8.06 | 15.59 | 7.63 | 15.39 | ---- | ---- |
| ORP (mV) | --- | 156 | 147 | --- | 219 | 185 | 188 | 174 | 18.1 | -65.6 | 199 | 42.4 | ---- | ---- |
| Dissolved Oxygen (mg/L) | --- | 0.88 | 2.78 | --- | 0.16 | 0.35 | 1.15 | 0.74 | 3.2 | 0.12 | 4.22 | 0.2 | ---- | ---- |

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 | 3/23/2006 | 9/8/2006 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 45 | 44 | 10 | 2.2 | 34 | 35 | 11 | 24 | 35 | 1.5 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 21 | 18 | 2.6 | 0.24 | 9.7 | 11 | 3.6 | 6.4 | 8.5 | <0.096 | 96 | 480 |
| 2-Butanone | < 0.74 | < 1.2 | < 0.36 | <0.39 | <0.39 | 0.46 | 0.96 | 1.7 | <0.78 | <0.57 | 90 | 460 |
| 4-Methyl-2-pentanone | < 0.32 | < 0.52 | < 0.34 | <0.32 | <0.32 | <0.32 | 0.35 | <0.64 | <0.64 | <0.32 | 50 | 500 |
| Acetone | 5.4 | < 2.2 | 1.2 | <0.74 | 1 | <0.74 | 1.8 | 3.2 | <1.5 | 1.4 | 200 | 1000 |
| Benzene | < 0.46 | < 0.74 | 0.44 | <0.22 | <0.22 | <0.22 | <0.22 | <0.44 | <0.44 | <0.13 | 0.5 | 5 |
| Chloromethane | < 0.61 | < 0.98 | < 0.26 | <0.14 | <0.14 | <0.14 | <0.14 | <0.28 | <0.28 | 0.45 | 0.3 | 3 |
| Methylene chloride | 4.6 | < 0.58 | < 0.28 | <0.19 | 0.52 | <0.19 | <0.19 | <0.38 | <0.38 | <0.33 | 0.5 | 5 |
| Naphthalene | < 0.52 | < 0.84 | 0.25 | <0.15 | <0.15 | <0.15 | <0.15 | 0.36 | 0.34 | <0.24 | 8 | 40 |
| Toluene | 0.83 | < 0.78 | < 0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.34 | <0.34 | <0.13 | 200 | 1,000 |
| Xylenes (total) | 2.9 | 1.6 | 0.57 | <0.44 | 0.66 | 1.4 | 0.6 | <0.88 | <0.88 | <0.28 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | | | |
| Arsenic | 0.0026 | < 0.0021 | < 0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.26 | 0.22 | 0.22 | 0.19 | 0.25 | 0.254 | 0.239 | 0.164 | 0.237 | 0.199 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | 0.00034 | <0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0064 | 0.0036 | 0.0059 | <0.00096 | 0.003 | 0.0029 | 0.0024 | <0.0012 | 0.0022 | 0.0025 | 0.008 | 0.04 |
| Iron | **9.8** | **3.7** | **0.74** | **0.66** | **5.6** | **8.89** | **6.8** | **5.4** | **7.8** | **2** | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.002 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **5** | **2.4** | **2.5** | **1.1** | **3.7** | **4.32** | **3.32** | **1.31** | **2.72** | **0.977** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000029 | 0.000032 | <0.000029 | <0.000029 | 0.00006 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | 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 | 13.8 | 5.1 | 0.2 | 125 | 250 |
| Nitrate as N | 1.1 | 1.7 | 8.9 | --- | 0.29 | --- | 0.52 | 0.16 | 0.16 | 0.5 | 2 | 10 |
| Sulfate | 1.4 | 2.7 | 9.6 | --- | 3.4 | --- | 5.3 | 1.8 | 2.8 | 2.6 | 125 | 250 |
| Total Alkalinity | 370 | 360 | 390 | --- | --- | --- | --- | 270 | 330 | 450 | ---- | ---- |
| Total Organic Carbon | 9 | 11 | 33 | --- | --- | --- | --- | 5 | 4 | 3 | ---- | ---- |
| pH | --- | 7.02 | --- | 6.15 | 6.54 | 7.16 | 6.01 | 6.95 | 6.54 | 6.57 | ---- | ---- |
| Conductivity (mS/cm) | --- | 0.7 | --- | 0.67 | 0.722 | 0.764 | 447 | 329 | 423 | 0.517 | ---- | ---- |
| Temperature (C) | --- | 8.35 | --- | 14.29 | 12.34 | 9.23 | 11.14 | 9.35 | 14.1 | 14.01 | ---- | ---- |
| ORP (mV) | --- | 166 | --- | 214 | 184 | 189 | -35.3 | -37.5 | -58.7 | -14.1 | ---- | ---- |
| Dissolved Oxygen (mg/L) | --- | 1.36 | --- | 0.43 | 3.01 | 0.92 | 0.71 | 1.08 | 0.11 | 0.43 | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 68 | 3.4 | 1.1 | 96 | 480 |
| 1,3,5-Trimethylbenzene | <0.32 | 1.2 | <0.16 | 96 | 480 |
| Acetone | 1.7 | 1.3 | 0.82 | 200 | 1000 |
| Carbon disulfide | 1.5 | <0.28 | <0.28 | 200 | 1000 |
| Chlorobenzene | <0.4 | 0.21 | <0.2 | ----- | ----- |
| Methylene chloride | <0.38 | 0.35 | 0.23 | 0.5 | 5 |
| Naphthalene | 1.4 | 2.1 | <0.15 | 8 | 40 |
| Xylenes (total) | 1.6 | <0.44 | <0.44 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | |
| Arsenic | **0.0353** | **0.0212** | **0.0242** | 0.001 | 0.01 |
| Barium | 0.918 | 0.637 | 0.638 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **13.2** | **5.4** | **4** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.16** | **1.37** | **1.27** | 0.025 | 0.05 |
| Mercury | 0.000076 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | |
| Chloride | 11.9 | 7.6 | 5.8 | 125 | 250 |
| Nitrate as N | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 0.61 | 1.6 | 2.6 | 125 | 250 |
| Total Alkalinity | ---- | 150 | 120 | ---- | ---- |
| Total Organic Carbon | ---- | 4 | 4 | ---- | ---- |
| pH | ---- | 7.59 | ---- | ---- | ---- |
| Conductivity (mS/cm) | ---- | 187 | ---- | ---- | ---- |
| Temperature (C) | ---- | 10.45 | ---- | ---- | ---- |
| ORP (mV) | ---- | -138.4 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | 4.31 | ---- | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 68 | 3.4 | 1.1 | 96 | 480 |
| 1,3,5-Trimethylbenzene | <0.32 | 1.2 | <0.16 | 96 | 480 |
| Acetone | 1.7 | 1.3 | 0.82 | 200 | 1000 |
| Carbon disulfide | 1.5 | <0.28 | <0.28 | 200 | 1000 |
| Chlorobenzene | <0.4 | 0.21 | <0.2 | ----- | ----- |
| Methylene chloride | <0.38 | 0.35 | 0.23 | 0.5 | 5 |
| Naphthalene | 1.4 | 2.1 | <0.15 | 8 | 40 |
| Xylenes (total) | 1.6 | <0.44 | <0.44 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | |
| Arsenic | **0.0353** | **0.0212** | **0.0242** | 0.001 | 0.01 |
| Barium | 0.918 | 0.637 | 0.638 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **13.2** | **5.4** | **4** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.16** | **1.37** | **1.27** | 0.025 | 0.05 |
| Mercury | 0.000076 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | |
| Chloride | 11.9 | 7.6 | 5.8 | 125 | 250 |
| Nitrate as N | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 0.61 | 1.6 | 2.6 | 125 | 250 |
| Total Alkalinity | ---- | 150 | 120 | ---- | ---- |
| Total Organic Carbon | ---- | 4 | 4 | ---- | ---- |
| pH | ---- | 7.59 | ---- | ---- | ---- |
| Conductivity (mS/cm) | ---- | 187 | ---- | ---- | ---- |
| Temperature (C) | ---- | 10.45 | ---- | ---- | ---- |
| ORP (mV) | ---- | -138.4 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | 4.31 | ---- | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 9.3 | 9.2 | 1.2 | 7.1 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 1.6 | 1.7 | <0.16 | <0.16 | 96 | 480 |
| Acetone | 0.91 | 0.91 | 1 | 0.84 | 200 | 1000 |
| Benzene | 0.44 | 0.43 | 0.23 | 0.45 | 0.5 | 5 |
| Carbon disulfide | 0.72 | 0.77 | <0.28 | <0.28 | 200 | 1000 |
| Chlorobenzene | 0.66 | 0.65 | <0.2 | 0.35 | ----- | ----- |
| Chloroethane | 1 | <0.24 | <0.24 | <0.24 | 80 | 400 |
| Methylene chloride | <0.19 | <0.19 | 0.64 | <0.19 | 0.5 | 5 |
| Naphthalene | 0.37 | 0.38 | 2 | 0.27 | 8 | 40 |
| Xylenes (total) | 0.92 | 0.88 | <0.44 | 0.64 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | |
| Arsenic | **0.0335** | **0.0314** | **0.016** | **0.0214** | 0.001 | 0.01 |
| Barium | 1.1 | 1.1 | 1.02 | 0.964 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.00098 | 0.0013 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **11.6** | **11.5** | **4.7** | **5.9** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.98** | **2.98** | **3.12** | **2.67** | 0.025 | 0.05 |
| Mercury | 0.00012 | 0.000051 | 0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | <0.00071 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | | |
| Chloride | 19.4 | 19.1 | 20 | 17.1 | 125 | 250 |
| Nitrate as N | <0.016 | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 0.15 | <0.11 | <0.12 | <0.12 | 125 | 250 |
| Total Alkalinity | ---- | ---- | 180 | 170 | ---- | ---- |
| Total Organic Carbon | ---- | ---- | 4 | 5 | ---- | ---- |
| pH | ---- | ---- | 7.38 | ---- | ---- | ---- |
| Conductivity (mS/cm) | ---- | ---- | 278 | ---- | ---- | ---- |
| Temperature (C) | ---- | ---- | 10.26 | ---- | ---- | ---- |
| ORP (mV) | ---- | ---- | -110.3 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | ---- | 7.82 | ---- | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 86 | 150 | 160 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 3 | 2.5 | <1 | 96 | 480 |
| Acetone | 2.6 | 1.7 | <4.6 | 200 | 1000 |
| Carbon disulfide | 2 | <0.47 | <1.8 | 200 | 1000 |
| Ethylbenzene | <0.48 | 1.9 | <1.2 | 140 | 700 |
| Methylene chloride | <0.48 | 0.68 | 3 | 0.5 | 5 |
| Naphthalene | 1.1 | 3.9 | 4.6 | 8 | 40 |
| Xylenes (total) | 2.5 | 3.2 | <2.8 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | |
| Arsenic | **0.0282** | **0.0199** | **0.0272** | 0.001 | 0.01 |
| Barium | 0.896 | 0.717 | 1.17 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **11.9** | **4.8** | **7.5** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.11** | **2.05** | **3.31** | 0.025 | 0.05 |
| Mercury | 0.00011 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.00083 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | |
| Chloride | 11.9 | 9 | 8.8 | 125 | 250 |
| Nitrate as N | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | <0.11 | <0.12 | <0.12 | 125 | 250 |
| Total Alkalinity | ---- | 190 | 230 | ---- | ---- |
| Total Organic Carbon | ---- | 4 | 5 | ---- | ---- |
| pH | ---- | 7.49 | ---- | ---- | ---- |
| Conductivity (mS/cm) | ---- | 248 | ---- | ---- | ---- |
| Temperature (C) | ---- | 10.56 | ---- | ---- | ---- |
| ORP (mV) | ---- | -114.8 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | 7.34 | ---- | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | <0.12 | 0.98 | <0.12 | 96 | 480 |
| Acetone | <0.74 | <0.74 | 1 | 200 | 1000 |
| Methylene chloride | <0.19 | 0.44 | 0.29 | 0.5 | 5 |
| **Metals, mg/L** | | | | | |
| Arsenic | **0.0152** | **0.0148** | **0.0168** | 0.001 | 0.01 |
| Barium | 0.384 | 0.313 | 0.373 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **1.7** | 0.28 | **0.97** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **1.07** | **0.984** | **1.03** | 0.025 | 0.05 |
| Mercury | 0.000053 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | |
| Chloride | 7.9 | 7.3 | 6.8 | 125 | 250 |
| Nitrate as N | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 4.2 | 3.9 | 2.2 | 125 | 250 |
| Total Alkalinity | ---- | 100 | 100 | ---- | ---- |
| Total Organic Carbon | ---- | 4 | 4 | ---- | ---- |
| pH | ---- | 7.85 | ---- | ---- | ---- |
| Conductivity (mS/cm) | ---- | 136 | ---- | ---- | ---- |
| Temperature (C) | ---- | 9.75 | ---- | ---- | ---- |
| ORP (mV) | ---- | -125.6 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | 4.92 | ---- | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 1.1 | < 0.14 | <0.12 | 0.13 | <0.12 | <0.12 | <0.12 | <0.12 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 0.3 | < 0.18 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | 96 | 480 |
| Acetone | < 0.66 | < 0.66 | <0.74 | <0.74 | <0.74 | <0.74 | 0.8 | <0.74 | 200 | 1000 |
| Benzene | < 0.2 | 0.5 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | 0.5 | 5 |
| Bromomethane | < 0.16 | < 0.16 | 0.45 | <0.36 | <0.36 | <0.36 | <0.36 | <0.36 | 1 | 10 |
| Chloromethane | < 0.26 | < 0.26 | 0.18 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | 0.3 | 3 |
| Methylene chloride | < 0.28 | < 0.28 | <0.19 | 0.41 | <0.19 | <0.19 | 0.48 | <0.19 | 0.5 | 5 |
| Naphthalene | 0.34 | < 0.16 | <0.15 | <0.15 | <0.15 | <0.15 | <0.15 | <0.15 | 8 | 40 |
| Xylenes (total) | 0.64 | < 0.45 | <0.44 | <0.44 | <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 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.18 | 0.047 | 0.12 | 0.085 | 0.0644 | 0.0455 | 0.0393 | 0.0407 | 0.4 | 2 |
| Cadmium | < 0.00036 | < 0.00028 | <0.00028 | 0.00029 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.003 | 0.00099 | <0.00096 | 0.0016 | 0.0011 | 0.0014 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **6.2** | **0.76** | **2.8** | **2.8** | **3.63** | **1.3** | **0.51** | 0.25 | 0.15 | 0.3 |
| Lead | 0.0024 | < 0.0017 | <0.0017 | <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** | **1.84** | **2.05** | 0.025 | 0.05 |
| Mercury | < 0.000067 | < 0.000029 | <0.000029 | <0.000029 | <0.000029 | 0.00007 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.008 | 0.0018 | <0.00071 | 0.0013 | 0.003 | 0.002 | <0.0019 | <0.0019 | 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 | 7.2 | 8.1 | 125 | 250 |
| Nitrate as N | < 0.019 | 0.23 | --- | <0.016 | ---- | 0.042 | 0.051 | <0.031 | 2 | 10 |
| Sulfate | 7 | 4.6 | --- | 5.2 | ---- | 10.9 | 11.9 | 5.6 | 125 | 250 |
| Total Alkalinity | 95 | 97 | --- | --- | ---- | ---- | 100 | 83 | ---- | ---- |
| Total Organic Carbon | 5 | 5 | --- | --- | ---- | ---- | 4 | 5 | ---- | ---- |
| pH | 6.95 | --- | 6.33 | 7.08 | 7.8 | 7.07 | 7.25 | 7.19 | ---- | ---- |
| Conductivity (mS/cm) | 0.254 | --- | 0.363 | 0.359 | 0.241 | 136 | 144 | 130 | ---- | ---- |
| Temperature (C) | 11.93 | --- | 13.74 | 12.06 | 8.82 | 8.67 | 8.36 | 8.43 | ---- | ---- |
| ORP (mV) | 162 | --- | 182 | 203 | 195 | 54 | 12.7 | 16.2 | ---- | ---- |

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

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

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved Oxygen (mg/L) | 6.6 | --- | 1.11 | 1.67 | 2.26 | 4.6 | 3.57 | 2.71 | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | 5.5 | < 1.1 | < 0.66 | < 0.66 | <0.74 | <0.74 | 0.85 | 0.88 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | < 0.2 | 0.46 | <0.22 | <0.22 | <0.22 | <0.22 | 0.5 | 5 |
| Chlorobenzene | < 0.38 | < 0.38 | < 0.16 | < 0.16 | <0.2 | <0.2 | <0.2 | 0.28 | ----- | ----- |
| Methylene chloride | 3.1 | < 0.29 | < 0.28 | < 0.28 | 0.4 | <0.19 | 0.43 | 0.19 | 0.5 | 5 |
| **Metals, mg/L** | | | | | 0.0098 | 0.0092 | 0.0053 | 0.0052 | 4s in Miller Well | |
| Arsenic | **0.019** | **0.019** | **0.02** | **0.021** | **0.019** | **0.0234** | **0.0147** | **0.0226** | 0.001 | 0.01 |
| Barium | 0.37 | 0.66 | 0.42 | 0.35 | 0.43 | 1.07 | 0.801 | 1.05 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.00074 | < 0.0011 | < 0.00096 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **5** | **9.6** | **6.4** | **4.9** | **5.7** | **16.8** | **9.4** | **18.7** | 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 | **0.41** | **0.64** | **0.41** | **0.49** | **0.47** | **1.02** | **0.932** | **1.17** | 0.025 | 0.05 |
| Mercury | 0.000092 | < 0.000087 | < 0.000067 | 0.00084 | <0.000029 | 0.000056 | 0.00012 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00096 | < 0.00071 | 0.00089 | <0.00071 | <0.0019 | <0.0019 | 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 | 18.8 | 42.8 | 125 | 250 |
| Nitrate as N | < 0.0076 | < 0.0076 | < 0.019 | < 0.016 | <0.016 | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 0.13 | < 0.11 | < 0.14 | < 0.11 | <0.11 | <0.11 | <0.12 | <0.12 | 125 | 250 |
| Total Alkalinity | 100 | 160 | 110 | 100 | --- | ---- | 230 | 230 | ---- | ---- |
| Total Organic Carbon | 4 | 4 | 4 | 4 | --- | ---- | 5 | 5 | ---- | ---- |
| pH | 6.98 | 7.26 | 7.02 | --- | 7.24 | 6.92 | 7.37 | 7.22 | ---- | ---- |
| Conductivity (mS/cm) | 0.231 | 0.391 | 0.26 | --- | 0.271 | 370 | 332 | 421 | ---- | ---- |
| Temperature (C) | 10.01 | 10.61 | 10.6 | --- | 9.64 | 10.78 | 10.37 | 10.34 | ---- | ---- |
| ORP (mV) | 107 | 89 | 140 | --- | 147 | -137.2 | -144.9 | -113 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 0.41 | 1.11 | 0.99 | --- | 1.12 | 1.24 | 1.03 | 0.42 | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.37 | 0.14 | < 0.14 | 0.21 | 0.29 | <0.12 | <0.12 | 96 | 480 |
| Acetone | 3.8 | < 1.1 | < 0.66 | 4.1 | <0.74 | <0.74 | 1.3 | 1 | 200 | 1000 |
| Benzene | 0.91 | 0.45 | 1.3 | 1.2 | 1.3 | 0.82 | 0.47 | 0.45 | 0.5 | 5 |
| Carbon disulfide | < 0.24 | < 0.24 | < 0.21 | 0.44 | <0.28 | <0.28 | <0.28 | <0.28 | 200 | 1000 |
| Chlorobenzene | 19 | 1.5 | 13 | 7.1 | 23 | 19 | 5.2 | 2.1 | ----- | ----- |
| Chloroethane | < 0.29 | < 0.29 | < 0.22 | < 0.22 | <0.24 | 0.27 | <0.24 | <0.24 | 80 | 400 |
| Methylene chloride | 2.8 | < 0.29 | < 0.28 | < 0.28 | 0.42 | <0.19 | 0.39 | 0.21 | 0.5 | 5 |
| Naphthalene | < 0.42 | < 0.42 | < 0.16 | < 0.16 | <0.15 | 0.21 | 2 | <0.15 | 8 | 40 |
| Xylenes (total) | < 0.44 | < 0.44 | < 0.45 | < 0.45 | <0.44 | <0.44 | 0.78 | <0.44 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | **0.012** | **0.012** | **0.011** | **0.013** | **0.012** | **0.0123** | **0.0106** | **0.0128** | 0.001 | 0.01 |
| Barium | 0.17 | 0.14 | 0.18 | 0.14 | 0.18 | 0.2 | 0.128 | 0.168 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | 0.00041 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.008 | 0.0013 | 0.0019 | 0.0039 | 0.0022 | 0.0033 | 0.0013 | 0.0019 | 0.008 | 0.04 |
| Iron | **29.5** | **29.3** | **40** | **36.2** | **42.1** | **42.2** | **33.8** | **37.9** | 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 | **1.9** | **2.8** | **3** | **2.3** | **2.2** | **2.36** | **2.19** | **1.49** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000087 | < 0.000067 | < 0.000029 | <0.000029 | 0.000061 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.00084 | 0.002 | 0.0013 | 0.0022 | 0.0019 | 0.001 | <0.0019 | <0.0019 | 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 | 25.6 | 20.9 | 125 | 250 |
| Nitrate as N | < 0.0076 | 0.01 | < 0.019 | < 0.016 | <0.016 | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | < 0.11 | 0.22 | 0.25 | 0.23 | 0.12 | < 0.11 | 0.15 | 0.27 | 125 | 250 |
| Total Alkalinity | 180 | 170 | 230 | 160 | --- | ---- | 160 | 170 | ---- | ---- |
| Total Organic Carbon | 6 | 4 | 5 | 6 | --- | ---- | 5 | 5 | ---- | ---- |
| pH | 6.47 | 6.74 | 6.47 | --- | 6.29 | 6.01 | 6.67 | 6.57 | ---- | ---- |
| Conductivity (mS/cm) | 0.563 | 0.476 | 0.56 | --- | 10.43 | 366 | 320 | 332 | ---- | ---- |
| Temperature (C) | 10.65 | 11.36 | 10.83 | --- | 10.43 | 10.98 | 10.87 | 10.86 | ---- | ---- |
| ORP (mV) | 133 | 96 | 168 | --- | 176 | -53 | -44.7 | -32 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 3.35 | 0.9 | 1.93 | --- | 2.49 | 1.95 | 3.19 | 0.77 | ---- | ---- |

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 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | **540** | **570** | **780** | **1100** | **1100** | **1000** | **1900** | **1600** | **1500** | **1100** |
| 1,3,5-Trimethylbenzene | **120** | **130** | **170** | **230** | **310** | **280** | **390** | **410** | **360** | **260** |
| Acetone | < 28 | < 28 | < 31 | < 55 | < 26 | < 19 | <53 | <37 | <37 | <25 |
| Benzene | < 9.2 | < 9.2 | < 11 | < 17 | **13** | **17** | <16 | <11 | <11 | <7.3 |
| Ethylbenzene | 10 | < 10 | 16 | 38 | 9.4 | 8.4 | 50 | 26 | 27 | 21 |
| Methylene chloride | < 7.2 | < 7.2 | < 8.3 | < 23 | < 11 | < 8 | <14 | **49** | **42** | <6.3 |
| Naphthalene | < 10 | < 10 | 14 | 20 | < 6.4 | 7.6 | <11 | <7.5 | <7.5 | 14 |
| Xylenes (total) | 29 | 27 | 54 | 160 | 52 | 39 | 210 | 93 | 87 | 77 |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | 0.0089 | 0.009 | 0.0065 | 0.0091 | 0.0086 | 0.0083 | 0.0066 | 0.0095 | **0.01** | 0.0083 |
| Barium | 0.3 | 0.32 | 0.26 | 0.29 | 0.33 | 0.33 | 0.29 | 0.32 | 0.33 | 0.315 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | < 0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00028 |
| Cobalt | < 0.00074 | < 0.00074 | < 0.00074 | < 0.0011 | < 0.00096 | < 0.00096 | <0.00096 | <0.00096 | <0.00096 | <0.00096 |
| Iron | **16.9** | **17.2** | **15.4** | **18.9** | **24.7** | **25.4** | **18** | **22.9** | **23.2** | **23.8** |
| Lead | < 0.0016 | < 0.0016 | < 0.0016 | < 0.0023 | < 0.0017 | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 |
| Manganese | **2.1** | **2.1** | **1.8** | **2.1** | **2.1** | **2.2** | **2.1** | **2.5** | **2.5** | **2.14** |
| Mercury | < 0.000087 | < 0.000087 | < 0.000087 | < 0.000067 | < 0.000029 | < 0.000029 | 0.000045 | <0.000029 | <0.000029 | <0.000029 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00067 | < 0.00096 | < 0.00071 | 0.00088 | <0.00071 | <0.00071 | 0.0012 | 0.0011 |
| **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 | --- |
| Nitrate as N | < 0.0076 | < 0.0076 | < 0.0076 | < 0.019 | < 0.016 | < 0.016 | --- | <0.016 | <0.016 | --- |
| Sulfate | 0.98 | 0.92 | 0.22 | 0.15 | 1 | | --- | 0.14 | 0.44 | --- |
| 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 |
| Conductivity (mS/cm) | 0.612 | 0.543 | --- | 0.611 | --- | --- | 0.635 | 0.645 | --- | 0.596 |
| Temperature (C) | 12.02 | 10.15 | --- | 11.72 | --- | --- | 11.88 | 12.44 | --- | 11.19 |
| ORP (mV) | 117 | 132 | --- | 133 | --- | --- | 181 | 173 | --- | 179 |
| Dissolved Oxygen (mg/L) | 4.49 | 0.58 | --- | 7.49 | --- | --- | 3.02 | 1.13 | --- | 2.08 |

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 | Duplicate 3/10/2005 | 6/9/2005 | Duplicate 6/9/2005 | 3/23/2006 | 9/7/2006 | 3/22/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | **1100** | **1500** | **1700** | **580** | **1200** | **660** | **1200** | 96 | 480 |
| 1,3,5-Trimethylbenzene | **270** | **380** | **420** | **150** | **260** | **110** | **280** | 96 | 480 |
| Acetone | <25 | <37 | <37 | 48 | <25 | <12 | <55 | 200 | 1000 |
| Benzene | <7.3 | <11 | <11 | <3.7 | <7.3 | <3.7 | <6.5 | 0.5 | 5 |
| Ethylbenzene | 21 | 32 | 27 | 4.1 | 9.6 | 3.7 | 19 | 140 | 700 |
| Methylene chloride | <6.3 | <9.5 | <9.5 | <3.2 | <6.3 | <3.2 | <16 | 0.5 | 5 |
| Naphthalene | 13 | 32 | 25 | 7 | 18 | 8.3 | 30 | 8 | 40 |
| Xylenes (total) | 79 | 140 | 120 | 23 | 52 | 25 | 120 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | **0.0101** | 0.0091 | 0.0092 | 0.0052 | <0.0043 | <0.0043 | 0.0058 | 0.001 | 0.01 |
| Barium | 0.313 | 0.361 | 0.342 | 0.248 | 0.267 | 0.244 | 0.328 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **23.3** | **27.5** | **25.9** | **17** | **16.1** | **13.3** | **14.9** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.13** | **2.29** | **2.14** | **1.41** | **1.78** | **1.28** | **1.84** | 0.025 | 0.05 |
| Mercury | <0.000029 | 0.000087 | 0.000042 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.00074 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Dissolved Gases, ug/L** | | | | | | | | | |
| Ethane | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Ethene | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Methane | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | |
| Chloride | ---- | 15.9 | 15.6 | 13.8 | 9.6 | 8.9 | 4.4 | 125 | 250 |
| Nitrate as N | ---- | <0.016 | <0.016 | <0.015 | <0.031 | 0.36 | <0.023 | 2 | 10 |
| Sulfate | ---- | 0.16 | 0.18 | 2.9 | 0.68 | 0.83 | <0.12 | 125 | 250 |
| Total Alkalinity | ---- | ---- | ---- | 220 | 260 | 240 | 340 | ---- | ---- |
| Total Organic Carbon | ---- | ---- | ---- | 9 | 12 | 10 | 14 | ---- | ---- |
| pH | ---- | 6.44 | ---- | 6.96 | -94.2 | 6.89 | 6.75 | ---- | ---- |
| Conductivity (mS/cm) | ---- | 391 | ---- | 330 | 343 | 350 | 0.404 | ---- | ---- |
| Temperature (C) | ---- | 10.49 | ---- | 11.21 | 12.13 | 10.58 | 11.73 | ---- | ---- |
| ORP (mV) | ---- | -78.3 | ---- | -73 | -94.2 | -56.7 | 118.6 | ---- | ---- |
| Dissolved Oxygen (mg/L) | ---- | 1.43 | ---- | 3.6 | 0.18 | 0.75 | 1.09 | ---- | ---- |

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 |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 210 | 180 | **750** | 67 | 51 | 210 | 150 | **1300** | **1200** |
| 1,3,5-Trimethylbenzene | 47 | 38 | **200** | 2.7 | 2.4 | 19 | 15 | **350** | **330** |
| 2-Butanone | < 4.5 | < 3.4 | < 24 | < 1.2 | < 0.72 | <2.2 | <3 | <20 | <20 |
| Acetone | < 8.5 | < 6.3 | < 44 | < 2.2 | < 1.3 | <4.2 | <5.7 | <37 | <37 |
| Benzene | < 2.8 | < 2.1 | < 13 | 1.5 | 0.56 | <1.3 | <1.7 | <11 | <11 |
| Ethylbenzene | 6.2 | 5.1 | 29 | 1.5 | 1.2 | 5.9 | 5.7 | 60 | 54 |
| Methylene chloride | 3.9 | < 1.7 | < 19 | < 0.93 | < 0.56 | <1.1 | <1.5 | **41** | **41** |
| Naphthalene | 6.2 | 5.4 | 28 | 2.2 | 1.6 | 7.7 | 14 | <7.5 | <7.5 |
| Xylenes (total) | 12 | 13 | 150 | 2 | 1.8 | 120 | 94 | 160 | 160 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | 0.0098 | **0.011** | **0.022** | **0.01** | **0.012** | 0.0053 | 0.0047 | **0.012** | **0.012** |
| Barium | 0.18 | 0.28 | 0.27 | 0.27 | 0.28 | 0.29 | 0.29 | 0.31 | 0.29 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | < 0.00028 | <0.00028 | <0.00028 | 0.00032 | 0.00033 |
| Cobalt | 0.0025 | 0.0041 | 0.0058 | 0.0045 | 0.0041 | 0.0056 | 0.0054 | 0.0094 | 0.0091 |
| Iron | **10.2** | **19.4** | **30.5** | **11.2** | **11.7** | **15.9** | **16.3** | **34.7** | **31.9** |
| Lead | < 0.0016 | < 0.0016 | < 0.0023 | < 0.0017 | < 0.0017 | <0.0017 | 0.003 | <0.0017 | <0.0017 |
| Manganese | **1.6** | **2** | **2.3** | **1.3** | **1.3** | **2.5** | **2.6** | **3.3** | **3.1** |
| Mercury | 0.000088 | < 0.000087 | 0.000075 | < 0.000029 | < 0.000029 | <0.000029 | <0.000029 | <0.000029 | <0.000029 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00096 | < 0.00071 | < 0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.00071 |
| **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 |
| Nitrate as N | 0.1 | 0.62 | 0.02 | 0.94 | 1.3 | --- | --- | 0.47 | 0.45 |
| Sulfate | 0.34 | 3.3 | 0.16 | 1.8 | 2.3 | | --- | 0.77 | 0.81 |
| 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 | --- |
| Conductivity (mS/cm) | 0.333 | 0.379 | 0.425 | --- | --- | 0.645 | --- | 0.549 | --- |
| Temperature (C) | 12.4 | 9.66 | 12.77 | --- | --- | 13.51 | --- | 12.73 | --- |
| ORP (mV) | 106 | 117 | 151 | --- | --- | 192 | --- | 178 | --- |
| Dissolved Oxygen (mg/L) | 1.75 | 0.74 | 5.12 | --- | --- | 2.27 | --- | 1.17 | --- |

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 | 3/10/2005 | 6/10/2005 | Duplicate 6/10/2005 | 3/23/2006 | 9/7/2006 | 3/22/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | **490** | **1300** | **1200** | **670** | **710** | **1200** | **1100** | 96 | 480 |
| 1,3,5-Trimethylbenzene | **48** | **390** | **370** | **73** | **110** | **120** | **160** | 96 | 480 |
| 2-Butanone | <4.9 | <16 | <16 | 10 | <7.1 | <7.8 | <28 | 90 | 460 |
| Acetone | <9.2 | <31 | <31 | 38 | <13 | <15 | <55 | 200 | 1000 |
| Benzene | <2.8 | <9.2 | <9.2 | <4.4 | <4 | <4.4 | <6.5 | 0.5 | 5 |
| Ethylbenzene | 17 | 57 | 51 | 41 | 19 | 23 | 10 | 140 | 700 |
| Methylene chloride | <2.4 | <7.9 | <7.9 | <3.8 | <3.5 | <3.8 | <16 | 0.5 | 5 |
| Naphthalene | 19 | **41** | **40** | **48** | **42** | **44** | 32 | 8 | 40 |
| Xylenes (total) | 61 | 250 | 240 | 53 | 83 | 30 | 40 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | **0.0151** | **0.0231** | **0.0227** | **0.0137** | **0.0138** | **0.0121** | 0.0062 | 0.001 | 0.01 |
| Barium | 0.391 | 0.5 | 0.519 | 0.392 | 0.382 | 0.383 | 0.281 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0086 | 0.0126 | 0.0127 | 0.0099 | 0.0105 | 0.0109 | 0.0056 | 0.008 | 0.04 |
| Iron | **39.7** | **60.7** | **59.1** | **39.2** | **40.7** | **39.1** | **14.6** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.83** | **3.86** | **3.83** | **3.98** | **4.87** | **3.79** | **1.85** | 0.025 | 0.05 |
| Mercury | <0.000029 | 0.00009 | 0.000058 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | 0.0013 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Dissolved Gases, ug/L** | | | | | | | | | |
| Ethane | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Ethene | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Methane | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | |
| Chloride | ---- | 4.8 | 4.6 | 6 | 2.5 | 5.9 | 4.2 | 125 | 250 |
| Nitrate as N | ---- | <0.016 | <0.016 | 0.18 | <0.031 | 0.63 | 0.2 | 2 | 10 |
| Sulfate | ---- | 0.2 | 0.18 | 0.52 | 2.5 | 1 | 3.6 | 125 | 250 |
| Total Alkalinity | ---- | ---- | ---- | 200 | 250 | 220 | 280 | ---- | ---- |
| Total Organic Carbon | ---- | ---- | ---- | 9 | 13 | 9 | 7 | ---- | ---- |
| pH | 7.12 | 6.08 | ---- | 6.76 | 6.59 | 6.71 | 6.49 | ---- | ---- |
| Conductivity (mS/cm) | 0.489 | 340 | ---- | 320 | 365 | 339 | 0.367 | ---- | ---- |
| Temperature (C) | 10.51 | 10.5 | ---- | 10.69 | 12.64 | 9.83 | 13.27 | ---- | ---- |
| ORP (mV) | 183 | -75.2 | ---- | -59.2 | -88.8 | -53.5 | 168.1 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 2.51 | 0.76 | ---- | 0.97 | 0.62 | 0.65 | 0.53 | ---- | ---- |

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

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

outside DMZ

| Volatile Organic Compounds (VOC), ug/L | 12/12/2002 | 10/7/2003 | 12/2/2004 | 6/8/2005 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | < 0.3 | 0.61 | 0.27 | 0.21 | <0.21 | 85 | 850 |
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.14 | 0.23 | 26 | <0.12 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | < 0.18 | <0.16 | <0.16 | <0.16 | 96 | 480 |
| Acetone | 2.1 | < 0.66 | <0.74 | <0.74 | <0.74 | 200 | 1000 |
| cis-1,2-Dichloroethene | < 0.35 | 0.42 | 0.35 | 0.42 | <0.21 | 7 | 70 |
| Ethylbenzene | < 0.41 | < 0.19 | <0.19 | 0.22 | <0.19 | 140 | 700 |
| Methylene chloride | 2.1 | < 0.28 | 0.44 | <0.19 | <0.19 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | |
| Arsenic | 0.0024 | < 0.0029 | <0.0026 | <0.0026 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.75 | 0.89 | 0.77 | 1.07 | 0.744 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | <0.00028 | <0.00028 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.0011 | <0.00096 | <0.00096 | <0.0012 | 0.008 | 0.04 |
| Iron | < 0.042 | 0.12 | <0.049 | <0.049 | <0.032 | 0.15 | 0.3 |
| Lead | < 0.0016 | 0.0024 | 0.0023 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **1.7** | **2.8** | **2** | **2.48** | **1.9** | 0.025 | 0.05 |
| Mercury | 0.000097 | < 0.000067 | <0.000029 | 0.000055 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | <0.00071 | <0.00071 | <0.0019 | 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 | 5.5 | 125 | 250 |
| Nitrate as N | < 0.0076 | 0.02 | <0.016 | <0.016 | <0.031 | 2 | 10 |
| Sulfate | 0.42 | 1.8 | 0.2 | 0.21 | <0.12 | 125 | 250 |
| Total Alkalinity | 100 | 140 | --- | ---- | 130 | ---- | ---- |
| Total Organic Carbon | 4 | 3 | --- | ---- | 4 | ---- | ---- |
| pH | 7.49 | 7.44 | 7.64 | 7.53 | 7.75 | ---- | ---- |
| Conductivity (mS/cm) | 0.227 | 0.289 | 0.3 | 199 | 178 | ---- | ---- |
| Temperature (C) | 10.5 | 10.71 | 10.25 | 10.51 | 10.13 | ---- | ---- |
| ORP (mV) | 96 | 140 | 195 | 25.4 | 77.9 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 0.42 | 4.41 | 3.22 | 1.42 | 1.67 | ---- | ---- |

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 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 0.55 | 0.71 | 0.29 | 0.31 | <0.21 | 85 | 850 |
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.14 | <0.12 | <0.12 | 0.27 | 96 | 480 |
| Acetone | 2.6 | < 0.66 | <0.74 | <0.74 | <0.74 | 200 | 1000 |
| cis-1,2-Dichloroethene | < 0.35 | 0.59 | 0.36 | 0.49 | 0.33 | 7 | 70 |
| Methylene chloride | 2.2 | < 0.28 | 0.54 | <0.19 | <0.19 | 0.5 | 5 |
| Trichloroethene | < 0.42 | 0.37 | <0.28 | <0.28 | <0.28 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | |
| Arsenic | < 0.0021 | < 0.0029 | <0.0026 | <0.0026 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.17 | 0.13 | 0.22 | 0.265 | 0.191 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | <0.00028 | <0.00028 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0022 | < 0.0011 | 0.0025 | 0.0019 | 0.0016 | 0.008 | 0.04 |
| Iron | 0.065 | < 0.044 | 0.25 | 0.16 | <0.032 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.7** | **2.7** | **3.6** | **4.68** | **2.72** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000067 | <0.000029 | <0.000029 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | 0.00071 | <0.00071 | <0.0019 | 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 | 8.8 | 125 | 250 |
| Nitrate as N | < 0.0076 | < 0.019 | <0.016 | <0.016 | <0.031 | 2 | 10 |
| Sulfate | 4 | 3.6 | 9.7 | 0.99 | 0.86 | 125 | 250 |
| Total Alkalinity | 160 | 150 | --- | ---- | 210 | ---- | ---- |
| Total Organic Carbon | 6 | 5 | --- | ---- | 4 | ---- | ---- |
| pH | 7.45 | 7.37 | 7.25 | 6.97 | 7.3 | ---- | ---- |
| Conductivity (mS/cm) | 0.342 | 0.307 | 0.506 | 316 | 274 | ---- | ---- |
| Temperature (C) | 11.1 | 10.28 | 11.4 | 9.17 | 9.53 | ---- | ---- |
| ORP (mV) | 113 | 127 | 191 | 31 | 69.5 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 2.86 | 3.08 | 0.84 | 7.47 | 0.66 | ---- | ---- |

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 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | 0.36 | 1.7 | 4.1 | 28 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | 0.22 | <0.16 | 1.6 | <0.27 | 96 | 480 |
| Acetone | 2.9 | < 0.66 | <0.74 | <0.74 | 1.9 | 200 | 1000 |
| Benzene | < 0.37 | < 0.2 | 0.3 | 0.53 | <0.37 | 0.5 | 5 |
| Chloroethane | < 0.29 | < 0.22 | 0.43 | <0.24 | <0.4 | 80 | 400 |
| cis-1,2-Dichloroethene | < 0.35 | < 0.25 | 0.41 | 0.39 | <0.35 | 7 | 70 |
| Ethylbenzene | < 0.41 | < 0.19 | 2.4 | 2.6 | 0.74 | 140 | 700 |
| Methylene chloride | 3.2 | < 0.28 | 0.55 | <0.19 | 0.32 | 0.5 | 5 |
| Naphthalene | < 0.42 | < 0.16 | <0.15 | 0.43 | <0.25 | 8 | 40 |
| Trichloroethene | < 0.42 | 0.23 | 0.3 | <0.28 | <0.47 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | |
| Arsenic | < 0.0021 | < 0.0029 | 0.0027 | 0.0047 | 0.0058 | 0.001 | 0.01 |
| Barium | 0.68 | 0.73 | 0.7 | 0.997 | 0.874 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | 0.0003 | <0.00028 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.0011 | <0.00096 | <0.00096 | <0.0012 | 0.008 | 0.04 |
| Iron | < 0.042 | 0.045 | 0.12 | **0.4** | 0.27 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0023 | 0.002 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.7** | **2.8** | **3.3** | **4.34** | **3.97** | 0.025 | 0.05 |
| Mercury | 0.00009 | < 0.000067 | <0.000029 | 0.000063 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | <0.00071 | <0.00071 | <0.0019 | 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 | 12.4 | 125 | 250 |
| Nitrate as N | < 0.0076 | < 0.019 | <0.016 | <0.016 | <0.031 | 2 | 10 |
| Sulfate | 5.7 | 1.1 | 0.84 | 0.48 | 0.45 | 125 | 250 |
| Total Alkalinity | 220 | 240 | --- | ----- | 330 | ---- | ---- |
| Total Organic Carbon | 2 | 3 | --- | ---- | 4 | ---- | ---- |
| pH | 7.41 | 7.31 | 7.37 | 7.3 | 7.48 | ---- | ---- |
| Conductivity (mS/cm) | 0.422 | 0.479 | 0.558 | 393 | 426 | ---- | ---- |
| Temperature (C) | 9.95 | 10.44 | 10.21 | 10.88 | 10.64 | ---- | ---- |
| ORP (mV) | 105 | 150 | 194 | -49.1 | -39.1 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 1.74 | 0.92 | 1.02 | 0.79 | 1 | ---- | ---- |

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 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|
| Acetone | 2.2 | < 0.66 | <0.74 | <0.74 | 1 | 200 | 1000 |
| Methylene chloride | 2.6 | < 0.28 | 0.5 | <0.19 | 0.2 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | |
| Arsenic | < 0.0021 | < 0.0029 | <0.0026 | <0.0026 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.088 | 0.093 | 0.073 | 0.0637 | 0.0525 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | 0.00029 | <0.00028 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.0011 | <0.00096 | <0.00096 | <0.0012 | 0.008 | 0.04 |
| Iron | 0.052 | < 0.044 | **0.45** | <0.049 | <0.032 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **0.59** | **0.32** | **0.79** | **0.33** | **0.135** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000067 | <0.000029 | <0.000029 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | 0.001 | <0.00071 | <0.0019 | 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 | 17.4 | 125 | 250 |
| Nitrate as N | 1.5 | 0.15 | 0.21 | 0.087 | 0.051 | 2 | 10 |
| Sulfate | 12.3 | 5.6 | 12.2 | 9.4 | 2.4 | 125 | 250 |
| Total Alkalinity | 190 | 230 | --- | --- | 230 | ---- | ---- |
| Total Organic Carbon | 0.9 | 2 | --- | --- | 3 | ---- | ---- |
| pH | 7.32 | 7.15 | 7.41 | 7.15 | 7.32 | ---- | ---- |
| Conductivity (mS/cm) | 0.44 | 0.497 | 0.373 | 237 | 316 | ---- | ---- |
| Temperature (C) | 11.73 | 11.96 | 12.14 | 9.5 | 9.52 | ---- | ---- |
| ORP (mV) | 124 | 177 | 208 | 163 | 271.5 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 7.07 | 4.3 | 3.34 | 6.64 | 5.32 | ---- | ---- |

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 | 3/22/2006 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|
| Acetone | 1 | 0.79 | <0.74 | 200 | 1000 |
| Carbon disulfide | 0.71 | <0.28 | <0.28 | 200 | 1000 |
| cis-1,2-Dichloroethene | 0.34 | 0.21 | 0.25 | 7 | 70 |
| Methylene chloride | <0.19 | 0.38 | <0.19 | 0.5 | 5 |
| Trichloroethene | 0.37 | <0.28 | <0.28 | 0.5 | 5 |
| **Metals, mg/L** | | | | | |
| Arsenic | <0.0026 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.104 | 0.0653 | 0.0604 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | 0.068 | <0.032 | 0.035 | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.33** | **1.86** | **1.52** | 0.025 | 0.05 |
| Mercury | 0.000048 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.00095 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | |
| Chloride | 1.6 | 3 | 3.6 | 125 | 250 |
| Nitrate as N | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 6.2 | 8.7 | 5.2 | 125 | 250 |
| Total Alkalinity | ---- | 220 | 170 | ---- | ---- |
| Total Organic Carbon | ---- | 1 | 2 | ---- | ---- |
| pH | 7.22 | 7.55 | 7.51 | ---- | ---- |
| Conductivity (mS/cm) | 232 | 2.65 | 236 | ---- | ---- |
| Temperature (C) | 11.06 | 10.73 | 10.69 | ---- | ---- |
| ORP (mV) | 126 | 112 | 123 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 1.45 | 1.1 | 0.53 | ---- | ---- |

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 | 3/22/2006 | 9/8/2006 | 3/22/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 1.7 | 0.97 | 5.5 | 2.1 | 3.1 | 2.5 | 1.9 | 3.7 | 1.1 | 4.4 | 96 | 480 |
| 1,3,5-Trimethylbenzene | 0.64 | < 0.4 | 1.8 | 0.8 | 1.3 | 0.96 | 0.66 | 1.1 | 0.34 | 1.8 | 96 | 480 |
| 2-Butanone | < 0.59 | < 0.59 | < 1.8 | < 0.36 | <0.65 | <0.39 | 1.2 | <0.65 | <0.39 | <0.57 | 90 | 460 |
| Acetone | 4.3 | < 1.1 | < 3.3 | < 0.66 | 2 | <0.74 | 2.3 | <1.2 | 2.1 | <1.1 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | < 1 | 0.43 | <0.37 | <0.22 | <0.22 | <0.37 | <0.22 | <0.13 | 0.5 | 5 |
| Ethylbenzene | < 0.41 | < 0.41 | 1.2 | 0.4 | 0.78 | 0.76 | 0.49 | 0.98 | 0.35 | 1 | 140 | 700 |
| Methylene chloride | 2.1 | < 0.29 | < 1.4 | < 0.28 | 1.2 | <0.19 | <0.19 | <0.32 | 0.3 | <0.33 | 0.5 | 5 |
| Naphthalene | 5 | 2.2 | 18 | 6 | 11 | 13 | 8.8 | 18 | 7.5 | 16 | 10 8 | 100 40 |
| Xylenes (total) | 1.4 | 0.47 | 2.3 | 1.1 | 2.1 | 2.3 | 1.4 | 2.6 | 0.86 | 2.9 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0021 | < 0.0029 | < 0.0026 | 0.0029 | <0.0026 | <0.0043 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.18 | 0.084 | 0.19 | 0.11 | 0.16 | 0.168 | 0.117 | 0.154 | 0.0893 | 0.13 | 0.4 | 2 |
| Cadmium | 0.00045 | < 0.00028 | < 0.00036 | < 0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0052 | 0.0015 | < 0.0011 | 0.0017 | 0.0013 | 0.0018 | <0.0012 | <0.0012 | <0.0012 | 0.0013 | 0.008 | 0.04 |
| Iron | **11.6** | **2.5** | **17.8** | **5.4** | **12.1** | **12.9** | **7.4** | **13.6** | **3.5** | **8.4** | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0023 | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **3.7** | **0.83** | **7** | **1.9** | **3.1** | **2.88** | **1.9** | **3.36** | **1.05** | **2.2** | 0.025 | 0.05 |
| Mercury | 0.000088 | < 0.000087 | < 0.000067 | < 0.000029 | <0.000029 | 0.000069 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00067 | < 0.00096 | < 0.00071 | 0.0011 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 6 | 5.6 | 5.8 | 2.6 | 125 | 250 |
| Nitrate as N | 0.01 | 0.34 | < 0.019 | 0.21 | 0.082 | 0.13 | 0.16 | <0.031 | 0.16 | 0.1 | 2 | 10 |
| Sulfate | 3 | 5.4 | 0.18 | 8.4 | 4.3 | 3.9 | 7.9 | 2.6 | 4.4 | 6.3 | 125 | 250 |
| Total Alkalinity | 210 | 150 | 170 | 160 | --- | | 170 | 180 | 140 | 190 | ---- | ---- |
| Total Organic Carbon | 14 | 5 | 12 | 10 | --- | | 7 | 9 | 6 | 13 | ---- | ---- |
| pH | 6.88 | 6.96 | 6.89 | --- | 6.41 | 6.45 | 6.91 | 6.75 | 6.77 | 6.59 | ---- | ---- |
| Conductivity (mS/cm) | 0.441 | 0.328 | 0.404 | --- | 0.385 | 229 | 223 | 247 | 201 | 0.248 | ---- | ---- |
| Temperature (C) | 11.13 | 7.7 | 12.24 | --- | 11.6 | 9.3 | 8.52 | 12.05 | 7.97 | 12.38 | ---- | ---- |
| ORP (mV) | 114 | 166 | 162 | --- | 188 | -45.5 | -23.3 | -88.1 | 13.4 | 181.3 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 3.22 | 5.02 | 6.03 | --- | 2.11 | 4.08 | 7.56 | 0.84 | 4.35 | 6.13 | ---- | ---- |

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 | 3/22/2006 | 9/7/2006 | 3/22/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,1-Dichloroethane | 1 | < 0.26 | < 0.26 | <0.21 | <0.21 | <2.1 | <0.21 | <0.21 | <0.15 | 85 | 850 |
| 1,2,4-Trimethylbenzene | < 0.37 | 0.29 | 0.28 | <0.12 | <0.12 | 290 | 12 | 4.1 | <0.12 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | < 0.18 | < 0.18 | <0.16 | <0.16 | <1.6 | <0.16 | <0.16 | <0.096 | 96 | 480 |
| 2-Butanone | < 0.59 | < 0.36 | < 0.36 | <0.39 | <0.39 | 5.7 | <0.39 | <0.39 | <0.57 | 90 | 460 |
| Acetone | < 1.1 | < 0.66 | < 0.66 | <0.74 | <0.74 | 12 | <0.74 | <0.74 | 1.2 | 200 | 1000 |
| Chlorobenzene | < 0.38 | < 0.16 | < 0.16 | <0.2 | 0.26 | <2 | <0.2 | <0.2 | 0.39 | ----- | ----- |
| cis-1,2-Dichloroethene | 0.56 | 0.29 | 0.26 | <0.21 | <0.21 | <2.1 | <0.21 | <0.21 | 0.24 | 7 | 70 |
| Methylene chloride | 3 | < 0.28 | < 0.28 | 0.44 | <0.19 | <1.9 | <0.19 | <0.19 | <0.33 | 0.5 | 5 |
| Naphthalene | < 0.42 | < 0.16 | < 0.16 | <0.15 | <0.15 | 2.5 | <0.15 | <0.15 | <0.24 | 8 | 40 |
| **Metals, mg/L** | | | | | | | | | | | |
| Arsenic | 0.0054 | < 0.0029 | < 0.0029 | <0.0026 | 0.0026 | <0.0043 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.86 | 0.74 | 0.75 | 0.44 | 0.958 | 1.06 | 0.874 | 0.679 | 0.834 | 0.4 | 2 |
| Cadmium | 0.00031 | 0.00092 | < 0.00036 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0012 | < 0.0011 | < 0.0011 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **1.1** | **4.1** | **1.6** | **0.51** | **0.64** | **0.67** | 0.13 | 0.069 | **0.3** | 0.15 | 0.3 |
| Lead | 0.0049 | **0.13** | **0.043** | <0.0017 | 0.002 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **3.6** | **3.4** | **3.5** | **2.2** | **4.65** | **5.53** | **5.01** | **3.43** | **4.72** | 0.025 | 0.05 |
| Mercury | 0.000092 | < 0.000067 | < 0.000067 | <0.000029 | 0.0001 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | < 0.00096 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 7.3 | 9.1 | 8.5 | 12.8 | 125 | 250 |
| Nitrate as N | 0.03 | < 0.019 | < 0.019 | <0.016 | <0.016 | <0.015 | <0.031 | <0.031 | <0.023 | 2 | 10 |
| Sulfate | 2.4 | 5.8 | 5.6 | 5.5 | 3.6 | 0.84 | 0.67 | 1.8 | 0.2 | | 250 |
| Total Alkalinity | 240 | 230 | 230 | --- | --- | 330 | 300 | 220 | 320 | ---- | ---- |
| Total Organic Carbon | 3 | 2 | 2 | --- | --- | 7 | 5 | 6 | 5 | ---- | ---- |
| pH | 7.25 | 7.2 | --- | 7.44 | 7.2 | 7.43 | 7.41 | 7.44 | 7.3 | ---- | ---- |
| Conductivity (mS/cm) | 0.466 | 0.469 | --- | 0.299 | 320 | 397 | 344 | 297 | 0.377 | ---- | ---- |
| Temperature (C) | 10.65 | 10.76 | --- | 10.31 | 10.64 | 10.18 | 10.84 | 10.18 | 10.67 | ---- | ---- |
| ORP (mV) | 93 | 100 | --- | 172 | -59.2 | -50 | -74.6 | -32.5 | 202.3 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 0.51 | 2.3 | --- | 0.68 | 0.66 | 1.42 | 0.64 | 0.71 | 0.56 | ---- | ---- |

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

# Table 3-2
## MW-16M
## Summary of Detected Compounds
## Former Onalaska Landfill

| Volatile Organic Compounds (VOC), ug/L | 3/23/2006 | Duplicate 3/23/2006 | 6/9/2006 | 9/7/2006 | 12/11/2006 | 3/23/2007 | Duplicate 3/23/2007 | 6/21/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 34 | 37 | 15 | 190 | 68 | 240 | 240 | 47 | 2.7 | 96 | 480 |
| 1,3,5-Trimethylbenzene | <0.32 | <0.32 | <0.16 | <1.1 | <0.16 | 7.1 | 8.6 | <0.24 | <0.096 | 96 | 480 |
| 2-Butanone | <0.78 | 1.4 | <0.39 | <2.6 | <0.39 | <1.3 | <1.3 | <1.4 | <0.57 | 90 | 460 |
| Acetone | 4.3 | 4.2 | <0.74 | <4.9 | <0.74 | <2.5 | <2.5 | <2.8 | <1.1 | 200 | 1000 |
| Benzene | 0.97 | 0.86 | 0.76 | <1.5 | 0.59 | 1.6 | 1.7 | <0.32 | 0.88 | 0.5 | 5 |
| Chlorobenzene | 2.2 | 2.2 | 1.7 | <1.3 | 1.7 | 2.9 | 2.8 | 1.8 | 1 | ----- | ----- |
| Chloroethane | 1.3 | 1.4 | 1.3 | <1.6 | <0.24 | <0.8 | 0.87 | <0.72 | 0.44 | 80 | 400 |
| Methylene chloride | <0.38 | <0.38 | <0.19 | <1.3 | <0.19 | <0.63 | <0.63 | 2.7 | <0.33 | 0.5 | 5 |
| Naphthalene | 3.1 | 3 | 1.8 | 23 | 5.8 | 13 | 12 | 2.1 | 0.3 | 8 | 40 |
| Xylenes (total) | 4.2 | 4 | 1.4 | 3.6 | 2.7 | 5 | 7 | <0.7 | 0.7 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | | |
| Arsenic | **0.0225** | **0.0213** | **0.0204** | **0.0103** | <0.0043 | **0.0277** | **0.0245** | **0.0234** | **0.0141** | 0.001 | 0.01 |
| Barium | 1.04 | 0.981 | 1.13 | 1.31 | 1.14 | 1.84 | 1.81 | 1.01 | 1.13 | 0.4 | 2 |
| Cadmium | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.0012 | <0.0012 | <0.0012 | 0.0022 | <0.0012 | 0.0013 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **22.1** | **20.7** | **22.6** | **20.9** | **7.5** | **32.9** | **31.8** | **18.1** | **18** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **1.43** | **1.36** | **1.28** | **1.88** | **1.14** | **1.82** | **1.78** | **1.06** | **1.32** | 0.025 | 0.05 |
| Mercury | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | | | |
| Chloride | 31.9 | 32 | 41.1 | 43.5 | 42.4 | 35.2 | 35.3 | 23.8 | 30.1 | 125 | 250 |
| Nitrate as N | <0.015 | <0.015 | <0.015 | <0.031 | <0.031 | <0.031 | <0.031 | <0.031 | <0.023 | 2 | 10 |
| Sulfate | <0.12 | <0.12 | 0.34 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | | 250 |
| Total Alkalinity | 180 | 180 | 170 | 250 | 170 | 260 | 270 | 170 | 180 | ---- | ---- |
| Total Organic Carbon | 5 | 120 | 5 | 7 | 5 | 7 | 7 | 5 | 5 | ---- | ---- |
| pH | 7.15 | --- | 7.05 | 6.99 | 7.31 | 7.2 | ---- | 7.27 | 7.17 | ---- | ---- |
| Conductivity (mS/cm) | 329 | --- | 355 | 410 | 352 | 481 | ---- | 327 | 0.301 | ---- | ---- |
| Temperature (C) | 10.83 | --- | 11.27 | 11.48 | 9.85 | 11.17 | ---- | 11.38 | 10.87 | ---- | ---- |
| ORP (mV) | -114 | --- | -140.6 | -149.7 | -153 | -131.5 | ---- | -155.3 | -40.5 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 0.88 | --- | 0.85 | 0.17 | 0.48 | 0.52 | ---- | 0.4 | 0.62 | ---- | ---- |

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

# Table 3-2
## MW-16S
## Summary of Detected Compounds
## Former Onalaska Landfill

| Volatile Organic Compounds (VOC), ug/L | 3/23/2006 | Duplicate 3/23/2006 | 6/9/2006 | Duplicate 6/9/2006 | 9/7/2006 | Duplicate 9/7/2006 | 12/11/2006 | Duplicate 12/11/2006 | 3/23/2007 | Duplicate 3/23/2007 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | **1500** | **1500** | 390 | 370 | **1800** | **1800** | 400 | 400 | 370 | 400 |
| 1,3,5-Trimethylbenzene | **150** | **160** | 16 | 12 | **200** | **200** | 9.8 | 8.8 | 9.3 | 14 |
| Acetone | 120 | 110 | 27 | 31 | <46 | <46 | <4.9 | <4.9 | <4.9 | <4.9 |
| Chlorobenzene | <13 | <13 | <3.3 | <3.3 | <12 | <12 | <1.3 | <1.3 | 1.7 | 1.7 |
| Ethylbenzene | 22 | 24 | 4.6 | 4.2 | 20 | 19 | 8.1 | 7 | 8.1 | 10 |
| Methylene chloride | <13 | <13 | <3.2 | <3.2 | <12 | <12 | 4.7 | 4.4 | <1.3 | <1.3 |
| Naphthalene | 37 | 35 | 4.9 | 4.8 | 37 | 37 | 27 | 29 | **49** | **48** |
| Xylenes (total) | 91 | 93 | 22 | 22 | 61 | 59 | 15 | 12 | 12 | 18 |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | 0.0099 | **0.0104** | 0.0076 | 0.0096 | **0.0111** | 0.0099 | 0.0057 | 0.0062 | **0.0124** | **0.0138** |
| Barium | 0.45 | 0.454 | 0.408 | 0.402 | 0.366 | 0.369 | 0.212 | 0.209 | 0.274 | 0.292 |
| Cadmium | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 |
| Cobalt | 0.0052 | 0.0053 | 0.0072 | 0.0071 | 0.0039 | 0.0029 | 0.0021 | 0.0021 | 0.0025 | 0.0035 |
| Iron | **42.6** | **44.6** | **46.4** | **46** | **37.3** | **37.4** | **22.3** | **21.9** | **32.6** | **35.3** |
| Lead | 0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 |
| Manganese | **9.53** | **9.61** | **12.2** | **12** | **8.42** | **8.29** | **4.52** | **4.46** | **5.38** | **5.5** |
| Mercury | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 |
| Vanadium | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | | |
| Chloride | 4.7 | 4.9 | 17.8 | 17.5 | 12.3 | 11.8 | 36.2 | 36.4 | 21.8 | 21.9 |
| Nitrate as N | <0.015 | <0.015 | <0.015 | <0.015 | <0.031 | <0.031 | <0.031 | <0.031 | <0.031 | <0.031 |
| Sulfate | 2.4 | 2.6 | 4.4 | 4.1 | <0.12 | <0.12 | <0.12 | <0.12 | 1.9 | 1.8 |
| Total Alkalinity | 470 | 480 | 570 | 580 | 460 | 450 | 180 | 180 | 260 | 250 |
| Total Organic Carbon | 12 | 12 | 9 | 10 | 11 | 11 | 7 | 7 | 10 | 10 |
| pH | 6.75 | --- | 6.62 | ---- | 6.58 | ---- | 6.68 | ---- | 6.63 | ---- |
| Conductivity (mS/cm) | 624 | --- | 766 | ---- | 625 | ---- | 393 | ---- | 419 | ---- |
| Temperature (C) | 9.27 | --- | 10.44 | ---- | 14.16 | ---- | 11.59 | ---- | 9.3 | ---- |
| ORP (mV) | -55.8 | --- | -89.1 | ---- | -110.6 | ---- | -92 | ---- | -42.5 | ---- |
| Dissolved Oxygen (mg/L) | 2.22 | --- | 2.2 | ---- | 0.83 | ---- | 1.59 | ---- | 0.54 | ---- |

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

# Table 3-2
## MW-16S
## Summary of Detected Compounds
## Former Onalaska Landfill

| Volatile Organic Compounds (VOC), ug/L | 6/21/2007 | Duplicate 6/21/2007 | 9/11/2007 | Duplicate 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | **610** | **590** | 400 | 440 | 96 | 480 |
| 1,3,5-Trimethylbenzene | **11** | **14** | <2.7 | <2.7 | 96 | 480 |
| Acetone | <37 | <37 | <31 | <31 | 200 | 1000 |
| Chlorobenzene | <5 | <5 | <4.3 | <4.3 | ----- | ----- |
| Ethylbenzene | <5.7 | <5.7 | <4.9 | <4.9 | 140 | 700 |
| Methylene chloride | **58** | **59** | <9.4 | <9.4 | 0.5 | 5 |
| Naphthalene | 8 | 9.4 | 7.1 | <6.9 | 8 | 40 |
| Xylenes (total) | 16 | 17 | 16 | 16 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | |
| Arsenic | **0.012** | **0.0106** | **0.0104** | **0.0102** | 0.001 | 0.01 |
| Barium | 0.513 | 0.484 | 0.461 | 0.461 | 0.4 | 2 |
| Cadmium | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0054 | 0.0055 | 0.0036 | 0.0039 | 0.008 | 0.04 |
| Iron | **43.1** | **41.1** | **29.6** | **28.7** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **11.8** | **11.3** | **12.2** | **12.6** | 0.025 | 0.05 |
| Mercury | 0.000095 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | | |
| Chloride | 14.2 | 14.2 | 39.7 | 39.4 | 125 | 250 |
| Nitrate as N | <0.031 | <0.031 | <0.023 | <0.023 | 2 | 10 |
| Sulfate | 6.1 | 6.1 | 1.8 | 1.8 | | 250 |
| Total Alkalinity | 610 | 610 | 590 | 590 | ---- | ---- |
| Total Organic Carbon | 11 | 11 | 10 | 10 | ---- | ---- |
| pH | 6.69 | ---- | 6.58 | ---- | ---- | ---- |
| Conductivity (mS/cm) | 819 | ---- | 0.843 | ---- | ---- | ---- |
| Temperature (C) | 10.79 | ---- | 15.49 | ---- | ---- | ---- |
| ORP (mV) | -82.3 | ---- | -64.3 | ---- | ---- | ---- |
| Dissolved Oxygen (mg/L) | 1.42 | ---- | 1.17 | ---- | ---- | ---- |

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

# Table 3-2
## MW-17M
## Summary of Detected Compounds
## Former Onalaska Landfill

| Volatile Organic Compounds (VOC), ug/L | 3/23/2006 | 6/9/2006 | 9/7/2006 | 12/11/2006 | 3/23/2007 | 6/21/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | <0.12 | 1.3 | <0.12 | 5.2 | <0.12 | 34 | 9.7 | 96 | 480 |
| 1,3,5-Trimethylbenzene | <0.16 | <0.16 | <0.16 | <0.16 | <0.16 | <0.096 | <0.096 | 96 | 480 |
| Acetone | 1.6 | 1.3 | <0.74 | <0.74 | <0.74 | <1.1 | <1.1 | 200 | 1000 |
| Methylene chloride | <0.19 | 1.7 | <0.19 | <0.19 | <0.19 | <0.33 | <0.33 | 0.5 | 5 |
| Toluene | <0.17 | 0.56 | <0.17 | <0.17 | <0.17 | <0.13 | <0.13 | 200 | 1,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | 0.0059 | 0.0078 | 0.006 | <0.0043 | 0.0069 | 0.0086 | 0.0074 | 0.001 | 0.01 |
| Barium | 0.433 | 0.586 | 0.713 | 0.756 | 0.683 | 0.77 | 1.05 | 0.4 | 2 |
| Cadmium | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.0012 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **2.8** | **4.1** | **0.53** | 0.11 | **4.7** | **4.7** | **2.5** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **1.71** | **2.03** | **2.43** | **2.27** | **2.09** | **2.2** | **3.52** | 0.025 | 0.05 |
| Mercury | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.000093 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | |
| Chloride | 4.8 | 6.1 | 5.4 | 5 | 4.9 | 3.2 | 5.1 | 125 | 250 |
| Nitrate as N | <0.015 | <0.015 | <0.031 | <0.031 | <0.031 | <0.031 | <0.023 | 2 | 10 |
| Sulfate | 0.89 | 0.83 | 0.35 | <0.12 | 2.2 | 1.9 | 0.6 | | 250 |
| Total Alkalinity | 150 | 190 | 200 | 240 | 210 | 260 | 320 | ---- | ---- |
| Total Organic Carbon | 5 | 6 | 8 | 7 | 4 | 4 | 5 | ---- | ---- |
| pH | 7.39 | 7.23 | 7.4 | 7.61 | 7.56 | 7.56 | 7.54 | ---- | ---- |
| Conductivity (mS/cm) | 204 | 257 | 249 | 305 | 288 | 332 | 0.361 | ---- | ---- |
| Temperature (C) | 10.53 | 10.97 | 11.12 | 9.65 | 10.48 | 10.84 | 10.76 | ---- | ---- |
| ORP (mV) | -113 | -136.8 | -159 | -162.7 | -146 | -159.3 | -155.6 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 2.45 | 1.23 | 0.18 | 0.31 | 0.35 | 0.45 | 0.61 | ---- | ---- |

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

# Table 3-2
## MW-17S
## Summary of Detected Compounds
## Former Onalaska Landfill

| Volatile Organic Compounds (VOC), ug/L | 3/23/2006 | 6/9/2006 | 9/7/2006 | 12/11/2006 | 3/23/2007 | 6/21/2007 | 9/11/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | 400 | **420** | **1100** | **550** | 240 | **1200** | **1200** | 96 | 480 |
| 1,3,5-Trimethylbenzene | 47 | **74** | **67** | **38** | 21 | **45** | **15** | 96 | 480 |
| Acetone | 82 | 14 | <25 | <7.4 | <2.5 | <69 | <69 | 200 | 1000 |
| Ethylbenzene | 7.8 | 4.9 | <6.3 | 2.7 | 1.6 | <11 | <11 | 140 | 700 |
| Methylene chloride | <7.6 | <2.7 | <6.3 | **6.3** | <0.63 | **130** | <21 | 0.5 | 5 |
| Naphthalene | <6 | <2.1 | 7.7 | 10 | 1.4 | <15 | <15 | 8 | 40 |
| Xylenes (total) | 22 | 17 | <15 | 8.7 | 1.8 | <18 | <18 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | |
| Arsenic | 0.0086 | 0.0095 | 0.009 | 0.0063 | <0.0043 | **0.0117** | **0.0116** | 0.001 | 0.01 |
| Barium | 0.23 | 0.183 | 0.229 | 0.216 | 0.146 | 0.265 | 0.272 | 0.4 | 2 |
| Cadmium | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.0012 | 0.0016 | <0.0012 | <0.0012 | 0.0017 | <0.0012 | 0.0025 | 0.008 | 0.04 |
| Iron | **21** | **22.2** | **25.4** | **22.3** | **7.6** | **31.7** | **30.4** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **3.65** | **3.22** | **3.79** | **3.33** | **1.39** | **3.51** | **4.38** | 0.025 | 0.05 |
| Mercury | <0.00009 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.00011 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | | |
| Chloride | 4.2 | 5.8 | 4.9 | 6.4 | 4.6 | 4.5 | 3.1 | 125 | 250 |
| Nitrate as N | 0.97 | 0.29 | <0.031 | 0.2 | 2.1 | 0.3 | 0.4 | 2 | 10 |
| Sulfate | 1.6 | 3.3 | 0.34 | 0.63 | 16 | 1.5 | 2.7 | | 250 |
| Total Alkalinity | 230 | 190 | 200 | 190 | 220 | 250 | 300 | ---- | ---- |
| Total Organic Carbon | 4 | 4 | 4 | 3 | 3 | 3 | 5 | ---- | ---- |
| pH | 7.06 | 1.51 | 6.78 | 6.92 | 6.97 | 6.88 | 6.67 | ---- | ---- |
| Conductivity (mS/cm) | 322 | 295 | 313 | 324 | 312 | 375 | 0.418 | ---- | ---- |
| Temperature (C) | 9.29 | 10.33 | 13.35 | 11.24 | 7.79 | 9.99 | 13.8 | ---- | ---- |
| ORP (mV) | -88.7 | -92.7 | -123 | -103.8 | -12.4 | -86.7 | 49.5 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 1.1 | 1.51 | 0.26 | 1.43 | 3.09 | 1.25 | 0.45 | ---- | ---- |

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

# Table 3-2
## PZ-1
## 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 | 3/22/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|
| Acetone | < 1.1 | < 1.1 | < 0.66 | < 0.66 | 1.3 | <0.74 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | < 0.2 | 0.5 | <0.22 | <0.22 | 0.5 | 5 |
| Methylene chloride | 3.4 | < 0.29 | < 0.28 | < 0.28 | 0.39 | <0.19 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | | |
| Arsenic | 0.0029 | < 0.0021 | < 0.0029 | 0.0035 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.024 | 0.031 | 0.033 | 0.039 | 0.0245 | 0.0349 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.00074 | < 0.0011 | < 0.00096 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | < 0.042 | < 0.042 | < 0.044 | 0.058 | <0.032 | <0.032 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0016 | < 0.0023 | < 0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **0.19** | **0.3** | **0.37** | **0.49** | **0.258** | **0.371** | 0.025 | 0.05 |
| Mercury | 0.000091 | < 0.000087 | < 0.000067 | < 0.000029 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.0013 | 0.0011 | 0.0012 | 0.0015 | <0.0019 | <0.0019 | 0.006 | 0.03 |
| **Dissolved Gases, ug/L** | | | | | | | | |
| Ethane | < 0.3 | < 0.3 | < 0.3 | < 0.14 | --- | --- | --- | --- |
| Ethene | < 0.29 | < 0.29 | < 0.29 | < 0.13 | --- | --- | --- | --- |
| Methane | 6.6 | 1.5 | 48 | 3.8 | --- | --- | --- | --- |
| **Natural Attenuation Parameters, mg/L** | | | | | | | | |
| Chloride | 9.4 | 12.8 | 5.8 | 7.2 | 8.5 | 7.3 | 125 | 250 |
| Nitrate as N | 0.23 | 0.23 | < 0.019 | < 0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 1.6 | 5.5 | 6.1 | 9.1 | 9.5 | 9 | 125 | 250 |
| Total Alkalinity | 120 | 130 | 190 | 150 | 120 | 130 | --- | --- |
| Total Organic Carbon | 3 | < 0.7 | 2 | 3 | 2 | 2 | --- | --- |
| pH | 7.54 | 7.43 | 7.31 | --- | 8.08 | 7.97 | --- | --- |
| Conductivity (mS/cm) | 0.271 | 0.314 | 0.404 | --- | 170 | 194 | --- | --- |
| Temperature (C) | 11.33 | 9.93 | 11.09 | --- | 9.96 | 9.74 | --- | --- |
| ORP (mV) | 105 | 169 | 186 | --- | 223.6 | 70.2 | --- | --- |
| Dissolved Oxygen (mg/L) | 2.78 | 4.8 | 3.99 | --- | 3.3 | 0.64 | --- | --- |

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

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

outside

| Volatile Organic Compounds (VOC), ug/L | 12/11/2002 | 10/7/2003 | 12/2/2004 | 6/9/2005 | 3/22/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|
| Acetone | 2.6 | < 0.66 | 2.9 | <0.74 | 0.76 | <0.74 | 200 | 1000 |
| Carbon disulfide | < 0.24 | < 0.21 | <0.28 | 0.56 | <0.28 | <0.28 | 200 | 1000 |
| Methylene chloride | 2.4 | < 0.28 | 0.64 | <0.19 | 0.42 | <0.19 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | | |
| Arsenic | **0.056** | < 0.0029 | **0.011** | 0.007 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.66 | 0.071 | 0.14 | 0.117 | 0.0601 | 0.0522 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | 0.00033 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.011 | < 0.0011 | 0.0024 | 0.0046 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **98.8** | **20.8** | **39.6** | **17.3** | **35.6** | **13.5** | 0.15 | 0.3 |
| Lead | 0.0062 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **5.2** | **1.5** | **3.4** | **3.59** | **4.04** | **1.51** | 0.025 | 0.05 |
| Mercury | 0.00013 | < 0.000067 | <0.000029 | 0.00005 | 0.00014 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.026 | 0.0016 | 0.0017 | 0.0014 | <0.0019 | <0.0019 | 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 | 8.2 | 11.9 | 125 | 250 |
| Nitrate as N | < 0.0076 | < 0.019 | <0.016 | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 2.4 | < 0.14 | 3.2 | 2 | 0.81 | 9 | 125 | 250 |
| Total Alkalinity | 160 | 77 | --- | --- | 160 | 110 | ---- | ---- |
| Total Organic Carbon | 15 | 7 | --- | --- | 9 | 6 | ---- | ---- |
| pH | 6.68 | 6.67 | 6.41 | 5.72 | 6.83 | 6.79 | ---- | ---- |
| Conductivity (mS/cm) | 0.432 | 0.239 | 0.412 | 235 | 275 | 207 | ---- | ---- |
| Temperature (C) | 11.03 | 11.08 | 10.89 | 8.85 | 8.4 | 8.02 | ---- | ---- |
| ORP (mV) | 116 | 149 | 173 | -68.1 | -78.7 | -33.1 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 5.14 | 4.43 | 1.6 | 0.92 | 8.45 | 1.38 | ---- | ---- |

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 | 3/22/2006 | 3/21/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.14 | <0.12 | 4.3 | <0.12 | 2.1 | 96 | 480 |
| Acetone | 3.1 | < 0.66 | 1.3 | <0.74 | 0.8 | 1.1 | 200 | 1000 |
| cis-1,2-Dichloroethene | < 0.35 | < 0.25 | <0.21 | 0.26 | 0.23 | 0.26 | 7 | 70 |
| Methylene chloride | 2.5 | < 0.28 | 1.1 | <0.19 | 0.38 | 0.21 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | | |
| Arsenic | 0.0038 | < 0.0029 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.097 | 0.081 | 0.16 | 0.166 | 0.148 | 0.152 | 0.4 | 2 |
| Cadmium | 0.00099 | < 0.00036 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | 0.0018 | < 0.0011 | 0.0014 | 0.0016 | <0.0012 | 0.0021 | 0.008 | 0.04 |
| Iron | **1.2** | **0.58** | **1.5** | **2.4** | **0.7** | 0.28 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **2.7** | **2.2** | **3.9** | **4.14** | **3.87** | **4.2** | 0.025 | 0.05 |
| Mercury | 0.00012 | 0.00007 | <0.000029 | 0.000055 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.0028 | < 0.00096 | 0.00092 | 0.0012 | <0.0019 | <0.0019 | 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 | 7.1 | 5.1 | 125 | 250 |
| Nitrate as N | < 0.0076 | < 0.019 | <0.016 | <0.016 | <0.015 | <0.031 | 2 | 10 |
| Sulfate | 1.2 | 3.5 | 0.74 | 1.5 | 1.7 | 0.42 | 125 | 250 |
| Total Alkalinity | 160 | 180 | --- | --- | 260 | 300 | ---- | ---- |
| Total Organic Carbon | --- | 6 | --- | --- | 6 | 6 | ---- | ---- |
| pH | 7.06 | 6.96 | 6.97 | 6.89 | 7.25 | 7.14 | ---- | ---- |
| Conductivity (mS/cm) | 0.33 | 0.363 | 0.558 | 304 | 313 | 370 | ---- | ---- |
| Temperature (C) | 10.98 | 10.18 | 11.09 | 9.46 | 9.97 | 9.81 | ---- | ---- |
| ORP (mV) | 133 | 191 | 179 | -18.9 | -14.9 | 13.7 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 4.48 | 3.83 | 0.78 | 1.39 | 4.27 | 0.43 | ---- | ---- |

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 | 3/23/2006 | 3/22/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.37 | < 0.14 | < 0.14 | <0.12 | <0.12 | 5.9 | 5.7 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | < 0.4 | < 0.18 | < 0.18 | <0.16 | <0.16 | 2.6 | 2.4 | 96 | 480 |
| Acetone | 3 | < 1.1 | < 0.66 | < 0.66 | <0.74 | <0.74 | 0.91 | <0.74 | 200 | 1000 |
| Benzene | < 0.37 | < 0.37 | < 0.2 | 0.49 | <0.22 | <0.22 | <0.22 | <0.22 | 0.5 | 5 |
| Methylene chloride | 2.5 | 0.34 | < 0.28 | < 0.28 | 0.48 | <0.19 | 0.45 | 0.21 | 0.5 | 5 |
| Xylenes (total) | < 0.44 | < 0.44 | < 0.45 | < 0.45 | <0.44 | <0.44 | 0.52 | <0.44 | 1,000 | 10,000 |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0021 | < 0.0029 | < 0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.091 | 0.075 | 0.082 | 0.061 | 0.061 | 0.0767 | 0.097 | 0.0957 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00028 | < 0.00036 | < 0.00028 | 0.00048 | <0.00028 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.00074 | < 0.0011 | 0.001 | <0.00096 | 0.0019 | 0.0018 | <0.0012 | 0.008 | 0.04 |
| Iron | 0.13 | 0.12 | < 0.044 | **0.59** | 0.091 | 0.074 | 0.069 | **0.38** | 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 | **0.18** | **0.17** | **0.43** | **0.67** | **0.73** | **1.67** | **3.69** | **4.46** | 0.025 | 0.05 |
| Mercury | 0.000098 | < 0.000087 | < 0.000067 | < 0.000029 | <0.000029 | 0.000048 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.0011 | 0.00075 | < 0.00096 | 0.0012 | 0.0011 | <0.00071 | <0.0019 | <0.0019 | 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 | 4.9 | 2 | 125 | 250 |
| Nitrate as N | 0.48 | 0.37 | 0.28 | 0.47 | 0.088 | 1.3 | 0.16 | 0.094 | 2 | 10 |
| Sulfate | 5.7 | 10.1 | 5.5 | 4.6 | 3.6 | 6.5 | 3.4 | 4.5 | 125 | 250 |
| Total Alkalinity | 260 | 220 | 260 | 190 | --- | ---- | 270 | 240 | ---- | ---- |
| Total Organic Carbon | 2 | 1 | 2 | 2 | --- | ---- | 0.7 | 2 | ---- | ---- |
| pH | 7.15 | 7.18 | 7.16 | --- | 7.31 | 6.87 | 7.38 | 7.24 | ---- | ---- |
| Conductivity (mS/cm) | 0.529 | 0.469 | 0.492 | --- | 0.361 | 249 | 302 | 301 | ---- | ---- |
| Temperature (C) | 10.98 | 8.72 | 10.56 | --- | 10.95 | 9.11 | 9.75 | 9.41 | ---- | ---- |
| ORP (mV) | 112 | 159 | 157 | --- | 208 | 164.4 | 35.8 | 33.5 | ---- | ---- |
| Dissolved Oxygen (mg/L) | 1.21 | 2.42 | 3.63 | --- | 4.17 | 4.32 | 2.98 | 3.2 | ---- | ---- |

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 | 6/9/2006 | 9/7/2006 | 6/21/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.14 | <0.12 | <0.12 | 0.16 | <0.12 | <0.12 | <0.12 | 96 | 480 |
| 1,3,5-Trimethylbenzene | < 0.4 | < 0.18 | <0.16 | <0.16 | <0.16 | <0.16 | <0.096 | <0.096 | 96 | 480 |
| Acetone | < 1.1 | < 0.66 | <0.74 | <0.74 | 1.3 | <0.74 | <1.1 | <1.1 | 200 | 1000 |
| Chloromethane | < 0.49 | < 0.26 | <0.14 | <0.14 | 0.17 | <0.14 | <0.3 | <0.3 | 0.3 | 3 |
| | (No VOCs Detected) | | | | | | | | | |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0029 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.024 | 0.023 | 0.022 | 0.0217 | 0.0202 | 0.0181 | 0.0217 | 0.0197 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.0011 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **5.9** | **1.7** | **5.4** | **3.8** | **4.1** | **0.57** | **4.4** | **0.88** | 0.15 | 0.3 |
| Lead | 0.0034 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **0.12** | **0.085** | **0.13** | **0.105** | **0.116** | **0.138** | **0.132** | **0.148** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000067 | 0.000061 | 0.000044 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 3/23/2006 | 9/7/2006 | 3/22/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1,2,4-Trimethylbenzene | < 0.37 | 0.18 | <0.12 | <0.12 | <0.12 | <0.12 | <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 | <0.16 | <0.16 | <0.16 | <0.096 | 96 | 480 |
| Acetone | < 1.1 | < 0.66 | <0.74 | <0.74 | <0.74 | <0.74 | 0.77 | 0.82 | <0.74 | <1.1 | 200 | 1000 |
| Chloromethane | < 0.49 | < 0.26 | 0.18 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.3 | 0.3 | 3 |
| Methylene chloride | < 0.29 | < 0.28 | <0.19 | 0.4 | <0.19 | <0.19 | <0.19 | 0.2 | 0.24 | <0.33 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | | | | | | |
| Arsenic | < 0.0021 | < 0.0029 | <0.0026 | <0.0026 | <0.0026 | <0.0026 | <0.0043 | <0.0043 | <0.0043 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.084 | 0.087 | 0.083 | 0.089 | 0.0751 | 0.116 | 0.0827 | 0.0815 | 0.0829 | 0.0726 | 0.4 | 2 |
| Cadmium | < 0.00028 | < 0.00036 | <0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00074 | < 0.0011 | <0.00096 | <0.00096 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | 0.16 | 0.16 | 0.079 | 0.17 | 0.0576 | **0.72** | 0.038 | <0.032 | 0.06 | 0.033 | 0.15 | 0.3 |
| Lead | < 0.0016 | < 0.0023 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <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** | 0.0477 | **0.295** | 0.0378 | **0.277** | 0.025 | 0.05 |
| Mercury | < 0.000087 | < 0.000067 | <0.000029 | <0.000029 | <0.000029 | 0.000086 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | < 0.00067 | < 0.00096 | <0.00071 | <0.00071 | <0.00071 | <0.00071 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 3/23/2006 | 9/8/2006 | 3/22/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | <0.74 | <0.74 | <0.74 | <0.74 | 1.1 | 1.2 | <0.74 | <1.1 | 200 | 1000 |
| Chloromethane | 0.18 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.3 | 0.3 | 3 |
| Methylene chloride | <0.19 | 0.45 | <0.19 | <0.19 | <0.19 | <0.19 | 0.23 | <0.33 | 0.5 | 5 |
| Toluene | 1.5 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.13 | 200 | 1,000 |
| **Metals, mg/L** | | | | | | | | | | |
| Arsenic | 0.0072 | 0.0098 | 0.0078 | 0.0092 | 0.0053 | 0.0065 | 0.0082 | <0.0043 | 0.001 | 0.01 |
| Barium | 0.29 | 0.28 | 0.279 | 0.304 | 0.199 | 0.213 | 0.607 | 0.225 | 0.4 | 2 |
| Cadmium | <0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | <0.00096 | <0.00096 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | **8.8** | **9.3** | **8** | **8.6** | **4** | **3.9** | **17.6** | **1.5** | 0.15 | 0.3 |
| Lead | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | <0.0017 | 0.0015 | 0.015 |
| Manganese | **5.3** | **5** | **4.84** | **5.12** | **4.04** | **4.09** | **9.36** | **3.95** | 0.025 | 0.05 |
| Mercury | 0.000038 | <0.000029 | <0.000029 | 0.000057 | 0.00015 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | <0.00071 | 0.0014 | <0.00071 | 0.0013 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 | 3/23/2006 | 9/7/2006 | 3/22/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetone | < 0.66 | <0.74 | <0.74 | <0.74 | <0.74 | 0.87 | 1.7 | <0.74 | <1.1 | 200 | 1000 |
| Benzene | 0.34 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.13 | 0.5 | 5 |
| Chloromethane | < 0.26 | 0.16 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.14 | <0.3 | 0.3 | 3 |
| Methylene chloride | < 0.28 | <0.19 | 0.58 | <0.19 | <0.19 | <0.19 | 0.22 | 0.23 | <0.33 | 0.5 | 5 |
| **Metals, mg/L** | | | | | | | | | | | |
| Arsenic | 0.0082 | 0.0035 | 0.0074 | 0.0068 | 0.0081 | 0.0066 | 0.0057 | 0.0077 | 0.0055 | 0.001 | 0.01 |
| Barium | 0.083 | 0.1 | 0.093 | 0.0962 | 0.116 | 0.119 | 0.105 | 0.122 | 0.107 | 0.4 | 2 |
| Cadmium | < 0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00028 | <0.00042 | <0.00042 | <0.00042 | <0.00042 | 0.0005 | 0.005 |
| Cobalt | < 0.00096 | <0.00096 | <0.00096 | <0.00096 | <0.00096 | <0.0012 | <0.0012 | <0.0012 | <0.0012 | 0.008 | 0.04 |
| Iron | 0.22 | **0.51** | 0.15 | 0.17 | 0.19 | 0.091 | <0.032 | 0.24 | 0.1 | 0.15 | 0.3 |
| Lead | < 0.0017 | <0.0017 | <0.0017 | <0.0017 | <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** | **1.52** | **1.44** | **1.52** | **1.46** | 0.025 | 0.05 |
| Mercury | < 0.000029 | 0.000061 | <0.000029 | <0.000029 | 0.000053 | <0.00009 | <0.00009 | <0.00009 | <0.00009 | 0.0002 | 0.002 |
| Vanadium | 0.0019 | <0.00071 | 0.0015 | 0.001 | 0.0012 | <0.0019 | <0.0019 | <0.0019 | <0.0019 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 |
| 1,2,4-Trimethylbenzene | < 0.37 | < 0.37 | < 0.37 | < 0.14 | < 0.14 | < 0.14 | < 0.14 | <0.12 | <0.12 | <0.12 | <0.12 |
| 2-Butanone | < 0.59 | < 0.59 | 2.2 | 0.45 | < 0.36 | 1 | 1.1 | 3.3 | 2.5 | <0.39 | <0.39 |
| 2-Hexanone | < 0.58 | < 0.58 | < 0.58 | < 0.31 | < 0.31 | < 0.31 | < 0.31 | <0.35 | 0.42 | <0.35 | 0.54 |
| 4-Methyl-2-pentanone | < 0.26 | < 0.26 | < 0.26 | < 0.34 | < 0.34 | < 0.34 | < 0.34 | <0.32 | <0.32 | <0.32 | 0.68 |
| Acetone | < 1.1 | < 1.1 | 3.5 | 1 | 0.66 | 1.9 | 2.1 | 7.4 | 5 | 6.6 | 4.1 |
| Benzene | < 0.37 | < 0.37 | < 0.37 | < 0.2 | < 0.2 | < 0.2 | 0.32 | <0.22 | <0.22 | <0.22 | <0.22 |
| Methylene chloride | 1.9 | 2 | 1 | < 0.28 | < 0.28 | 1.4 | 0.9 | **5.9** | 1.9 | **14** | <0.19 |
| Toluene | < 0.39 | < 0.39 | < 0.39 | < 0.17 | < 0.17 | < 0.17 | < 0.17 | 0.19 | 0.21 | <0.17 | <0.17 |

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

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

| (041) 6/9/2005 | 3/23/2006 | 6/9/2006 | 9/7/2006 | 3/22/2007 | 3/23/2007 | 6/21/2007 | 9/10/2007 | PAL | ES |
|---|---|---|---|---|---|---|---|---|---|
| <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.18 | <0.19 | <0.19 | 0.7 | 7 |
| <0.12 | <0.12 | <0.12 | <0.12 | <0.12 | 0.76 | <0.12 | <0.12 | 96 | 480 |
| <0.39 | <0.39 | <0.39 | <0.39 | <0.39 | <0.39 | <0.57 | <0.57 | 90 | 460 |
| 0.37 | <0.35 | <0.35 | <0.35 | <0.35 | <0.35 | <0.41 | <0.41 | ----- | ----- |
| 0.51 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | <0.32 | 50 | 500 |
| <0.74 | 1 | 1.8 | 1.5 | 3.4 | 3.6 | <1.1 | 2.6 | 200 | 1000 |
| <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.22 | <0.13 | <0.13 | 0.5 | 5 |
| <0.19 | 1.7 | <0.19 | 0.77 | 1.7 | 2.3 | <0.33 | <0.33 | 0.5 | 5 |
| <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.17 | <0.13 | <0.13 | 200 | 1,000 |

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

**Table 3-3**
**Range of VOC Detected**
**Former Onalaska Landfill**
**Onalaska, Wisconsin**

| VOC | Minimum Detected (ug/L) | Maximum Detected (ug/L) | Lower Value of Non-Detect | Upper Value of Non-Detect |
|---|---|---|---|---|
| 1,1,1-Trichloroethane | Not Detected | Not Detected | <0.21 | <14 |
| 1,1,2,2-Tetrachloroethane | Not Detected | Not Detected | <0.18 | <11 |
| 1,1,2-Trichloroethane | Not Detected | Not Detected | <0.22 | <17 |
| 1,1-Dichloroethane | Not Detected | Not Detected | <0.15 | <9.4 |
| 1,1-Dichloroethene | Not Detected | Not Detected | <0.18 | <12 |
| 1,2,4-Trimethylbenzene | 0.27 | 1200 | <0.12 | <0.12 |
| 1,2-Dichloroethane | Not Detected | Not Detected | <0.16 | <14 |
| 1,2-Dichloropropane | Not Detected | Not Detected | <0.15 | <11 |
| 1,3,5-Trimethylbenzene | 0.34 | 280 | <0.096 | <2.7 |
| 2-Butanone | Not Detected | Not Detected | <0.39 | <36 |
| 2-Hexanone | Not Detected | Not Detected | <0.35 | <26 |
| 4-Methyl-2-pentanone | Not Detected | Not Detected | <0.32 | <20 |
| Acetone | 0.82 | 3.6 | <0.74 | <69 |
| Benzene | 0.45 | 1.7 | <0.13 | <8.1 |
| Bromodichloromethane | Not Detected | Not Detected | <0.14 | <9.4 |
| Bromoform | Not Detected | Not Detected | <0.17 | <40 |
| Bromomethane | Not Detected | Not Detected | <0.36 | <26 |
| Carbon disulfide | Not Detected | Not Detected | <0.13 | <8.1 |
| Carbon tetrachloride | Not Detected | Not Detected | <0.13 | <8.1 |
| Chlorobenzene | 0.28 | 2.9 | <0.15 | <9.4 |
| Chloroethane | 0.44 | 0.87 | <0.24 | <18 |
| Chloroform | Not Detected | Not Detected | <0.16 | <10 |
| Chloromethane | 0.45 | 0.45 | <0.14 | <19 |
| cis-1,2-Dichloroethene | 0.24 | 0.33 | <0.17 | <11 |
| cis-1,3-Dichloropropene | Not Detected | Not Detected | <0.12 | <8.8 |
| Dibromochloromethane | Not Detected | Not Detected | <0.18 | <11 |
| Ethylbenzene | 0.35 | 23 | <0.17 | <11 |
| Methylene chloride | 0.19 | 130 | <0.19 | <21 |
| Naphthalene | 0.15 | 49 | <0.15 | <15 |
| Styrene | Not Detected | Not Detected | <0.11 | <6.9 |
| Tetrachloroethene | Not Detected | Not Detected | <0.19 | <18 |
| Toluene | Not Detected | Not Detected | <0.13 | <8.1 |
| trans-1,2-Dichloroethene | Not Detected | Not Detected | <0.16 | <12 |
| trans-1,3-Dichloropropene | Not Detected | Not Detected | <0.17 | <12 |
| Trichloroethene | Not Detected | Not Detected | <0.17 | <11 |
| Vinyl chloride | Not Detected | Not Detected | <0.21 | <14 |
| Xylenes (total) | 0.45 | 120 | <0.28 | <18 |

Note: Results for the December 2006, March 2007, June 2007, and September 2007 monitoring events are included in this table.

**Table 3-4**
**Range of Metals Detected**
**Former Onalaska Landfill**
**Onalaska, Wisconsin**

| Metal | Minimum Detected (mg/L) | Maximum Detected (mg/L) | Lower Value of Non-Detect | Upper Value of Non-Detect |
|---|---|---|---|---|
| Arsenic | 0.0045 | 0.0277 | <0.0043 | <0.0043 |
| Barium | 0.0197 | 1.84 | Always Detected | |
| Cadmium | Not Detected | Not Detected | <0.00042 | <0.00042 |
| Cobalt | 0.0013 | 0.0109 | <0.0012 | <0.0012 |
| Iron | 0.033 | 43.1 | <0.032 | <0.032 |
| Lead | Not Detected | Not Detected | <0.0017 | <0.0017 |
| Manganese | 0.0378 | 12.6 | Always Detected | |
| Mercury | 0.000093 | 0.00011 | <0.00009 | <0.00009 |
| Vanadium | Not Detected | Not Detected | <0.0019 | <0.0019 |

Note: Results for the December 2006, March 2007, June 2007, and September 2007 monitoring events are included in this table.

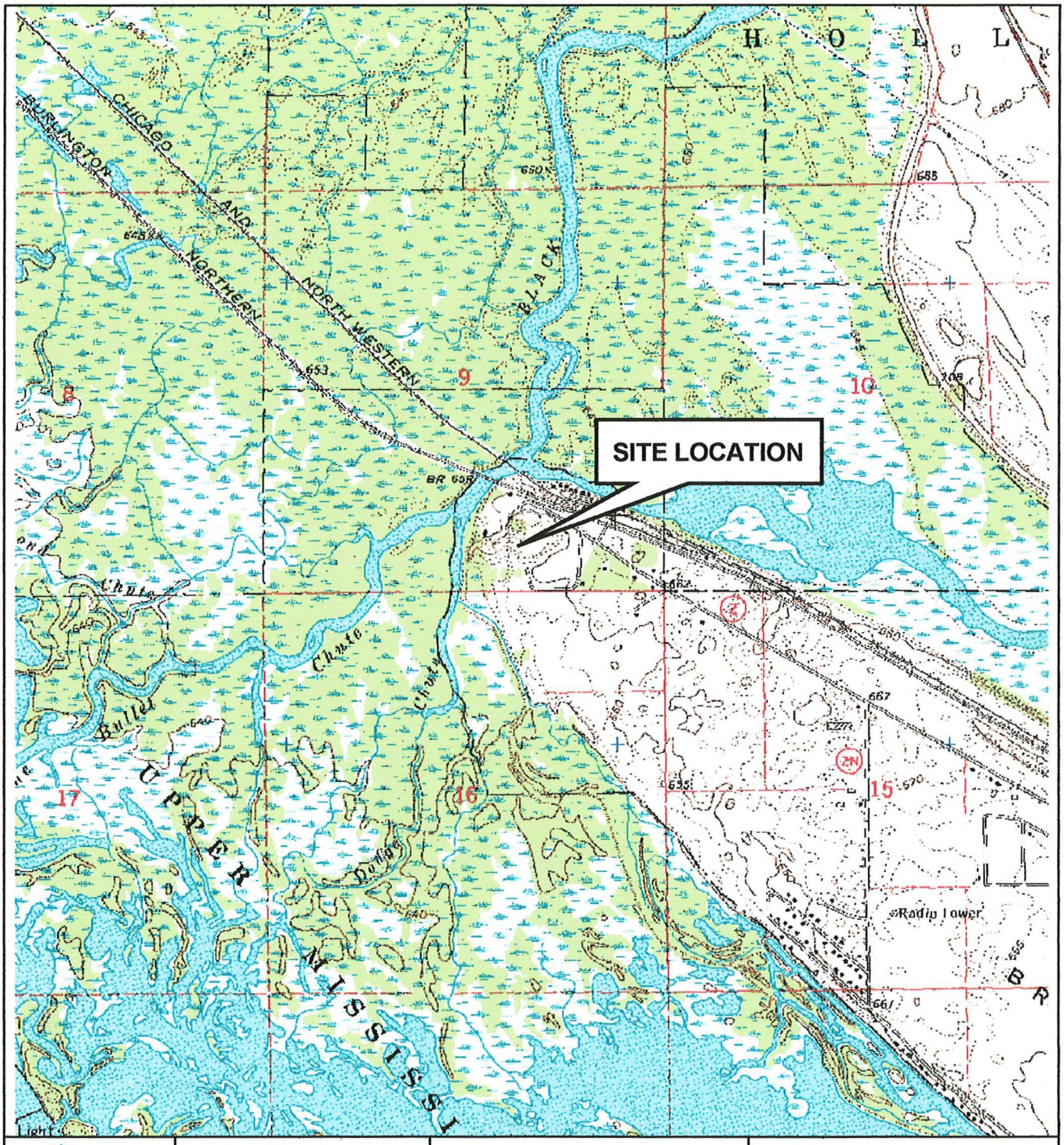
**Table 3-5**
**Summary of Historic Concentrations of Select VOCs in the Groundwater**
**Former Onalaska Landfill**

| 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 |
| | 3/23/06 | <3.7 | <2.8 | 23 | <3.5 | <4.7 |
| | 3/22/07 | <3.7 | <2.8 | 25 | <3.5 | <4.7 |
| 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 |
| | 3/23/06 | <4.4 | <3.4 | 53 | <4.2 | <5.6 |
| | 3/22/07 | <4.4 | <3.4 | 30 | <4.2 | <5.6 |
| 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 | <0.22 | <0.17 | <0.44 | 0.29 | <0.28 |
| | 6/8/05 | <0.22 | <0.17 | <0.44 | 0.31 | <0.28 |
| | 3/21/07 | <0.22 | <0.17 | <0.44 | <0.21 | <0.28 |
| PZ-3 | 3/22/06 | <0.22 | <0.17 | <0.44 | <0.21 | <0.28 |
| | 3/21/07 | <0.22 | <0.17 | <0.44 | <0.21 | <0.28 |

Note: The remediation system operated from July 1994 through November 2001.

# FIGURES

# Figures




Scale: 1:24000

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

# Site Location Map

Onalaska Landfill
Onalaska, Wisconsin

March 2006 Job No. 07349-002

Figure 1-1

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BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

MW1-S
MW1-M

MILLER

PRETASKY

MW-1SR
645.84

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

645.50

645.25

645.00

JOHNSON WELL
MW-14S
645.44

645.41
AW-1

CLARIFIER

MW-2
D M S
645.45

645.37
PZ-1
645.37
AW-9

AST WITH CONCRETE PIT

MW-5S
645.37

EW-5
645.33
MW-17S

MW-17M

PROCESS BUILDING

AW-13
645.30

EW-4

MW-16S
645.14

MW-16M

PZ-2
645.35

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
645.10

AW-25
645.12

EW-2

AW-28
645.10

645.12
MW-4S

EW-1

645.31
PZ-3

PZ-5
645.06

PZ-6
644.98

MW-7M

MW-6
M S
645.02

MW-15M

GRAVEL DRIVE

MW-8
S M D
644.93

SPORTSMANS CLUB ROAD

ACKERMAN WELL

GARDEN SPIGOTS

MW-12S
644.88

PZ-4
644.99

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
- u — u — u — u = Utility lines
- = Utility pole
- = Hydrant
- ← = Inferred Direction of Groundwater Flow

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.

Note:

Groundwater Elevations were Gauged on March 21 and March 22, 2007

| FIGURE NUMBER: | Groundwater Elevation Map<br>Shallow Zone Wells<br>MARCH 2007<br>ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | | |
|---|---|---|---|
| 3–1 | | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10–16–07 | 7349–002 |

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FAX: (952) 942–0317
WEB: HTTP://WWW.ENSR.AECOM.COM

| DESIGNED BY: | REVISIONS | | | |
|---|---|---|---|---|
| AC | NO.: | DESCRIPTION: | DATE: | BY: |
| DRAWN BY: | | | | |
| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

BLACK RIVER

SHORELINE

SHORELINE

RIVER

BLACK

CANOE LANDING

MILLER

PRETASKY

MW-1SR

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

JOHNSON WELL
MW-14S

AW-1

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 AW-9

MW-5S

EW-5

MW-17S

MW-17M
645.41

PROCESS BUILDING

AW-13

EW-4

MW-16S

MW-16M
645.23

EW-3

AW-20

AW-25

EW-2

AW-28

PZ-2

DESIGNATED MANAGEMENT ZONE

PZ-3

MW-6
M S
645.03

644.92
MW-15M

GRAVEL DRIVE

MW-8

ACKERMAN WELL

S M D
644.93

GARDEN SPIGOTS

PZ-4

MW-2
D M S
645.43

645.40

MW-4S

EW-1

PZ-5

PZ-6

645.00

MW-7M
644.91

SPORTSMANS CLUB ROAD

MW-12S

PASTURE

CROPLAND

644.60

644.66
MW-10M

644.55
MW-9M

644.52
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

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.

Note:

Groundwater Elevations were Gauged on March 21 and March 22, 2007

| FIGURE NUMBER: | Groundwater Elevation Map<br>Medium Zone Wells<br>MARCH 2007<br>ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | | |
|---|---|---|---|
| 3-2 | | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10-16-07 | 7349-002 |

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|---|---|---|---|---|
| AC | NO.: | DESCRIPTION: | DATE: | BY: |
| DRAWN BY: | | | | |
| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

BLACK RIVER SHORELINE

BLACK RIVER SHORELINE

MILLER

PRETASKY

MW-1SR
643.54

CANOE LANDING

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

643.42
AW-1

JOHNSON WELL
MW-14S
643.45

CLARIFIER

643.45
PZ-1
643.44
AW-9

AST WITH CONCRETE PIT

MW-5S
643.52

EW-5

643.46
MW-17S

MW-17M

PROCESS BUILDING

AW-13
643.78

EW-4

MW-16S
643.39

MW-16M

PZ-2
645.35

DESIGNATED MANAGEMENT ZONE

EW-3

AW-20
643.43

AW-25
643.48

EW-2

AW-28
643.54

643.64
PZ-3

MW-2
D M S
643.59

643.63
MW-4S

EW-1

PZ-5
643.67

PZ-6
643.61

MW-7M

MW-6
M S
643.42

MW-15M

GRAVEL DRIVE

SPORTSMANS CLUB ROAD

ACKERMAN WELL

MW-8
S M D
643.54

MW-12S
643.60

643.60

GARDEN SPIGOTS

PZ-4
643.49

PASTURE

CROPLAND

643.50

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

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.

Note:

Groundwater Elevations were Gauged on September 10 and September 11, 2007

| FIGURE NUMBER: |
|---|
| 3-3 |
| SHEET NUMBER: |
| 1 |

Groundwater Elevation Map
Shallow Zone Wells

SEPTEMBER 2007
ONALASKA LANDFILL
ONALASKA, WISCONSIN

| SCALE: | DATE: | PROJECT NUMBER: |
|---|---|---|
| 1"=175' | 10-16-07 | 7349-002 |

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|---|---|---|---|---|
| AC | NO.: | DESCRIPTION: | DATE: | BY: |
| DRAWN BY: | | | | |
| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

BLACK RIVER SHORELINE

CANOE LANDING

MILLER

PRETASKY

MW-1SR

ASPHALT DRIVE

LYTLE ROAD

B.N.S.F. RAILROAD

STATE BIKE TRAIL

COUNTY ROAD "Z"

SHORELINE

RIVER

643.60

643.50

643.40

BLACK

JOHNSON WELL

MW-14S

AW-1

CLARIFIER

AST WITH CONCRETE PIT

PZ-1 AW-9

MW-5S

EW-5

MW-17S

MW-17M

643.54

PROCESS BUILDING

AW-13

EW-4

MW-16S

PZ-2

DESIGNATED MANAGEMENT ZONE

MW-16M

643.47

EW-3

AW-20

AW-25

EW-2

AW-28

MW-2

D M S

643.57

MW-4S

EW-1

PZ-3

PZ-5

PZ-6

MW-6

M S

643.40

643.40

MW-15M

GRAVEL DRIVE

MW-8

S M D

643.59

ACKERMAN WELL

SPORTSMANS CLUB ROAD

MW-12S

MW-7M

643.70

GARDEN SPIGOTS

PZ-4

PASTURE

CROPLAND

643.41

MW-10M

643.50

MW-9M

643.64

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

Approximate Scale
1 inch = 175 feet

0 175 350

N

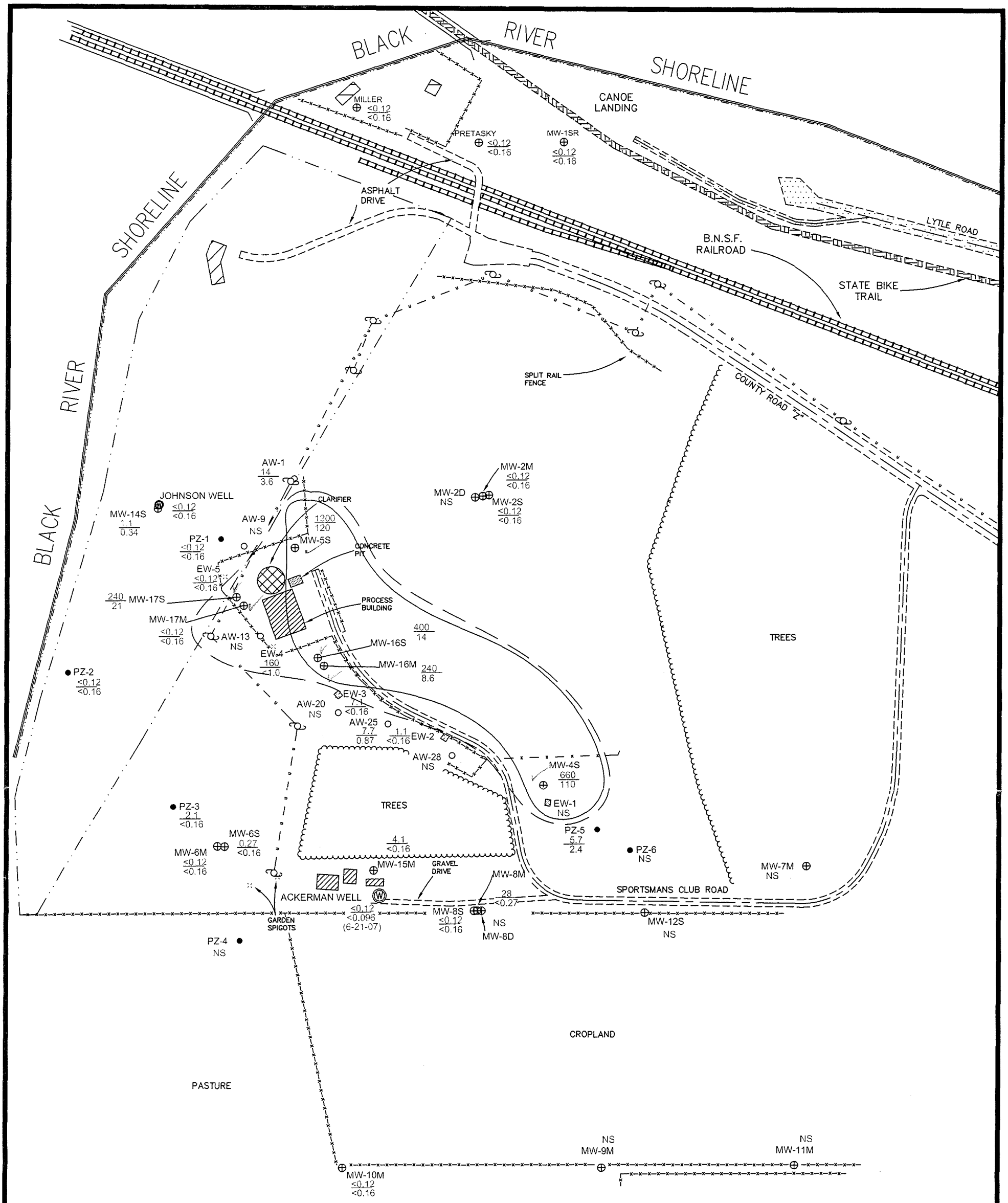
Source:

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

Note:

Groundwater Elevations were Gauged on September 10 and September 11, 2007

| FIGURE NUMBER: | Groundwater Elevation Map<br>Medium Zone Wells<br>SEPTEMBER 2007<br>ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | | | ENSR \| AECOM<br>ENSR CORPORATION<br>ST. LOUIS PARK, MINNESOTA 55416<br>PHONE: (952) 924-0117<br>FAX: (952) 942-0317<br>WEB: HTTP://WWW.ENSR.AECOM.COM | DESIGNED BY: AC<br>DRAWN BY: AC<br>CHECKED BY: PJM<br>APPROVED BY: PJM |
|---|---|---|---|---|---|
| 3-4 | | | | | REVISIONS: NO. / DESCRIPTION / DATE / BY |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: | | |
| 1 | 1"=175' | 10-16-07 | 7349-002 | | |




## LEGEND

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

## NOTES

Groundwater Samples Collected on March 21, 22 and 23, 2007.

$\frac{<1.0}{<1.0}$ = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l) / 1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)

NS = Not Sampled

<1.0 = Less than Specified Method Detection Limit

N

Approximate Scale
1 inch = 175 feet

0 175 350

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

| FIGURE NUMBER: | Trimethylbenzene Groundwater Analytical Results MARCH 2007 | | |
|---|---|---|---|
| 3–5 | ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10–18–07 | 7349–002 |

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| DRAWN BY: | | | | |
| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

BLACK RIVER

SHORELINE

CANOE LANDING

SHORELINE

RIVER

BLACK

MILLER
⊕ <0.12
<0.096

PRETASKY
⊕ <0.12
<0.096

MW-1SR
⊕
NS

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
<0.12
<0.096

CLARIFIER

MW-14S
4.9
1.8

AW-9
NS

1100
160

PZ-1
NS

MW-5S

CONCRETE PIT

EW-5
NS

1200
15
MW-17S

PROCESS BUILDING

MW-17M
9.7
<0.096

AW-13
0.99
<0.096

EW-4
NS

440
<2.7
MW-16S

MW-16M
2.7
<0.096

PZ-2
NS

EW-3
NS

AW-20
0.27
<0.096

AW-25
<0.12
<0.096

NS

EW-2

AW-28
1.5
<0.096

MW-4S
1200
280

EW-1
NS

TREES

TREES

PZ-3
NS

MW-6S
NS

MW-6M
NS

<0.12
<0.096

MW-15M

GRAVEL DRIVE

PZ-5
NS

PZ-6
NS

MW-7M
NS

MW-8M
NS

ACKERMAN WELL

SPORTSMANS CLUB ROAD

<0.12
<0.96

MW-8S
NS

NS

MW-8D

GARDEN SPIGOTS

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

## NOTES

Groundwater Samples Collected on September 17 and September 18, 2007.

<1.0 = 1,2,4 – Trimethylbenzene concentration in groundwater (ug/l)
<1.0 = 1,3,5 – Trimethylbenzene concentration in groundwater (ug/l)

NS = Not Sampled
<1.0 = Less than Specified Method Detection Limit

N

Approximate Scale
1 inch = 175 feet

0 175 350

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

| FIGURE NUMBER: | Trimethylbenzene Groundwater Analytical Results SEPTEMBER 2007 | | |
|---|---|---|---|
| 3–6 | ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10–18–07 | 7349–002 |

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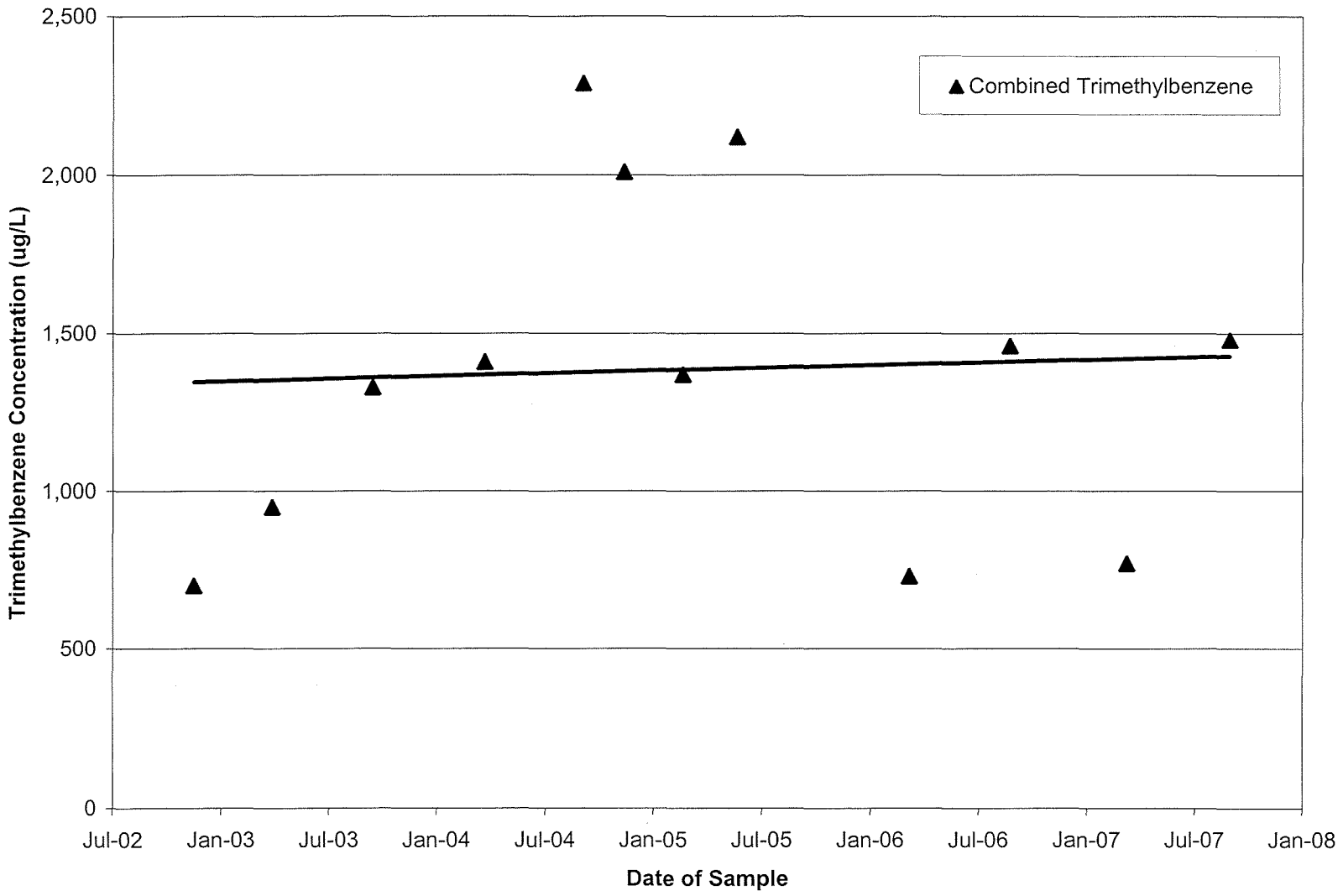
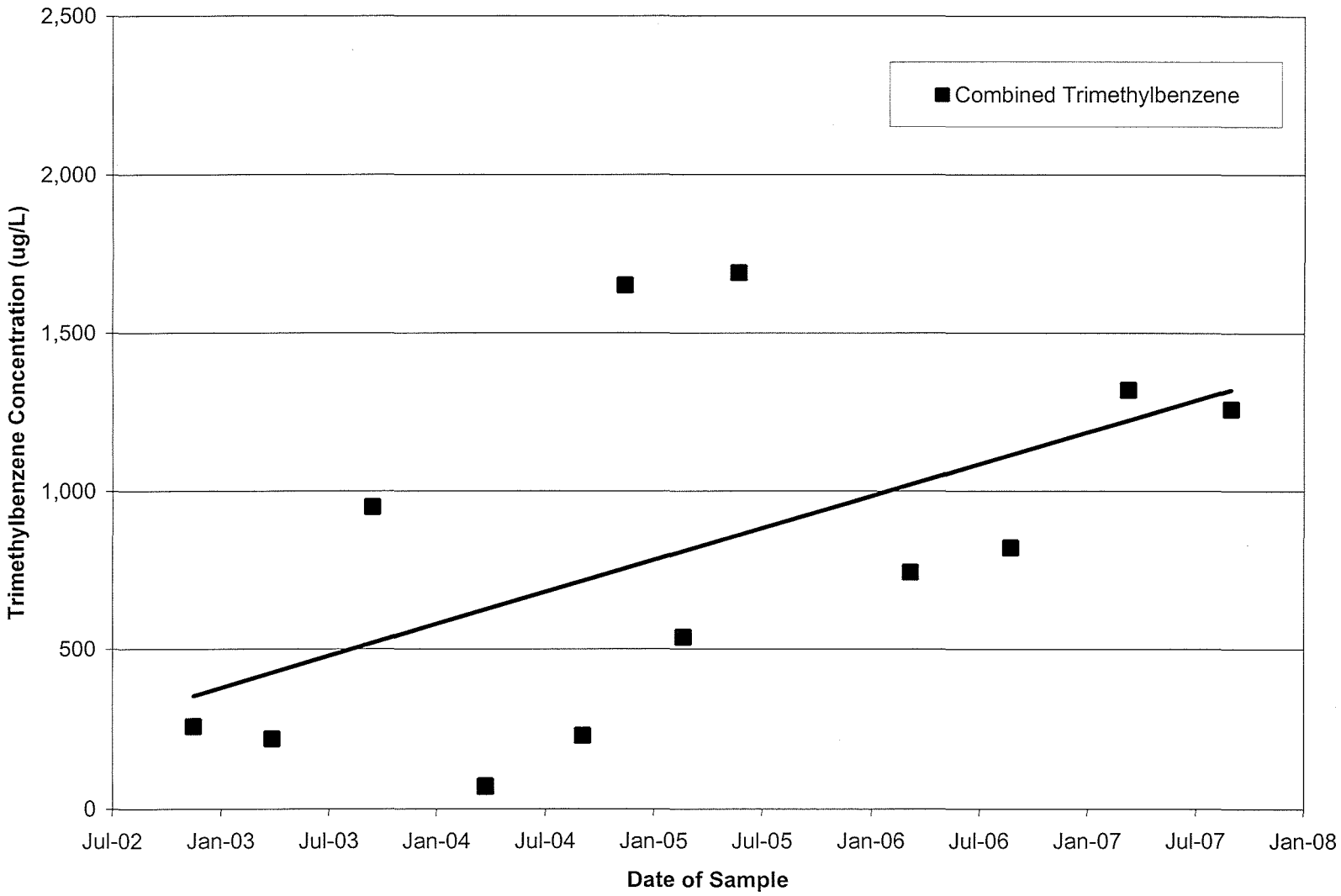
| DRAWN BY: | | | | |
| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

Figure 3-7
Trend in Trimethylbenzene Concentrations in MW-4S
Onalaska Landfill
Onalaska, Wisconsin



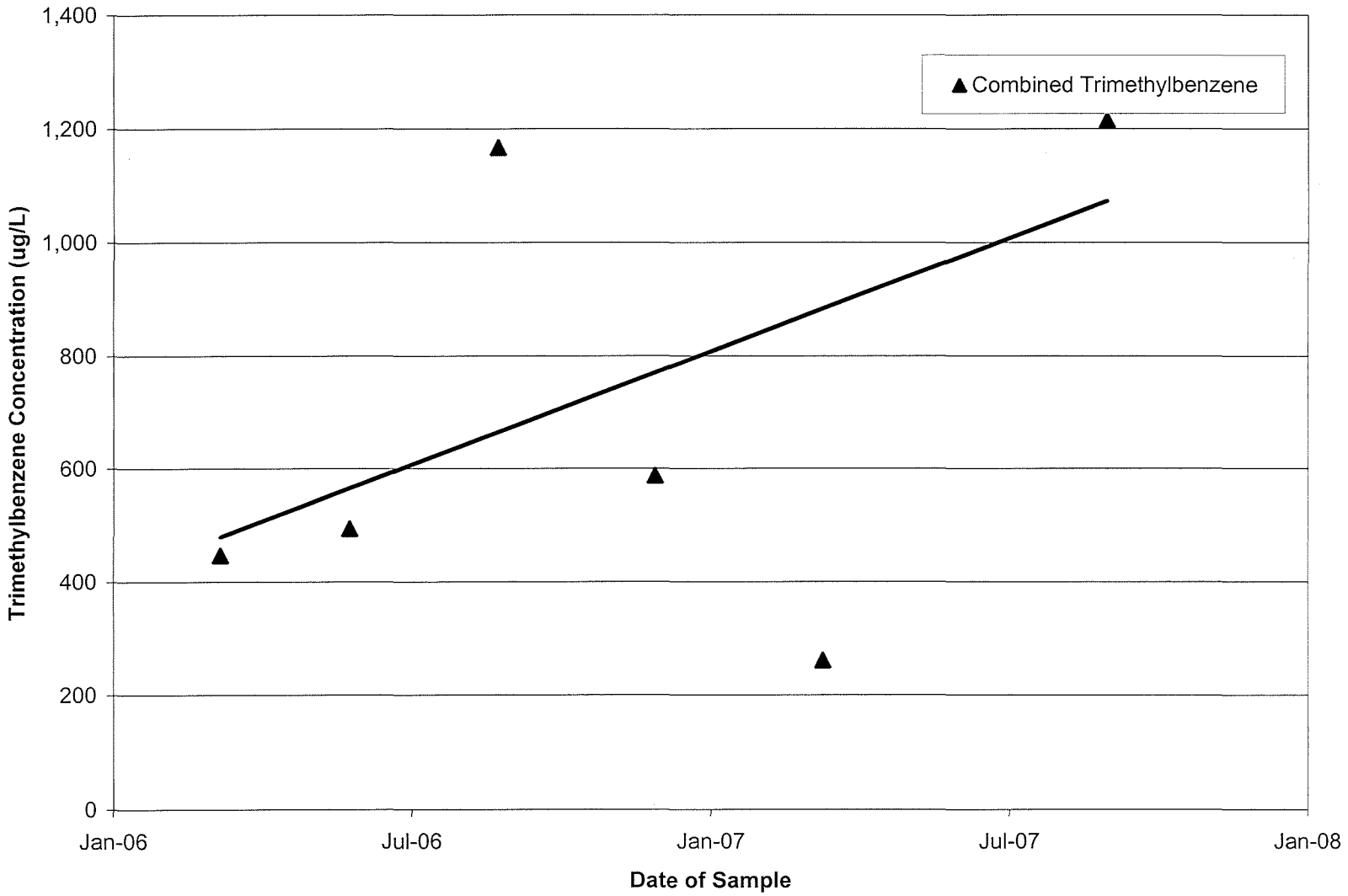

J:\Projects and Proposal\07349 WDNR\07349-002\Tables\Graph of MW-4S and MW-5S v2

Figure 3-8
Trend in Trimethylbenzene Concentrations in MW-5S
Onalaska, Landfill
Onalaska, Wisconsin



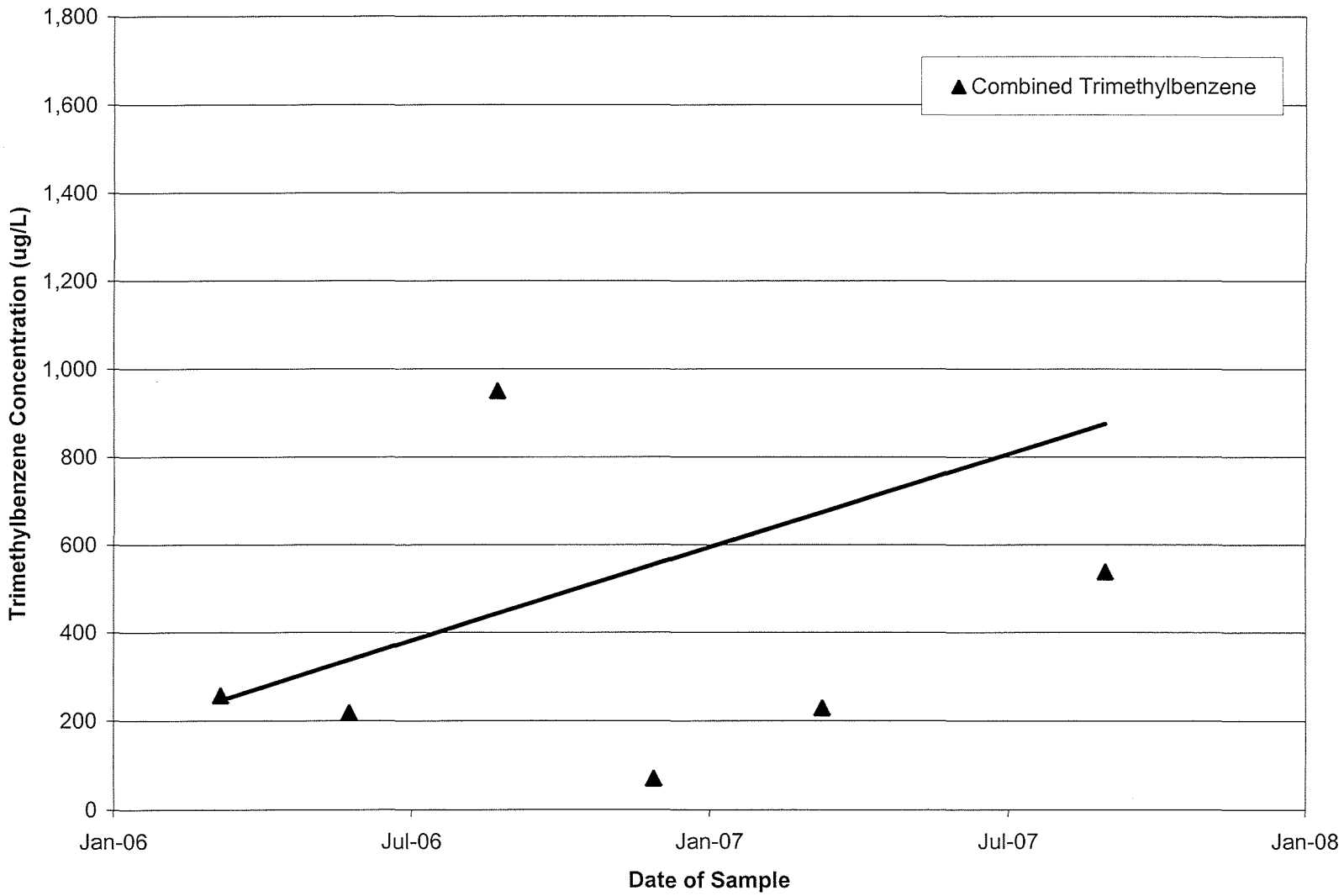

J:\Projects and Proposal\07349 WDNR\07349-002\Tables\Graph of MW-4S and MW-5S v2

Figure 3-9
Trend in Trimethylbenzene Concentrations in MW-16S
Onalaska Landfill
Onalaska, Wisconsin

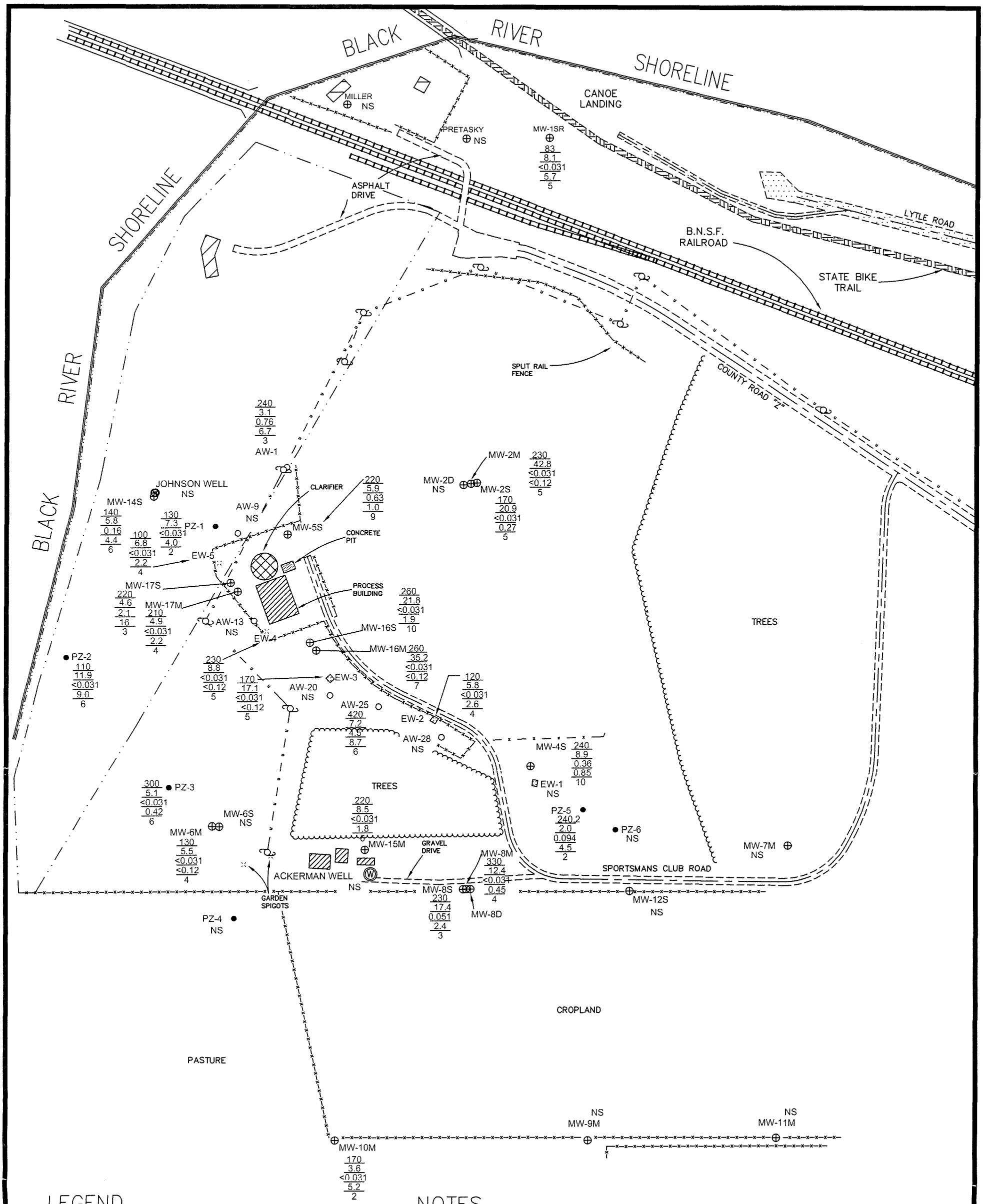



J:\Projects and Proposal\07349 WDNR\07349-002\Tables\Graph of MW-4S and MW-5S v2

Figure 3-10
Trend in Trimethylbenzene Concentrations in MW-17S
Onalaska Landfill
Onalaska, Wisconsin




J:\Projects and Proposal\07349 WDNR\07349-002\Tables\Graph of MW-4S and MW-5S v2




## LEGEND

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

## NOTES

Groundwater Samples Collected on March 21, 22 and 23, 2007.
Results resulted in mg/L

Alkalinity
Chloride
Nitrate
Sulfate
Total Organic Carbon

NS = Not Sampled

Approximate Scale
1 inch = 175 feet

0 175 350

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

| FIGURE NUMBER: | Natural Attenuation Parameters Laboratory Analyzed MARCH 2007 ONALASKA LANDFILL ONALASKA, WISCONSIN | | |
|---|---|---|---|
| 4–1 | | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10–18–07 | 7349–002 |

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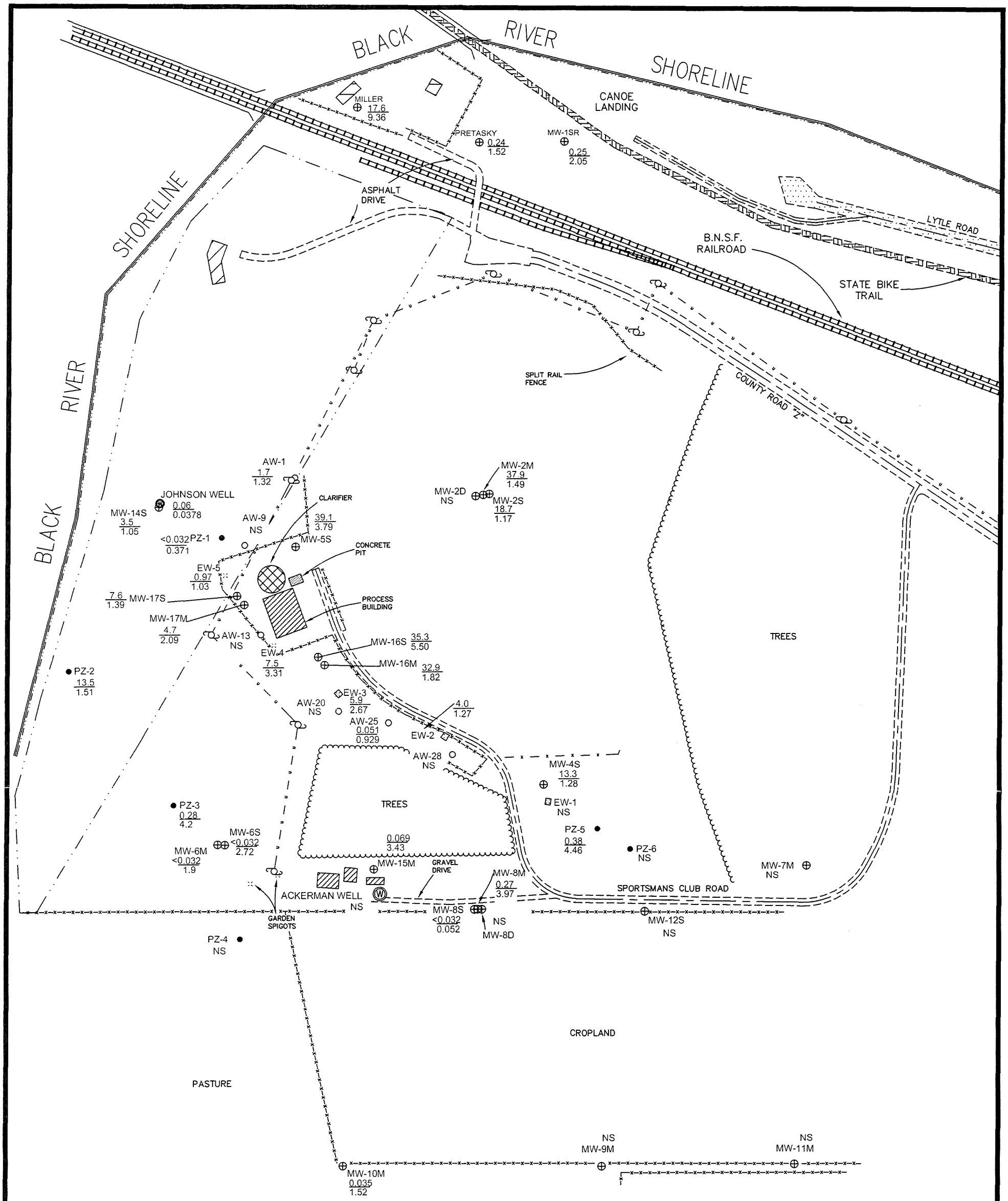
| PJM | | | | |




## LEGEND

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

## NOTES

Groundwater Samples Collected on March 21, 22 and 23, 2007.

0.28 / 4.2 = Dissolved Iron (mg/L) / Dissolved Manganese (mg/L)

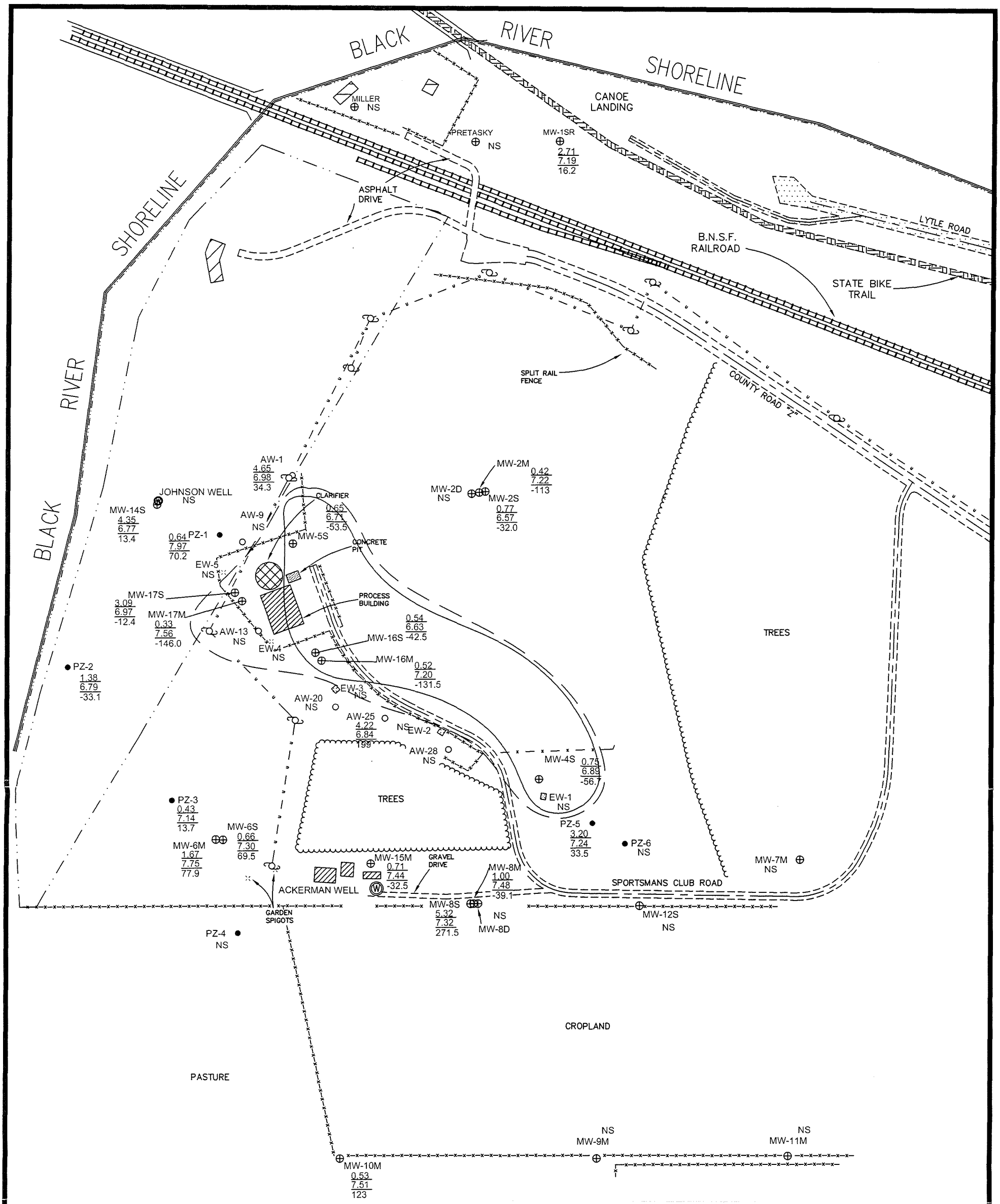
NS = Not Sampled or Analyzed for Specific Compound

Approximate Scale
1 inch = 175 feet

0 175 350

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

| FIGURE NUMBER: | Natural Attenuation Parameters<br>Iron and Manganese<br>MARCH 2007<br>ONALASKA LANDFILL<br>ONALASKA, WISCONSIN | ENSR \| AECOM<br>ENSR CORPORATION<br>ST. LOUIS PARK, MINNESOTA 55416<br>PHONE: (952) 924-0117<br>FAX: (952) 942-0317<br>WEB: HTTP://WWW.ENSR.AECOM.COM | DESIGNED BY: AC<br>DRAWN BY: AC<br>CHECKED BY: PJM<br>APPROVED BY: PJM |
|---|---|---|---|
| 4-2 | | | REVISIONS: NO. / DESCRIPTION / DATE / BY |
| SHEET NUMBER: 1 | SCALE: 1"=175' / DATE: 10-18-07 / PROJECT NUMBER: 7349-002 | | |




## LEGEND

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

## NOTES

Groundwater Samples Collected on March 21, 22 and 23, 2007.

DO = Dissolved Oxygen – Results reported in mg/L
pH = pH – Unitless
ORP = Oxidation–Reduction Potential – Results reported in mV

NS = Not Sampled

N

Approximate Scale
1 inch = 175 feet

0 175 350

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

| FIGURE NUMBER: | Natural Attenuation Parameters Field Analyzed MARCH 2007 ONALASKA LANDFILL ONALASKA, WISCONSIN | | |
|---|---|---|---|
| 4–3 | | | |
| SHEET NUMBER: | SCALE: | DATE: | PROJECT NUMBER: |
| 1 | 1"=175' | 10–18–07 | 7349–002 |

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| AC | | | | |
| CHECKED BY: | | | | |
| PJM | | | | |
| APPROVED BY: | | | | |
| PJM | | | | |

# APPENDIX

# Appendix A

# Summary of Operation and Maintenance Activities

## SUMMARY OF OPERATION AND MAINTENANCE ACTIVITIES

Mr. William 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. No treatment chemicals remain at the Site.

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 October 31, 2007 Olson's Tri-County Transport (Sparta Wisconsin) hauled 20,000 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 1,500 to 2,500 gallons of groundwater will be stored inside the "sludge holding tank" at the end of the current contract (December 16, 2007).

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

Several out of scope items were completed during this current contract period. Some of the out of scope items included sampling of additional wells during the March 2007 sampling event, corresponding with the EPA, certification of the Site fire extinguishers, repair of heating exhaust vents and other smaller items, replacement of the surge protector for the electrical panel, and participation in the Five-Year Review.

The Five-Year Review was conducted on September 26, 2007 and was attended by ENSR, WDNR, and EPA. During the Five-Year Review several potential repair items were identified. The potential repair items included the following.

- The air compressor trap is leaking condensate water
- Extraction well EW-1 is not functioning
- Bearings in the large sump pump need to be repaired
- Replacement of the trash sumps used for wastewater conveyance

B

# Appendix B

# Results of Data Validation

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# Memorandum

Date: May 31, 2007

To: Peter Moore/St. Louis Park

From: Sheena Blair/Westford

Subject: Data Validation
Volatile Organic Compounds
Onalaska Landfill
STL A7C240117

Distribution: Lori Herberich/Westford

07349-002-800 File
ZZ265.voc.doc

## SUMMARY

Full validation was performed on the data for five groundwater samples and one trip blank analyzed for site-specific volatile organic compounds (VOCs) by SW-846 method 8260B. The samples were collected at the Onalaska site on March 22 and 23, 2007 and submitted to Severn Trent Laboratory (STL) in North Canton, OH for analysis. STL processed and reported the results under sample delivery group (SDG) A7C240117.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (10/99). Modification of the Functional Guidelines was done to accommodate the non-CLP methodology.

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

## SAMPLES

The samples included in this review are listed below.

| Sample IDs | Sample IDs |
|---|---|
| MW-16S | MW-16S Dup (field duplicate of MW-16S) |
| MW-4S | AW-1 |
| PZ-2 | Trip (trip blank) |

## REVIEW ELEMENTS

Sample data were reviewed for the following parameters:

-Agreement of analyses conducted with the chain of custody (COC) requests
-Holding times/sample preservation

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-Gas chromatography/mass spectrometry (GC/MS) tunes
-Initial and continuing calibrations
-Method blanks/trip blanks/field 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). No discrepancies were noted.

### Holding Times/Sample Preservation

The samples were analyzed within the method specified holding time.

The cooler temperatures upon receipt at STL met the QC acceptance range of 4°C ± 2°C.

All samples were preserved to 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 % 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 nonconformances. 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 these compounds in the other samples in this data package.

**Associated ICAL 2/07/07**

| Calibration | Compound | %D or Drift |
|---|---|---|
| CCAL (3/28/07) | 4-Methyl-2-pentanone | 26.7 |
| Instrument A3UX9 | 2-Hexanone | 25.8 |
| Associated samples: MW-16S, MW-16S Dup, MW-4S, PZ-2, AW-1, Trip Blank | | |

### Method Blanks/Trip Blanks/Field Blanks

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

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No target compounds were detected in the laboratory method blanks. Several target compounds were detected in the trip blank sample. The presence of blank contamination indicates that false positives may exist for these compounds in the associated samples. Action Levels (ALs) were established at 10x the highest concentration detected in the blanks for acetone and methylene chloride, and at 5x for 1,2,4 trimethylbenzene, 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) |
|---|---|---|---|
| Trip Blank | Acetone | 3.6 | 36 |
| | Methylene chloride | 2.3 | 23 |
| | 1,2,4-Trimethylbenzene | 0.76 | 3.8 |
| 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 compounds in other samples for false positive results.

## Surrogate Spike Recoveries

The surrogate percent recoveries (%Rs) were within the QC acceptance limits in all sample analyses.

## LCS/LCSD Results

All target compounds with the exception of naphthalene, 1,2,4-trimethyl benzene, and 1,3,5-trimethyl benzene were spiked into the LCS and/or LCSD samples. The %Rs and relative percent differences (RPDs) of all spiked compounds were within the QC acceptance criteria for the LCS and LCSD analyses with the following exceptions.

| Compound | LCS/LCSD %R | QC Limits %R | Actions (Detects/Nondetects) |
|---|---|---|---|
| Methylene chloride | 125/121 | 78-118 | Estimate (J) / Accept |
| trans-1,3,-Dichloropropene | 78/78 | 84-130 | Estimate (J)/ Estimate (UJ) |
| 1,1,2,2-Tetrachloroethane | 120/120 | 85-118 | Estimate (J) / Accept |
| **Associated samples:** MW-16S, MW-16S Dup, MW-4S, PZ-2, AW-1, Trip Blank | | | |

Note the actions listed in the table above would have been used if qualifiers were being applied to results for this project.

It may be appropriate to review results for these compounds in other samples to determine impacts to the results.

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## MS/MSD Results

MS/MSD analyses were performed on sample MW-16S. All target compounds with the exception of naphthalene, 1,2,4- trimethyl benzene, and 1,3,5-trimethyl benzene were spiked into the MS and MSD samples. The %Rs and RPDs of all spiked compounds were within the QC acceptance criteria for the MS and MSD analyses with the following exception.

| Compound | LCS/LCSD %R | QC Limits %R | Actions (Detects/Nondetects) |
|---|---|---|---|
| trans-1,3,-Dichloropropene | 78/78 | 84-130 | Estimate (J)/ Estimate (UJ) |
| **Associated samples:** MW-16S, MW-16S Dup | | | |

Note the actions listed in the table above would have been used if qualifiers were being applied to results for this project.

It may be appropriate to review results for this compound in other samples to determine impacts to the results.

## Internal Standard Performance

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

## Field Duplicate Results

Samples MW-16S and MW-16S Duplicate were submitted as field duplicate pairs with this sample set. The following table summarizes the RPDs of the detected compounds in the field duplicate pairs.

| Compound | MW-16S (µg/L) | MW-16S Duplicate (µg/L) | RPD (%) |
|---|---|---|---|
| Chlorobenzene | 1.7 J | 1.7 J | 0 |
| Ethylbenzene | 8.1 | 10 | 21 |
| Naphthalene | 49 | 48 | 2 |
| 1,2,4-Trimethylbenzene | 370 | 400 | 8 |
| 1,3,5-Trimethylbenzene | 9.3 | 14 | 40 |
| Xylenes (total) | 12 | 18 | 40 |

The RPDs for 1,3,5-trimethylbenzene and total xylenes were acceptable since the results of the sample and duplicate were <5x the SQL and the acceptance criterion was doubled. The RPD for the remaining compounds met the QC acceptance criteria of 30% for an aqueous matrix.

## Quantitation Limits and Sample Results

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

| Sample IDs | Dilution Factor |
|---|---|
| MW-4S | 17 |

Result calculations were spot checked; no discrepancies were noted.

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

| Compound | Reporting Limit (µg/L) | MDL (µg/L) | ES (µg/L) | PAL (µg/L) |
|---|---|---|---|---|
| 1,1,2,2-Tetrachloroethane | 1.0 | 0.22 | 0.20 | 0.02 |
| Bromodichloromethane | 1.0 | 0.14 | 0.60 | 0.06 |
| cis-1,3-Dichloropropene | 1.0 | 0.12 | 0.20 | 0.02 |
| Vinyl chloride | 1.0 | 0.21 | 0.20 | 0.02 |
| trans-1,3-Dichloropropene | 1.0 | 0.17 | 0.20 | 0.020 |

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# Memorandum

Date: May 30, 2007

To: Peter Moore/St. Louis Park

From: Sheena Blair/Westford

Subject: Data Validation, Inorganic Analysis
Onalaska Landfill
STL SDG A7C240117

Distribution: Lori Herberich/Westford

07349-002-800 File

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## SUMMARY

Full validation was performed on the data for five groundwater samples analyzed for the following parameters.

- Selected total metals by SW-846 methods 6010B and 7470A
- Chloride (Cl) by Methods for the Chemical Analysis of Water and Wastes (MCAWW) 300.0
- Sulfate (SO4) by MCAWW 300.0
- Nitrate (NO3) by MCAWW 300.0
- Alkalinity, by MCAWW 310.1, and
- Total organic carbon (TOC) by MCAWW 415.1

The samples were collected at the Onalaska site on March 22 and 23, 2007 and submitted to Severn Trent Laboratory (STL) in North Canton, OH for analysis. STL processed and reported the results under sample delivery group (SDG) A7C240117.

The sample results were assessed according to the "USEPA Contract Laboratory Program National Functional Guidelines for Validation of Inorganic Data", October 2004. 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.

## SAMPLES

The samples included in this review are listed below.

| Sample IDs | Sample IDs |
|---|---|
| MW-16S | MW-16S Dup (field duplicate of MW-16S) |
| MW-4S | AW-1 |
| PZ-2 | |

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## REVIEW ELEMENTS

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 chain-of-custody (COC). There were no discrepancies noted.

### Holding Times/Sample Preservation

The samples were analyzed within the method specified holding time for all sample analyses.

The cooler temperatures upon receipt at STL met the QC acceptance range of 4°C ± 2°C.

Chemical preservation was acceptable for all parameters, where applicable.

### Initial and Continuing Calibrations

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

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 ± 50 percent recovery (%R) for lead and 100 ± 30 %R for the remaining metals 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.

Target analytes were detected in the laboratory blanks i.e., preparation blank (PB), initial and continuing calibration blanks (ICB/CCBs) associated with the samples reviewed. The following table summarizes the blank contamination.

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| Blank Type | Analytes | Conc. Detected (µg/L) |
|---|---|---|
| PB | Manganese | 0.87 |
| PB | Total Alkalinity | 2.9 (mg/L) |
| CCB | Barium | 1.1 |
| CCB | Mercury | -0.1 |
| Associated samples: MW-16S, MW-16S Dup, MW-4S, PZ-2, AW-1 | | |

Sample results were evaluated as follows:

Manganese, barium, and total alkalinity were present in samples MW-16S, MW-16S Dup, MW-4S, PZ-2, and AW-1 at concentrations that significantly exceeded the low levels of blank contamination. No validation action would have been taken on this basis.

The mercury results for samples MW-16S, MW-16S Dup, MW-4S, PZ-2, and AW-1 were nondetect; therefore these nondetect mercury results would have been estimated (UJ) if qualifiers were being applied to results for this project.

It may be appropriate to review results for these analytes in other samples to determine impacts to the results.

**ICP ICS Results**

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

**MS/MSD Results**

MS/MSD analyses were performed on sample MW-16S for metals and wet chemistry. The %Rs and relative percent differences (RPDs) were within acceptance limits.

**Laboratory Duplicate Results**

Laboratory duplicate analyses were performed on sample MW-16S for wet chemistry. All RPDs met the QC acceptance criteria.

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

**Field Duplicate Results**

Samples MW-16S and MW-16S Dup were submitted as a field duplicate pair with this sample set. The following table summarizes the RPDs of the detected analytes in the field duplicate pair.

**ENSR**
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| Analytes | MW-16S (ug/L) | MW-16S Duplicate (ug/L) | RPD (%) |
|---|---|---|---|
| Arsenic | 12.4 | 1.8 | 11 |
| Barium | 274 | 292 | 6 |
| Cobalt | 2.5 | 3.5 | 33 |
| Manganese | 5380 | 5500 | 2 |
| Iron | 32.6 (mg/L) | 35.3 (mg/L) | 8 |
| Chloride | 21.8 (mg/L) | 21.9 (mg/L) | 0.46 |
| Sulfate | 1.9 (mg/L) | 1.8 (mg/L) | 5 |
| Total Alkalinity | 260 (mg/L) | 250 (mg/L) | 4 |
| TOC | 10 (mg/L) | 10 (mg/L) | 0 |

The RPD for cobalt was deemed acceptable since the sample and duplicate results were <10x the sample quantitation limit (SQL) and the absolute difference between the results was <4x the SQL. The RPDs for the remaining analytes met the QC acceptance criteria of 30% for an aqueous matrix.

## LCS Results

The %Rs 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-16S. The percent differences (%Ds) for all analytes met the QC acceptance criteria of <10%.

## 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 RL. 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, barium, and lead were at or below the project Enforcement Standards and Preventative Action Limits. Detection limit exceedances of the ESs and/or PALs are listed in the table below.

| Analyte | Reporting Limit (µg/L) | MDL (µg/L) | ES (µg/L) | PAL (µg/L) |
|---|---|---|---|---|
| Arsenic | 10.0 | 4.3 | 10 | 1.0 |
| Barium | 200 | 3.2 | 2.0 | 0.4 |
| Lead | 3.0 | 1.7 | 15 | 1.5 |

C

# Appendix C

# Mann-Kendall Results for MW-4S, MW-5S, MW-16S, and MW-17S

**State of Wisconsin**
**Department of Natural Resources**
**Remediation and Redevelopment Program**

**Mann-Kendall Statistical Test**
**Form 4400-215 (2/2001)**

**Notice:** This form is the DNR supplied spreadsheet referenced in Appendices A of Comm 46 and NR 746, Wis. Adm. Code. It is provided to consultants as an optional tool for groundwater contaminant trend analysis to support site closure requests under s. Comm 46.07, Comm 46.08, NR 746.07, NR 746.08, Wis. Adm. Code. Use this form or a manual method when seeking case closure under those rules. Earlier versions of this form should not be used.

**Instructions:** Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

| Site Name : Onalaska Landfill | | | | BRRTS No. = | | Well Number = MW-4S | |
|---|---|---|---|---|---|---|---|
| | Compound -> | Benzene Concentration (leave blank if no data) | Toluene Concentration (leave blank if no data) | Ethylbenzene Concentration (leave blank if no data) | Total Xylenes Concentration (leave blank if no data) | Total TMB Concentration (leave blank if no data) | MTBE Concentration (leave blank if no data) |
| Event Number | Sampling Date (most recent last) | | | | | | |
| 1 | 8-Oct-03 | | | | | 1,330.00 | |
| 2 | 13-Apr-04 | | | | | 1,410.00 | |
| 3 | 24-Sep-04 | | | | | 2,290.00 | |
| 4 | 2-Dec-04 | | | | | 2,010.00 | |
| 5 | 10-Mar-05 | | | | | 1,370.00 | |
| 6 | 9-Jun-05 | | | | | 2,120.00 | |
| 7 | 23-Mar-06 | | | | | 730.00 | |
| 8 | 7-Sep-06 | | | | | 1,460.00 | |
| 9 | 22-Mar-07 | | | | | 770.00 | |
| 10 | 11-Sep-07 | | | | | 1,480.00 | |
| | Mann Kendall Statistic (S) = | 0.0 | 0.0 | 0.0 | 0.0 | -3.0 | 0.0 |
| | Number of Rounds (n) = | 0 | 0 | 0 | 0 | 10 | 0 |
| | Average = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1497.00 | #DIV/0! |
| | Standard Deviation = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 521.772 | #DIV/0! |
| | Coefficient of Variation(CV)= | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 0.349 | #DIV/0! |
| Error Check, Blank if No Errors Detected | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| Trend ≥ 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Trend ≥ 90% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Stability Test, If No Trend Exists at | | n<4 | n<4 | n<4 | n<4 | **CV <= 1** | n<4 |
| 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | **STABLE** | n<4 |

| Data Entry By = PJM | Date = 7-Nov-07 | Checked By = CBC |
|---|---|---|

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**Instructions:** Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name : Onalaska Landfill | BRRTS No. = | Well Number = MW-5S

| Event Number | Sampling Date (most recent last) | Benzene Concentration (leave blank if no data) | Toluene Concentration (leave blank if no data) | Ethylbenzene Concentration (leave blank if no data) | Total Xylenes Concentration (leave blank if no data) | Total TMB Concentration (leave blank if no data) | MTBE Concentration (leave blank if no data) |
|---|---|---|---|---|---|---|---|
| | Compound -> | | | | | | |
| 1 | 7-Oct-03 | | | | | 950.00 | |
| 2 | 14-Apr-04 | | | | | 69.70 | |
| 3 | 23-Sep-04 | | | | | 229.00 | |
| 4 | 2-Dec-04 | | | | | 1,650.00 | |
| 5 | 10-Mar-05 | | | | | 538.00 | |
| 6 | 10-Jun-05 | | | | | 1,690.00 | |
| 7 | 23-Mar-06 | | | | | 743.00 | |
| 8 | 7-Sep-06 | | | | | 820.00 | |
| 9 | 22-Mar-07 | | | | | 1,320.00 | |
| 10 | 11-Sep-07 | | | | | 1,260.00 | |
| | Mann Kendall Statistic (S) = | 0.0 | 0.0 | 0.0 | 0.0 | 15.0 | 0.0 |
| | Number of Rounds (n) = | 0 | 0 | 0 | 0 | 10 | 0 |
| | Average = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 926.97 | #DIV/0! |
| | Standard Deviation = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 556.732 | #DIV/0! |
| | Coefficient of Variation(CV)= | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 0.601 | #DIV/0! |
| Error Check, Blank if No Errors Detected | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| Trend ≥ 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | **INCREASING** | n<4 |
| Trend ≥ 90% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Stability Test, If No Trend Exists at | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | NA | n<4 |

Data Entry By = PJM | Date = 7-Nov-07 | Checked By = CBC

**State of Wisconsin**
**Department of Natural Resources**
**Remediation and Redevelopment Program**

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| Site Name : Onalaska Landfill | | | | BRRTS No. = | | Well Number = MW-16S | |
|---|---|---|---|---|---|---|---|
| | Compound -> | Benzene Concentration (leave blank if no data) | Toluene Concentration (leave blank if no data) | Ethylbenzene Concentration (leave blank if no data) | Total Xylenes Concentration (leave blank if no data) | Total TMB Concentration (leave blank if no data) | MTBE Concentration (leave blank if no data) |
| Event Number | Sampling Date (most recent last) | | | | | | |
| 1 | 23-Mar-06 | | | | | 447.00 | |
| 2 | 9-Jun-06 | | | | | 494.00 | |
| 3 | 7-Sep-06 | | | | | 1,167.00 | |
| 4 | 11-Dec-06 | | | | | 588.00 | |
| 5 | 23-Mar-07 | | | | | 261.00 | |
| 6 | 21-Jun-07 | | | | | 1,245.00 | |
| 7 | 11-Sep-07 | | | | | 1,215.00 | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| | Mann Kendall Statistic (S) = | 0.0 | 0.0 | 0.0 | 0.0 | 9.0 | 0.0 |
| | Number of Rounds (n) = | 0 | 0 | 0 | 0 | 7 | 0 |
| | Average = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 773.86 | #DIV/0! |
| | Standard Deviation = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 419.099 | #DIV/0! |
| | Coefficient of Variation(CV)= | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 0.542 | #DIV/0! |
| Error Check, Blank if No Errors Detected | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| Trend ≥ 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | **INCREASING** | n<4 |
| Trend ≥ 90% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Stability Test, If No Trend Exists at | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | NA | n<4 |
| | Data Entry By = PJM | | Date = 7-Nov-07 | | Checked By = CBC | | |

**State of Wisconsin**
**Department of Natural Resources**
**Remediation and Redevelopment Program**

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**Instructions:** Do not change formulas or other information in cells with a blue background, only cells with a yellow background are used for data entry. To use the spreadsheet, provide at least four rounds and not more than ten rounds of data that is not seasonally affected. Use consistent units. The spreadsheet contains several error checks, and a data entry error may cause "DATA ERR" or "DATE ERR" to be displayed. Dates that are not consecutive will show an error message and will not display the test results. The spreadsheet tests the data for both increasing and decreasing trends at both 80 percent and 90 percent confidence levels. If a declining trend is present at 80 percent but not at 90 percent, a site is still eligible for closure under Comm 46 and NR 746 provided that other conditions in those rules are met. If an increasing or decreasing trend is not present, an additional coefficient of variation test is used to test for stability, as proposed by Wiedemeier et al, 1999. For additional information, refer to the Interim Guidance on Natural Attenuation for Petroleum Releases, dated October 1999. Refer to the guidance for recommendations on data entry for non-detect values.

Site Name : Onalaska Landfill | BRRTS No. = | Well Number = MW-17S

| | Compound -> | Benzene Concentration (leave blank if no data) | Toluene Concentration (leave blank if no data) | Ethylbenzene Concentration (leave blank if no data) | Total Xylenes Concentration (leave blank if no data) | Total TMB Concentration (leave blank if no data) | MTBE Concentration (leave blank if no data) |
|---|---|---|---|---|---|---|---|
| Event Number | Sampling Date (most recent last) | | | | | | |
| 1 | 23-Mar-06 | | | | | 257.00 | |
| 2 | 9-Jun-06 | | | | | 218.00 | |
| 3 | 7-Sep-06 | | | | | 950.00 | |
| 4 | 11-Dec-06 | | | | | 69.70 | |
| 5 | 23-Mar-07 | | | | | 229.00 | |
| 6 | 21-Jun-07 | | | | | 1,650.00 | |
| 7 | 11-Sep-07 | | | | | 538.00 | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| | Mann Kendall Statistic (S) = | 0.0 | 0.0 | 0.0 | 0.0 | 5.0 | 0.0 |
| | Number of Rounds (n) = | 0 | 0 | 0 | 0 | 7 | 0 |
| | Average = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 558.81 | #DIV/0! |
| | Standard Deviation = | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 562.643 | #DIV/0! |
| | Coefficient of Variation(CV)= | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | 1.007 | #DIV/0! |
| Error Check, Blank if No Errors Detected | | n<4 | n<4 | n<4 | n<4 | | n<4 |
| Trend ≥ 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Trend ≥ 90% Confidence Level | | n<4 | n<4 | n<4 | n<4 | No Trend | n<4 |
| Stability Test, If No Trend Exists at | | n<4 | n<4 | n<4 | n<4 | **CV > 1** | n<4 |
| 80% Confidence Level | | n<4 | n<4 | n<4 | n<4 | **NON-STABLE** | n<4 |

Data Entry By = PJM | Date = 7-Nov-07 | Checked By = CBC