PERIODIC REVIEW

Olympic View Sanitary Landfill
Facility Site ID#: 79649975

10015 SW Barney White Road
Port Orchard, WA 98367

Northwest Region Office

SOLID WASTE MANAGEMENT PROGRAM

November 2021

1.0 INTRODUCTION

Waste Management of Washington, Inc. (WMW) is the owner and operator of the Olympic View Sanitary Landfill (OVSL) site (Site), located at 10015 SW Barney White Road in Port Orchard, Washington. Kitsap Public Health Department (KPHD) issues a Solid Waste Landfill Post-Closure Permit to OVSL in accordance with Washington Administrative Code (WAC) 173-351 (Criteria for Municipal Solid Waste (MSW) Landfills) and Kitsap County Board of Health Ordinance 2010-1, as amended.

WMW entered into Agreed Order No. DE 00SWFAPNR-1729 with the Washington Department of Ecology (Ecology) on January 31, 2000, to address the release of certain products of solid waste decomposition into the environment in accordance with the Model Toxics Control Act (MTCA) regulations in WAC 173-340. This agreed order required WMW to prepare a Remedial Investigation (RI) and Feasibility Study (FS) pursuant to MTCA for the Site. WMW completed interim actions to improve the landfill containment system and completed the RI/FS in October 2010.

WMW entered into Agreed Order No. DE 8462 with Ecology on June 9, 2011. This agreed order requires WMW to implement the Cleanup Action Plan (CAP) (Ecology, 2010). The CAP:

- Addresses contamination in groundwater.
- States that surface water impacts were not observed and that landfill gas concentrations were compliant with the solid waste regulations.
- Establishes groundwater cleanup levels for ten indicator hazardous substances.
- Identifies the conditional point of compliance for groundwater as 150 meters (492 feet) from the landfill boundary (consistent with the relevant point of compliance defined in the solid waste regulations).
- Identifies compliance groundwater wells.
- Describes the interim actions performed and actions planned to improve the landfill containment system.
- Requires that WMW implement a monitored natural attenuation program for groundwater.
- Recognizes that institutional controls and financial assurance are required under the solid waste regulations.

WAC 173-340-420(2) requires that Ecology (also referred to as "the department") conduct a periodic review of a site every five years under the following conditions:

(a) Whenever the department conducts a cleanup action;
(b) Whenever the department approves a cleanup action under an order, agreed order, or consent decree;
(c) Or, as resources permit, whenever the department issues a no further action opinion;
(d) And one of the following conditions exists:

1. Where an institutional control and/or financial assurance is required as part of the cleanup action;
2. Where the cleanup level is based on a practical quantitation limit; or
3. Where, in the department's judgment, modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the Site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

When evaluating whether human health and the environment are being protected, factors the department shall consider include [WAC 173-340-420(4)]:

(a) The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the Site;
(b) New scientific information for individual hazardous substances or mixtures present at the Site;
(c) New applicable state and federal laws for hazardous substances present at the Site;
(d) Current and projected Site and resource use;
(e) Availability and practicability of more permanent remedies; and
(f) The availability of improved analytical techniques to evaluate compliance with cleanup levels.

The Department shall publish a notice of all periodic reviews in the Site Register and provide an opportunity for public comment.

2.0 SUMMARY OF SITE CONDITIONS

Engineering Managements Support, Inc. (EMSI, 2021) prepared a Five Year Review Evaluation for OVSL on behalf of WMW. This periodic review references figures and tables from the EMSI (2021) report, which are provided in Appendices 6.1 and 6.2, respectively.

2.1 Site Description and History

The OVSL site is located at 10015 SW Barney White Road in Port Orchard, Washington, within the Olympic View Industrial Park Complex. WMW owns eleven adjoining parcels totaling 454.15 acres, and the approximate 65-acre MSW landfill is located on three of those parcels. OVSL accepted MSW between 1963 and 2002. The landfill consists of three adjoining areas (Appendix 6.1, Figure 2):

- The approximate 20-acre Old Barney White Landfill (OBWL) lies in the southwest portion of the facility. OBWL was constructed before the implementation of WAC 173-301 (the state's first solid waste regulation) in 1972 and closed before its repeal in 1985. OBWL has no bottom liner, but was completed with a final cover system in 1993 that was compliant with WAC 173-304 (Minimum Functional Standards for Solid Waste Handling).
- The approximate 25-acre Phase I Landfill area, located adjacent to the east side of the OBWL, consists of:
    - Phase I Stage A has a bottom liner that was not constructed to meet bottom liner requirements in WAC 173-304 because the area was already constructed and filled before these requirements were implemented on November 27, 1985.
    - Phase I Stage B and Phase I Stage C were designed and constructed with a bottom liner system that met the requirements of WAC 173-304-460.
- The approximate 20-acre Phase II Landfill area, located adjacent to the north side of Phase I, includes a bottom liner system designed and constructed to meet the requirements of WAC 173-351 (Criteria for MSW Landfills).

Concurrent with the closure of the disposal areas at the Site in 2002, WMW constructed a solid waste transfer station near the landfill to allow for continued service for south Kitsap County residents. The current land uses around the Site include industrial activities (e.g., the waste transfer station) to the north and east, recreational uses to the south, and residential uses to the west.

Existing source control and containment systems include:

- Geomembrane cap over the Phase I and II landfill cells and OBWL to reduce precipitation infiltration and resulting leachate generation.

- Stormwater runoff diversion and control structures to reduce precipitation infiltration and leachate generation.
- Geomembrane liner beneath Phases I and II (excluding Phase I, Stage A) to contain leachate.
- Leachate collection system from the Phase I and II Landfill cells.
- OBWL toe drain leachate collection system.
- Leachate treatment and disposal system.
- Landfill gas extraction and treatment system for Phase I, Phase II, and OBWL.

The OVSL Site is located on a hillside that slopes westward along the flank of the Southern Upland to the Union River Valley. The highest elevation on the Site is approximately 300 feet above mean sea level (MSL), near the eastern boundary. Ground surface elevation in the Union River Valley adjacent to the west of the Site is about 140 feet MSL (Parametrix, 2007).

Surface water generally flows from the upland areas east of the Site towards the Union River to the west. The landfill boundary is about 1500 feet from the Union River at the closest point. The East Fork of the Union River passes close to or through a corner of the site to the northwest. Tributary No. 512 to the Union River is located near the southern Site boundary and extends from the southeast corner of the Site about 4,000 feet towards the southwest corner of the Site. Wetlands located on the western portion of the Site receive surface water runoff and discharge from seeps and springs (Parametrix, 2007).

The subsurface at the Site is dominated by poorly graded to well graded sands and gravels associated with coarse-grained Vashon recessional and advance outwash deposits and intervening lenses of silty sands, silts and clays associated with Vashon recessional lacustrine deposits. The outwash deposits and the interbedded recessional lacustrine deposits overlay thick deposits of silts and clays associated with the Vashon advance lacustrine deposits.

Groundwater is present in all of the units beneath the Site, with the primary groundwater system composed of the Vashon recessional and advance outwash deposits. These two units have been shown to act as one continuous unconfined aquifer extending from the water table to the underlying fine-grained deposits of the Vashon advance lacustrine deposits. The groundwater flow direction of the regional aquifer is generally to the west or west northwest, extending from the highland areas along the eastern and southeastern portions of the Site to the wetlands and Union River valley to the west and west-northwest of the Site.

The regional aquifer is a water supply source for multiple residences in the vicinity of the OVSL. A water well inventory was completed as part of the Remedial Investigation and served as the basis for development and implementation of a water supply well sampling program. Evaluation of the water quality data from these sampling events indicated that none of these wells have been impacted by the landfill.

2.2 Site Investigations

The CAP reports that groundwater downgradient of the landfill contained volatile organic compounds, trace metals, and general water quality parameters at concentrations above state standards or risk-based levels. The extent of groundwater contamination was primarily coincident with areas located immediately downgradient of the landfill within the property boundary.

The CAP reported that:

- No domestic wells were impacted by the site.
- Contaminants were not detected in surface water samples collected from the site. The surface water quality of the receiving water downgradient and downstream of the landfill was consistent with background conditions.
- Landfill gas, specifically methane and carbon dioxide, have historically been detected in monitoring probes outside the landfill area. Landfill gas concentrations were below the methane migration standards in WAC 173-351-200(4). Methane is not regulated under MTCA.

2.3 Cleanup Actions

The CAP selected cleanup Alternative 2 (Landfill Gas Collection System Upgrades), which includes:

Landfill Post-Closure Care Activities

KPHD permits WMW to perform post-closure care at OVSL in accordance with WAC 173-351 and Kitsap County Board of Health Ordinance 2010-1. Post-closure care includes continued operation and maintenance of the existing landfill source control and containment systems and environmental monitoring programs.

Specific post-closure care activities and requirements are detailed in the OVSL Post Closure Operations & Maintenance Plan which is currently under review by Ecology and KPHD (Vikek, 2020) and Solid Waste Landfill Post Closure Permit for the Olympic View Sanitary Landfill (KPHD, 2021a). The ongoing operations, maintenance, and monitoring activities include:

- Inspection and maintenance of the landfill cover.
- Control of weeds and intrusive vegetation to eliminate the potential for root penetration into and resultant damage to the cover.
- Inspection and maintenance of stormwater runoff and control structures.
- Extraction and collection of leachate from the collection system associated with the Phase I and II landfills and from the OBWL toe drain system.
- Storage and treatment of collected leachate in the double-lined leachate collection pond.

- Disposal of leachate through a publicly-owned treatment works under State Waste Discharge Permit No. 7271.
- Inspection, maintenance, and repair of the leachate collection system pumps, piping, transfer, and truck load-out pumps and the leachate pond liner and cover.
- Inspection, operation, and maintenance of the landfill gas vacuum blowers, landfill gas extraction wells, and lateral and header piping to extract and collect landfill gas from the Phase I and II cells and from OBWL.
- Destruction of the landfill gas in the flare pursuant to the conditions of Order of Approval No. 6954, issued by Puget Sound Clean Air Agency.
- Operation of the landfill gas condensate traps to collect condensate and disposal of the condensate in conjunction with leachate disposal.
- Inspection and maintenance of the perimeter fencing to limit trespass potential.
- Inspection and maintenance of existing berms and, if necessary, construction of additional berms across roads or trails to limit trespass potential.
- Inspection, repair, and maintenance of the environmental monitoring points and systems.

WMW is required to perform post-closure care until the landfill becomes functionally stable for leachate, landfill gas, landfill settlement and cover integrity, and groundwater quality in accordance with WAC 173-351-500(2)(b)(iii). WMW is required to maintain financial assurance for post-closure care in accordance with WAC 173-351-600.

Improvements to Leachate, Gas, and Stormwater Management Systems

The cleanup action included the following improvements/enhancements and repairs to reduce potential leachate generation, increase leachate capture, optimize gas collection, and further reduce the potential for migration of landfill gas from the landfill.

The following improvements were implemented between 2011 and 2015:

- Repair/modification of the landfill cover system along the landfill toe to reduce potential for stormwater infiltration and resultant leachate generation, and to reduce potential for atmospheric air intrusion and resultant increased oxygen levels and loss of vacuum applied by the landfill gas system.
- Inspection and repair of penetrations to cover system to reduce potential for atmospheric air intrusion and resultant increased oxygen levels and loss of vacuum applied by the landfill gas system.
- Repair/replacement of landfill gas extraction wells containing blockages that restrict gas extraction and flow.
- Repair/replacement of landfill gas extraction system conveyance piping as needed to eliminate blockages that restrict gas extraction and flow.
- Repair/replacement of condensate collection equipment as needed to reduce condensate accumulation in the piping that causes blockages, thereby restricting gas extraction and flow.
- Maintenance/repair of landfill gas system vacuum blowers to optimize gas extraction and flow.

- A program of optimization of the landfill gas collection system (well field balancing) to ensure that all portions of the landfill are subject to vacuum thereby minimizing the potential for gas migration from the landfill.
- Increased inspection, maintenance, and adjustment of the leachate collection system pumps to ensure optimum performance of the leachate extraction system.
- Repair and improvement of the perimeter stormwater drainage diversion and control system to minimize the potential for stormwater infiltration into the landfill and resultant leachate generation.

The following improvements, not required by the CAP, were completed between 2016 and 2020:

- Replacement of brittle leachate pipe riser on west perimeter road where a leachate release occurred at LR-3 on August 20, 2019 (ERTS 692481) (WMW, 2019; SCS Engineers, 2019).
- Replacement of leachate pond leakage collection system pump.

WMW is evaluating potential alternatives to address the north slope of the leachate pond to comply with earthquake standards that are applicable for surface impoundments with a capacity greater than 10 acre-feet of water (WAC 173-350-330(12)). Alternatives include:

- Design of smaller leachate pond and decommissioning of the existing leachate pond.
- Construction of a mechanically stabilized earth wall outside of the wetlands.
- Regrading of the north slope and construction and maintenance of replacement wetlands.

This analysis is expected to be completed in 2022.

Additional Landfill Gas Extraction Wells

The cleanup action required that additional landfill gas extraction wells be installed, primarily within OBWL, to reduce the amount of gas that may be contributing to groundwater contamination beneath and subsequently downgradient of OBWL and to reduce the potential for lateral gas migration. In 2011, six additional landfill gas extraction wells were installed in OBWL and connected to the landfill gas collection system. Evaluation of the assumed radius of influence for the landfill gas extraction wells indicated that the additional six landfill gas extraction wells combined with the existing 14 wells in OBWL provided adequate coverage (SCS, 2011).

Twenty-three of the landfill gas wells were taken off-line in the last 5 years due to low or no methane production. None of the landfill gas wells were abandoned (EMSI, 2021).

Natural Attenuation

In addition to the source control measures described above, the selected cleanup alternative relies upon natural attenuation processes to achieve Site cleanup levels. Over time, natural attenuation reduces the concentrations of chemicals introduced into the environment using natural biological and chemical processes. Natural attenuation is monitored as described in the next subsection.

Environmental Monitoring Program

The CAP includes the implementation of the Environmental Monitoring Plan (EMP) (EMSI, 2009). The EMP was prepared before the completion of the Feasibility Study (June 2010) and the CAP (December 2010), and it addresses both MTCA and solid waste regulation requirements. Groundwater monitoring is required under both MTCA and WAC 173-351. Landfill gas, leachate, and stormwater sampling are not required under MTCA. The EMP includes a Sampling and Analysis Plan (SAP) as an appendix, which satisfies WAC 173-340-820 (Sampling and Analysis Plans) and WAC 173-351-410 (Groundwater Sampling and Analysis Requirements). Solid waste regulation WAC 173-351-410 addresses all aspects of MTCA regulation WAC 173-340-820. Additionally, solid waste regulation WAC 173-351-440 (Assessment Monitoring Program) addresses all aspects for monitored natural attenuation.

The SAP is continually updated under the landfill permit:

- The SAP was updated to comply with the 2012 update of WAC 173-351, which requires the analysis of total metals[1] (SCS, 2013).
- The SAP (Revision 1.1) was updated to address Ecology's 2016/2017 Periodic Review and Ecology's onsite building monitoring and landfill gas monitoring procedures (SCS, 2017).
- The SAP (Revision 1.2) was updated based on statistically significant decreasing trends in contaminant concentrations (SCS, 2019). Ecology approved the following changes on a two-year trial basis:
    - Reduced sampling frequency of compliance and downgradient wells from quarterly to semi-annually based the statistically significant decreasing trends in contamination.
    - Collection of field parameters only from upgradient wells during one of the semi-annual sampling events;
- As discussed in Section 2.4, KPHD and Ecology (July 15, 2021) recommended that WMW revise the SAP to adopt the natural background concentrations of arsenic, iron, and manganese and the upgradient background concentration of ammonia as the groundwater quality standards in accordance with WAC 173-200-050(b)(ii). The agency letters are provided in Appendix 6.3. WMW revised SAP (Revision 1.3) to incorporate the recommended background concentrations as groundwater quality standards (SCS, 2021).

Institutional Controls

The CAP requires the following institutional controls:

- Signage to identify the presence of the landfill.
- Access restrictions – locked gates, berms.

[1] This document reports total concentrations of arsenic, iron, and manganese.

- Restricted use of the landfill surface.
- Deed notification regarding the presence of the landfill.
- Financial assurance for post-closure operation and maintenance costs.
- Existing regulatory prohibitions on installing water supply wells within 1,000 feet of waste management unit boundaries of a solid waste landfill.

These institutional controls are required under WAC 173-351 and the landfill permit, except the water well prohibition. WAC 173-160-171(3)(b)(vi) requires that water wells be set back a minimum of 1,000 feet from the property boundary of solid waste landfills. The CAP recognizes that the institutional control requirements under the solid waste regulations and does not require an environmental covenant under MTCA.

2.4 Evaluation of Natural Background Concentrations

The Remedial Investigation/Feasibility Study Executive Summary (October 2010) states that background concentrations of arsenic, iron, manganese, and ammonia were evaluated in the 2008 Annual Monitoring Report for the landfill. Background prediction limits were calculated based on the 99% upper confidence limit (UCL) of sampling results from monitoring wells MW-13, MW-13A, MW-13B, and MW-35 between 2005 and 2008. These wells are located east and upgradient of the landfill[2]. The calculated background concentrations were:

- 0.462 µg/L arsenic
- 230 µg/L iron
- 31 µg/L manganese
- 190 µg/L nitrate

Ecology recommended that WMW evaluate natural background metal concentrations in regional groundwater during the MTCA periodic review process. WMW contracted JMO Consulting to evaluate background concentrations, who coordinated with Ecology and KPHD during the evaluation. JMO Consulting submitted two technical memoranda describing the background evaluation:

- Statistical Derivation of Background Metal Concentrations – Olympic View Sanitary Landfill, Kitsap County, Washington (JMO Consulting, May 20, 2021).
- Development of Background Metals Concentrations – Olympic View Sanitary Landfill, Kitsap County, Washington (JMO Consulting, March 25, 2021) (included as Attachment 1 of the May 20, 2021 technical memorandum).

JMO Consulting calculated natural background concentrations for arsenic, iron, and manganese in groundwater based on the 95% UCL with 95% coverage. The calculated natural background concentrations are:

[2] See Figure 5 (Groundwater Monitoring Well Network), Five Year Review Evaluation Olympic View Sanitary Landfill, Engineering Management Support, Inc., June 9, 2021.

- 4.27 µg/L arsenic
- 1,900 µg/L iron
- 730 µg/L manganese

The calculated natural background concentration of arsenic is less than 10 µg/L maximum contaminant level for drinking water and less than the 5 µg/L MTCA Method A cleanup level, which is based on a regulatory accepted background concentration. The calculated natural background concentrations of iron and manganese are less than the 11,000 µg/L Method B cleanup level for iron and the 750 µg/L MTCA Method B cleanup level for manganese, which are based on toxicological risk.

KPHD and Ecology recommended that WMW revise the SAP, required under the landfill permit, and adopt the natural background concentrations of arsenic, iron, and manganese and the upgradient background concentration of ammonia as the groundwater quality standards in accordance with WAC 173-200-050(b)(ii). The agency letters are provided in Appendix 6.3. The SAP, Revision 1.4, adopts the background concentrations as groundwater quality standards (SCS, 2021).

2.5 Indicator Hazardous Substances, Cleanup Levels, Point of Compliance

The CAP identifies the indicator hazardous substances, groundwater cleanup levels, and conditional points of compliance for groundwater. The upgradient background concentrations of arsenic and ammonia were applied as groundwater cleanup levels, as allowed under WAC 173-340-720(7)(c). The indicator hazardous substances and groundwater cleanup levels are defined in Table 3 of the CAP, which are summarized in Table 2.1 below:

Table 2.1: Groundwater Cleanup Levels for Indicator Hazardous Substances

Indicator Hazardous Substance	Groundwater Cleanup Level (µg/L)
Volatile organic compounds	
Trichloroethylene	1
cis-1,2-Dichloroethylene	35
Vinyl chloride	0.2
1,1-Dichloroethane	50
1,4-Dichlorobenzene	2
Ethyl ether	50
Naturally occurring metals	
Arsenic	0.462
Iron	300
Manganese	50
Conventional parameters	
Ammonia	190

The groundwater point of compliance under MTCA is defined in WAC 173-340-720(8):

> Point of compliance. Point or points where the groundwater cleanup levels must be attained for a site to be in compliance with the cleanup standards.
>
> Standard point of compliance. Shall be established throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the site.
>
> Conditional point of compliance. Shall be as close as practicable to the source of hazardous substances and within the property, when it is not practicable to meet the cleanup level throughout the site within a reasonable restoration timeframe.

The groundwater point of compliance is alternately defined in WAC 173-351-300(6) for MSW landfills.

> Relevant point of compliance. No more than 150 meters (492 feet) from the waste management unit boundary and within land owned by the owner of the landfill.

KPHD approved the relevant point of compliance for OVSL during the permitting process based on factors required in WAC 173-351-300(6).

The CAP specifies a conditional point of compliance that is consistent with the relevant point of compliance defined in the solid waste regulations. The CAP specifies the conditional point of compliance to be 150 meters (492 feet) from the landfill, and that it will be monitored by groundwater monitoring wells MW-15R, M-34A, MW-34C, MW-39, MW-42, and MW-43.

The landfill permit requires that WMW perform post-closure care until the landfill is functionally stable. One functional stability criterion is that groundwater quality must remain in compliance with the groundwater quality standards established under WAC 173-200 (Water Quality Standards for Groundwaters of the State of Washington) at the relevant point of compliance (WAC 173-351-500(2)(b)(iii)(D)).

2.6 Environmental Covenant

OVSL should be subject to environmental covenants associated with landfill closure and post-closure care under WAC 173-351, and corrective action under MTCA. Table 2.2 shows the WMW-owned parcels[3] and identifies the environmental covenants recorded on the parcels.

[3] Kitsap County parcels identified by https://psearch.kitsapgov.com/psearch/ on August 6, 2021.

Table 2.2: OVSL Parcels and Environmental Covenant Checklist						
Owner	Kitsap County Parcel No.	Acreage (acres)	Description	Landfill Closure Covenant	Landfill Post-Closure Covenant	MTCA Covenant
WMW	102301-1-003-1003	27.34	OBWL, leachate pond	–	–	Yes
WMW	102301-1-004-1002	41.40	Phase I and II landfills	–	Yes	Yes
WMW	102301-1-001-1005	41.38	Phase II landfill	–	Yes	Yes
WMW	102301-4-001-1009	37.76	South of Phase I landfill	–	–	Yes
WMW	102301-4-002-1008	20.40	South of OBWL	–	–	Yes
WMW	102301-3-001-1001	141.19	Southwest of OBWL	–	–	Yes
WMW	102301-2-028-1002	40.40	Leachate pond and west	–	Yes	Yes
WMW	102301-1-005-1001	14.08	North of OBWL	–	Yes	Yes
WMW	102301-1-002-1004	41.40	North of OBWL	–	–	Yes
WMW	032301-4-009-1000	38.43	North of Phase II landfill	–	–	–
WMW	022301-3-003-1009	10.37	Northeast of Phase II landfill	–	–	–
NA	192501-1-009-2004	NA	Non-existent parcel	–	–	Yes
WMW	Total	454.15				

Landfill Closure

WMW is required to provide an environmental covenant for the closed MSW landfill under WAC 173-351-500(1)(h). Ecology did not identify an environmental covenant associated with closure of the landfill in 2004, which should prohibit uses that (WAC 173-351-500(1)(h)(iv)):

A. Threatens the integrity of any cover, waste containment, stormwater control, gas, leachate, public access control, or environmental monitoring systems;
B. May interfere with the operation and maintenance, monitoring, or other measures necessary to assure the integrity of the MSW landfill unit and continued protection of human health and the environment; and
C. May result in the release of solid waste constituents or otherwise exacerbate exposures.

The MTCA environmental covenant includes these restrictions in Section 2 of that covenant, as described below.

Landfill Post-Closure Care

WAC 173-351 was updated in 2012 to include functional stability criteria for leachate, landfill gas, landfill settlement and cover integrity, and groundwater quality for ending post-closure care. KPHD should consider the functional stability criteria when decreasing or increasing the post-closure care period of the permitted landfill. Groundwater quality must be compliant with groundwater quality standards at the relevant point compliance (i.e., 150 meters or 492 feet from the landfill boundary). Landfill owners and operators were required to update their post-closure plans or environmental covenants prepared in accordance with WAC 173-351(1)(iv) to include functional stability criteria in WAC 173-351-500(2)(b)(iii) by November 1, 2013.

WMW recorded a covenant on four parcels on September 6, 2011 (provided in Appendix 6.4), which restricts the property in accordance with WAC 173-351-500(2)(b)(iii)[4] (i.e., functional stability criteria) and subjects the property to 40 CFR 61, Subpart M (National Emission Standard for Asbestos). The parcels with covenants include the Phase I and II landfills, and the two parcels that adjoin the OBWL to the north and west. The covenant was not recorded on the parcel that contains OBWL, which closed prior to the implementation of WAC 173-304. This covenant states that WMW intends to control future site access and use of the property, but does not reference prohibited uses in WAC 173-351-500(1)(h)(iv).

Corrective Action

WMW prepared a Restrictive (Environmental) Covenant on April 18, 2011, which was signed by WMW on April 25, 2011, and by Ecology on June 11, 2011. This covenant is provided in Appendix 6.5. The covenant was prepared in accordance with MTCA and the Uniform Environmental Covenants Acts. The MTCA covenant was recorded on the three landfill parcels and all hydraulically-downgradient parcels to the west and south of the landfill. The covenant was not recorded on the two WMW-owned parcels north and east of the landfill. The stated basis of the covenant is:

- The concentrations of vinyl chloride, trichloroethylene, arsenic, iron, manganese, and ammonia exceed MTCA Method B cleanup levels for groundwater [consistent with WAC 173-340-440(4)(a)].
- A conditional point of compliance was established for groundwater [consistent with WAC 173-340-440(4)(e)].

The environmental covenant has the following restrictions:

Section 1.

1. No groundwater may be taken from the Property for drinking, cooking, or personal washing. The use of groundwater for other purposes must be approved in writing by Ecology.[5]
2. Any activity on the Property that may result in the release or exposure to the environment of the waste contained in the landfill, or create a new exposure pathway, is prohibited. Some examples of activities that are prohibited in the capped areas include: drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, piercing the surface with a rod, spike or similar item, bulldozing or earthwork, unless such activities are conducted in accordance with the landfill Operations and Maintenance Plan approved by Ecology or prior written approval of the activity has been obtained from Ecology.[6]

[4] The environmental covenant incorrectly references WAC 173-351-500(2)(c)(iii) instead of WAC 173-351-500(2)(b)(iii).
[5] Ecology approved WMW's proposed use of MW1 as a production well on the OVSL property on August 8, 2011 (see Appendix 6.5). The approved uses includes washing pads (flare, etc.), maintenance of leachate pond floating cover, and toilet flushing in site trailer.
[6] Restriction is consistent with landfill closure environmental covenant requirement in WAC 173-351-500(1)(h)(vi).

Section 2. Any activity on the Property that may interfere with the integrity of the Remedial Action and continued protection of human health and the environment is prohibited.[7]

Section 3. Any activity on the Property that may result in the release or exposure to the environment of a hazardous substance that remains on the Property as part of the Remedial Action, or create a new exposure pathway, is prohibited without prior written approval from Ecology.[8]

Section 4. The Owner of the property must give thirty (30) days advance written notice to Ecology of the Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 5. The Owner must restrict leases to uses and activities consistent with the Covenant and notify all lessees of the restrictions on the use of the Property.

Section 6. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Covenant. Ecology may approve any inconsistent use only after public notice and comment.

Section 7. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect remedial actions conducted at the property, to determine compliance with this Covenant, and to inspect records that are related to the Remedial Action.

Section 8. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs.

2.7 Financial Assurance

WMW is required to provide financial assurance for landfill post-closure care under WAC 173-351-600(3). No additional financial assurance is required for corrective action under WAC 173-351-600(4) or WAC 173-340-440(11).

[7] Restriction is consistent with landfill closure environmental covenant requirement in WAC 173-351-500(1)(h)(vi).
[8] Restriction is consistent with landfill closure environmental covenant requirement in WAC 173-351-500(1)(h)(vi).

3.0 PERIODIC REVIEW

3.1 Effectiveness of landfill containment system

The landfill containment system includes:

- Landfill cover and stormwater collection and conveyance system.
- Leachate collection, treatment, and disposal.
- Landfill gas extraction.
- Groundwater detection and assessment monitoring.

The landfill containment system is operated in accordance with solid waste and air permitting requirements, and is not subject to the CAP. The landfill permit and the landfill post-closure care environmental covenant require that WMW maintain and operate these systems until the landfill achieves function stability criteria[9] for:

- Settlement and cover integrity – Landfill covers should have uniform slope between 2 and 33 percent and generally maintain design slopes, show no evidence of differential settlement, have a settlement trend curve that approaches zero slope, and exhibit uniform settlement of less than ½-inch over a two-year period.
- Leachate – Landfill units subject to WAC 173-351 are required to have a leachate collection system capable of maintaining less than 1-foot of head on the bottom liner[10]. The covered leachate pond at OVSL should capture no more water than is attributed to precipitation or than can be evaporated, and the facility should not be subject to a leachate discharge permit.
- Landfill gas – The concentrations of landfill gas show a significantly steady or declining trend, methane concentrations are below explosive gas control criteria[11], including landfill gas vents, for at least eight consecutive quarters, and the concentrations of non-methane volatile organic compounds are below the regulatory limit of the air permitting authority (Puget Sound Clean Air Agency).
- Groundwater quality – Should comply with groundwater quality standards in WAC 173-200 for a minimum of eight consecutive quarters.

Landfill Cover and Stormwater Collection and Conveyance System

WMW maintains the landfill cover by implementing weed control measures in the spring and mowing in the early to mid-summer. WMW inspects the landfill cover at least quarterly and

[9] Functional stability requirements are defined in WAC 173-351-500(2)(b)(iii). Ecology provided specific criteria for ending post-closure care at landfills regulated under WAC 173-304 in Ecology Publication No. 11-07-006 (February 2011) and its Addendum (January 2013).
[10] WAC 173-351-300(2)(a).
[11] WAC 173-351-200(4) requires that the concentrations of methane not exceed 1.25 percent in facility structures other than gas recovery and control systems, not exceed 5 percent at the landfill property boundary, and not exceed 100 parts per million by volume (ppmV) in offsite structures.

within one week following a major storm, which is defined to be greater than 2 inches of rain in 24 hours. Any minor issues identified during such inspections are repaired immediately. More significant repairs, if needed, are performed by a contractor retained by WMW and the results of such activities are reported to Ecology and KPHD. Stormwater collection and conveyance features are inspected annually, and any necessary repairs are performed by a contractor and reported to Ecology and KPHD.

WMW reports that the landfill cover and stormwater collection and conveyance structures, in conjunction with ongoing maintenance, evaluation, and repair, are effective at limiting the amount of infiltration that could otherwise contribute to leachate generation within the landfill. Ecology, KPHD, and WMW visited the landfill on May 18, 2021, and Ecology completed the site inspection checklist provided in Appendix 6.6. The landfill cover appears to be in satisfactory condition.

Leachate Collection, Treatment, and Disposal

Leachate is collected from the lined portion of the landfill and pumped from leachate risers through a force main to the leachate pond. Leachate is also collected along the toe of OBWL via gravity flow to a sump, where leachate is pumped to the leachate pond. The majority of leachate flow occurs through the force main with very little flow from the OBWL toe drain.

The overall rate of leachate production declined from a high of nearly 3,000,000 gallons in 2008 to a low of 592,000 gallons in 2020. The declining leachate production rate demonstrates that the landfill cover improvements have been effective in reducing the amount of leachate generation.

The collected leachate is treated by aeration in the leachate pond and then shipped for disposal at the Port Orchard publicly-owned treatment works. During the period from 2016 through 2020, WMW disposed of 6,038,010 gallons of leachate, including:

- 1,818,010 gallons in 2016,
- 1,506,000 gallons in 2017,
- 1,080,000 gallons in 2018,
- 788,000 gallons in 2019, and
- 846,000 gallons in 2020.

KPHD regulates the leachate pond under the landfill permit, in accordance with WAC 173-350-330 (Surface Impoundments and Tanks).

The leachate pond was constructed with a double liner with an intervening leak detection layer. A floating cover was added to the leachate pond in 2008 to prevent precipitation that directly falls on the leachate pond from adding to the amount of leachate that needs to be managed.

Operation of the leachate pond includes removal of accumulated stormwater from the surface of the floating cover and removal of leachate from the pond itself to maintain sufficient freeboard

so that the pond does not overflow. Leachate removed from the pond is pumped into tanker trucks and hauled to the West Sound Utility District, South Kitsap Water Reclamation Facility. Maintenance and monitoring of the leachate pond consists of inspection and removal of debris (e.g., leaves, twigs, pine needles, windblown dust, etc.) from the surface of the floating cover and washing the cover once per year. Monitoring consists of checking the leak detection system for fluid accumulation weekly and collection of samples quarterly if and when fluid is found to be present. In late 2012, the configuration of the leak detection system was modified to eliminate the potential for measurement of combined liquid and air in order to provide more accurate estimates of the total liquid volume produced by the leak detection system. Since that time, the total volumes of liquid removed from the leak detection system have been relatively constant, ranging from:

- 2,863 gallons in 2013,
- 2,230 gallons in 2014,
- 2,975 gallons in 2015,
- 1,837 gallons in 2016,
- 1,340 gallons in 2017,
- 4,900 gallons in 2018,
- 790 gallons in 2019, and
- 1,098 gallons in 2020.

The leakage rate ranged from 2.2 gallons per day in 2019 to 13.4 gallons per day in 2018.

Landfill Gas Extraction

WMW collects landfill gas from the Phase I and II landfill areas and from the OBWL. Puget Sound Clean Air Agency regulates the landfill gas emissions under Notice of Construction (NOC) No. 10159. This NOC states that landfill emissions were below the 50 megagram per year threshold at closure for regulation under 40 CFR 60, Subpart WWW. The NOC requires that WMW operate a landfill gas flare that destroys 98 percent of the non-methane volatile organic compounds, or reduce the concentration to less than 20 parts per million by volume.

The landfill gas emissions have decreased since landfill closure. WMW evaluated the landfill gas emissions in the 2018 Update of Functional Stability (Vista, 2019). WMW reported that the annual average landfill gas flow decreased from 1,416 standard cubic feet per minute (SCFM) in 2003, to 353 SCFM in 2011, to 257 SCFM in 2018. In the Five-Year Review Evaluation (EMSI, 2021), WMW reports the landfill gas flow decreased from approximately 350 SCFM in 2011 to approximately 200 SCFM in 2021. The declining landfill gas flow is expected due to the age of waste and a decrease in methanogenic activity as the landfill approaches a state of functional stability on the tail end of the gas curve. Increased vacuum was applied to the system in 2014 to determine if a higher level of gas production could be maintained. The vacuum was increased from approximately 12 to 20 inches of water. Although higher flow was realized initially, WMW determined the flow was not sustainable given the observed decrease in methane concentrations and increase in percentage of balance gases (i.e., carbon dioxide, nitrogen, oxygen). In the spring 2016, the vacuum was adjusted to 13 inches of water. In the winter, the vacuum is adjusted to 17 inches of water to account for the lower barometric pressures.

Landfill gas extraction was ceased at 23 gas extraction wells during the 2016–2020 period. These 23 wells were taken out of service due to no to low methane production. These wells remain in place, but are no longer part of the active landfill gas extraction system operation.

Overall, LFG collection at the site continues to result in positive effects observed in the perimeter gas monitoring probes. Historically, gas probe GP-15 (located west of the Phase II landfill area) had several detections of methane above the lower explosive limit (i.e., 5 percent methane by volume). From 2007 to 2009, methane concentrations in this probe typically ranged between 5 and 11 percent. Over the past 10 years, however, there have been no exceedances for methane in any gas probes on site (including GP-15). In 2020, the highest methane observed in GP-15 was 2.2 percent in August 2019. Methane gas was detected in this probe at 1.9 percent in June 2020 and 0.5 percent in September 2020 and was not detected at this location in either March or November 2020.

Continued operation and enhancement of the landfill gas collection system also resulted in improved groundwater quality, as discussed in the Groundwater Detection and Assessment Monitoring section below.

Groundwater Detection and Assessment Monitoring

WMW is required to perform groundwater monitoring under WAC 173-351 and under the Environmental Monitoring Plan (EMSI, 2009) referenced in the CAP. The Environmental Monitoring Program includes a Sampling and Analysis Plan (SAP), which is updated under the landfill permitting process (see Section 2.3). The SAP implements an assessment monitoring program, which is required under WAC 173-351-440 when groundwater impacts are identified during the detection monitoring program. The assessment monitoring program is used to evaluate the natural attenuation cleanup action specified in the CAP. The assessment monitoring program is required until the groundwater contamination levels are below the groundwater protection standards at the relevant point of compliance.

The groundwater monitoring network includes:

- Compliance monitoring wells – The CAP designates six monitoring wells as compliance wells at the landfill relevant point of compliance and the MTCA conditional point of compliance, which are 150 meters or 492 feet from the landfill boundary. The compliance wells are MW-15R, MW-34A, MW-34C, MW-39, MW-42, and MW-43.
- Performance monitoring wells – Performance wells are located within the landfill relevant point of compliance (identical to the MTCA conditional point of compliance). Monitoring well MW-19C is the only performance well, and is located between the OBWL and the leachate surface impoundment.
- Downgradient monitoring wells – Monitoring wells MW-29A, MW-32, MW-33A, MW-33C, and MW-36A are located downgradient of the relevant point of compliance.
- Upgradient monitoring wells – Upgradient wells MW-13A, MW-13B, MW-16, and MW-35 are located upgradient of the landfill.

Appendix 6.1, Figure 5 shows the groundwater monitoring network well locations. Appendix 6.7 provides the compliance and downgradient monitoring well logs. WMW abandoned the following monitoring wells in 2018 and 2019 with regulatory approval: MW-5, MW-13, MW-18, MW-19A, MW-19B, MW-19D, MW-23B, MW-23C, MW-26, MW-27, MW-28, MW-29B, MW-30B, MW-34B, MW-38, MW-40A, MW-40B, and MW-40C.

The natural attenuation of contamination is discussed in Section 3.2.

3.2 Effectiveness of natural attenuation

The selected cleanup alternative in the CAP relies on natural attenuation processes to achieve Site cleanup levels. WMW prepares Annual Monitoring Reports for OVSL under the landfill permit in accordance with WAC 173-351-415. The Annual Monitoring Reports are prepared for groundwater, leachate, and landfill gas monitoring. For groundwater, the Annual Monitoring Reports describe groundwater gradients, groundwater quality, the spatial distribution and temporal trends of contamination, geochemistry, statistical evaluations, and point of compliance and cleanup level exceedances. The effectiveness of natural attenuation is evaluated using data from the 2020 Annual Monitoring Report (SCS, 2021) and the Five Year Review Evaluation (EMSI, 2021).

Five-Year Compliance Summary

EMSI (2021) prepared tables (Appendix 6.2, Tables 3-1 to 3.5) that summarize annual statistical evaluations, trends, and cleanup level exceedances for the indicator hazardous substances in the compliance and downgradient monitoring wells for calendar years 2016 to 2020. The 95% UCLs were calculated using sampling data from the last three years (i.e., a three-year moving dataset) and the trend analyses were evaluated by Sen's Non-Parametric Test for Trend using sampling data since January 2005. EMSI evaluated the trend from January 2005 to December 2020 based on the implementation of engineering controls after 2005.

Trichloroethylene and vinyl chloride were the only volatile organic compound (VOC) indicator hazardous substances detected in the 2016–2021 period. Four indicator hazardous substances – cis-1,2-dichloroethlyene, 1,1-dichloroethane, 1,4-dichlorobenzene, and ethyl ether – were not detected during the 2016–2020 period. The detections of VOCs were limited to four wells located west of OBWL: performance well MW-19C, compliance wells MW-34C and MW-42, and downgradient well MW-32. Vinyl chloride was the only VOC to exceed the cleanup level, which occurs in downgradient well MW-32.

Ecology prepared Tables 3-1 to 3-12 in Appendix 6.8 from EMSI's tables/annual reports for the discussions below. Table 3-1 shows the concentrations of indicator hazardous substances from performance well MW-19C during the 2016–2020 period. Tables 3-2 to 3-12 show the 95% UCLs of indicator hazardous substances for the compliance and downgradient wells during the 2016–2020 period. The 95% UCLs are based on three years of data. The statistically significant trends were evaluated for compliance and downgradient wells by Sen's Non-Parametric Test for Trend using sampling data from January 2005 to December 2020. The non-detected indicator

hazardous substances – cis-1,2-dichloroethlyene, 1,1-dichloroethane, 1,4-dichlorobenzene, and ethyl ether – were omitted from Tables 3-1 to 3-12.

The 95% UCL represents a 95% confidence that the data distribution has a mean less than or equal to the UCL. Black bolded numbers in the tables indicate an exceedance of the cleanup levels: red bolded numbers indicate an exceedance of the cleanup level and the natural background concentrations.

Performance Well Summary:

Performance well MW-19C is located between OBWL and the leachate pond, and screened from 85 to 90 feet below ground surface (bgs). MW-19C is impacted by the release of leachate from the unlined OBWL. The concentrations of trichloroethylene ranged from 0.9 to 1.2 µg/L near the 1 µg/L cleanup level, while the concentrations of vinyl chloride were below the cleanup level. The concentrations of arsenic were below the natural background concentration, but the concentrations of manganese and ammonia exceeded natural background concentrations by an approximate factor of two. The concentrations of iron were below the cleanup level. The cleanup level exceedances are minor and steady, but MW-19C is interior of the landfill relevant point of compliance and the MTCA conditional point of compliance.

Compliance Well Summary:

Compliance well MW-39 is a shallow groundwater well screened from 15 to 25 feet bgs adjacent to wetlands northwest of the Phase II landfill area. No VOC indicator hazardous substances were detected during the 2016–2020 period; however, vinyl chloride was detected below the cleanup level in 2014. The 95% UCLs of arsenic and manganese exceeded the cleanup levels, but were below the natural background concentrations. The 95% UCLs of iron and ammonia exceeded the cleanup levels and natural background concentrations, and may be associated with natural reducing conditions near the wetlands. No statistically significant trends were noted during the 2005–2020 period.

Compliance well MW-15R is a shallow groundwater well screened from 23 to 33 feet bgs on the west side of the wetlands west of the Phase II landfill area. The 95% UCLs of all indicator hazardous substances were below the cleanup levels and natural background concentrations during the 2016–2020 period, and no VOC indicator hazardous substances were detected. Manganese showed a decreasing trend during the 2005–2020 period.

Compliance wells MW-34A and MW-34C are co-located on the west side of the wetlands west of the OBWL. MW-34A is screened from 28 to 48 feet bgs and MW-34C is screened from 83 to 98 feet bgs. The 95% UCLs were below the cleanup levels in shallow well MW-34A, except for arsenic, and no VOC indicator hazardous substances were detected. The 95% UCLs of arsenic were below the natural background concentration. No concentration trends were observed in shallow well MW-34A during the 2005–2020 period. Landfill impacts were observed in the deeper well MW-34C, where the 95% UCLs of vinyl chloride were below the cleanup level and decreasing. The 95% UCLs of arsenic, iron, and manganese exceeded natural background concentrations and cleanup levels, which is consistent with anaerobic reducing conditions

associated with the landfill release. The 95% UCLs of arsenic, iron, and manganese continued to decrease during the 2016–2020 period.

Compliance wells MW-42 and MW-43 are located on the northwest and southwest corners of the leachate surface impoundment, and are screened from approximately 25 to 30 feet bgs. The 95% UCLs of vinyl chloride were below the cleanup level and decreasing in MW-42, and were below the detection limits in MW-43. The 95% UCLs of arsenic were below the natural background concentration in both wells, but exceeded the cleanup level in MW-42. The 95% UCLs of iron, manganese, and ammonia exceeded the cleanup levels and natural background concentrations in MW-42, which is consistent with a leachate release, and showed a decreasing trend from 2016 to 2020. The 95% UCLs of iron increased above the natural background concentration in MW-43, while the 95% UCLs of arsenic, manganese, and ammonia showed decreasing trends from 2016 to 2020. Although an increasing trend was observed for arsenic in MW-42 during the 2005–2020 period, the 95% UCLs are below the natural background concentration.

Downgradient Well Summary:

Downgradient well MW-32 is a shallow well, screened from 15 to 21 feet bgs, located west and downgradient of compliance well MW-42, near Wetland C. The 95% UCL of vinyl chloride steadily decreased from 0.43 µg/L in 2016 to 0.32 µg/L in 2020, and is approaching the 0.2 µg/L cleanup level (0.23 ug/L of arsenic detected in November 2020). Additionally, a statistically significant decreasing trend of arsenic was observed during the 2005–2020 period. MW-32 was the only well beyond the relevant point of compliance (and conditional point of compliance) with a VOC cleanup level exceedance. The 95% UCLs of arsenic and manganese exceeded the cleanup levels and exceeded the natural background concentrations by factors of two to four. The 95% UCLs of iron and ammonia were below the natural background concentrations.

Downgradient well MW-36A is located north of impacted well MW-34C, and is screened from 90 to 100 feet bgs, similar to MW-34C. The 95% UCLs were below the cleanup levels, except that arsenic slightly exceeded the cleanup level and was well below the natural background concentration. No VOCs were detected in MW-36A. No significant contaminant trends were observed during the 2005–2020 period.

Downgradient wells MW-33A and MW-33C are located west of impacted well MW-32 on the opposing side of Wetland D, and the wells are screened from 5 to 20 feet bgs and from 30 to 40 feet bgs. Landfill impacts were not evident in MW-33A and MW-33C during the 2016–2020 period. No VOCs were detected, and the 95% UCLs of arsenic were below the natural background concentration. The 95% UCLs of iron and ammonia exceeded the natural background concentrations in shallow well MW-33A, which may be consistent with wetland conditions. The 95% UCLs of manganese were below natural background concentrations in MW-33A and MW-33C and the 95% UCLs of iron and ammonia were below the cleanup levels in deeper well MW-33C. Although an increasing trend was observed for arsenic in MW-33C during the 2005–2020 period, the 95% UCLs are below the natural background concentration. Downgradient well MW-29A is a shallow well, screened from 19 to 24 feet bgs, located west of the leachate pond and southwest of impacted wells MW-42 and MW-32. No VOCs were

detected in MW-29A during the 2016–2020 period, and the 95% UCLs of arsenic were below the natural background concentrations. The 95% UCLs of iron and manganese exceed natural background concentrations by a factor of two, without evident decreasing trends from 2016 to 2020. Statistically significant decreasing trends of manganese and ammonia were observed during the 2005–2020 period.

Summary of Natural Attenuation Effectiveness

The source control measures and natural attenuation processes have been effective for the VOC indicator hazardous substances. In 2011, the concentrations of vinyl chloride exceeded the cleanup level in MW-15R, MW-32, MW-34C, and MW-42. During the 2016–2020 period, the concentrations of vinyl chloride only exceeded the cleanup level in MW-32, where the concentration declined to 0.23 µg/L during the November 20, 2020 sampling event, approaching the 0.2 µg/L cleanup level. The concentrations of vinyl chloride were below the cleanup level in MW-19C, MW-34C, and MW-42, and not detected in the remaining wells. The concentrations of trichloroethylene persist near the cleanup level in performance well MW-19C (interior of the relevant point of compliance and conditional point of compliance). No other VOC indicator hazardous substances were detected at the Site.

Arsenic, iron, and manganese are mobilized in anaerobic groundwater. Elevated concentrations of arsenic, iron, manganese, and ammonia can be attributed to solid waste biodegradations reactions, as well as natural phenomena such as wetland environments. The concentrations of these redox-sensitive indicator hazardous substances were compared with natural background concentrations and cleanup levels.

Exceedances of the natural background concentrations (4.27 µg/L arsenic, 1,900 µg/L iron, and 730 µg/L manganese) and the upgradient background ammonia concentration (190 ug/L) were observed in deep wells MW-19C and MW-34C, which are screened about 90 feet bgs.

- The concentrations of manganese and ammonia in performance well MW-19C adjoining OBWL exceeded natural background concentrations by an approximate factor of two, and remained stable. Groundwater in MW-19C has been impacted by leachate, but the reducing conditions appear to be sub-optimal for reductive dechlorination reactions based on persistent 1 µg/L trichloroethylene concentrations and low iron concentrations of about 200 µg/L.
- The reducing conditions in downgradient well MW-34C were the highest at the Site, but the groundwater trended toward aerobic conditions based decreasing concentrations of the redox-sensitive indicator hazardous substances. The 95% UCLs of arsenic declined from 85 to 37 µg/L, the 95% UCLs of iron declined from 148,000 to 84,000 µg/L, and the 95% UCLs of manganese declined from 5,900 to 3,300 µg/L in MW-34C between 2016 and 2020, indicating a natural attenuation process.

The concentrations of the redox-sensitive indicator hazardous substances also exceeded natural background concentrations in shallow wells MW-29A, MW-32, MW-33A, MW-39, and MW-42. These wells were screened between 5 and 33 feet bgs. The concentrations of arsenic, iron,

manganese, and ammonia are indicative of reducing conditions, which could be attributable to biological degradation reactions in the landfill and the wetlands. The concentrations of the redox-sensitive parameters generally remained stable between 2016 and 2020, indicating limited natural attenuation. The concentrations of arsenic were below the 4.27 µg/L natural background in all of the shallow wells, except for MW-32, where the vinyl chloride concentrations continue to naturally attenuate.

3.3 New scientific information for individual hazardous substances or mixtures present at the Site

New toxicity values lead to changes in the MTCA Method B groundwater cleanup level, as published in the CLARC[12] reference tables, for the following indicator hazardous substances:

Updated MTCA Method B Groundwater Cleanup Levels					
Indicator Hazardous Substance	C or NC	Former Value (µg/L)	Revised Value (2016 Review) (µg/L)	Revised Value (2021 Review) (µg/L)	Background Concentration (µg/L)
Volatile organic compounds					
Trichloroethylene	C	0.49	0.54	0.54	NA
	NC	2.4	4.0	4.0	
cis-1,2 Dichloroethylene	NC	80	16	16	NA
Vinyl chloride	C	0.029	NE	0.029	NA
	NC	24	NE	24	
1,1-Dichloroethane	C	NE	7.68	7.7	NA
	NC	1,600	NE	1,600	
1,4-Dichlorobenzene	C	1.8	8.1	8.1	NA
	NC	NE	560	560	
Ethyl ether	NC	1,600	NE	1,600	NA
Naturally occurring metals					
Arsenic	C	4.8	NE	4.8	4.27
	NC	0.058	NE	0.058	
Iron	NC	NE	11,200	11,000	1,900
Manganese	NC	2,200	NE	750	730
Conventional parameters					
Ammonia		NE	NE	NE	190
Values obtained from CLARC Data Table for Groundwater – Method B, Method A, and/or applicable or relevant and appropriate requirements (ARARs). C – Carcinogenic; 1E-6 excess cancer risk NC – Non-carcinogenic NA – Not applicable NE – Not evaluated					

[12] CLARC Data Tables and Technical Information

3.4 New applicable state and federal laws for hazardous substances present at the Site

Chemical Specific Regulations

The cleanup at the Site was governed by WAC 173-340. WAC 173-340-702(12)(c) provides that:

> "A release cleaned up under the cleanup levels determined in (a) or (b) of this subsection shall not be subject to further cleanup action due solely to subsequent amendments to the provision in this chapter on cleanup levels, unless the department determines, on a case-by-case basis, that the previous cleanup action is no longer sufficiently protective of human health and the environment."

The 2017 Periodic Review evaluated changes to the National Recommended Water Quality Criteria (NRWQC) for trichloroethylene and vinyl chloride. Ecology concluded the following.

WAC 173-340-720(4)(b) requires that groundwater cleanup levels must be as stringent as criteria established to protect surface water, unless it can be demonstrated that the indicator hazardous substances are not likely to reach surface water. When developing the CAP, the surface water studies, including studies of the Union River and site wetlands, and risk assessments conducted during the RI were considered, along with the following factors:

- Neither trichloroethylene nor vinyl chloride were detected in the Union River or wetland surface water samples.
- Wetlands are not a source of drinking water.
- Fish have not been observed in the wetlands.
- Trichloroethylene and vinyl chloride are highly volatile; if released from groundwater to surface water they would be expected to volatilize rapidly or breakdown via photolysis or microbial processes upon entry to the aerobic surface water environment.

Because trichloroethylene and vinyl chloride are not likely to reach surface water, and the groundwater cleanup levels are protective of carcinogenic and non-carcinogenic effects in humans ingesting groundwater, the cleanup levels were based on the groundwater standards and criteria, and not the NRWQC. The same reasoning would apply to continue basing the cleanup levels on the groundwater standards and criteria and not the new State surface water criteria for trichloroethylene and vinyl chloride.

MTCA Regulations

Significant changes were made to MTCA in 2013 primarily in order to speed up cleanup work and reduce impacts caused by stormwater (Ecology, 2013). Specifically, changes were made to:

- Introduce the concept of "brownfields" into MTCA and facilitate the cleanup and redevelopment of brownfields sites.

- Authorize Ecology to establish model remedies (standardized cleanup methods) for lower risk sites.
- Create a more stable and effective funding program for stormwater management by local governments.
- Ecology's reporting and accountability requirements.
- The distribution, use, and management of MTCA funding.

These changes do not affect the cleanup actions or cleanup standards at OVSL Site.

Solid Waste Regulations

KPHD regulates OVSL in accordance WAC 173-351 and the leachate pond in accordance with WAC 173-350-330. KPHD (2021a) issued a new a Solid Waste Landfill Post Closure Permit on March 4, 2021, which is effective from January 1, 2021 through December 31, 2025.

The State adopted changes to WAC 173-351 in November 2012 (Ecology, 2012) and October 2015 (Ecology, 2015). The WAC 173-351 changes in 2012 included:

- New post-closure care period standards based on functional stability criteria for landfill settlement and cover integrity, landfill gas, leachate generation, and groundwater quality.
- A requirement for filing an environmental covenant at closure in accordance with the Uniform Environmental Covenants Act (Chapter 64.70 Revised Code of Washington).
- A change in groundwater monitoring parameters from dissolved metals to total metals, among other items.

These changes apply to active and closed landfills regulated under WAC 173-351. The regulations state that jurisdictional health departments that issue solid waste permits must ensure that owners and operators meet the new standards in accordance with the effective dates provided in the amended rule (Ecology, 2012). The October 2015 changes included the addition of two hazardous organic constituents to WAC 173-351, Appendix III, which is the list of hazardous inorganic and organic constituents required for assessment phase monitoring. The landfill permit requires WMW to meet these standards.

WMW implemented the relevant changes to WAC 173-351. WMW evaluated OVSL relative to the functional stability criteria (Vista, 2019). WMW prepared a revised Post-Closure Operations and Maintenance Plan (Vikek, 2020) that updated the post-closure activities to include the changes reflected in the revisions to the solid waste regulations. WMW modifies the Sampling and Analysis Plan to incorporate new requirements (See Section 2.3 for modifications). WMW recorded two environmental covenants that address landfill closure and functional stability requirements (See Section 2.6 for details).

3.5 Current and projected Site and resource use

The Site contains a 65-acre closed municipal solid waste landfill that is subject to post-closure care under a landfill permit subject to WAC 173-351. WMW owns the landfill and adjoining parcels, totaling 454 acres (see Section 2.6). The Site is subject to post-closure care for the foreseeable future, that is for 30 years or until the criteria for functional stability have been achieved WAC 173-351-500(2)(a).

WMW has stated they may harvest timber on parcels of WMW-owned land that are beyond the landfill footprint and associated facilities, including the leachate pond.

3.6 Availability and practicability of more permanent remedies

The remedy implemented includes containment of solid waste, natural attenuation, and monitoring of groundwater and landfill gas, and it continues to be protective of human health and the environment. While higher preference cleanup technologies may be available, they are still not practicable at this Site.

3.7 Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the remedial action were capable of detection below selected Site cleanup levels. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

4.0 CONCLUSIONS

The following conclusions have been drawn by this periodic review:

- The cleanup actions completed at the Site appear to be protective of human health and the environment, although ongoing natural attenuation processes have not achieved cleanup standards at this point. The CAP selected cleanup Alternative 2 (Landfill Gas Collection System Upgrades). WMW completed improvements to the leachate, gas, and stormwater managements systems for this alternative. Cleanup Alternative 2 also includes the natural attenuation of the indicator hazardous substances in groundwater, which are evaluated by the assessment monitoring program required in WAC 173-351-440. Cleanup Alternative 2 includes components that are required under WAC 173-351, including post-closure care, groundwater assessment monitoring, and environmental covenants.
- The source control measures and natural attenuation processes have been effective for the VOC indicator hazardous substances. In 2011, the concentrations of vinyl chloride exceeded the cleanup level in MW-15R, MW-32, MW-34C, and MW-42. During the 2016–2020 review period, the concentrations of vinyl chloride only exceeded the cleanup level in MW-32, where the concentration declined to 0.23 µg/L in MW-32, approaching the 0.2 µg/L cleanup level. The concentrations of vinyl chloride were below the cleanup level in MW-19C, MW-34C, and MW-42, and not detected in the remaining wells. The concentrations of trichloroethylene persist near the cleanup level in performance well MW-19C, which is interior to the landfill relevant point of compliance and MTCA conditional point of compliance. No other VOC indicator hazardous substances were detected at the Site.
- WMW calculated natural background concentrations of arsenic, iron, and manganese in regional groundwater based on the 95% UCL with 95% coverage (see Section 2.4). The calculated natural background concentrations are 4.27 µg/L arsenic, 1,900 µg/L iron, and 730 µg/L manganese. The calculated natural background concentration of arsenic is less than the MTCA Method A cleanup level, which is based on a regulatory accepted background concentration. The calculated natural background concentrations of iron and manganese are less than the MTCA Method B cleanup levels, which are based on toxicological risk. Ecology recommended and KPHD granted using the natural background concentrations as groundwater quality standards for the landfill, as allowed under WAC 173-200-050(b)(ii). Similarly, the groundwater cleanup levels developed under MTCA should be no more stringent than natural background concentrations, as allowed under WAC 173-340-720(7)(c). Ecology recommends using a CAP Addendum to incorporate the natural background concentrations as revised groundwater cleanup levels for arsenic, iron, and manganese.
- Arsenic, iron, and manganese are mobilized in anaerobic groundwater. Elevated concentrations of arsenic, iron, manganese, and ammonia can be attributed to solid waste biodegradations reactions, as well as natural phenomena such as wetland environments. The concentrations of these redox-sensitive indicator hazardous substances were compared with natural background concentrations and cleanup levels.

- Natural background exceedances were observed in deep wells MW-19C and MW-34C, which are screened about 90 feet bgs.

    - The concentrations of manganese and ammonia in performance well MW-19C adjoining OBWL exceeded natural background concentrations by an approximate factor of two, and remained stable. Groundwater in MW-19C has been impacted by leachate, but the reducing conditions appear to be sub-optimal for reductive dechlorination reactions based on persistent 1 µg/L trichloroethylene concentrations and low iron concentrations of about 200 µg/L.
    - The reducing conditions in downgradient well MW-34C were the highest at the Site, but the groundwater trended toward aerobic conditions based on decreasing concentrations of the redox-sensitive indicator hazardous substances. The 95% UCLs of arsenic declined from 85 to 37 µg/L, the 95% UCLs of iron declined from 148,000 to 84,000 µg/L, and the 95% UCLs of manganese declined from 5,900 to 3,300 µg/L in MW-34C between 2016 and 2020, indicating a natural attenuation process.

- The concentrations of the redox-sensitive indicator hazardous substances also exceeded natural background concentrations in shallow wells MW-29A, MW-32, MW-33A, MW-39, and MW-42. These wells were screened between 5 and 33 feet bgs. The concentrations of arsenic, iron, manganese, and ammonia are indicative of reducing conditions, which could be attributable to biological degradation reactions in the landfill and the wetlands. The concentrations of the redox-sensitive parameters generally remained stable between 2016 and 2020, indicating limited natural attenuation. The concentrations of arsenic were below the 4.27 µg/L natural background in all of the shallow wells, except for MW-32, where the vinyl chloride concentrations continue to naturally attenuate.
- The Site is subject to environmental covenants with restrictions for landfill closure, landfill post-closure care, and corrective action. WMW recorded two environmental covenants in 2011 for different parcels that meet the requirements for MSW landfills under WAC 173-351 and for MTCA cleanups under WAC 173-340. The environmental covenants are protective of human health and the environment.

4.1 Proposed Cleanup Action Plan Addendum

Ecology recommends using a CAP Addendum to incorporate the natural background concentrations as revised groundwater cleanup levels for arsenic, iron, and manganese. The following table summarizes the previous and revised groundwater cleanup levels for the indicator hazardous substances.

Table 4-1: Revised Groundwater Cleanup Levels for Indicator Hazardous Substances

Indicator Hazardous Substance	Previous Groundwater Cleanup Level (µg/L)	Revised Groundwater Cleanup Level (µg/L)
Volatile organic compounds		
Trichloroethylene	1	1
cis-1,2-Dichloroethylene	35	35
Vinyl chloride	0.2	0.2
1,1-Dichloroethane	50	50
1,4-Dichlorobenzene	2	2
Ethyl ether	50	50
Naturally occurring metals		
Arsenic	0.462	4.27
Iron	300	1,900
Manganese	50	730
Conventional Parameters		
Ammonia	190	190

4.2 Proposed Changes to Environmental Covenants

The existing environmental covenants (discussed in Section 2.6) have overlapping solid waste and MTCA corrective action requirements. WMW recorded an environmental covenant with post-closure care requirements relating to function stability on four parcels generally associated with the landfill, but exclude a parcel with the OBWL permitted under WAC 173-301. WMW recorded the landfill closure requirements in the MTCA environmental covenant, which was recorded for ten parcels. The MTCA environmental covenant is otherwise restricted to prohibiting groundwater use; however, Ecology (2011b) approved WMW's request to use water from well MW-1 for wash water, maintenance of the leachate pond, and toilets. Additionally, groundwater use is restricted by WAC 173-160-171(3)(b)(vi), which requires that water wells be set back a minimum of 1,000 feet from the property boundary of solid waste landfills.

Ecology recommends that WMW consider revising the environmental covenants to more accurately prescribe the landfill closure, landfill post-closure, and corrective action restrictions with references to applicable regulations with templates provided by Ecology. Environmental covenants are required for landfill closure and landfill post-closure care, but may not be warranted for corrective action. The environmental covenants will eventually need to be revised to lift restrictions based on ending landfill post-closure care and meeting MTCA groundwater cleanup levels.

4.3 Additional Evaluation of Background Conditions

WMW intends to evaluate options for establishing revised background limits for ammonia and well-specific limits for arsenic, iron and manganese. WMW reports the groundwater upgradient (east) of the landfill is recharged by precipitation and is relatively aerobic, whereas groundwater downgradient (west) of the landfill is naturally impacted by wetlands and thus expected to be relatively anaerobic naturally. The change in natural redox conditions across the facility affects concentrations of ammonia detected in groundwater.

The groundwater quality standards and groundwater cleanup levels should be no more stringent than natural background (WAC 173-200-050(3)(b)(iii), WAC 173-340-720(7)(c)), but should be capable of detecting "contamination," which includes the mobilization of naturally occurring compounds due to the "alteration of physical, chemical, biological, or radiological properties" by landfill leachate and landfill gas (WAC 173-351-100).

WMW intends to assess options for developing updated background concentrations for ammonia that are more representative of site conditions downgradient of the landfill. In addition, and as described in the recent Technical Memorandum (JMO Consulting, 2021b), the updated background limits for arsenic, iron, and manganese may not fully bracket the natural conditions at the site. WMW intends to further assess the potential that localized reducing conditions (i.e., wetlands) in the vicinity of certain wells may allow certain metals to reach higher natural equilibrium concentrations than those predicted by the updated background values.

4.4 Next Review

In accordance with WAC 173-340-420(2), periodic reviews are required:

- For as long an institutional control or financial assurance is required as part of the cleanup action.
- When modifications to default equations or assumptions using site-specific information would significantly increase the concentrations of hazardous substances remaining at the site after cleanup.
- When additional review of an ecological evaluation and reliability of the cleanup action is needed to assure long-term protection of human health and the environment.

Thus, periodic reviews are required for as long as the corrective action environmental covenant is in place, and when additional background concentrations are adopted as groundwater cleanup levels. The next review for the Site will be scheduled five years from the date of this periodic review.

5.0 REFERENCES

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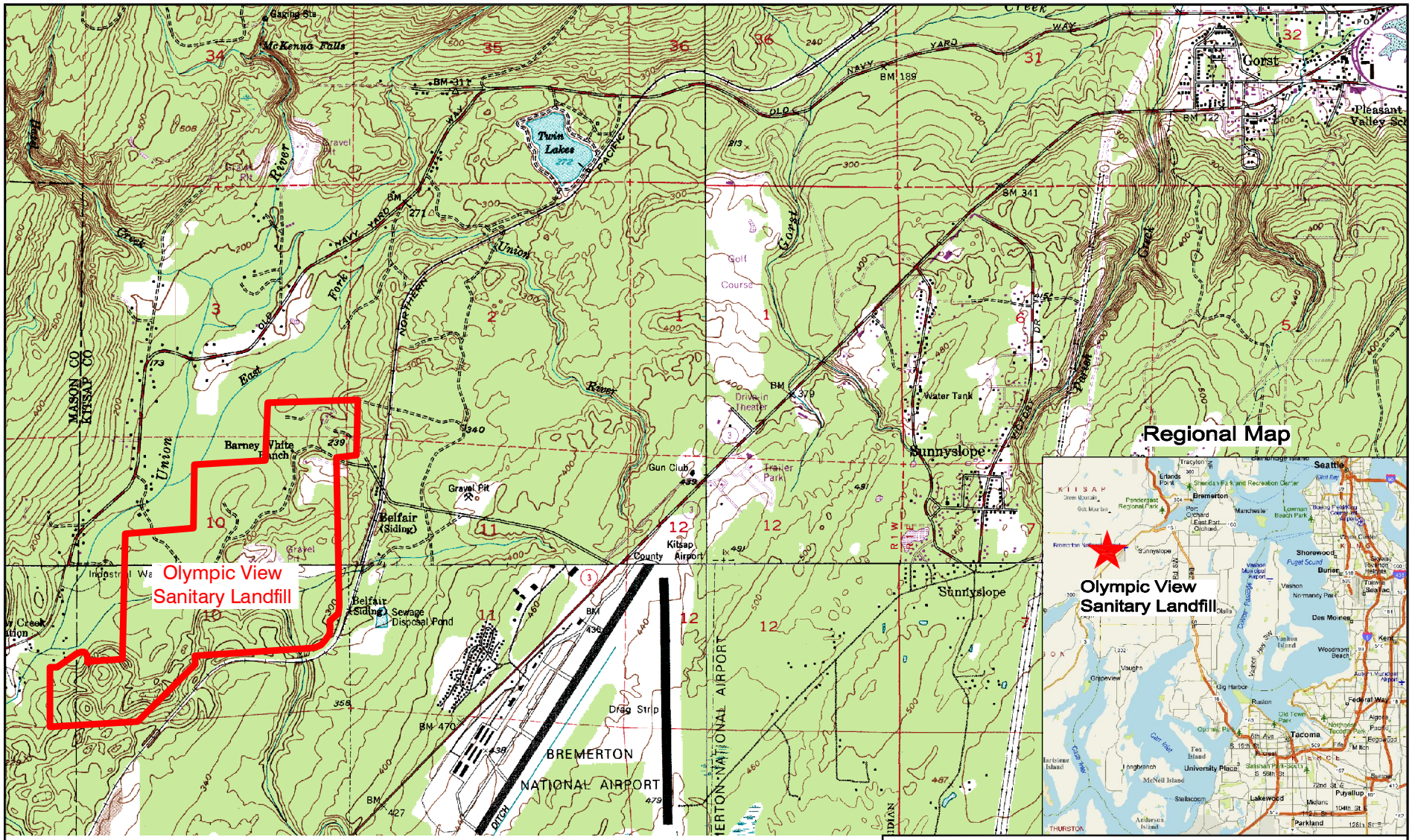
6.0 APPENDICES

6.1 Five Year Review Evaluation Figures

M:\clients\EMSI\Waste-Man-OVSL\Parametrix\BL2982003P06T04F2-1 11-9-07\Site-Fig-1.dwg plotted: 01/06/2009



WASHINGTON

Vicinity Map

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SCALE IN FEET

Figure 1

Site Location Map
Kitsap County, Washington

Olympic View Sanitary Landfill

EMSI Engineering Management Support, Inc.

EAST FORK UNION RIVER

UNION RIVER

STORMWATER DETENTION POND A

STORMWATER DETENTION POND B/C

WETLAND B

WETLAND C

WETLAND D

FORMER LEACHATE LAGOONS

DETENTION POND D

FORMER NORTH BORROW

PHASE II STAGE B3

PHASE II STAGE B1

PHASE II STAGE B2

PHASE II STAGE A

PHASE I STAGE B1

PHASE I STAGE A

PHASE I STAGE B

PHASE I STAGE C

TRUCK LOADOUT HUT

OLD BARNEY WHITE LANDFILL (UNLINED BOTTOM)

BARNEY WHITE REGIONAL INFILTRATION/DETENTION FACILITY

TRANSFER STATION

TRANSFER AND STORAGE WAREHOUSES

WEST BORROW

OLD PUMP STATION

LEACHATE AERATION LAGOON

FLARE FACILITY AND LEACHATE EVAPORATOR

SOUTH BORROW

TRIBUTARY 512

FORMER LEACHATE SPRAY IRRIGATION

SOUTH SLOPE WELL PUMP HOUSE

PORT OF BREMERTON WASTEWATER PONDS

LANDFILL DEVELOPMENT PHASE BOUNDARY

Plan Area

Property Line

KEY MAP

NO SCALE

NOTES:

1. Contour data based on topographic survey data supplied by Space Imaging LLC & Kitsap County GIS Aerial Imagery, June 2001.
2. Additional property to south (see Key Map).

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SCALE IN FEET

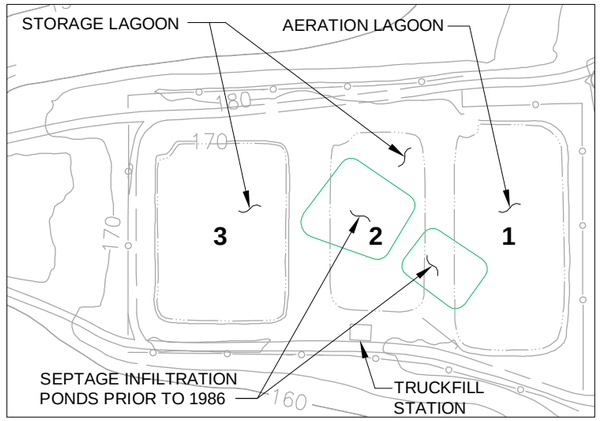
Figure 2

Overall Site Plan

Olympic View Sanitary Landfill

EMSI Engineering Management Support, Inc.

M:\CLIENTS\EMSI\WASTE-MAN-OVSL\PARAMETRIX\BL2982003P06T04F2-1 11-9-07\OVSL-FIG-2_8-09.DWG-11X17 FIGURE 08/27/2009 9:27AM

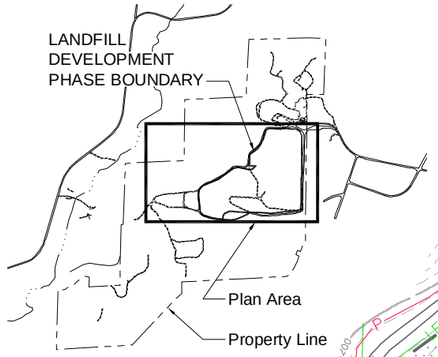


LEACHATE LAGOON AREA
1986 TO 1997

NOTES:

1. LeachateTransmission Pipe (LTP) was abandoned as part of the installation of Leachate Forcemain (LFM) HDPE system; however, the Leachate Toe Slope Collector System (LC) was connected to a new 2-inch HDPE pipe that was slipped with the LTP and leachate manholes and discharges at LM-5. As part of LFM and leachate manholes system, Leachate manholes (LM) No.1, 2, 3, and 4 were abandoned. Phase 1 Leachate was diverted around LM-1 to the new pump station.

2. Design Areas:
   - OLD - 20 Acres
   - PHASE I - 25 Acres
   - PHASE II - 20 Acres



KEY MAP
NO SCALE

LR-01
LR-02
LR-03
LR-04
ABANDONED LEACHATE PUMP STATION
LM-1
LM-2
LM-3
LM-4
LM-5
L-INF
LEACHATE TRANSMISSION PIPE [1]
LEACHATE MANHOLE, TYP. [1]
LEACHATE TOE SLOPE COLLECTOR
LEACHATE AERATION LAGOON
TRUCKFILL STATION
PREVIOUS TRUCKFILL STATION
FLARE FACILITY AND LEACHATE EVAPORATOR, SEE FIGURE 2-3
SEE INSET PLAN ABOVE FOR HISTORIC LEACHATE MANAGEMENT FACILITIES
PROPERTY LINE, TYP.
POWER LINE (TYP.)
LCO-1
LCO-2
LCO-3
LCO-4
LCO-5
LCO-6
LCO-7
LCO-8
LCO-9
LCO-10
LCO-11
PHASE II STAGE B3 [NA]
PHASE II STAGE B1 [NA]
PHASE II STAGE B2 [NA]
PHASE II STAGE A [187]
PHASE I STAGE BI [225]
PHASE I STAGE A [202]
PHASE I STAGE C [233]
PHASE I STAGE B [225]
OLD BARNEY WHITE LANDFILL (UNLINED BOTTOM) [190]

LEGEND:

◎LM-5	Leachate Manhole	LC	Leachate Toe Slope Collection Pipe
○LM-2	Decommissioned Leachate Manhole	LCP	Leachate Collection Pipe
• LCO-1	Leachate Cleanout	LTP	Leachate Transmission Pipe (Decommissioned-In-Place)
[202]	Approximate Bottom Elevation	LFM	Leachate Force Main Pipe
P	Power Utility Vault	P	Underground Power Line
◆ L-INF	Leachate Influent Monitoring Station and Flow Meter		
◇ LR	Leachate Riser		
	Landfill Development Phase Boundary		
	Bottom Liner System		

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SCALE IN FEET

Figure 3
Leachate Collection System
Olympic View Sanitary Landfill

EMSI Engineering Management Support, Inc.

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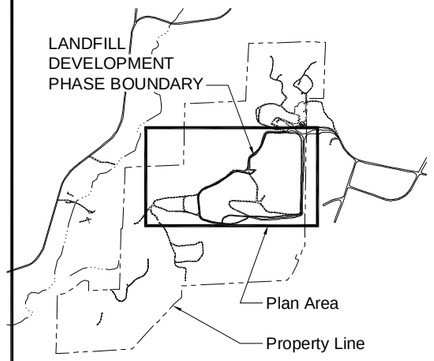

KEY MAP

NO SCALE

LEACHATE AERATION LAGOON, SEE FIGURE 3

FLARE FACILITY AND LEACHATE EVAPORATOR

OLD BARNEY WHITE LANDFILL (UNLINED BOTTOM)

PHASE II STAGE B3

PHASE II STAGE B1

PHASE II STAGE B2

PHASE II STAGE A

PHASE I STAGE BI

PHASE I STAGE A

PHASE I STAGE B

PHASE I STAGE C

PROPERTY LINE, TYP.

LEGEND:

- GW-5 — Well Location
- LCO-2 (HC-7) — Horizontal Trench/LCO Location
- Condensate Knockout
- Isolation Valve
- LFG — Landfill Gas HDPE Pipe
- Flow Direction
- Landfill Development Phase Boundary
- Bottom Liner System

NOTES:

1. Landfill Gas System based on as-built data provided by Shaw Emcon/OWT, Issued August 2004.

Filenames: 2003asblts01.dwg, 2003asblts02.dwg, & 2003asblts16.dwg.

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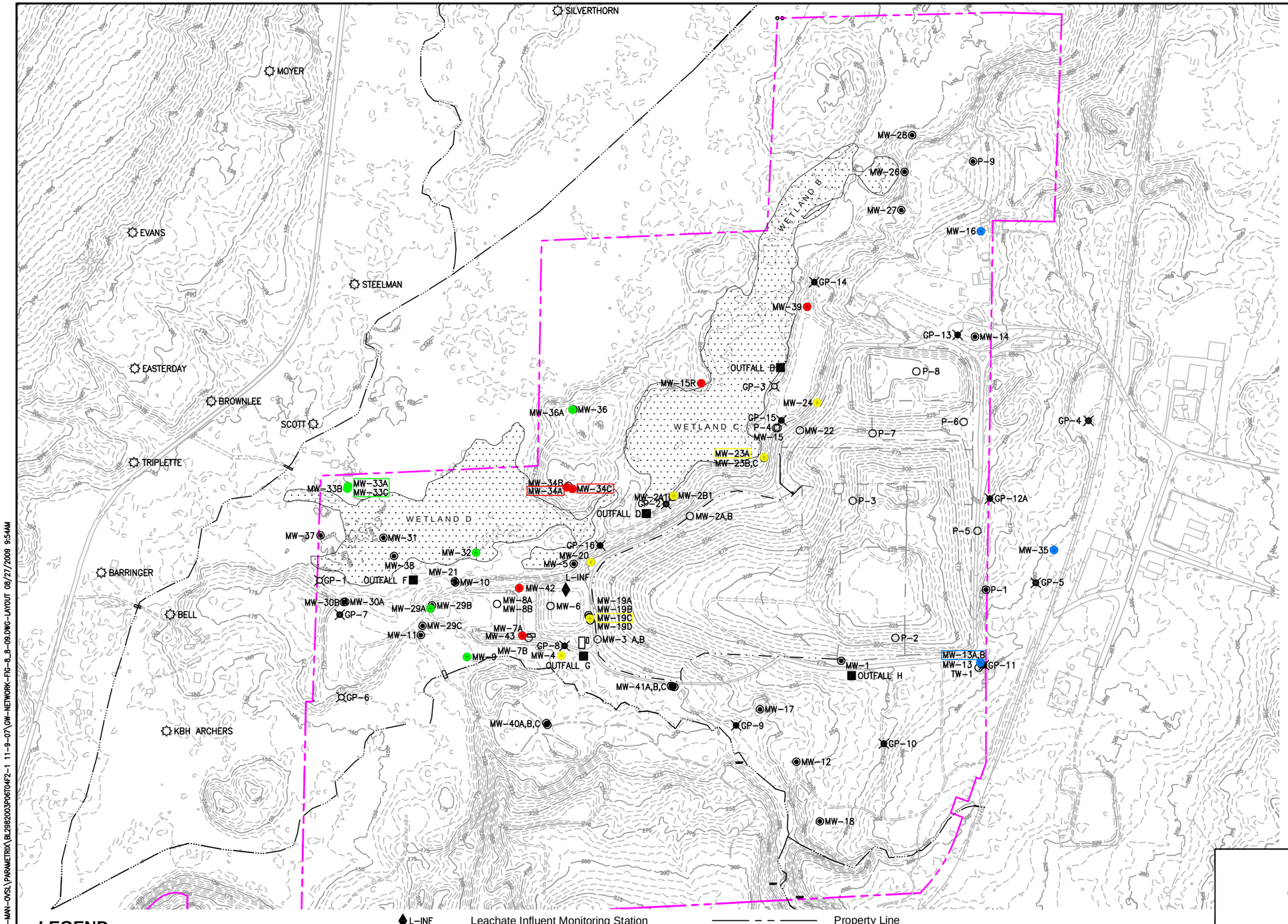
Figure 4

Landfill Gas Extraction System

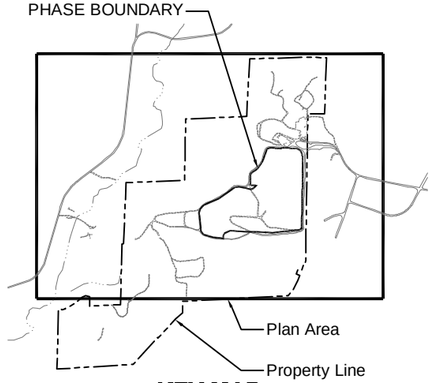
Olympic View Sanitary Landfill

EMSI Engineering Management Support, Inc.

M:\CLIENTS\EMSI\WASTE-MAN-OVSL\PARAMETRIX\BL2982003P06T04F2-1 11-9-07\SITE-FIG-4.DWG-11X17 FIGURE 01/06/2009 2:56PM



LANDFILL DEVELOPMENT PHASE BOUNDARY



KEY MAP

NO SCALE

NOTES:

1. Contour data based on topographic survey data supplied by Space Imaging LLC & Kitsap County GIS Aerial Imagery, June 2001.
2. Additional property to south (see Key Map).

MONITORING WELL KEY

- Compliance Monitoring Well
- Performance Monitoring Well
- Downgradient Monitoring Well
- Upgradient (background) Monitoring Well

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LEGEND:

MW-32	Monitoring Well or Piezometer
SCOTT	Offsite Private Well
MW-15	Decommissioned Monitoring Well or Piezometer
L-INF	Leachate Influent Monitoring Station
GP-15	Gas Probe
GP-6	Decommissioned Gas Probe
GP-7B	Decommissioned Gas Probe Boring
OUTFALL B	Stormwater Monitoring Outfall
	Property Line
	Landfill Development Phase Boundary
	Stream
	Access Road
	Railroad

Figure 5

Groundwater Monitoring Well Network

Olympic View Sanitary Landfill

EMSI Engineering Management Support, Inc.

M:\CLIENTS\EMSI\WASTE-MAN-OVSL\PARAMETRIX\BL2992003P06T04P2-1 11-9-07\GW-NETWORK-FIG-8_8-09.DWG-LAYOUT 08/27/2009 9:54AM

Figure 6: Annaul Leachate Riser Flow Rates

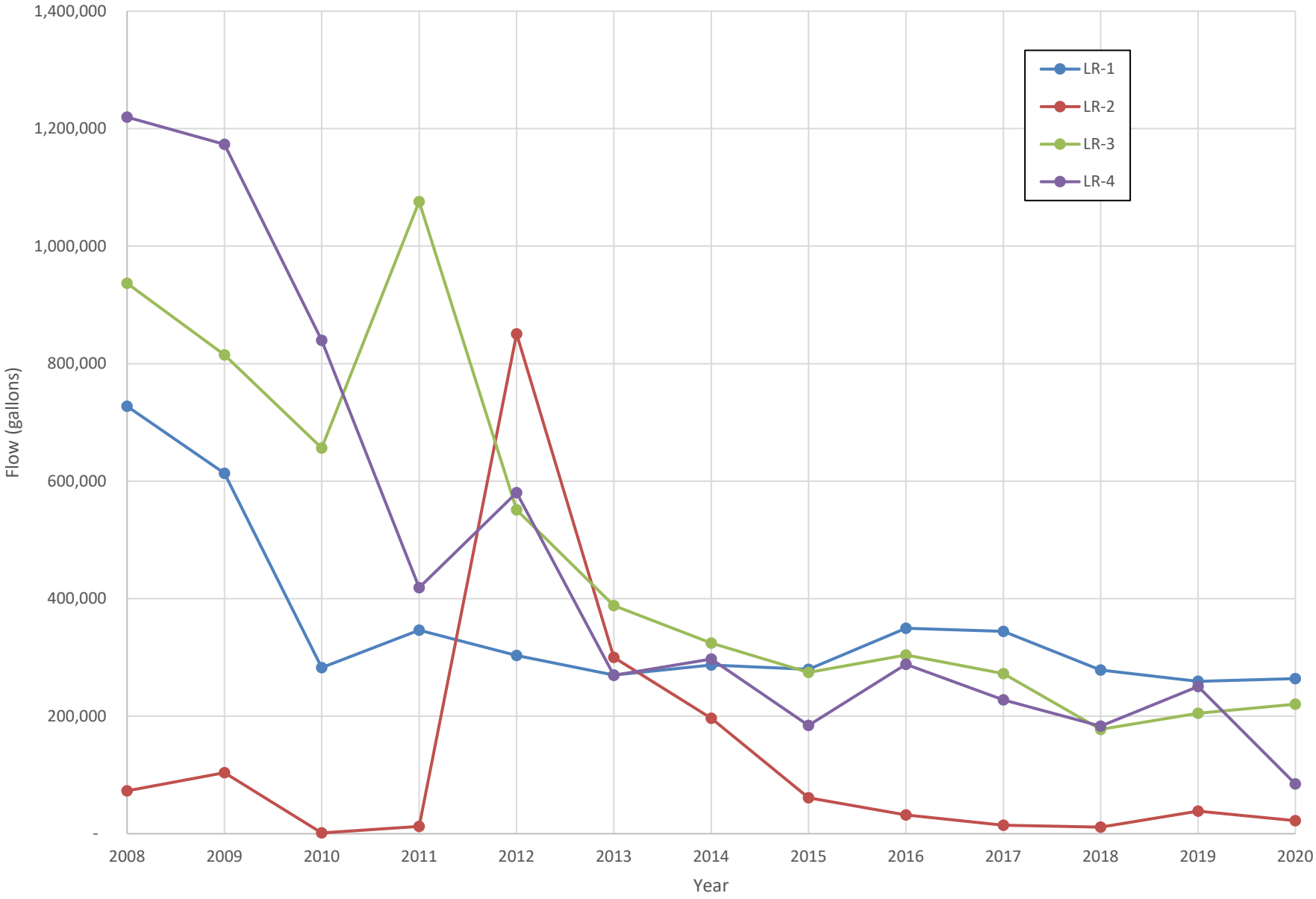


Figure 7: Annual Total Leachate Flow Rates (L-pond) and Rainfall Rates

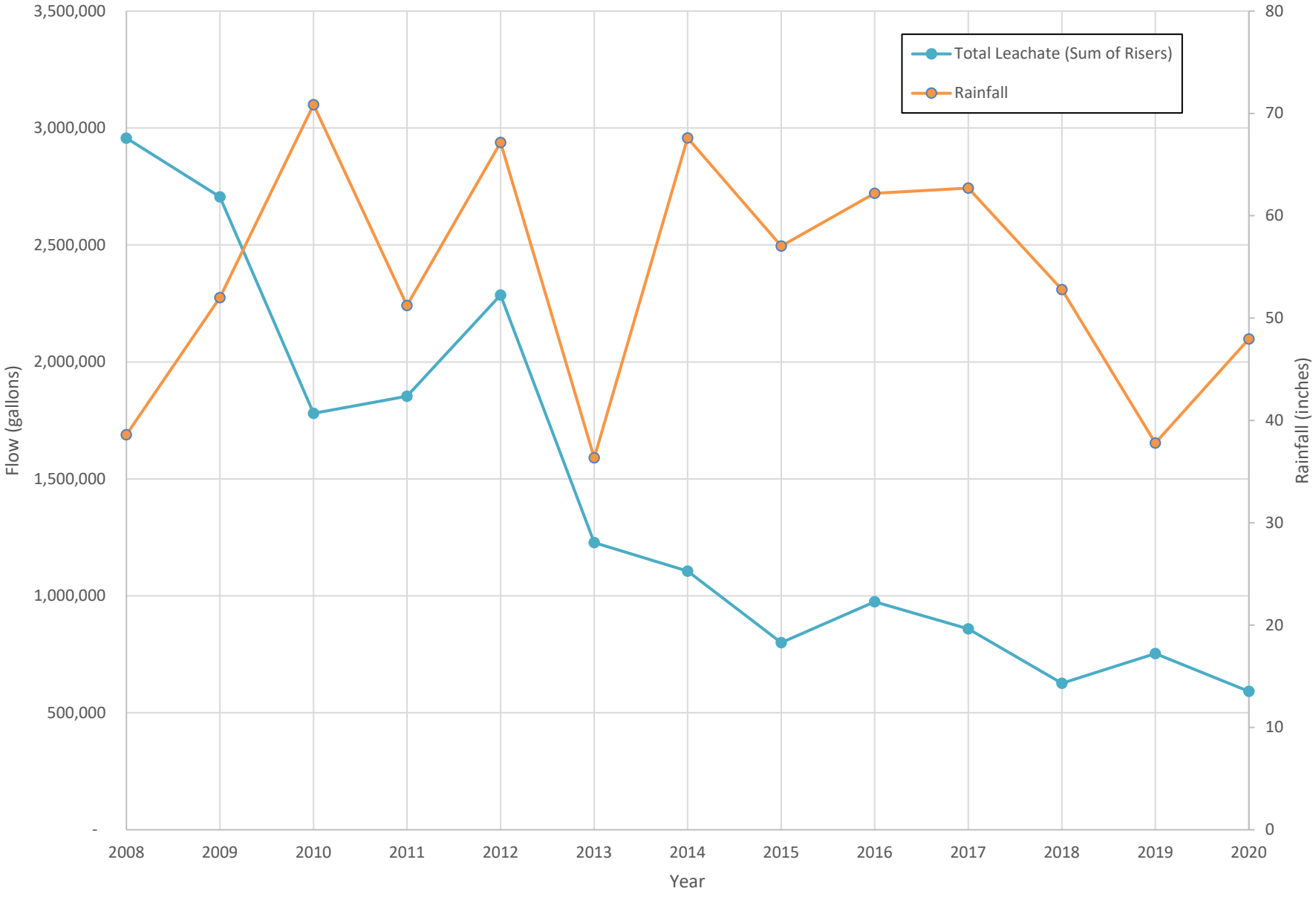


Figure 8: Annual Total Leachate Production per Inch of Rainfall

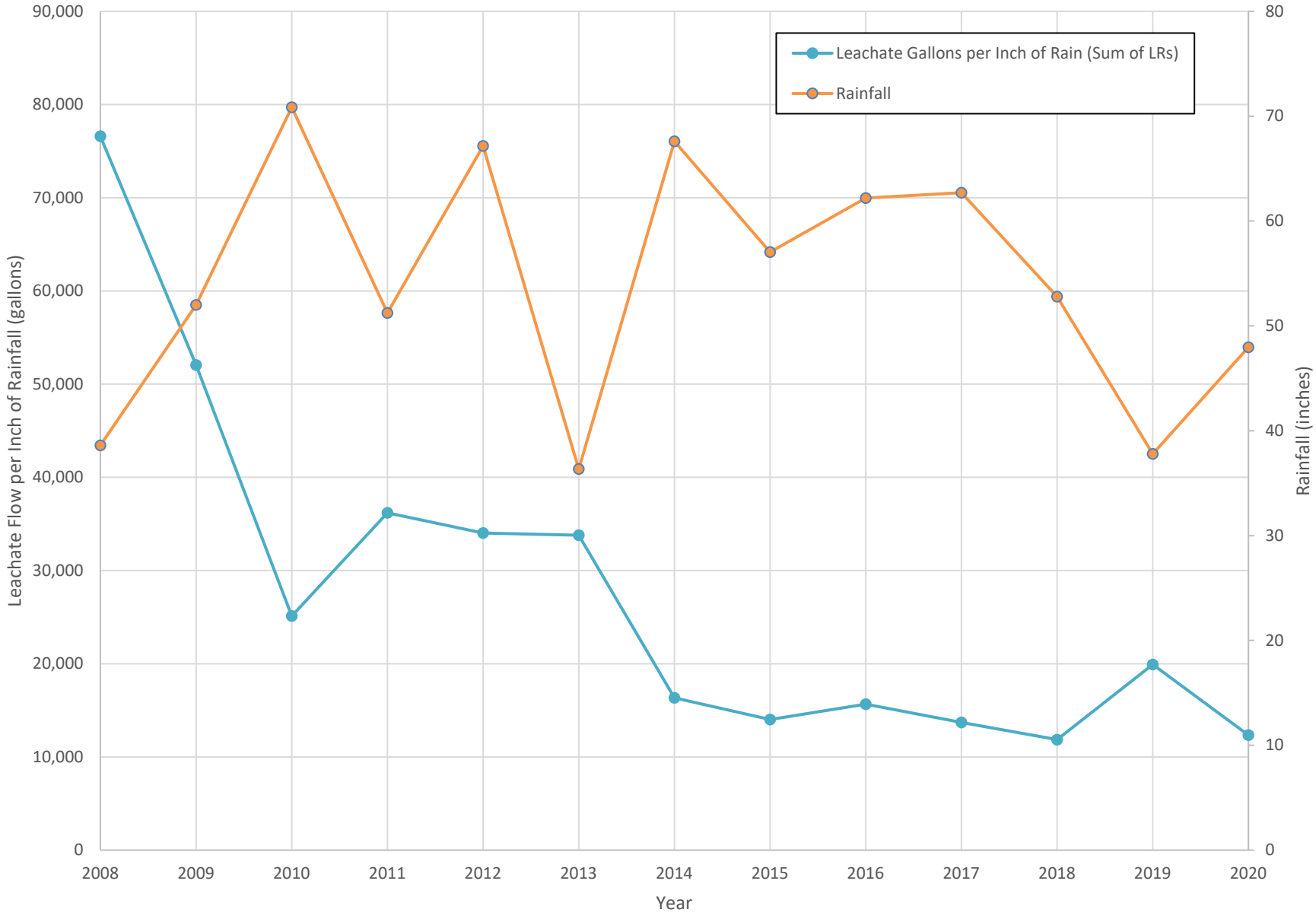
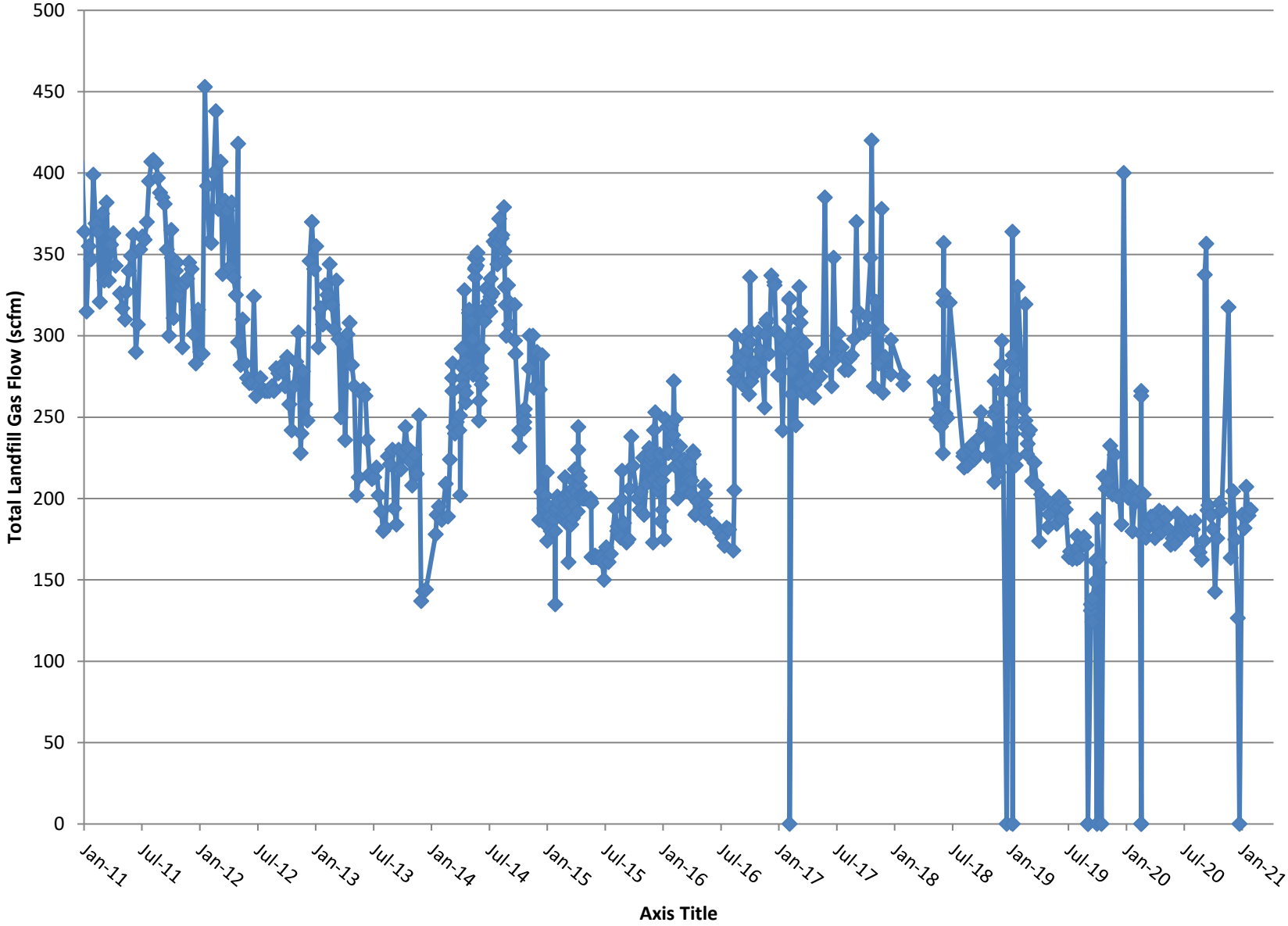
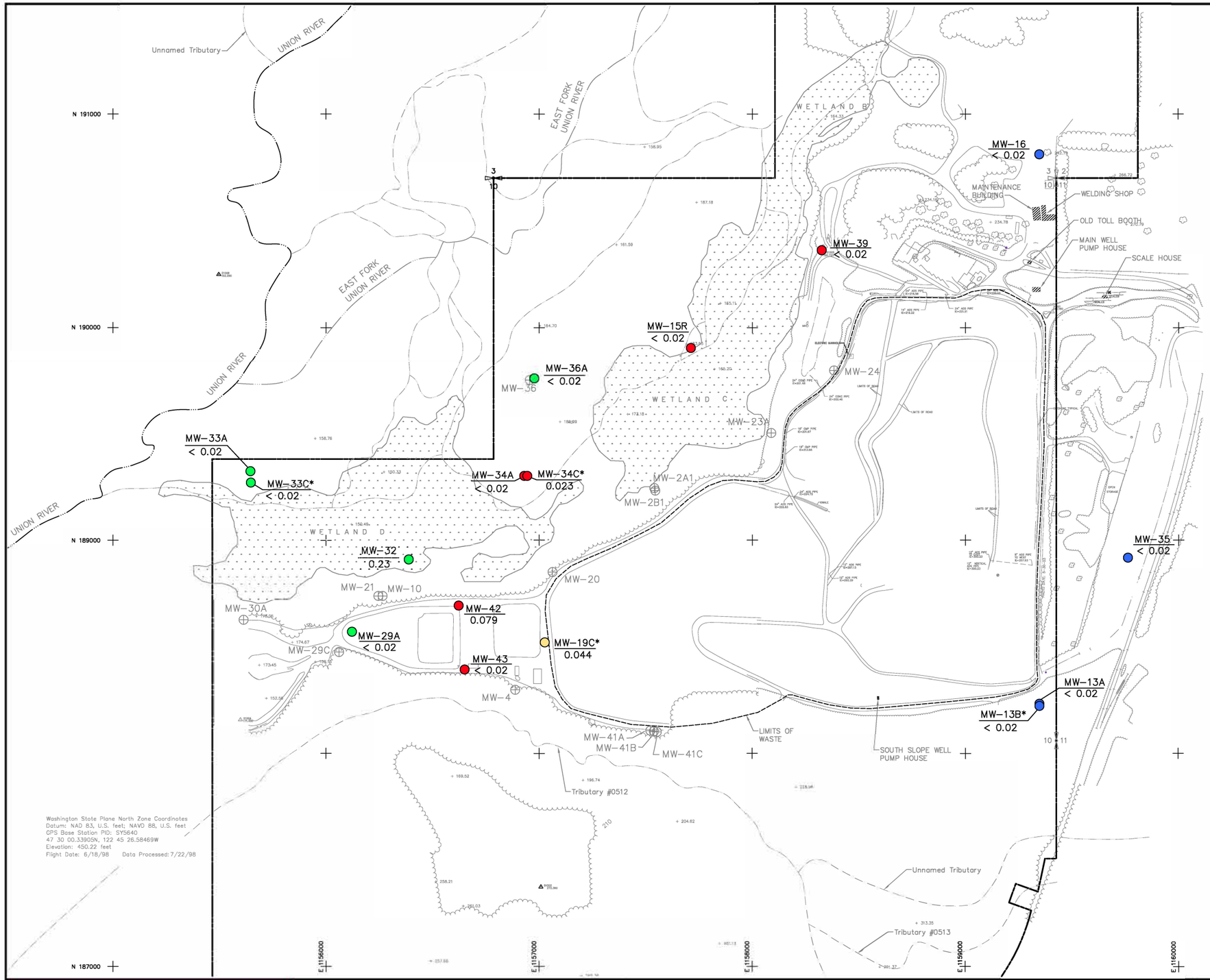
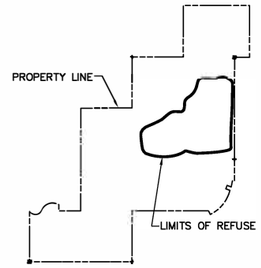


Figure 9: Total Gas Flow (SCFM)







KEY MAP

LEGEND

MW-35	UPGRADIENT (BACKGROUND) GROUNDWATER MONITORING WELL
MW-32	DOWNGRADIENT GROUNDWATER MONITORING WELL
MW-19C	PERFORMANCE GROUNDWATER MONITORING WELL
MW-43	COMPLIANCE GROUNDWATER MONITORING WELL
MW-10	GROUNDWATER MONITORING WELL (WATER LEVEL ONLY)
MW-32 / 0.23	SHALLOW MONITORING WELL VINYL CHLORIDE, TOTAL (ug/L)
*	DEEP MONITORING WELL
———	PROPERTY LINE (ASSUMED)
NS	NOT SAMPLED

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SCALE IN FEET

SCS ENGINEERS
Environmental Consultants and Contractors
2405 140th Avenue NE, Suite 107
Bellevue, Washington 98005
(425) 746-4600 FAX: (425) 746-6747

PROJECT NO. 04204027.24	DES BY A.L.
SCALE AS SHOWN	CHK BY S.G.
CAD FILE FIGURE 6D	APP BY D.V.

VINYL CHLORIDE CONCENTRATION MAP
NOVEMBER 2020

OLYMPIC VIEW SANITARY LANDFILL
KITSAP COUNTY, WASHINGTON

DATE FEBRUARY 2021

FIGURE 10

6.2 Five Year Review Evaluation Tables

TABLE 3-1: 2016 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2014 through December 31, 2016

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-9+, MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-15R	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-15R	Compliance	Arsenic, total	12	100%	0.238	0.22	ug/L	LN	0.462	ug/L	No	No
MW-15R	Compliance	Iron, total	11[7]	18%	0.11	0.11	mg/L	A	0.30	mg/L	No	No
MW-15R	Compliance	Manganese, total	12	100%	0.021	0.01	mg/L	LN	0.05	mg/L	No	No
MW-15R	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-15R	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-15R	Compliance	Vinyl Chloride	12	0.0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-15R	Compliance	Ammonia as N	12	8.3%	0.036	0.036	mg/L	A	0.19	mg/L	No	No
MW-34A	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34A	Compliance	Arsenic, total	12	100%	0.50	0.45	ug/L	LN	0.462	ug/L	No	No
MW-34A	Compliance	Iron, total	12	8.3%	0.06	0.06	mg/L	A	0.30	mg/L	No	No
MW-34A	Compliance	Manganese, total	12	67%	0.0044	0.003	mg/L	LN	0.05	mg/L	No	No
MW-34A	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34A	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34A	Compliance	Vinyl Chloride	12	8.3%	0.03	0.03	ug/L	A	0.20	ug/L	No	No
MW-34A	Compliance	Ammonia as N	12	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-34C	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34C	Compliance	Arsenic, total	12	100%	84.6	84.6	ug/L	A**	0.462	ug/L	**Yes**	No
MW-34C	Compliance	Iron, total	12	100%	100	148	mg/L	LN	0.30	mg/L	**Yes**	No
MW-34C	Compliance	Manganese, total	12	100%	14	5.9	mg/L	Z	0.05	mg/L	**Yes**	No
MW-34C	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No

TABLE 3-1: 2016 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2014 through December 31, 2016

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-9+, MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-34C	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34C	Compliance	Vinyl Chloride	12	100%	0.16	0.12	ug/L	LN	0.20	ug/L	No	Yes (▼)
MW-34C	Compliance	Ammonia as N	12	25%	0.031	0.031	mg/L	A	0.19	mg/L	No	No
MW-39	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-39	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-39	Compliance	Arsenic, total	12	100%	2.16	1.70	ug/L	N	0.462	ug/L	Yes	No
MW-39	Compliance	Iron, total	12	100%	40	33.6	mg/L	Z	0.30	mg/L	Yes	No
MW-39	Compliance	Manganese, total	12	100%	0.49	0.43	mg/L	Z	0.05	mg/L	Yes	No
MW-39	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-39	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-39	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-39	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-39	Compliance	Ammonia as N	12	92%	0.48	0.39	mg/L	Z	0.19	mg/L	Yes	No
MW-42	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-42	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-42	Compliance	Arsenic, total	12	100%	1.93	1.73	ug/L	LN	0.462	ug/L	Yes	No
MW-42	Compliance	Iron, total	12	100%	32	26.8	mg/L	LN	0.30	mg/L	Yes	No
MW-42	Compliance	Manganese, total	12	100%	5.3	4.8	mg/L	LN	0.05	mg/L	Yes	No
MW-42	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-42	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-42	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-42	Compliance	Vinyl Chloride	12	92%	0.16	0.13	ug/L	LN	0.20	ug/L	No	No
MW-42	Compliance	Ammonia as N	12	100%	6.7	6.2	mg/L	LN	0.19	mg/L	Yes	No
MW-43	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-43	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No

TABLE 3-1: 2016 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2014 through December 31, 2016

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-9+, MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-43	Compliance	Arsenic, total	12	17%	0.05	0.05	ug/L	A	0.462	ug/L	No	No
MW-43	Compliance	Iron, total	11[8]	100%	1.7	1.23	mg/L	LN	0.30	mg/L	Yes	No
MW-43	Compliance	Manganese, total	12	100%	0.26	0.34	mg/L	LN	0.05	mg/L	Yes	No
MW-43	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-43	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-43	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-43	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-43	Compliance	Ammonia as N	12	58%	0.12	0.08	mg/L	LN	0.19	mg/L	No	Yes (▼)
MW-29A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-29A	Downgradient	Arsenic, total	6	100%	1.99	1.94	ug/L	LN	0.462	ug/L	Yes	No
MW-29A	Downgradient	Iron, total	6	100%	4.7	4.63	mg/L	LN	0.30	mg/L	Yes	No
MW-29A	Downgradient	Manganese, total	6	100%	1.4	1.39	mg/L	Z	0.05	mg/L	Yes	No
MW-29A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-29A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-29A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-29A	Downgradient	Ammonia as N	6	100%	0.095	0.09	mg/L	LN	0.19	mg/L	No	Yes (▼)
MW-32	Downgradient	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-32	Downgradient	Arsenic, total	12	100%	26.6	13.8	ug/L	Z	0.462	ug/L	Yes	No
MW-32	Downgradient	Iron, total	12	100%	6.3	2.0	mg/L	Z	0.30	mg/L	Yes	No
MW-32	Downgradient	Manganese, total	12	100%	4.1	2.8	mg/L	LN	0.05	mg/L	Yes	No
MW-32	Downgradient	cis-1,2-dichloroethene	12	8.3%	0.81 (ND)	0.81	ug/L	A*	35	ug/L	No	No
MW-32	Downgradient	Ethyl ether	11	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	Trichloroethene	12	67%	0.50	0.50	ug/L	A***	1.0	ug/L	No	No
MW-32	Downgradient	Vinyl Chloride	12	100%	0.54	0.43	ug/L	LN	0.20	ug/L	Yes	No

TABLE 3-1: 2016 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2014 through December 31, 2016

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-9+, MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-32	Downgradient	Ammonia as N	11	18%	0.039	0.039	mg/L	A	0.19	mg/L	No	No
MW-33A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33A	Downgradient	Arsenic, total	6	100%	0.509	0.468	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33A	Downgradient	Iron, total	6	100%	5.0	5.0	mg/L	A**	0.30	mg/L	**Yes**	No
MW-33A	Downgradient	Manganese, total	6	100%	0.10	0.08	mg/L	Z	0.05	mg/L	**Yes**	No
MW-33A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33A	Downgradient	Ammonia as N	6	67%	0.30	0.30	mg/L	A	0.19	mg/L	**Yes**	No
MW-33C	Downgradient	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33C	Downgradient	Arsenic, total	12	100%	2.67	2.55	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33C	Downgradient	Iron, total	12	83%	0.38	0.30	mg/L	LN	0.3	mg/L	No	No
MW-33C	Downgradient	Manganese, total	12	100%	0.29	0.22	mg/L	LN	0.05	mg/L	**Yes**	No
MW-33C	Downgradient	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33C	Downgradient	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33C	Downgradient	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33C	Downgradient	Ammonia as N	12	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-36A	Downgradient	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-36A	Downgradient	Arsenic, total	12	100%	0.68	0.586	ug/L	LN	0.462	ug/L	**Yes**	No
MW-36A	Downgradient	Iron, total	12	50%	0.18	0.13	mg/L	LN	0.3	mg/L	No	No
MW-36A	Downgradient	Manganese, total	12	83%	0.0068	0.006	mg/L	LN	0.05	mg/L	No	No

TABLE 3-1: 2016 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2014 through December 31, 2016

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-9+, MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-36A	Downgradient	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-36A	Downgradient	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-36A	Downgradient	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-36A	Downgradient	Ammonia as N	12	8.3%	0.03	0.03	mg/L	A	0.19	mg/L	No	No

NOTES:

+ Well MW-9 is no longer routinely sampled and no longer included on this table

[1] N = number of data points used for UCL calculation of the mean; only SIM results used for Vinyl Chloride (e.g., duplicate results with higher RLs by non-SIM were omitted).

[2] MAX = maximum detected result in the data set; if no detected results, then = maximum reporting limit for non-detect results (indicated with ND).

[3] A 3-year moving data set is used for calculation of the UCL.

[4] ug/L - micrograms per liter; mg/L = milligrams per liter.

[5] Groundwater Cleanup Levels are listed on Table 3 of the October 2010 Draft Cleanup Action Plan.

[6] Trend analysis results are based on data for the period January 2005 through December 2016; arrows indicated increasing (▲) or decreasing (▼) trends.

[7] For MW-15R, outlier of 0.41 mg/L from 2-24-15 sampling event was removed prior to UCL calculation

[8] For MW-43, outlier of 24 mg/L from 6-2-14 sampling event was removed prior to UCL calculation

A = Detection frequency of data set too low and/or N too few to calculate 95% UCL of mean; therefore, the highest detected result in the data set used to represent 95% UCL of mean.

A* = Same as note "A" except that the highest value in the data set is below the reporting limit of one or more non-detected results; therefore, the highest reporting limit is used to represent the 95% UCL of the mean.

A** = MTCAStat suggests use of lognormal formula but calculation of 95% UCL of mean by Land's formula provides unrealistic result; therefore, the highest detected result is used to represent the 95% UCL of the mean.

A*** = MTCAStat suggests use of the Z-score method but then cites inability to calculate due to presence of censored values; therefore, the highest detected result is used to represent the 95% UCL of the mean.

B = Detection frequency = 0; therefore, the highest reporting limit in the data set is used to represent the 95% UCL of mean.

LN = The 95% UCL of the mean is calculated using Land's formula since lognormal distribution is indicated.

N = The 95% UCL of the mean is calculated using a normal-based t-statistic since a normal distribution is indicated.

Z = the 95% UCL of the mean is calculated using the Z-score method in MTCAStat since neither normal nor lognormal distribution can be determined.

TABLE 3-2: 2017 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2015 through December 31, 2017

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-15R	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-15R	Compliance	Arsenic, total	12	100%	0.258	0.23	ug/L	LN	0.462	ug/L	No	No
MW-15R	Compliance	Iron, total	11[7]	9.1%	0.11	0.11	mg/L	A	0.30	mg/L	No	No
MW-15R	Compliance	Manganese, total	12	100%	0.021	0.01	mg/L	LN	0.05	mg/L	No	No
MW-15R	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-15R	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-15R	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-15R	Compliance	Ammonia as N	12	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-34A	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34A	Compliance	Arsenic, total	12	100%	0.478	0.452	ug/L	LN	0.462	ug/L	No	No
MW-34A	Compliance	Iron, total	12	8.3%	0.06	0.06	mg/L	A	0.30	mg/L	No	No
MW-34A	Compliance	Manganese, total	12	75%	0.0044	0.002	mg/L	LN	0.05	mg/L	No	No
MW-34A	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34A	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34A	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.03	ug/L	B	0.20	ug/L	No	No
MW-34A	Compliance	Ammonia as N	12	8.3%	0.035	0.04	mg/L	A	0.19	mg/L	No	No
MW-34C	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34C	Compliance	Arsenic, total	12	100%	84.6	84.6	ug/L	A**	0.462	ug/L	**Yes**	No
MW-34C	Compliance	Iron, total	12	100%	100	155	mg/L	LN	0.30	mg/L	**Yes**	No
MW-34C	Compliance	Manganese, total	12	100%	14	5.5	mg/L	Z	0.05	mg/L	**Yes**	No
MW-34C	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No

TABLE 3-2: 2017 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2015 through December 31, 2017

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-34C	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34C	Compliance	Vinyl Chloride	12	100%	0.11	0.09	ug/L	LN	0.20	ug/L	No	Yes (▼)
MW-34C	Compliance	Ammonia as N	12	25%	0.034	0.034	mg/L	A	0.19	mg/L	No	No
MW-39	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-39	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-39	Compliance	Arsenic, total	12	100%	2.16	1.77	ug/L	Z	0.462	ug/L	Yes	No
MW-39	Compliance	Iron, total	12	100%	40	33.7	mg/L	Z	0.30	mg/L	Yes	No
MW-39	Compliance	Manganese, total	12	100%	0.66	0.46	mg/L	N	0.05	mg/L	Yes	No
MW-39	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-39	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-39	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-39	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-39	Compliance	Ammonia as N	12	92%	0.63	0.44	mg/L	Z	0.19	mg/L	Yes	No
MW-42	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-42	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-42	Compliance	Arsenic, total	12	100%	1.93	1.78	ug/L	LN	0.462	ug/L	Yes	No
MW-42	Compliance	Iron, total	12	100%	27	24.9	mg/L	LN	0.30	mg/L	Yes	No
MW-42	Compliance	Manganese, total	12	100%	4.8	4.5	mg/L	LN	0.05	mg/L	Yes	No
MW-42	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-42	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-42	Compliance	Trichloroethene	12	8.3%	0.58	0.58	ug/L	A	1.0	ug/L	No	No
MW-42	Compliance	Vinyl Chloride	12	83%	0.12	0.09	ug/L	LN	0.20	ug/L	No	No
MW-42	Compliance	Ammonia as N	12	100%	6.7	5.9	mg/L	LN	0.19	mg/L	Yes	No
MW-43	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-43	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No

TABLE 3-2: 2017 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2015 through December 31, 2017

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-43	Compliance	Arsenic, total	12	17%	0.0562	0.056	ug/L	A	0.462	ug/L	No	No
MW-43	Compliance	Iron, total	12	100%	2.5	1.51	mg/L	LN	0.30	mg/L	**Yes**	No
MW-43	Compliance	Manganese, total	12	100%	0.12	0.10	mg/L	N	0.05	mg/L	**Yes**	No
MW-43	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-43	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-43	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-43	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-43	Compliance	Ammonia as N	12	67%	0.06	0.05	mg/L	LN	0.19	mg/L	No	**Yes (▼)**
MW-29A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-29A	Downgradient	Arsenic, total	6	100%	2.13	2.04	ug/L	LN	0.462	ug/L	**Yes**	No
MW-29A	Downgradient	Iron, total	6	100%	4.6	4.26	mg/L	LN	0.30	mg/L	**Yes**	No
MW-29A	Downgradient	Manganese, total	6	100%	1.4	1.35	mg/L	Z	0.05	mg/L	**Yes**	No
MW-29A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-29A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-29A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-29A	Downgradient	Ammonia as N	6	100%	0.095	0.08	mg/L	Z	0.19	mg/L	No	**Yes (▼)**
MW-32	Downgradient	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-32	Downgradient	Arsenic, total	12	100%	10.7	10.2	ug/L	LN	0.462	ug/L	**Yes**	No
MW-32	Downgradient	Iron, total	12	100%	0.94	0.75	mg/L	LN	0.30	mg/L	**Yes**	**Yes (▼)**
MW-32	Downgradient	Manganese, total	12	100%	2.9	2.3	mg/L	Z	0.05	mg/L	**Yes**	**Yes (▼)**
MW-32	Downgradient	cis-1,2-dichloroethene	12	8.3%	0.81 (ND)	0.81	ug/L	A*	35	ug/L	No	No
MW-32	Downgradient	Ethyl ether	11	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	Trichloroethene	12	42%	0.66	0.66	ug/L	A***	1.0	ug/L	No	No
MW-32	Downgradient	Vinyl Chloride	12	100%	0.46	0.38	ug/L	LN	0.20	ug/L	**Yes**	**Yes (▼)**

TABLE 3-2: 2017 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2015 through December 31, 2017

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-32	Downgradient	Ammonia as N	11	18%	0.039	0.039	mg/L	A	0.19	mg/L	No	No
MW-33A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33A	Downgradient	Arsenic, total	6	100%	0.610	0.618	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33A	Downgradient	Iron, total	6	100%	2.5	2.2	mg/L	Z	0.30	mg/L	**Yes**	No
MW-33A	Downgradient	Manganese, total	6	100%	0.09	0.20	mg/L	LN	0.05	mg/L	**Yes**	No
MW-33A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33A	Downgradient	Ammonia as N	6	50%	0.30	0.30	mg/L	A	0.19	mg/L	**Yes**	No
MW-33C	Downgradient	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33C	Downgradient	Arsenic, total	10	100%	2.67	2.60	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33C	Downgradient	Iron, total	10	80%	0.33	0.29	mg/L	LN	0.3	mg/L	No	No
MW-33C	Downgradient	Manganese, total	10	100%	0.29	0.21	mg/L	Z	0.05	mg/L	**Yes**	No
MW-33C	Downgradient	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33C	Downgradient	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33C	Downgradient	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33C	Downgradient	Ammonia as N	10	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-36A	Downgradient	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-36A	Downgradient	Arsenic, total	10	100%	0.616	0.580	ug/L	LN	0.462	ug/L	**Yes**	No
MW-36A	Downgradient	Iron, total	10	40%	0.11	0.11	mg/L	A	0.3	mg/L	No	No
MW-36A	Downgradient	Manganese, total	10	70%	0.0034	0.003	mg/L	A***	0.05	mg/L	No	No

TABLE 3-2: 2017 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2015 through December 31, 2017

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-36A	Downgradient	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-36A	Downgradient	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-36A	Downgradient	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-36A	Downgradient	Ammonia as N	10	10%	0.03	0.03	mg/L	A	0.19	mg/L	No	No

NOTES:

[1] N = number of data points used for UCL calculation of the mean; only SIM results used for Vinyl Chloride (e.g., duplicate results with higher RLs by non-SIM were omitted).

[2] MAX = maximum detected result in the data set; if no detected results, then = maximum reporting limit for non-detect results (indicated with ND).

[3] A 3-year moving data set is used for calculation of the UCL.

[4] ug/L - micrograms per liter; mg/L = milligrams per liter.

[5] Groundwater Cleanup Levels are listed on Table 3 of the October 2010 Draft Cleanup Action Plan.

[6] Trend analysis results are based on data for the period January 2005 through December 2017; arrows indicated increasing (▲) or decreasing (▼) trends.

[7] For MW-15R, outlier of 0.41 mg/L from 2-24-15 sampling event was removed prior to UCL calculation

A = Detection frequency of data set too low and/or N too few to calculate 95% UCL of mean; therefore, the highest detected result in the data set used to represent 95% UCL of mean.

A* = Same as note "A" except that the highest value in the data set is below the reporting limit of one or more non-detected results; therefore, the highest reporting limit is used to represent the 95% UCL of the mean.

A** = MTCAStat suggests use of lognormal formula but calculation of 95% UCL of mean by Land's formula provides unrealistic result; therefore, the highest detected result is used to represent the 95% UCL of the mean.

A*** = MTCAStat suggests use of the Z-score method but then cites inability to calculate due to presence of censored values; therefore, the highest detected result is used to represent the 95% UCL of the mean.

B = Detection frequency = 0; therefore, the highest reporting limit in the data set is used to represent the 95% UCL of mean.

LN = The 95% UCL of the mean is calculated using Land's formula since lognormal distribution is indicated.

N = The 95% UCL of the mean is calculated using a normal-based t-statistic since a normal distribution is indicated.

Z = the 95% UCL of the mean is calculated using the Z-score method in MTCAStat since neither normal nor lognormal distribution can be determined.

TABLE 3-3: 2018 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2016 through December 31, 2018

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-15R	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-15R	Compliance	Arsenic, total	12	100%	0.269	0.24	ug/L	LN	0.462	ug/L	No	No
MW-15R	Compliance	Iron, total	12	8.3%	0.11	0.11	mg/L	A	0.30	mg/L	No	No
MW-15R	Compliance	Manganese, total	12	100%	0.0084	0.004	mg/L	Z	0.05	mg/L	No	No
MW-15R	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-15R	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-15R	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-15R	Compliance	Ammonia as N	12	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-34A	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34A	Compliance	Arsenic, total	12	100%	0.488	0.464	ug/L	Z	0.462	ug/L	Yes	No
MW-34A	Compliance	Iron, total	12	17%	0.092	0.06	mg/L	A	0.30	mg/L	No	No
MW-34A	Compliance	Manganese, total	12	83%	0.0044	0.0025	mg/L	LN	0.05	mg/L	No	No
MW-34A	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34A	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34A	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.03	ug/L	B	0.20	ug/L	No	No
MW-34A	Compliance	Ammonia as N	12	17%	0.035	0.035	mg/L	A	0.19	mg/L	No	No
MW-34C	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34C	Compliance	Arsenic, total	12	100%	69.9	44.9	ug/L	LN	0.462	ug/L	**Yes**	No
MW-34C	Compliance	Iron, total	12	100%	96	77	mg/L	LN	0.30	mg/L	**Yes**	No
MW-34C	Compliance	Manganese, total	12	100%	14	5.5	mg/L	LN	0.05	mg/L	**Yes**	No
MW-34C	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34C	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No

TABLE 3-3: 2018 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2016 through December 31, 2018

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-34C	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34C	Compliance	Vinyl Chloride	12	100%	0.081	0.07	ug/L	LN	0.20	ug/L	No	Yes (▼)
MW-34C	Compliance	Ammonia as N	12	25%	0.034	0.034	mg/L	A	0.19	mg/L	No	No
MW-39	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-39	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-39	Compliance	Arsenic, total	12	100%	2.13	1.78	ug/L	Z	0.462	ug/L	Yes	No
MW-39	Compliance	Iron, total	12	100%	37	33.7	mg/L	Z	0.30	mg/L	Yes	No
MW-39	Compliance	Manganese, total	12	100%	0.66	0.45	mg/L	Z	0.05	mg/L	Yes	No
MW-39	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-39	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-39	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-39	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-39	Compliance	Ammonia as N	12	92%	0.65	0.49	mg/L	Z	0.19	mg/L	Yes	No
MW-42	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-42	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-42	Compliance	Arsenic, total	12	100%	1.93	1.81	ug/L	Z	0.462	ug/L	Yes	Yes (▲)
MW-42	Compliance	Iron, total	12	100%	27	24.8	mg/L	LN	0.30	mg/L	Yes	No
MW-42	Compliance	Manganese, total	12	100%	4.5	4.3	mg/L	LN	0.05	mg/L	Yes	Yes (▼)
MW-42	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-42	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-42	Compliance	Trichloroethene	12	17%	0.58	0.58	ug/L	A	1.0	ug/L	No	No
MW-42	Compliance	Vinyl Chloride	12	75%	0.082	0.05	ug/L	LN	0.20	ug/L	No	No
MW-42	Compliance	Ammonia as N	12	100%	8.4	5.8	mg/L	Z	0.19	mg/L	Yes	No
MW-43	Compliance	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-43	Compliance	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-43	Compliance	Arsenic, total	12	42%	0.108	0.108	ug/L	A	0.462	ug/L	No	No
MW-43	Compliance	Iron, total	12	100%	3.5	3.28	mg/L	LN	0.30	mg/L	Yes	No

TABLE 3-3: 2018 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2016 through December 31, 2018

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-43	Compliance	Manganese, total	12	100%	0.11	0.09	mg/L	LN	0.05	mg/L	Yes	No
MW-43	Compliance	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-43	Compliance	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-43	Compliance	Trichloroethene	12	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-43	Compliance	Vinyl Chloride	12	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-43	Compliance	Ammonia as N	12	50%	0.052	0.052	mg/L	A***	0.19	mg/L	No	Yes (▼)
MW-29A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-29A	Downgradient	Arsenic, total	6	100%	2.19	2.16	ug/L	LN	0.462	ug/L	Yes	No
MW-29A	Downgradient	Iron, total	6	100%	4.6	4.30	mg/L	LN	0.30	mg/L	Yes	No
MW-29A	Downgradient	Manganese, total	6	100%	1.4	1.29	mg/L	Z	0.05	mg/L	Yes	No
MW-29A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-29A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-29A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-29A	Downgradient	Ammonia as N	6	100%	0.19	0.12	mg/L	Z	0.19	mg/L	No	Yes (▼)
MW-32	Downgradient	1,1-Dichloroethane	12	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	1,4-Dichlorobenzene	12	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-32	Downgradient	Arsenic, total	12	100%	11.2	10.5	ug/L	LN	0.462	ug/L	Yes	No
MW-32	Downgradient	Iron, total	12	100%	0.81	0.72	mg/L	LN	0.30	mg/L	Yes	No
MW-32	Downgradient	Manganese, total	12	100%	2.6	2.0	mg/L	Z	0.05	mg/L	Yes	No
MW-32	Downgradient	cis-1,2-dichloroethene	12	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-32	Downgradient	Ethyl ether	12	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	Trichloroethene	12	50%	0.71	0.71	ug/L	A***	1.0	ug/L	No	No
MW-32	Downgradient	Vinyl Chloride	12	100%	0.46	0.35	ug/L	LN	0.20	ug/L	Yes	Yes (▼)
MW-32	Downgradient	Ammonia as N	12	33%	0.12	0.12	mg/L	A	0.19	mg/L	No	No
MW-33A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No

TABLE 3-3: 2018 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2016 through December 31, 2018

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-33A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33A	Downgradient	Arsenic, total	6	100%	0.610	0.705	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33A	Downgradient	Iron, total	6	100%	2.5	2.4	mg/L	Z	0.30	mg/L	**Yes**	No
MW-33A	Downgradient	Manganese, total	6	100%	0.083	0.046	mg/L	Z	0.05	mg/L	No	No
MW-33A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33A	Downgradient	Ammonia as N	6	50%	0.30	0.30	mg/L	A**	0.19	mg/L	**Yes**	No
MW-33C	Downgradient	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33C	Downgradient	Arsenic, total	8	100%	2.77	2.65	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33C	Downgradient	Iron, total	8	88%	0.28	0.26	mg/L	LN	0.3	mg/L	No	No
MW-33C	Downgradient	Manganese, total	8	100%	0.29	0.21	mg/L	Z	0.05	mg/L	**Yes**	No
MW-33C	Downgradient	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33C	Downgradient	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33C	Downgradient	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33C	Downgradient	Ammonia as N	8	13%	0.04	0.04	mg/L	A	0.19	mg/L	No	No
MW-36A	Downgradient	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-36A	Downgradient	Arsenic, total	8	100%	0.616	0.592	ug/L	LN	0.462	ug/L	**Yes**	No
MW-36A	Downgradient	Iron, total	8	50%	0.17	0.13	mg/L	LN	0.3	mg/L	No	No
MW-36A	Downgradient	Manganese, total	8	88%	0.0034	0.003	mg/L	LN	0.05	mg/L	No	No
MW-36A	Downgradient	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-36A	Downgradient	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-36A	Downgradient	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No

TABLE 3-3: 2018 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2016 through December 31, 2018

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-36A	Downgradient	Ammonia as N	8	25%	0.031	0.031	mg/L	A	0.19	mg/L	No	No

NOTES:

[1] N = number of data points used for UCL calculation of the mean; only SIM results used for Vinyl Chloride (e.g., duplicate results with higher RLs by non-SIM were omitted).

[2] MAX = maximum detected result in the data set; if no detected results, then = maximum reporting limit for non-detect results (indicated with ND).

[3] A 3-year moving data set is used for calculation of the UCL.

[4] ug/L - micrograms per liter; mg/L = milligrams per liter.

[5] Groundwater Cleanup Levels are listed on Table 3 of the October 2010 Draft Cleanup Action Plan.

[6] Trend analysis results are based on data for the period January 2005 through December 2018; arrows indicated increasing (▲) or decreasing (▼) trends.

A = Detection frequency of data set too low and/or N too few to calculate 95% UCL of mean; therefore, the highest detected result in the data set used to represent 95% UCL of mean.

A* = Same as note "A" except that the highest value in the data set is below the reporting limit of one or more non-detected results; therefore, the highest reporting limit is used to represent the 95% UCL of the mean.

A** = MTCAStat suggests use of lognormal formula but calculation of 95% UCL of mean by Land's formula provides unrealistic result; therefore, the highest detected result is used to represent the 95% UCL of the mean.

A*** = MTCAStat suggests use of the Z-score method but then cites inability to calculate due to presence of censored values; therefore, the highest detected result is used to represent the 95% UCL of the mean.

B = Detection frequency = 0; therefore, the highest reporting limit in the data set is used to represent the 95% UCL of mean.

LN = The 95% UCL of the mean is calculated using Land's formula since lognormal distribution is indicated.

N = The 95% UCL of the mean is calculated using a normal-based t-statistic since a normal distribution is indicated.

Z = the 95% UCL of the mean is calculated using the Z-score method in MTCAStat since neither normal nor lognormal distribution can be determined.

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2017 through December 31, 2019

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-15R	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-15R	Compliance	Arsenic, total	10	100%	0.269	0.24	ug/L	LN	0.462	ug/L	No	No
MW-15R	Compliance	Iron, total	10	0%	0.06 (ND)	0.06	mg/L	B	0.30	mg/L	No	No
MW-15R	Compliance	Manganese, total	10	100%	0.0032	0.002	mg/L	LN	0.05	mg/L	No	Yes (▼)
MW-15R	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-15R	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-15R	Compliance	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-15R	Compliance	Ammonia as N	10	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-34A	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34A	Compliance	Arsenic, total	10	100%	0.488	0.47	ug/L	N	0.462	ug/L	Yes	No
MW-34A	Compliance	Iron, total	10	30%	0.18	0.18	mg/L	A	0.30	mg/L	No	No
MW-34A	Compliance	Manganese, total	10	90%	0.0047	0.002	mg/L	Z	0.05	mg/L	No	No
MW-34A	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34A	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34A	Compliance	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-34A	Compliance	Ammonia as N	10	20%	0.035	0.035	mg/L	A	0.19	mg/L	No	No

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat
Data Input (general): 3-year "moving window", updated annually
Data Input (specific): January 1, 2017 through December 31, 2019
Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-34C	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34C	Compliance	Arsenic, total	10	100%	30.7	32.7	ug/L	LN	0.462	ug/L	**Yes**	No
MW-34C	Compliance	Iron, total	10	100%	39	78	mg/L	LN	0.30	mg/L	**Yes**	No
MW-34C	Compliance	Manganese, total	10	100%	5.3	3.0	mg/L	LN	0.05	mg/L	**Yes**	No
MW-34C	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34C	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34C	Compliance	Vinyl Chloride	10	100%	0.064	0.05	ug/L	LN	0.20	ug/L	No	**Yes (▼)**
MW-34C	Compliance	Ammonia as N	10	20%	0.034	0.034	mg/L	A	0.19	mg/L	No	No
MW-39	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-39	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-39	Compliance	Arsenic, total	10	100%	2.98	2.09	ug/L	Z	0.462	ug/L	**Yes**	No
MW-39	Compliance	Iron, total	10	100%	44	38	mg/L	Z	0.30	mg/L	**Yes**	No
MW-39	Compliance	Manganese, total	10	100%	0.66	0.50	mg/L	Z	0.05	mg/L	**Yes**	No
MW-39	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-39	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-39	Compliance	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-39	Compliance	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-39	Compliance	Ammonia as N	10	100%	0.65	0.53	mg/L	Z	0.19	mg/L	**Yes**	No

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2017 through December 31, 2019

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-42	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-42	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-42	Compliance	Arsenic, total	10	100%	1.84	1.79	ug/L	Z	0.462	ug/L	**Yes**	**Yes (▲)**
MW-42	Compliance	Iron, total	10	100%	26	24.4	mg/L	LN	0.30	mg/L	**Yes**	No
MW-42	Compliance	Manganese, total	10	100%	4.4	4.1	mg/L	LN	0.05	mg/L	**Yes**	**Yes (▼)**
MW-42	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-42	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-42	Compliance	Trichloroethene	10	20%	0.58	0.58	ug/L	A	1.0	ug/L	No	No
MW-42	Compliance	Vinyl Chloride	10	80%	0.094	0.08	ug/L	LN	0.20	ug/L	No	No
MW-42	Compliance	Ammonia as N	10	100%	8.4	5.5	mg/L	Z	0.19	mg/L	**Yes**	No
MW-43	Compliance	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-43	Compliance	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-43	Compliance	Arsenic, total	10	70%	0.108	0.073	ug/L	LN	0.462	ug/L	No	No
MW-43	Compliance	Iron, total	10	100%	3.5	2.23	mg/L	N	0.30	mg/L	**Yes**	No
MW-43	Compliance	Manganese, total	10	100%	0.11	0.08	mg/L	LN	0.05	mg/L	**Yes**	No
MW-43	Compliance	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-43	Compliance	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-43	Compliance	Trichloroethene	10	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-43	Compliance	Vinyl Chloride	10	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-43	Compliance	Ammonia as N	10	40%	0.052	0.052	mg/L	A	0.19	mg/L	No	**Yes (▼)**

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2017 through December 31, 2019

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-29A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-29A	Downgradient	Arsenic, total	6	100%	2.19	2.12	ug/L	LN	0.462	ug/L	**Yes**	No
MW-29A	Downgradient	Iron, total	6	100%	4.2	4.12	mg/L	LN	0.30	mg/L	**Yes**	No
MW-29A	Downgradient	Manganese, total	6	100%	1.4	1.29	mg/L	Z	0.05	mg/L	**Yes**	No
MW-29A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-29A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-29A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-29A	Downgradient	Ammonia as N	6	100%	0.19	0.12	mg/L	Z	0.19	mg/L	No	**Yes (▼)**
MW-32	Downgradient	1,1-Dichloroethane	10	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	1,4-Dichlorobenzene	10	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-32	Downgradient	Arsenic, total	10	100%	11.2	10.6	ug/L	LN	0.462	ug/L	**Yes**	No
MW-32	Downgradient	Iron, total	10	100%	0.94	0.79	mg/L	LN	0.30	mg/L	**Yes**	No
MW-32	Downgradient	Manganese, total	10	100%	3.3	2.4	mg/L	Z	0.05	mg/L	**Yes**	No
MW-32	Downgradient	cis-1,2-dichloroethene	10	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-32	Downgradient	Ethyl ether	10	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	Trichloroethene	10	60%	0.71	0.58	ug/L	LN	1.0	ug/L	No	No
MW-32	Downgradient	Vinyl Chloride	10	100%	0.37	0.33	ug/L	LN	0.20	ug/L	**Yes**	**Yes (▼)**
MW-32	Downgradient	Ammonia as N	10	60%	0.12	0.12	mg/L	A	0.19	mg/L	No	No

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2017 through December 31, 2019

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-33A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33A	Downgradient	Arsenic, total	6	100%	0.61	0.509	ug/L	Z	0.462	ug/L	**Yes**	No
MW-33A	Downgradient	Iron, total	6	100%	2.5	2.2	mg/L	N	0.30	mg/L	**Yes**	No
MW-33A	Downgradient	Manganese, total	6	100%	0.028	0.044	mg/L	LN	0.05	mg/L	No	No
MW-33A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33A	Downgradient	Ammonia as N	6	33%	0.13	0.13	mg/L	A	0.19	mg/L	No	No
MW-33C	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33C	Downgradient	Arsenic, total	6	100%	2.88	2.80	ug/L	LN	0.462	ug/L	**Yes**	**Yes (▲)**
MW-33C	Downgradient	Iron, total	6	100%	0.11	0.11	mg/L	LN	0.3	mg/L	No	No
MW-33C	Downgradient	Manganese, total	6	100%	0.18	0.17	mg/L	Z	0.05	mg/L	**Yes**	No
MW-33C	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33C	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33C	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33C	Downgradient	Ammonia as N	6	17%	0.04	0.04	mg/L	A	0.19	mg/L	No	No

TABLE 3-4: 2019 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2017 through December 31, 2019

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-36A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-36A	Downgradient	Arsenic, total	6	100%	0.616	0.596	ug/L	LN	0.462	ug/L	**Yes**	No
MW-36A	Downgradient	Iron, total	6	50%	0.17	0.17	mg/L	A	0.3	mg/L	No	No
MW-36A	Downgradient	Manganese, total	6	83%	0.0028	0.003	mg/L	LN	0.05	mg/L	No	No
MW-36A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-36A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-36A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-36A	Downgradient	Ammonia as N	6	17%	0.031	0.031	mg/L	A	0.19	mg/L	No	No

NOTES:

[1] N = number of data points used for UCL calculation of the mean; only SIM results used for Vinyl Chloride (e.g., duplicate results with higher RLs by non-SIM were omitted).

[2] MAX = maximum detected result in the data set; if no detected results, then = maximum reporting limit for non-detect results (indicated with ND).

[3] A 3-year moving data set is used for calculation of the UCL.

[4] ug/L - micrograms per liter; mg/L = milligrams per liter.

[5] Groundwater Cleanup Levels are listed on Table 3 of the October 2010 Draft Cleanup Action Plan.

[6] Trend analysis results are based on data for the period January 2005 through December 2019; arrows indicated increasing (▲) or decreasing (▼) trends.

A = Detection frequency of data set too low and/or N too few to calculate 95% UCL of mean; therefore, the highest detected result in the data set used to represent 95% UCL of mean.

A* = Same as note "A" except that the highest value in the data set is below the reporting limit of one or more non-detected results; therefore, the highest reporting limit is used to represent the 95% UCL of the mean.

A** = MTCAStat suggests use of lognormal formula but calculation of 95% UCL of mean by Land's formula provides unrealistic result; therefore, the highest detected result is used to represent the 95% UCL of the mean.

A*** = MTCAStat suggests use of the Z-score method but then cites inability to calculate due to presence of censored values; therefore, the highest detected result is used to represent the 95% UCL of the mean.

B = Detection frequency = 0; therefore, the highest reporting limit in the data set is used to represent the 95% UCL of mean.

LN = The 95% UCL of the mean is calculated using Land's formula since lognormal distribution is indicated.

N = The 95% UCL of the mean is calculated using a normal-based t-statistic since a normal distribution is indicated.

Z = the 95% UCL of the mean is calculated using the Z-score method in MTCAStat since neither normal nor lognormal distribution can be determined.

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-15R	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-15R	Compliance	Arsenic, total	8	100%	0.269	0.239	ug/L	LN	0.462	ug/L	No	No
MW-15R	Compliance	Iron, total	8	0%	0.06 (ND)	0.06	mg/L	B	0.30	mg/L	No	No
MW-15R	Compliance	Manganese, total	8	100%	0.0026	0.002	mg/L	Z	0.05	mg/L	No	Yes (▼)
MW-15R	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-15R	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-15R	Compliance	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-15R	Compliance	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-15R	Compliance	Ammonia as N	8	0%	0.03 (ND)	0.03	mg/L	B	0.19	mg/L	No	No
MW-34A	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34A	Compliance	Arsenic, total	8	100%	0.492	0.482	ug/L	LN	0.462	ug/L	Yes	No
MW-34A	Compliance	Iron, total	8	50%	0.18	0.17	mg/L	LN	0.30	mg/L	No	No
MW-34A	Compliance	Manganese, total	8	87.5%	0.0047	0.003	mg/L	Z	0.05	mg/L	No	No
MW-34A	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34A	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34A	Compliance	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34A	Compliance	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-34A	Compliance	Ammonia as N	8	12.5%	0.031	0.031	mg/L	A	0.19	mg/L	No	No

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-34C	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-34C	Compliance	Arsenic, total	8	100%	30.7	36.9	ug/L	LN	0.462	ug/L	**Yes**	No
MW-34C	Compliance	Iron, total	8	100%	46	84	mg/L	LN	0.30	mg/L	**Yes**	No
MW-34C	Compliance	Manganese, total	8	100%	5.3	3.3	mg/L	Z	0.05	mg/L	**Yes**	No
MW-34C	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-34C	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-34C	Compliance	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-34C	Compliance	Vinyl Chloride	8	100%	0.055	0.05	ug/L	LN	0.20	ug/L	No	**Yes (▼)**
MW-34C	Compliance	Ammonia as N	8	12.5%	0.031	0.031	mg/L	A	0.19	mg/L	No	No
MW-39	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-39	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-39	Compliance	Arsenic, total	8	100%	2.98	2.39	ug/L	LN	0.462	ug/L	**Yes**	No
MW-39	Compliance	Iron, total	8	100%	44	40	mg/L	Z	0.30	mg/L	**Yes**	No
MW-39	Compliance	Manganese, total	8	100%	0.49	0.47	mg/L	LN	0.05	mg/L	**Yes**	No
MW-39	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-39	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-39	Compliance	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-39	Compliance	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-39	Compliance	Ammonia as N	8	100%	0.65	0.52	mg/L	Z	0.19	mg/L	**Yes**	No

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-42	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-42	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-42	Compliance	Arsenic, total	8	100%	1.97	1.85	ug/L	LN	0.462	ug/L	**Yes**	**Yes (▲)**
MW-42	Compliance	Iron, total	8	100%	25	24.4	mg/L	Z	0.30	mg/L	**Yes**	No
MW-42	Compliance	Manganese, total	8	100%	4.2	4.1	mg/L	LN	0.05	mg/L	**Yes**	**Yes (▼)**
MW-42	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-42	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-42	Compliance	Trichloroethene	8	12.5%	0.47	0.47	ug/L	A	1.0	ug/L	No	No
MW-42	Compliance	Vinyl Chloride	8	87.5%	0.094	0.08	ug/L	N	0.20	ug/L	No	No
MW-42	Compliance	Ammonia as N	8	100%	8.4	5.5	mg/L	Z	0.19	mg/L	**Yes**	No
MW-43	Compliance	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-43	Compliance	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-43	Compliance	Arsenic, total	8	87.5%	0.108	0.071	ug/L	Z	0.462	ug/L	No	No
MW-43	Compliance	Iron, total	8	100%	3.5	8.5	mg/L	LN	0.30	mg/L	**Yes**	No
MW-43	Compliance	Manganese, total	8	100%	0.11	0.08	mg/L	LN	0.05	mg/L	**Yes**	**Yes (▼)**
MW-43	Compliance	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-43	Compliance	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-43	Compliance	Trichloroethene	8	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-43	Compliance	Vinyl Chloride	8	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-43	Compliance	Ammonia as N	8	12.5%	0.052	0.052	mg/L	A	0.19	mg/L	No	**Yes (▼)**

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-29A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-29A	Downgradient	Arsenic, total	6	100%	2.19	2.11	ug/L	LN	0.462	ug/L	Yes	No
MW-29A	Downgradient	Iron, total	6	100%	4.5	4.42	mg/L	N	0.30	mg/L	Yes	No
MW-29A	Downgradient	Manganese, total	6	100%	1.5	1.43	mg/L	Z	0.05	mg/L	Yes	No
MW-29A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-29A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-29A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-29A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-29A	Downgradient	Ammonia as N	6	100%	0.19	0.12	mg/L	Z	0.19	mg/L	No	Yes (▼)
MW-32	Downgradient	1,1-Dichloroethane	8	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	1,4-Dichlorobenzene	8	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-32	Downgradient	Arsenic, total	8	100%	11.2	10.7	ug/L	LN	0.462	ug/L	Yes	No
MW-32	Downgradient	Iron, total	8	100%	0.94	0.82	mg/L	LN	0.30	mg/L	Yes	No
MW-32	Downgradient	Manganese, total	8	100%	3.3	2.7	mg/L	LN	0.05	mg/L	Yes	No
MW-32	Downgradient	cis-1,2-dichloroethene	8	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-32	Downgradient	Ethyl ether	8	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-32	Downgradient	Trichloroethene	8	87.5%	0.71	0.57	ug/L	Z	1.0	ug/L	No	No
MW-32	Downgradient	Vinyl Chloride	8	100%	0.36	0.32	ug/L	LN	0.20	ug/L	Yes	Yes (▼)
MW-32	Downgradient	Ammonia as N	8	87.5%	0.12	0.07	mg/L	Z	0.19	mg/L	No	No

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-33A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33A	Downgradient	Arsenic, total	6	100%	0.607	0.696	ug/L	LN	0.462	ug/L	**Yes**	No
MW-33A	Downgradient	Iron, total	6	100%	4.6	9.0	mg/L	LN	0.30	mg/L	**Yes**	No
MW-33A	Downgradient	Manganese, total	6	100%	0.099	0.099	mg/L	A**	0.05	mg/L	**Yes**	No
MW-33A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33A	Downgradient	Ammonia as N	6	33%	0.21	0.21	mg/L	A	0.19	mg/L	**Yes**	No
MW-33C	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-33C	Downgradient	Arsenic, total	6	100%	2.89	2.87	ug/L	LN	0.462	ug/L	**Yes**	**Yes (▲)**
MW-33C	Downgradient	Iron, total	6	100%	0.37	0.23	mg/L	Z	0.3	mg/L	No	No
MW-33C	Downgradient	Manganese, total	6	100%	0.21	0.19	mg/L	N	0.05	mg/L	**Yes**	No
MW-33C	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-33C	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-33C	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-33C	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-33C	Downgradient	Ammonia as N	6	17%	0.04	0.04	mg/L	A	0.19	mg/L	No	No

TABLE 3-5: 2020 Annual Groundwater Cleanup Level Statistical Evaluation Summary

Olympic View Sanitary Landfill

Statistical Methodology: calculation of 95% UCL of mean per MTCAStat

Data Input (general): 3-year "moving window", updated annually

Data Input (specific): January 1, 2018 through December 31, 2020

Wells Evaluated: (1) Compliance -- MW-15R, MW-34A, MW-34C, MW-39, MW-42, MW-43; (2) Downgradient -- MW-29A, MW-32, MW-33A, MW-33C, MW-36A

Monitoring Well	Monitoring Well Type	Corrective Action Monitoring Parameter	N[1]	% Detect	Max[2]	95% UCL of Mean[3]	Units[4]	Note	Groundwater Cleanup Level[5]	Units[4]	Does 95% UCL Exceed Cleanup Level?	Significant Trend?[6]
MW-36A	Downgradient	1,1-Dichloroethane	6	0%	0.38 (ND)	0.38	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	1,4-Dichlorobenzene	6	0%	0.84 (ND)	0.84	ug/L	B	2.0	ug/L	No	No
MW-36A	Downgradient	Arsenic, total	6	100%	0.594	0.585	ug/L	LN	0.462	ug/L	**Yes**	No
MW-36A	Downgradient	Iron, total	6	50%	0.17	0.17	mg/L	A	0.3	mg/L	No	No
MW-36A	Downgradient	Manganese, total	6	67%	0.0024	0.003	mg/L	LN	0.05	mg/L	No	No
MW-36A	Downgradient	cis-1,2-dichloroethene	6	0%	0.81 (ND)	0.81	ug/L	B	35	ug/L	No	No
MW-36A	Downgradient	Ethyl ether	6	0%	0.72 (ND)	0.72	ug/L	B	50	ug/L	No	No
MW-36A	Downgradient	Trichloroethene	6	0%	0.46 (ND)	0.46	ug/L	B	1.0	ug/L	No	No
MW-36A	Downgradient	Vinyl Chloride	6	0%	0.02 (ND)	0.02	ug/L	B	0.20	ug/L	No	No
MW-36A	Downgradient	Ammonia as N	6	17%	0.031	0.031	mg/L	A	0.19	mg/L	No	No

NOTES:

[1] N = number of data points used for UCL calculation of the mean; only SIM results used for Vinyl Chloride (e.g., duplicate results with higher RLs by non-SIM were omitted).

[2] MAX = maximum detected result in the data set; if no detected results, then = maximum reporting limit for non-detect results (indicated with ND).

[3] A 3-year moving data set is used for calculation of the UCL.

[4] ug/L - micrograms per liter; mg/L = milligrams per liter.

[5] Groundwater Cleanup Levels are listed on Table 3 of the October 2010 Draft Cleanup Action Plan.

[6] Trend analysis results are based on data for the period January 2005 through December 2020; arrows indicated increasing (▲) or decreasing (▼) trends.

A = Detection frequency of data set too low and/or N too few to calculate 95% UCL of mean; therefore, the highest detected result in the data set used to represent 95% UCL of mean.

A* = Same as note "A" except that the highest value in the data set is below the reporting limit of one or more non-detected results; therefore, the highest reporting limit is used to represent the 95% UCL of the mean.

A** = MTCAStat suggests use of lognormal formula but calculation of 95% UCL of mean by Land's formula provides unrealistic result; therefore, the highest detected result is used to represent the 95% UCL of the mean.

A*** = MTCAStat suggests use of the Z-score method but then cites inability to calculate due to presence of censored values; therefore, the highest detected result is used to represent the 95% UCL of the mean.

B = Detection frequency = 0; therefore, the highest reporting limit in the data set is used to represent the 95% UCL of mean.

LN = The 95% UCL of the mean is calculated using Land's formula since lognormal distribution is indicated.

N = The 95% UCL of the mean is calculated using a normal-based t-statistic since a normal distribution is indicated.

Z = the 95% UCL of the mean is calculated using the Z-score method in MTCAStat since neither normal nor lognormal distribution can be determined.

6.3 Agency Approval Letters for Natural Background Concentrations

KITSAP PUBLIC
HEALTH DISTRICT

345 6th Street, Suite 300
Bremerton, WA 98337
360-728-2235

July 15, 2021

Phil Perley
Waste Management
9081 Tujunga Ave
Sun Valley, CA 91352

RE: CHAPTER 172-200 WASHINGTON ADMINISTRATIVE CODE GROUNDWATER QUALITY CRITERIA MODIFICATION to CALCULATED NATURAL BACKGROUND CONCENTRATIONS for OLYMPIC VIEW SANITARY LANDFILL REGIONAL GROUNDWATER

Dear Mr. Perley:

Kitsap Public Health District agrees to modify the Chapter 173-200 Washington Administrative Code groundwater quality criteria concentrations for arsenic, manganese, and iron to the statistically derived background concentrations for the aquifer surrounding the Olympic View Sanitary Landfill in Bremerton, Washington. This approval is based on the following Technical Memorandum and letters:

- *Revised Technical Memorandum: Statistical Derivation of Background Metal Concentrations - Olympic View Sanitary Landfill*, dated May 20, 2021, JMO Consulting (on behalf of Waste Management of Washington), and

- *Recommended Adoption of Background Concentrations of Arsenic, Manganese, and Iron as Groundwater Quality Criteria, Olympic View Sanitary Landfill, Bremerton, Washington* dated July 15, 2021, Washington State Department of Ecology (attached).

Please update the Sampling and Analysis Plan to reference background concentrations incorporated under WAC 173-200-050(3)(b)(ii) and submit it to the Health District and Ecology at your convenience. If you have any questions or require additional information, please do not hesitate to contact me at 360-728-2274.

Sincerely,

Patrick Hamel
Environmental Health Specialist
Solid & Hazardous Waste Program
Kitsap Public Health District

Cc: Tim O'Connor, Ecology, NWRO
Alan Noell, Ecology, NWRO

Attachment

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • PO Box 330316 • Shoreline, Washington 98133-9716 • (206) 594-0000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

July 15, 2021

Patrick Hamel
Environmental Health Specialist
Solid & Hazardous Waste Program
Kitsap Public Health District
345 6th St., Suite 300
Bremerton, WA 98337

Re: Recommended Adoption of Background Concentrations of Arsenic, Manganese, and Iron as Groundwater Quality Criteria, Olympic View Sanitary Landfill, Bremerton, Washington

Dear Mr. Hamel:

Waste Management owns and operates the Olympic View Sanitary Landfill (OVSL), located at 10015 SW Barney White Road in Port Orchard, Washington. Kitsap Public Health District (KPHD) regulates OVSL as a municipal solid waste (MSW) landfill under Chapter 173-351 of the Washington Administrative Code (WAC) and the Washington State Department of Ecology (Ecology) regulates OVSL as a formal cleanup site under Chapter 173-340 of the WAC (Model Toxics Control Act, MTCA).

Waste Management completed landfill closure in 2004 under WAC 173-351. Waste Management entered into MTCA agreed orders with Ecology on January 31, 2000 and June 9, 2011. KPHD is the permitting authority under WAC 173-351 and Ecology provides technical assistance to KPHD under this regulation. When a cleanup action is implemented under MTCA, Ecology is the lead agency and KPHD provides input in accordance with WAC 173-351-460 and -465. KPHD continues to regulate all MSW landfill units during the cleanup action.

Current Groundwater Quality Standards

Groundwater quality standards have been established under WAC 173-351 and WAC 173-340. WAC 173-351-440(8) requires the landfill owner to establish groundwater protections using groundwater quality criteria in WAC 173-200, and states that the background level must be used as the groundwater protection standard when background concentrations exceed quality criteria. Groundwater quality criteria are defined in WAC 173-200-040 Table 1. However, WAC 173-200-050(3)(b)(ii), states that the enforcement limits should not exceed the background groundwater quality. Waste Management defined the groundwater quality standards in the OVSL Sampling and Analysis Plan, Revision 1.2 (April 2019), Tables 4 through 7, which do not account for background concentrations.

The June 9, 2011 Agreed Order (DE 8462) requires Waste Management to implement the Cleanup Action Plan (CAP), dated December 2011. The CAP defines groundwater cleanup levels that were developed in accordance with WAC 173-340-720 (Groundwater cleanup standards) and applicable local,

state, and federal laws. WAC 173-720(7)(c) states that groundwater cleanup levels should not be set below natural background concentrations. Waste Management calculated background concentrations of arsenic, iron, manganese, and ammonia using groundwater monitoring data from upgradient wells at the landfill facility (Remedial Investigation, 2007). Ecology defined groundwater cleanup levels in the CAP, Table 3.

The following table summarizes previously calculated background concentrations and the currently defined groundwater cleanup levels and groundwater quality standards for these analytes.

	WAC 173-200-040 Table 1	Remedial Investigation (2007)	Cleanup Action Plan (2011)	Sampling and Analysis Plan (2017)
Analyte	Groundwater Quality Criteria (µg/L)	Upgradient Background Concentration (µg/L)	Groundwater Cleanup Level (CUL) (µg/L)	Groundwater Quality Standard (µg/L)
Arsenic	0.05	0.462	0.462	0.05
Iron	300	230	300	300
Manganese	50	31	50	50
Ammonia	NA	190	190	10

Regional Groundwater Background Study

Ecology recommended that Waste Management evaluate natural background metal concentrations in regional groundwater during the MTCA periodic review process. Waste Management contracted JMO Consulting to evaluate background concentrations, who coordinated with Ecology and KPHD during the evaluation. JMO Consulting (JMO) submitted two technical memoranda describing the background evaluation:

- Statistical Derivation of Background Metal Concentrations – Olympic View Sanitary Landfill, Kitsap County, Washington (JMO Consulting, May 20, 2021).
- Development of Background Metals Concentrations – Olympic View Sanitary Landfill, Kitsap County, Washington (JMO Consulting, March 25, 2021) (included as Attachment 1 of the May 20, 2021 technical memorandum).

JMO calculated regional background concentrations for arsenic, iron, and manganese in groundwater based on the 95 percent upper confidence limit with 95 percent coverage. The calculated regional background concentrations are: 4.27 µg/L arsenic; 1,900 µg/L iron; and 730 µg/L manganese.

The calculated regional background concentration of arsenic is less than the MTCA Method A cleanup level, which is based on a regulatory accepted background concentration. The calculated regional background concentrations of iron and manganese are less than the MTCA Method B cleanup levels, which are based on toxicological risk.

Ecology recommends that Waste Management revise the Sampling and Analysis Plan (SAP) and adopt the regional background concentrations of arsenic, iron, and manganese and the upgradient background

concentration of ammonia as the groundwater quality standards in accordance with WAC 173-200-050(b)(ii).

The following table summarizes the primary and secondary maximum contaminant levels (MCLs) for drinking water, MTCA Method A and B groundwater cleanup levels, the upgradient background concentrations calculated in the 2007 Remedial Investigation, the regional background concentrations calculated in 2021, and Ecology's recommended groundwater quality standards for the SAP.

Analyte	Primary MCL (µg/L)	Secondary MCL (µg/L)	MTCA Method A CUL (µg/L)	MTCA Method B CUL (µg/L)	Upgradient Bkg. Conc. (µg/L)	Regional Bkg. Conc. (µg/L)	Recommended Groundwater Quality Standard (µg/L)
Arsenic	10	NA	5	0.058	0.462	4.27	4.27
Iron	NA	300	NA	2,400	230	1,900	1,900
Manganese	NA	50	NA	750	31	730	730
Ammonia	NA	NA	NA	NA	190	NE	190

Please contact Tim O'Connor at 425-389-2695 or tim.oconnor@ecy.wa.gov or Alan Noell at 425-213-4803 or alan.noell@ecy.wa.gov if you have any questions.

Sincerely,

Steven Williams

Section Manger
Solid Waste Management Program

Attachment: Revised Technical Memorandum: Statistical Derivation of Background Metal Concentrations – Olympic View Sanitary Landfill, Kitsap County, Washington (JMO Consulting, May 20, 2021).

cc: Tim O'Connor, Ecology, Solid Waste Management Program
Alan Noell, Ecology, Solid Waste Management Program
Phil Perley, Waste Management
Jim Obermier, JMO Consulting

6.4 Environmental Covenant for Landfill Post-Closure Care

When recorded, return to:
WM Corporate Services, Inc.
Real Estate Department
720 E. Butterfield Road
Lombard, IL 60148
ATTN: Deborah Nendick

Tax Parcel Nos.
Brief Legal:

102301-1-001-1005 – 40.00 Acres NE ¼ / NE ¼, 10 - 23N - 1W, W.M
102301-1-004-1002 – 36.57 Acres SE 1/4 / NE ¼, 10 - 23N -1W, W.M.
102301-1-005-1001 – 8.27 Acres SW ¼ / NE ¼, 10 - 23N - 1W, W.M.
102301-2-028-1002 – 38.78 Acres SE ¼ / NW ¼, 10-23N – 1W, W.M.

Cross Reference: None

Declaration of Covenants, Conditions and Restrictions

This Declaration of Covenants, Conditions and Restrictions (**"Declaration"**) is dated September 6, 2011, and is made by WASTE MANAGEMENT OF WASHINGTON, INC., a Delaware corporation, (**"Declarant"**) for the purpose of creating certain covenants, conditions and restrictions as are more particularly described herein.

Recitals

WHEREAS, The Declarant is the owner of the property (**"Property"**) legally described as follows:

Account No. 102301-1-001-1005
The Northeast Quarter of the Northeast Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington

Account No. 102301-1-004-1002
The Southeast Quarter of the Northeast Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington; EXCEPT that portion conveyed to Kitsap County for Masales Road per Auditor's File No. 518278.

Account No. 102301-1-005-1001
That portion of the Southwest Quarter of the Northeast Quarter of Section 10, Township 23 North, Range 1 West W.M., in Kitsap County, Washington, lying northerly of the Barney White Road, as it existed prior to 1937.

Account No. 102301-2-028-1002
The Southeast Quarter of the Northwest Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, less portions described as follows: Beginning at the Southwest corner of the Southeast Quarter of the Northwest Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, and proceeding thence along the west line of said Southeast Quarter of the Northwest Quarter north 0 degrees 58' 51" west 1343.81 feet; thence along the north line of said Southeast Quarter of the Northwest Quarter north 85 degrees 10' 50" east 59.53 feet; thence south 0 degrees 07' 51" East 1345.27 feet; thence along the south line of said Southeast Quarter of the Northwest Quarter south 85 degrees 09' 12" west 39.53 feet to the point of beginning; TOGETHER WITH AN EASEMENT for ingress, egress and utilities over, under and across the existing road running in a southeasterly direction from the Old Belfair Highway across Parcel 1 as described in deed recorded under Auditor's File No. 561298.

WHEREAS, the Property has been used as a landfill facility, commonly known as Olympic View Sanitary Landfill;

WHEREAS, the use of the Property is restricted pursuant to Subsection (2)(c)(iii) of WAC 173-351-500;

WHEREAS, the Property has been used in the past for disposal of asbestos-containing waste material; and

WHEREAS, the Property is subject to 40 CFR 61, Subpart M;

WHEREAS, the Declarant desires and intends to control future site access to and use of the Property.

NOW, THEREFORE, the Declarant hereby declares that the Property is held and shall be held, conveyed, mortgaged or encumbered, leased, rented, used, occupied and improved subject to the following covenants, conditions and restrictions (**"Covenants"**), all of which are declared to control future site access to and use of the Property. All of such Covenants shall run with the land and shall be binding on all parties having or acquiring any right, title or interest in the Property or any part thereof (**"Party"**).

The land has been used as a licensed solid waste disposal facility. Future use of the property during the post closure period shall be limited to post-closure maintenance or as provided in WAC 173-351-500 Section 1.i., Section (2)(c)(iii).

These covenants are to run with the land and shall be binding upon the Party and all persons claiming under term perpetually.

Enforcement shall be by proceedings at law or in equity against any person or persons violating or attempting to violate any covenants either to restrain violation or to recover damages.

Invalidation of any one of these covenants by judgment or court order shall in no way affect any of the other provisions, which shall remain in full force and effect.

IN WITNESS WHEREOF, the Declarant has caused this Declaration to be signed on the date first written above.

WASTE MANAGEMENT OF WASHINGTON, INC., a Delaware corporation

By: _____
Steven D. Richtel
Group Director, Closed Site Management Group

STATE OF COLORADO
COUNTY OF ARAPAHOE

On this 6th of September, 2011, I certify that Steven D. Richtel personally appeared before me, acknowledged that he is the Group Director, Closed Site Management Group, of the corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument for said corporation.

KIMBERLY L. VERNON
NOTARY PUBLIC
STATE OF COLORADO

_____
Notary Public in and for the State of Colorado, residing at 8830 Cloverleaf Cir., Parker, CO 80134.
My appointment expires _____.
My Commission Expires
October 24, 2012

6.5 Environmental Covenant for Corrective Action

Appendix 6.5 A - Covenant for Corrective Action

After Recording Return to:
Madeline Wall
Department of Ecology
Northwest Regional Office
3190 160th Ave SE
Bellevue, WA 98008-5452

PACIFIC NW TITLE 201106300193
Covenants Rec Fee: $ 69.00
06/30/2011 02:43 PM
Walter Washington, Kitsap Co Auditor
Page: 1 of 8

Restrictive (Environmental) Covenant

Grantor: Waste Management of Washington, Inc., a Delaware corporation, Successor by Merger to Olympic View Sanitary Landfill, Inc., a Washington corporation formerly known as Kitsap County Sanitary Landfill, Inc.

Grantee: State of Washington, Department of Ecology

Legal: SE ¼ / SE 1/4, 3 - 23N - 1W, W.M.
NE ¼ / NE ¼, 10 - 23N - 1W, W.M.
NW ¼ / NE ¼, 10 - 23N - 1W, W.M.
SW ¼ / NE 1/4, 10 - 23N - 1W, W.M.
SE ¼ / NW ¼, 10 - 23N - 1W, W.M.
NE ¼ / SE ¼, 10 - 23N - 1W, W.M.
NW ¼ / SE ¼, 10 - 23N - 1W, W.M.
E ½ / SW ¼, 10 - 23N - 1W, W.M.
W ½ / NW ¼, 10 - 23N - 1W, W.M.
SW ¼ / SW ¼, 10 - 23N - 1W, W.M.
W ½ / NW ¼ / SW ½, 10 - 23N - 1W, W.M.

Tax Parcel Nos.:
102301-1-002-1004 – 39.83 Acres
102301-1-003-1003 – 30.00 Acres
102301-4-001-1009 – 37.50 Acres
102301-2-028-1002 – 38.78 Acres
102301-4-002-1008 - 20.00 Acres
102301-1-001-1005 – 40.00 Acres
102301-1-004-1002 – 36.57 Acres
102301-1-005-1001 – 8.27 Acres
102301-3-001-1001 – 134.94 Acres
192501-1-009-2004 - 20.00 Acres

Cross Reference: None

Grantor, Waste Management of Washington, Inc., hereby binds Grantor, its successors and assigns to the land use restrictions identified herein and grants such other rights under this environmental covenant (hereafter "Covenant") made this 18th day of April, 2011 in favor of the State of Washington Department of Ecology (Ecology). Ecology shall have full right of enforcement of the rights conveyed under this Covenant pursuant to the Model Toxics Control Act, RCW 70.105D.030(1)(g), and the Uniform Environmental Covenants Act, 2007 Wash. Laws ch. 104, sec. 12.

This Declaration of Covenant is made pursuant to RCW 70.105D.030(1)(f) and (g) and WAC 173-340-440 by Waste Management of Washington, Inc., its successors and assigns, and the State of Washington Department of Ecology, its successors and assigns (hereafter "Ecology").

A remedial action (hereafter "Remedial Action") occurred at the property that is the subject of this Covenant. The Remedial Action conducted at the property is described in the following document:

Cleanup Action Plan, Olympic View Sanitary Landfill, Kitsap County, Washington, Washington State Department of Ecology, December 2010

This document is on file at Ecology's Northwest Regional Office.

This Covenant is required because the Remedial Action resulted in residual concentrations of vinyl chloride, trichloroethylene, arsenic, iron, manganese, and ammonia which exceed the Model Toxics Control Act Method B Cleanup Levels for groundwater established under WAC 173-340-720.

And

This Restrictive Covenant is required because a conditional point of compliance has been established for groundwater.

++

The undersigned, Waste Management of Washington, Inc., is the fee owner of real property (hereafter "Property") in the County of Kitsap, State of Washington, that is subject to this Covenant. The Property is legally described in Exhibit A of this covenant and made a part hereof by reference.

Waste Management of Washington, Inc. makes the following declaration as to limitations, restrictions, and uses to which the Property may be put and specifies that such declarations shall constitute covenants to run with the land, as provided by law and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Property (hereafter "Owner").

Section 1.

1. No groundwater may be taken from the Property for drinking, cooking, or personal washing. The use of groundwater for other purposes must be approved in writing by Ecology.
2. Any activity on the Property that may result in the release or exposure to the environment of the waste contained in the landfill, or create a new exposure pathway, is prohibited. Some examples of activities that are prohibited in the capped areas include: drilling, digging, placement of any objects or use of any equipment which deforms or stresses the surface beyond its load bearing capability, piercing the surface with a rod, spike or similar item, bulldozing or earthwork, unless such activities are conducted in accordance with the landfill Operations and Maintenance Plan approved by Ecology or prior written approval of the activity has been obtained from Ecology.

Section 2. Any activity on the Property that may interfere with the integrity of the Remedial Action and continued protection of human health and the environment is prohibited.

Section 3. Any activity on the Property that may result in the release or exposure to the environment of a hazardous substance that remains on the Property as part of the Remedial Action, or create a new exposure pathway, is prohibited without prior written approval from Ecology.

Section 4. The Owner of the property must give thirty (30) day advance written notice to Ecology of the Owner's intent to convey any interest in the Property. No conveyance of title, easement, lease, or other interest in the Property shall be consummated by the Owner without

adequate and complete provision for continued monitoring, operation, and maintenance of the Remedial Action.

Section 5. The Owner must restrict leases to uses and activities consistent with the Covenant and notify all lessees of the restrictions on the use of the Property.

Section 6. The Owner must notify and obtain approval from Ecology prior to any use of the Property that is inconsistent with the terms of this Covenant. Ecology may approve any inconsistent use only after public notice and comment.

Section 7. The Owner shall allow authorized representatives of Ecology the right to enter the Property at reasonable times for the purpose of evaluating the Remedial Action; to take samples, to inspect remedial actions conducted at the property, to determine compliance with this Covenant, and to inspect records that are related to the Remedial Action.

Section 8. The Owner of the Property reserves the right under WAC 173-340-440 to record an instrument that provides that this Covenant shall no longer limit use of the Property or be of any further force or effect. However, such an instrument may be recorded only if Ecology, after public notice and opportunity for comment, concurs.

[SIGNATURES APPEAR ON FOLLOWING PAGES]

WASTE MANAGEMENT OF WASHINGTON, INC.

Steven D. Richtel
Group Director, Closed Site Management Group

Dated: 4/25/11

STATE OF COLORADO
COUNTY OF DOUGLAS

On this 25th of April, 2011, I certify that Steven D. Richtel personally appeared before me, acknowledged that he is the Group Director, Closed Site Management Group, of the corporation that executed the within and foregoing instrument, and signed said instrument by free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument for said corporation.

Kimberly L. Vernon
Notary Public in and for the State of Colorado, residing at 8830 Cloverleaf Cir., Parker, CO 80134
My appointment expires _____.

My Commission Expires
October 24, 2012

KIMBERLY L. VERNON
NOTARY PUBLIC
STATE OF COLORADO

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY

Peter D. Christiansen
Section Manager, Waste 2 Resources Program

Dated: 9 JUNE 2011

Exhibit A
Legal Description

Account No. 102301-1-001-1005

The Northeast Quarter of the Northeast Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington

Account No. 102301-01-002-1004

The Northwest Quarter of the Northeast Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, lying northerly of the Barney-White Road, as it existed prior to 1937; EXCEPT any portion within Barney White Road.

Account No. 102301-1-004-1002

The Southeast Quarter of the Northeast Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington; EXCEPT that portion conveyed to Kitsap county for Masales Road per Auditor's File No. 518278.

Account No. 102301-1-003-1003

That portion of the Southwest Quarter of the Northeast Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, lying southerly of the Barney White Road as it existed prior to 1937; EXCEPT Barney White Road

Account No. 102301-1-005-1001

That portion of the Southwest Quarter of the Northeast Quarter of Section 10, Township 23 North, Range 1 West W.M., in Kitsap County, Washington, lying northerly of the Barney White Road, as it existed prior to 1937.

Account No. 102301-2-028-1002

The Southeast Quarter of the Northwest Quarter of Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, less portions described as follows: Beginning at the Southwest corner of the Southeast Quarter of the Northwest Quarter orf Seciton 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, and proceeding thence along the west line of said Southeast Quarter of the Northwest Quarter northy 0 degrees 58' 51" west 1343.81 feet; thence along the north line of said Southeast Quarter of the

Northwest Quarter north 85 degrees 10' 50" east 59.53 feet; thence south 0 degrees 07' 51" East 1345.27 feet; thence along the souty line of said Southeast Quarter of the Northwest Quarter south 85 degrees 09' 12" west 39.53 feet to the point of beginning; TOGETHER WITH AN EASEMENT for ingress, egress and utilities over, under and across the existing road running in a southeasterly direction from the Old Belfair Highway across Parcel 1 as described in deed recorded under Auditor's File No. 561298.

Account No. 102301-4-001-1009

The Northeast Quarter of the Southeast Quarter, Section 10, Township 23 North, Range 1 West, W.M.; LESS portion taken by the United States of America for Bremerton naval yard Railroad right-of-way; situate in Kitsap County, Washington.

Account No. 102301-4-002-1008

The East Half of the Northwest Quarter of the Southeast Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, except that portion if any lying within Masales Road.

Account No. 102301-3-001-1001

Parcel A: The East Half of the Southwest Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington; except that portion thereof conveyed to the United States of America by deed recorded under Auditor's file number 414305.

Parcel B: The West Half of the Northwest Quarter of the Southeast Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington.

Parcel C: The Southwest Quarter of the Southwest Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington.

Parcel D: That portion of the West Half of the Northwest Quarter of the Southwest Quarter, Section 10, Township 23 North, Range 1 West, W.M., in Kitsap County, Washington, lying south of Miller Road.

*** END OF EXHIBIT A ***

Appendix 6.5 B - Covenant for Corrective Action

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Avenue SE • Bellevue, Washington 98008-5452 • (425) 649-7000

August 8, 2011

Mr. Steven D. Richtel, R. G.
Director, Closed Site Management Group
Waste Management, Inc.
2400 West Union Avenue
Englewood, Colorado 80110

Dear Mr. Richtel:

Subject: Groundwater use at Olympic View Sanitary Landfill

The Restrictive (Environmental) Covenant recorded for the Olympic View Sanitary Landfill (OVSL) restricts the use of groundwater at the property:

Section 1.

1. *No groundwater may be taken from the Property for drinking, cooking, or personal use. The use of groundwater for other purposes must be approved in writing by Ecology.*

Groundwater well MW1 is a production well on the OVSL property. In an email sent June 30, 2011, you proposed using water from MW1 for the following purposes:

1. Washing pads (flare, etc.) – fluid is then pumped into leachate pond, and discharged to the POTWs, per an NPDES permit.
2. Maintenance of the leachate pond floating cover – fluid is pumped off as non-contact storm water.
3. Toilet flushing in site trailer – fluid/waste is pumped to a tank, then the tank is pumped into trucks and hauled to a POTW.

A water sample from MW1 was analyzed in September 2005. Results indicate no significant impact from the landfill that would preclude use of the water for the purposes proposed.

Ecology approves the use of groundwater pumped from MW1 for the purposes listed above. The use of the water, however, must be authorized by Ecology in the form of a water right permit or certificate, or fall under the Ground Water Permit Exemption of RCW 90.44.050. A focus sheet on The Ground Water Permit Exemption is enclosed.

Please contact me at 425-649-7015 if you have any questions about this letter.

Sincerely,

Madeline Wall

Madeline Wall, P.E.
Waste 2 Resources Program

Enclosure

cc: Jan Brower, Kitsap County Health District

The Ground Water Permit Exemption
RCW 90.44.050

In Washington State, prospective water users must obtain authorization from the Department of Ecology (Ecology) before diverting surface water or withdrawing ground water, with the one exception discussed below.

Authorization to use surface or ground water is granted by Ecology in the form of a water right permit or certificate.

How the Permit Exemption Works

The permit exemption allows certain users of small quantities of ground water (most commonly, single residential well owners) to construct wells and develop their water supplies without first obtaining a water right permit from Ecology. Here are some other facts ground water users should know:

- All wells for a given project apply toward the limits of the exemption. For example, you cannot irrigate two acres by installing four wells (each serving 1/2 acre). If you wish to develop land and supply the commercial or domestic development with water from several wells, all the wells of the development together must pump 5,000 gallons a day or less to be covered under this exemption. Remember, the cumulative total of withdrawn ground water for a commercial or domestic project exceeding 5,000 gallons a day, you need to secure a water right from Ecology.
- Water users have the option of applying for a water right permit from Ecology even if their uses fall under the permit exemption.
- Water users withdrawing ground water under the exemption establish a water right that is subject to the same privileges and restrictions as a water right permit or certificate obtained directly from Ecology.
- Although exempt ground water withdrawals don't require a water right permit, they are always subject to state water law. In some instances, Ecology has had to regulate, stop or reduce ground water withdrawals when they interfere with prior or "senior" water rights, including instream flow rules.

Definitions

Surface water is water located above the ground, such as a river, stream, spring, or lake.

Ground water is water located under the ground.

For More Information

If you have additional questions, please contact the Ecology regional office nearest you.

Northwest Regional Office
3190-160th Avenue SE
Bellevue, WA 98008-5452
(425) 649-7000

Central Regional Office
15 W. Yakima Ave., Suite 200
Yakima, WA 98902-3452
(509) 575-2490

Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775
(360) 407-6300

Eastern Regional Office
N. 4601 Monroe
Spokane, WA 99205-1295
(509) 329-3400

Special accommodations:

If you need this publication in an alternative format, call the Water Resources Program at 360-407-6600. Persons with hearing loss, call 711 for Washington Relay Service. Persons with a speech disability, call 877-833-6341.

- The permit exemption is not available to prospective water users in certain areas that have been closed to further appropriation because there is limited or no water available. Check with Ecology staff at the regional offices (listed below) for limits that may apply to your development site.

Ground water right exemption

On November 18, 2005, the state Attorney General's Office issued a formal opinion regarding how the ground water exemption, especially for watering livestock, should be applied. There are four types of ground water uses exempt from state water-right permitting requirements:

- Providing water for livestock (no gallon per day limit or acre restriction).
- Watering a non-commercial lawn or garden one-half acre in size or less (no gallon per day limit).
- Providing water for a single home or groups of homes (limited to 5,000 gallons per day).
- Providing water for industrial purposes, including irrigation (limited to 5,000 gallons per day but no acre limit).

Water use of any sort is subject to the "first in time, first in right" clause, originally established in historical western water law and now part of Washington State law. This means that a senior right cannot be impaired by a junior right. Seniority is established by priority date - the date an application was filed for a permitted or certificated water right - or the date that water was first put to beneficial use in the case of claims and exempt ground water withdrawals.

Other laws and regulations: well-drilling

It is important to remember that although you are exempt from the water right permit process under the ground water exemption, all other water laws and regulations still apply. For example, there are a number of rules and regulations associated with the actual drilling of the well. To begin, it is mandatory under state law to submit a Notice of Intent to Construct a Water Well form to Ecology, accompanied by the appropriate fee, at least 72-hours prior to the beginning of construction.

State law requires that all wells meet certain minimum standards for construction. Information on well construction laws and requirements can be accessed at Ecology's Well Construction and Licensing website at http://www.ecy.wa.gov/programs/wr/wells/wellhome.html

This publication and others about water rights and well-drilling are available at: http://www.ecy.wa.gov/programs/wr/wrhome.html

6.6 Site Inspection Checklist

SITE INFORMATION	
Site name: Olympic View Sanitary Landfill	**Date of inspection: May 18, 2021**
Location and Region: Kitsap County, NWRO	**F/S ID: 79649975/4217**
Agency, office, or company leading the five-year review: Ecology, SWM, NWRO	**Weather/temperature: clear with clouds/60s**

Remedy Includes: (Check all that apply)

√Landfill cover/containment
√Access controls
√ Institutional controls
− Groundwater pump and treatment
− Surface water collection and treatment
√ Monitored natural attenuation
− Groundwater containment
− Vertical barrier walls
√Other – landfill gas collection/flare; leachate collection/treatment; surface water controls

Attachments: √ Inspection team roster attached √ Site map attached

INSTITUTIONAL CONTROLS √ Applicable − N/A

A. Fencing

1. **Fencing damaged** − Location shown on site map √ Gates secured − N/A
   Remarks – Entry road gate kept locked. In good repair.

B. Other Access Restrictions

1. **Signs and other security measures** − Location shown on site map − N/A
   Remarks – WM reported that fencing, berms, security cameras, and security drive-through inspections are keeping trespassers out. Cameras are at the LFG flare.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**
   Site conditions imply ICs properly implemented √ Yes − No − N/A
   Site conditions imply ICs being fully enforced √ Yes − No − N/A

   Type of monitoring (*e.g.*, self-reporting, drive by) _____
   Frequency _____
   Responsible party/agency _____
   Contact _____ _____ _____ _____
   Name Title Date Phone no.

   Reporting is up-to-date X Yes − No − N/A
   Reports are verified by the lead agency − Yes − No − N/A

   Specific requirements in deed or decision documents have been met √ Yes − No − N/A
   Violations have been reported − Yes − No − N/A
   Other problems or suggestions: − Report attached

   Inspection requirements are described in the Post Closure Operations and Maintenance Plan (September 2012). Inspections are performed by WM staff (Aspect Consulting). Also, quarterly inspections are conducted by KPHD (Patrick Hamel). The WM inspection reports should be included in the annual report submitted-Phil indicated they would submit these annually. All reports were emailed to Ecology after the site visit.

2. **Adequacy** √ ICs are adequate − ICs are inadequate − N/A
Remarks
Additionally, the Environmental Covenant requires that WM obtain Ecology approval of activities that are prohibited by the covenant, such as disturbing the landfill cover or using groundwater.

GROUND COVERS − Applicable − N/A

Surface

1. **Settlement** (Low spots) − Location shown on site map √ Settlement not evident
Areal extent_____ Depth_____
Remarks_____

2. **Cracks** − Location shown on site map √ Cracking not evident
Lengths_____ Widths_____Depths_____
Remarks_____

3. **Erosion** − Location shown on site map √ Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Holes** − Location shown on site map √Holes not evident
Areal extent_____ Depth_____
Remarks_____

5. **Vegetative Cover** √ Grass √ Cover properly established √ No signs of stress
− Trees/Shrubs (indicate size and locations on a diagram)
Remarks - Grass well established and maintained. Annual mowing.

8. **Wet Areas/Water Damage** − Wet areas/water damage not evident
− Wet areas − Location shown on site map Areal extent_____
− Ponding − Location shown on site map Areal extent_____
− Seeps − Location shown on site map Areal extent_____
− Soft subgrade − Location shown on site map Areal extent_____
Remarks_____

9. **Slope Instability** − Slides − Location shown on site map √ No evidence of slope instability
Areal extent_____
Remarks_____

Treatment System (leachate) √ Applicable − N/A

1. **Treatment Train** (Check components that apply)
- Metals removal − Oil/water separation − Bioremediation
- Air stripping − Carbon adsorbers
- Filters_____
- Additive (*e.g.*, chelation agent, flocculent)_____
- Others_____
- Good condition − Needs Maintenance
- Quantity of groundwater treated annually_____
- Quantity of surface water treated annually_____

Remarks – Leachate is conveyed to a double-lined surface impoundment with a floating cover. The leachate is aerated and periodically trucked to a local POTW. Approx 778,110 gallons of leachate were pumped into the pond in 2020.

2. **Electrical Enclosures and Panels** (properly rated and functional)
− N/A − Good condition − Needs Maintenance
Remarks_____

3. Tanks, Vaults, Storage Vessels
− N/A √ Good condition √ Proper secondary containment
− Needs Maintenance
Remarks – The surface impoundment for leachate storage appears to be in good condition, however, the cover prevents inspection of the pond itself. Liquid that accumulates between the primary and secondary liners is pumped into a graduated plastic tank for measuring before being discharged back into the leachate pond. The quantity of liquid is reported to KPHD and ECY quarterly. The current leachate pump and measuring system has been improved and volumes in the leak detection system have declined.

4. **Discharge Structure and Appurtenances**
− N/A √ Good condition − Needs Maintenance
Remarks – We discussed the mention in the Post Closure Plan of Operations of an overflow pipe from the leachate pond. WM has looked for it in the field, and we looked for it during the site inspection. It appears to no longer exist, but WM needs to research site documents to confirm that it was properly abandoned or removed. Washington State Dam Safety has contacted WM and improvements are being implemented for the safety of the leachate lagoon.

5. **Treatment Building(s)**
√ N/A − Good condition (esp. roof and doorways) − Needs repair
− Chemicals and equipment properly stored
Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
− Properly secured/locked − Functioning − Routinely sampled − Good condition
− All required wells located − Needs Maintenance √ N/A
Remarks: MW-34C was redeveloped and the pump replaced

Monitoring Data

1. Monitoring Data – groundwater and landfill gas
√ Is routinely submitted on time − Is of acceptable quality

2. Monitoring data suggests:
− Groundwater plume is effectively contained − Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

− Properly secured/locked √ Functioning √ Routinely sampled − Good condition

− All required wells located − Needs Maintenance − N/A

Remarks – wells within the monitoring network are routinely sampled in accordance with approved Environmental Monitoring Plan. Several monitoring wells are lost, if they are located they will be evaluated for monitoring or properly abandoned once approved by KPHD and Ecology.

OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

Landfill gas extraction, conveyance, and flaring

Gas is extracted from a network of wells in the waste. Currently the average methane content of the gas is about 26%. Volume of landfill gas is between 175 and 200 SCFM. The well field is maintained and balanced by WM staff. The system appears to be adequately maintained and operated.

OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The purpose of the remedy is to reduce landfill impacts to groundwater – from gas and leachate. The goal is to reduce vinyl chloride, other VOCs, and arsenic, manganese, and iron to below the cleanup levels. Vinyl chloride and other VOCs appear to be declining in compliance and downgradient wells. Data will be evaluated for evidence of downward trends in contaminants of concern.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The closed landfill appears to be well operated and maintained. As the remedy largely consists of properly maintaining the closed landfill, continuing to do so is expected to provide long-term protectiveness.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, which suggest that the protectiveness of the remedy may be compromised in the future.

None identified.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

_____
_____
_____
_____
_____

Inspection Team:

Ecology – Alan Noell and Tim O'Connor
(SWM)

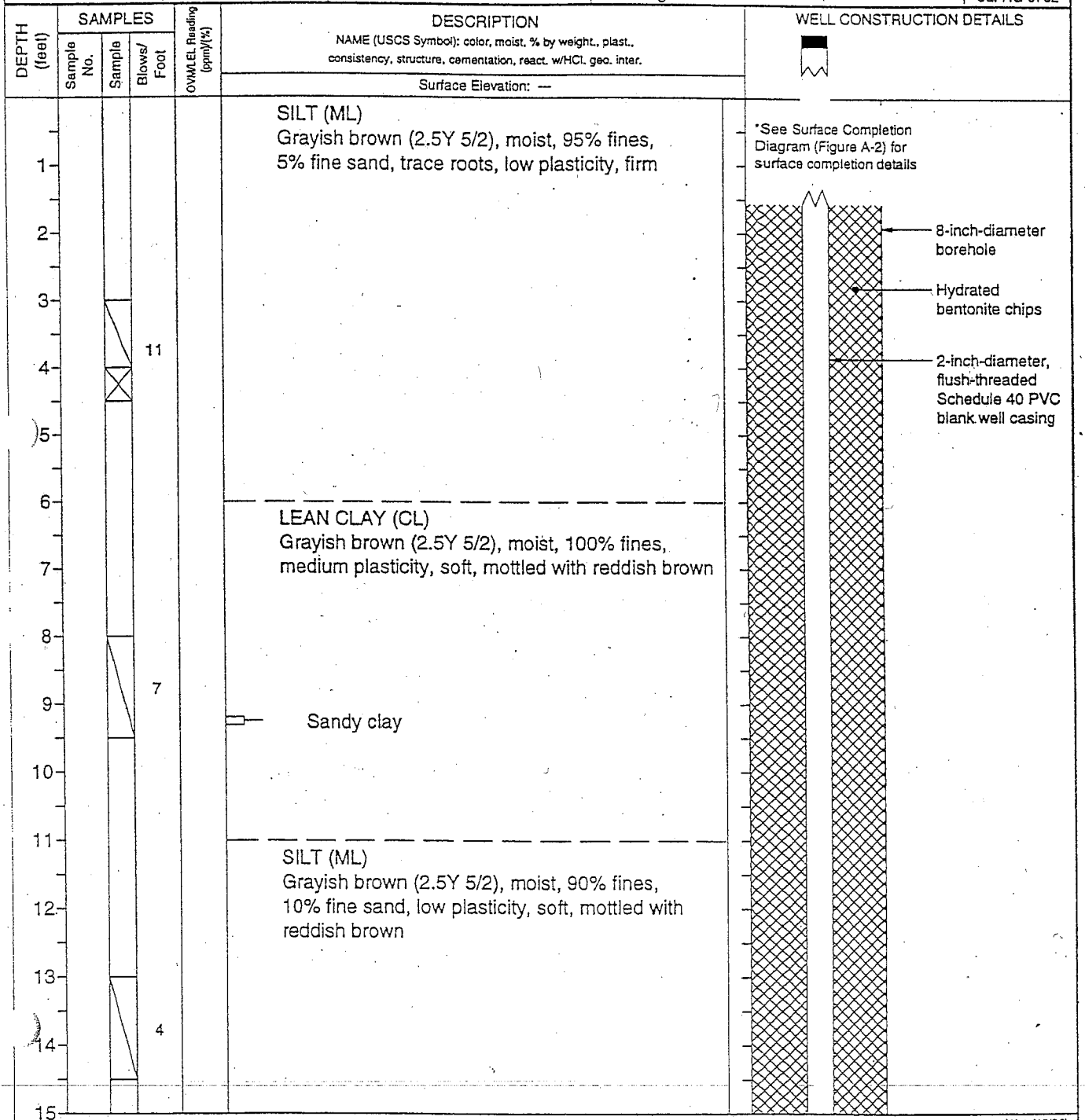
KPHD – Patrick Hamel
Waste Management – Phil Perley and Patrick Madej
Aspect Consulting – Dan Venchiarutti

6.7 Groundwater Monitoring Network Well Logs

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-15R

BORING LOCATION: 525 feet northwest of P-4	ELEVATION AND DATUM: 180.66 feet at top of casing (TOC), 1929 NGVD
DRILLING CONTRACTOR: Tacoma Pump and Drilling, Inc.	DATE STARTED: 6/24/99 / DATE FINISHED: 6/24/99
DRILLING METHOD: Hollow stem auger	TOTAL DEPTH: 33.4 feet bgs / SCREEN INTERVAL: 23.5-32.9 feet bgs
DRILLING EQUIPMENT: Mobile B-61 HDX	DEPTH TO WATER: FIRST 17.5 feet bgs, COMPL. 17.88 feet TOC / CASING: 2-in.-diam. Schedule 40 PVC
SAMPLING METHOD: Standard penetration split-spoon drive sampler	LOGGED BY: T. Gavigan
HAMMER WEIGHT: 140 pounds / DROP: 30 inches	RESPONSIBLE PROFESSIONAL: T. Gavigan / REG. NO. Ca. RG 6782



W-1 (12/95)

Project No. 3946.03	Geomatrix Consultants	Figure A-3

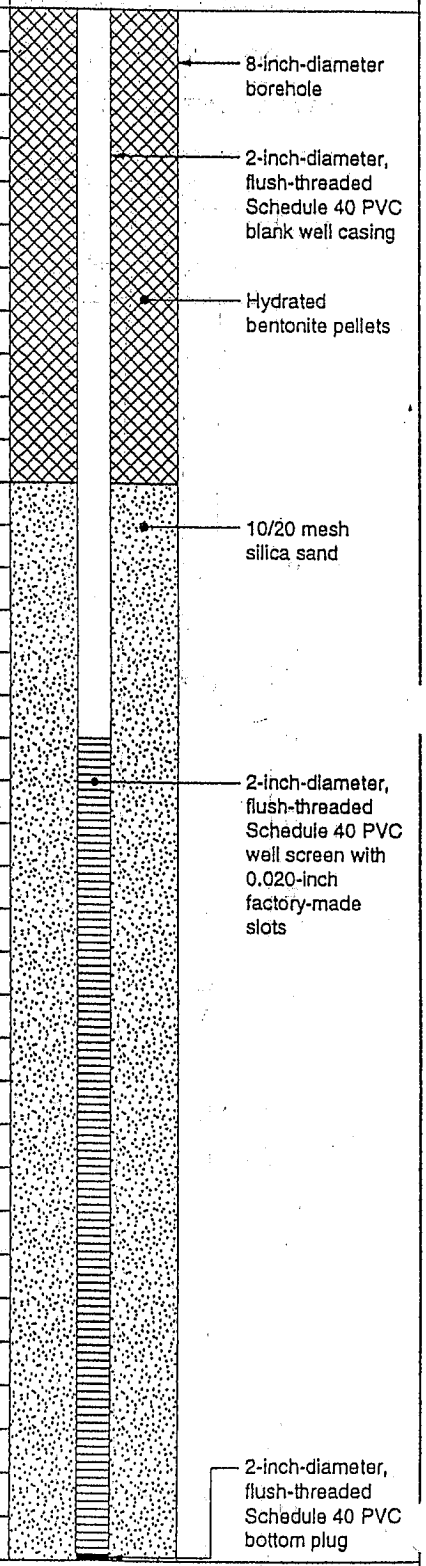
s:\3946.03\vw_9907\logs_MW_15R_01.ai

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-15R (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/LEL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react, w/HCl, geo. inter.
16			9		SILT (ML) (continued) Trace coarse sand
17					
18					SILTY SAND (SM) Grayish brown (2.5Y 5/2), wet, 85% fine to medium sand, 15% nonplastic fines
19			15		Silt
20					
21					SILT (ML) Grayish brown (2.5Y 5/2), wet, 90% fines, 10% fine sand, low plasticity, firm
22					
23					
24			7		Silty sand (approximately 1/4-inch thick) Silty sand (approximately 1/4-inch thick)
25					
26			26		POORLY-GRADED SAND (SP) Dark olive gray (5Y 3/2), wet, 95% fine to medium sand, 5% fines
27					Silt
28			44		Mottled with brown (10YR 4/3)
29					
30			100		Sand content 85%, sand fraction fine to coarse, 10% fine subrounded gravel, brown (10YR 4/3)
31					
32					
33					

WELL CONSTRUCTION DETAILS



W-2 (12/95)

Project No. 3946.03 | Geomatrix Consultants | Figure A-3 (cont.)

s:\3946.03\uw_9907\logs_MW_15R_02.ai

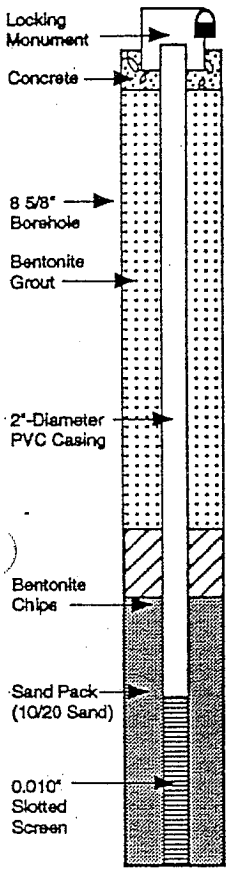
PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-15R (cont.)

Depth (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM-EL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl. geo. inter.	WELL CONSTRUCTION DETAILS
34					POORLY-GRADED SAND (SP) (continued)	8-inch-diameter borehole
35					Bottom of boring at 33.8 feet bgs. Well installed to 33.4 feet bgs.	2-inch-diameter, flush-threaded Schedule 40 PVC bottom plug
36						10/20 mesh silica sand
37						
38						
39						
40						
41						
42						
43						
44						
45						
46						
47						
48						
49						
50						
51						

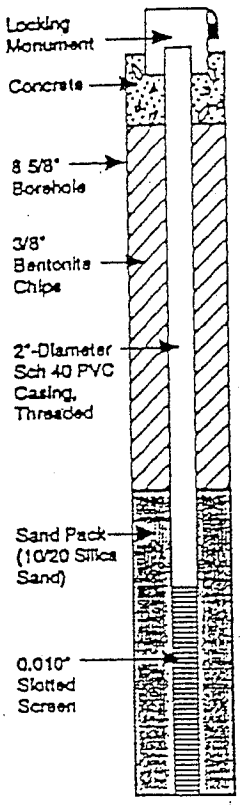
W-2 (12/95)

DRILLING LOG	PROJECT: OLYMPIC VIEW LANDFILL	PROJECT NO: 93C0234B	SHEET: 1 of 1
HOLE NO: MW-29A		ELEVATION AT TOP OF CASING: 160.42'	
LOCATION: SEE FIGURE 2-1		DEPTH TO WATER BELOW GRD SURFACE: 12'	
DRILLING AGENCY: HOLT DRILLING		DATE STARTED: 4/19/93	COMPLETED: 4/19/93
NAME OF DRILLER: J. NIEDERKORN		DRILLING METHOD: HOLLOW STEM AUGER	
TOTAL DEPTH OF HOLE: 25'		INSPECTOR: K. TEAGUE	



DPT (FT)	S T	B/FT	SAMP NO.	% REC.	CLASSIFICATION OF MATERIALS (DESCRIPTION)	P I D	REMARKS
5					Gravel fill (GW).		
	X	7			Black organic silt (OL), moist, abundant roots, vegetable matter.		
10					Brown silty sand (SM). Moist, loose, fine-grained sand.		
	X	2			Very loose, with medium sand below 13.5'.		
20	X	3			Trace of silt (SP/SM) below 18.5'.		
25	X	5			Gravelly below 25'.		
					Total depth of boring = 25'.		
30							
35							
40							

DRILLING LOG	PROJECT: OLYMPIC VIEW LANDFILL	PROJECT NO: 93C0234B	SHEET: 1 of 1
HOLE NO: B-32		ELEVATION AT TOP OF CASING: 152.40'	
LOCATION: SEE FIGURE 1		DEPTH TO WATER BELOW GRD SURFACE: 2.9'	
DRILLING AGENCY: PACIFIC TESTING		DATE STARTED: 6/29/93	COMPLETED: 6/29/93
NAME OF DRILLER: C. GRIFFITH		DRILLING METHOD: HOLLOW STEM AUGER	
TOTAL DEPTH OF HOLE: 20'		INSPECTOR: C. ERIKSSON	



DPT (FT)	S T	B/FT	SAMP NO.	% REC.	CLASSIFICATION OF MATERIALS (DESCRIPTION)	PID	REMARKS
0							
	X	4		100	Silt (ML) at 2'.		
5					Fine-to-medium-to-coarse sandy gravel, brown (GW) at 7'.		Driller reports gravel at 4.5-5'.
	X	33		10	Gray fine-to-medium sand (SP)		Driller reports sand (heaving) at 7'.
10							
	X	14		40	0.1' lens of coarse sand and fine gravel.		
15							Driller reports large cobbles (at least 8") at 15'.
	X	36		10	Gray medium-to-coarse sand (SP).		
20							
					Total depth of boring = 21'.		
25							
30							
35							
40							

Parametrix, Inc.

Exploratory Boring Log

Boring #: MW-33A Total Depth: 20.5 Feet Sheet 1 of 1

Project Name:	Olympic View Sanitary Landfill	Datum:	Feet (MSL)
Project Number:	23-2651-02 (08)	Driller:	Holt Drilling
Location:	Port Orchard, WA.	Drilling Method:	Hollow Stem Auger
PMX Rep:	A. Ackerman	Drill Rig:	
Boring Diameter:	4¼ inches	Well Installed (Y/N):	YES
Date Started:	12/1/95	Casing Material:	SCH 40 PVC
Date Completed:	12/1/95	Well Screen Slot Width:	0.020 INCHES
Sampling Method:	SPLIT-SPOON	Casing Joint Type:	FLUSH THREADED
Ground Elevation:	145.3	Filter Pack Material:	COLORADO 10-20 SAND
Measuring Point Elevation:	147.68	Annular Seal Material:	BENTONITE CHIPS
Northing:	189355.7	Monument Type:	6 INCH STEEL (ABOVE GROUND)
Easting:	1515476.2		

Sample Types: Split spoon

Well Details: Cement, Bentonite Chips, Sand, Bentonite Slurry

▽ ATD

Depth to Water (feet below ground surface)	
Date: 12-1-95	5.76
Time: 12-8-95	3.38

DESCRIPTION:

SOIL: Group Name, Group Symbol, Grain Size, Plasticity, Color, Moisture Content, Density/Compaction, Miscellaneous

(Reference: Unified Soil Classification System)

RECOVERY (INCHES)	LITHO-LOGIC SAMPLE	BLOW COUNT	DEPTH IN FEET	SAMPLE INTERVAL	WELL CONSTRUCTION	LITHOLOGIC DESCRITION	LITHO-LOGIC COLUM
18		3/6/5	5			Poorly graded sand (SP) fine grained, reddish brown to gray, saturated ▽	SP
			10				
18		1/1/1	15			Gray, abundant wood chips	
18		8/9/7	20			Trace fine gravel at 20'	
						End of Boring = 20.5 feet	

C:\CAD\2651-02\MW-33A

Parametrix, Inc.

Exploratory Boring Log

Boring #: MW-33B/C Total Depth: 99.5 Feet Sheet 1 of 4

Project Name: Olympic View Sanitary Landfill
Project Number: 23-2651-02 (08)
Location: Port Orchard, WA
PMX Rep: A. Ackerman
Boring Diameter: 8 inches
Date Started: 12/5/95
Date Completed: 12/8/95
Sampling Method: BAILER
Ground Elevation: 145.0
Measuring Point Elevation: 147.55/147.59
Northing: 189341.8
Easting: 1515472.6

Datum: Feet (MSL)
Driller: Holt Drilling
Drilling Method: Cable Tool
Drill Rig:
Well Installed (Y/N): YES
Casing Material: SCH 40 PVC
Well Screen Slot Width: 0.020 INCHES
Casing Joint Type: FLUSH THREADED
Filter Pack Material: COLORADO 10-20 SAND
Annular Seal Material: BENTONITE CHIPS/SLURRY
Monument Type: 6 INCH STEEL (ABOVE GROUND)

Well Details: Cement; Bentonite Chips; Sand; Bentonite Slurry

▽ ATD

Depth to Water (feet below ground surface)	
Date: 12-6-95	-0.48 (33B) -0.58 (33C)
Time:	

DESCRIPTION:
SOIL: Group Name, Group Symbol, Grain Size, Plasticity, Color, Moisture Content, Density/Compaction, Miscellaneous
(Reference: Unified Soil Classification System)

RECOVERY (INCHES)	LITHO-LOGIC SAMPLE	BLOW COUNT	DEPTH IN FEET	SAMPLE INTERVAL	WELL CONSTRUCTION	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
			5			Poorly graded sand (SP) fine grained, gray to brown, saturated	SP
			10			Silt lens at 10'	
			15			Well graded gravel (GW) fine to coarse grained, some medium grained sand	GW
			20			More fine to medium grained sand at 20'	
						Poorly graded sand (SP), fine grained, some gravel, gray	SP

Exploratory Boring Log (continued)

Boring #: MW-33B/C Total Depth: 99.5 Feet Sheet 2 of 4

Project Name: Olympic View Sanitary Landfill

Project Number: 23-2651-02 (08)

DESCRIPTION:

SOIL: Group Name, Group Symbol, Grain Size, Plasticity, Color, Moisture Content, Density/Compaction, Miscellaneous

(Reference: Unified Soil Classification System)

RECOVERY (INCHES)	LITHO-LOGIC SAMPLE	BLOW COUNT	DEPTH IN FEET	SAMPLE INTERVAL	WELL CONSTRUCTION	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
						Well graded sand (SW), fine to coarse grained, some fine to coarse grained gravel, gray	SW
						Silt (ML), gray	ML
			30			Well graded sand (SW), fine to coarse grained, some fine to coarse grained gravel, gray	SW
			35			Well graded gravel (GW), fine to coarse grained	GW
			40			Well graded sand with gravel (SW), sand fine to coarse grained, gravel fine grained, gray	SW
			45				
			50				

Parametrix, Inc.

Exploratory Boring Log (continued)

Boring #: MW-33B/C Total Depth: 99.5' Sheet 3 of 4

Project Name: Olympic View Sanitary Landfill

Project Number: 23-2651-02 (08)

DESCRIPTION:

SOIL: Group Name, Group Symbol, Grain Size, Plasticity, Color, Moisture Content, Density/Compaction, Miscellaneous

(Reference: Unified Soil Classification System)

RECOVERY (INCHES)	LITHO-LOGIC SAMPLE	BLOW COUNT	DEPTH IN FEET	SAMPLE INTERVAL	WELL CONSTRUCTION	LITHOLOGIC DESCRITION	LITHO-LOGIC COLUMN
			60			Well graded sand with gravel (SW) sand fine to coarse grained, gravel fine grained, gray	SW
			65			Well graded gravel (GW), fine to coarse grained	GW
			70			Silt (ML), gray Some fine gravel, poor recovery in bailer	ML
			75			no gravel	
			80			Some fine gravel, poor recovery in bailer	

Exploratory Boring Log (continued)

Boring #: MW-33B/C Total Depth: 99.5' Sheet 4 of ___

Project Name: Olympic View Sanitary Landfill

Project Number: 23-2651-02 (08)

DESCRIPTION:

SOIL: Group Name, Group Symbol, Grain Size, Plasticity, Color, Moisture Content, Density/Compaction, Miscellaneous

(Reference: Unified Soil Classification System)

RECOVERY (inches)	LITHO-LOGIC SAMPLE	BLOW COUNT	DEPTH IN FEET	SAMPLE INTERVAL / WELL CONSTRUCTION	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
			90		Silt (ML), gray	ML
			95		trace, fine gravel	
			100		End of Boring = 99.5 feet	

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER	23-3037-01	BORING/WELL NUMBER	MW-34A
PROJECT NAME	Olympic View Sanitary Landfill	DATE COMPLETED	October 25, 1996
LOCATION	Port Orchard, Washington	TOTAL DEPTH OF BORING	68.0
COORDINATES	N 189349.7 E 516780.0	INITIAL WATER LEVEL ▽	38.0
DRILLING METHOD	Cable Tool	STATIC WATER LEVEL ▼	38.0
SAMPLING METHOD	3" Split Spoon Grab	LOGGED BY	A. Ackerman
GROUND ELEVATION	195.9 MSL	TOP OF CASING ELEVATION	197.95 MSL

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	8 9 12	12	SS		10	ML		Silt (ML) trace very fine sand, dark greyish brown 10 YR 4/2, low plasticity, moist, trace plant roots, some horizontal laminae, some iron staining
	5 7 12	12	SS		20			Silt (ML) trace very fine sand along bedding planes (every ~1/4 - 1/2"), dark greyish brown 10 YR 4/2, moist, iron staining on bedding planes, moderate plasticity
	7 8 15	12	SS		30			Silt (ML) trace very fine sand, dark greyish brown 10 YR 4/2, moist, some iron staining, moderate plasticity
					35	SW		

Continued Next Page

WELL DIAGRAM

- 4" Sch. 40 PVC
- Bentonite Slurry
- Bentonite Seal
- Fine Sand
- Filter Pack
- 4" Sch. 40 PVC 0.020 Slot

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 23-3037-01

PROJECT NAME Olympic View Sanitary Landfill

BORING/WELL NUMBER MW-34A

DATE COMPLETED October 25, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	7 19 30		SS		40			Well graded sand with silt and gravel (SW), ~10% fines, few coarse rounded gravel, sand is fine grained with trace medium-coarse grained, dark yellowish brown 10 YR 4/3, saturated
	28 30 41		SS		50			Well graded sand (SW) fine to coarse grained, ~50% fine grained, trace fine to coarse rounded gravel, trace silt, very dark greyish brown 10 YR 3/4, ~70% quartz, ~30% dark minerals, saturated Trace well rounded cobbles at 52'
	5 25 73	0	SS		60			Trace cobbles at 57' No recovery, pushed a cobble
					70			End of boring at 68'
					75			

DEPTH (ft.) | WELL DIAGRAM

40 45 50 55 60 65 70 75

Bentonite Chips

BWC_OLY 12/13/96

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 23-3037-01
PROJECT NAME Olympic View Sanitary Landfill
LOCATION Port Orchard, Washington
COORDINATES N 189358.2 E 516789.3
DRILLING METHOD Cable Tool
SAMPLING METHOD 3" Split Spoon Grab
GROUND ELEVATION 196.8 MSL

BORING/WELL NUMBER MW-34B
DATE COMPLETED October 21, 1996
TOTAL DEPTH OF BORING 218.0
INITIAL WATER LEVEL ▽ 43.0
STATIC WATER LEVEL ▼ 39.0
LOGGED BY A. Ackerman
TOP OF CASING ELEVATION 198.93 MSL

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	4 4 6	10	SS		0–5	ML		Silt with sand (ML), ~ 20% fines, subrounded sand, dark yellowish brown 10 YR 4/4, dry, non-plastic, loose, trace organics, trace iron staining.
								Trace fine to coarse sand at 7'
	3 7 7	12	SS		10			Silt (ML), trace very fine sand, olive brown 2.5 Y 4/3, moist, moderate plasticity, medium dense, horizontal laminae at 1/2" intervals beginning at 11' display some iron staining
	4 7 8	12	SS		20			Silt with sand (ML), ~20% fine sand, olive brown 7.5 Y 4/4, moist, moderate plasticity, medium dense, iron staining on laminae at 10'
	4 11 15		SS		30			Silt with sand (ML), trace coarse, well-rounded sand, low plasticity, iron staining on laminae as above, with more staining beginning at 31.2'
					35			

Continued Next Page

DEPTH (ft.)

WELL DIAGRAM

5 — 4" Sch. 40 PVC

15 — Bentonite Slurry

BWC OLY 1 18

Parametrix, Inc.

BORING/WELL CONSTRUCTION LO

PROJECT NUMBER 23-3037-01 BORING/WELL NUMBER MW-34B

PROJECT NAME Olympic View Sanitary Landfill DATE COMPLETED October 21, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION	DEPTH (ft.)	WELL DIAGRAM
					40	SP		Sand and gravel beginning at 35'	40	
								Trace cobbles from 37' to 44'		
	24 17 20	12	SS					Poorly graded sand with silt (SP), ~10% fines, trace cobbles, sand is fine grained subrounded to rounded with trace coarse grained, ~85% quartz, dark yellowish brown 10 YR 3/4, saturated, dense, 1" very fine sand lens at 41'		
					45				45	
								Very dark greyish brown at 48'		
					50			HP-34B-1 at 50'	50	Bento Slurr
	4 10 35	8	SS			SW		Well graded sand (SW), ~10% silt, trace fine to coarse subangular to angular gravel, sand is 70% fine grained, subrounded to subangular, 70% quartz, 30% mafic minerals, very dark greyish brown 10 YR 3/2, saturated, dense, coarse sand and gravel zone at 51.2', some cobbles from 54-56'		
					55				55	
					60				60	
	9 35 70	9	SS			SP		Poorly graded sand (SP), trace silt, trace fine gravel, sand is fine grained, subangular to subrounded, trace medium to coarse grained, 70% quartz, 30% mafic minerals, saturated, very dense		
					65				65	
								Trace fine to coarse well-rounded gravel at 68'		
								HP-34B-2 at 69.5'		
			SS		70			Poorly graded sand (SP), trace silt, fine grained, subrounded, 60% quartz, 40% mafic minerals including mica, very dark greyish brown 10 YR 3/2, saturated, grain size increasing with depth	70	
					75				75	

Continued Next Page

BWC OLY 12/13/96

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 23-3037-01 BORING/WELL NUMBER MW-34B

PROJECT NAME Olympic View Sanitary Landfill DATE COMPLETED October 21, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	35 50 50	9	SS		80	SW		Well graded sand with gravel (SW), ~40% fine subrounded gravel, trace coarse subangular gravel, sand is 80% coarse grained, subrounded, 20% fine grained, rounded, very dark greyish brown 10 YR 3/2, saturated, dense
					85			Less gravel beginning at 86' Trace cobbles at 87'
	6 10 30	10	SS		90	SP		HP-34B-3 at 90' Poorly graded sand with silt (SP), ~15% fines, fine grained, subrounded, 70% quartz, 30% mafic minerals, trace coarse sand and gravel beginning at 91.3', very dark grey 10 YR 3/1, saturated, dense
					95			Some fine to coarse, subangular to subrounded gravel from 96' to 98'
	8 23 50	10	SS		100	ML		Silt (ML), trace very fine sand, dark brown 10 YR 4/3 changing to dark grey 10 YR 4/1 at 101', saturated, very stiff, 1" poorly graded sand with silt lens at 101.4'
	35 40 75		SS		105	SP		Poorly graded sand (SP), trace fines, trace coarse sand, changing to well graded sand with gravel (SW) at 104.5', 90% coarse sand, 30% fine gravel
	40 55 60	7	SS			GM		Silty gravel (GM), ~25% fines, 60% fine grained subrounded gravel, 40% coarse angular sand, dark greyish brown 2.5 Y, saturated 4/2, silt cementing grains, TILL
					110	SP		HP-34B-4 at 110'
	30 50 60	10	SS					Poorly graded sand (SP), trace fines, fine grained, subangular to subrounded, 60% quartz, 40% mafic, very dark greyish brown 10 YR 3/2, saturated, very dense
					115			

DEPTH (ft.)	WELL DIAGRAM
80	
85	
90	Bentonite Slurry
95	
100	
105	
110	
115	

Continued Next Page

Parametrix, Inc.

BORING/WELL CONSTRUCTION LO

PROJECT NUMBER 23-3037-01 BORING/WELL NUMBER MW-34B

PROJECT NAME Olympic View Sanitary Landfill DATE COMPLETED October 21, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	30 60 100	7	SS		120	SW		Well graded sand with silt and gravel (SW), ~10% fines, ~15% fine grained, subrounded gravel, sand is 90% fine grained, 10% medium to coarse grained, subrounded, 60% quartz, 40% mafic, saturated, very dense
					125			Trace coarse, subrounded gravel 124' to 128'
					130			HP-34B-5 at 129'
	30 60 50/ 1/2"	3	SS		135			Well graded sand with silt and gravel (SW), ~10% fines, ~40% fine to coarse grained, well rounded gravel, sand is 80% medium grained, trace fine and coarse grained, subrounded, 70% quartz, dark yellowish brown 10 YR 3/4, saturated, very dense
	85 100/2"	0	SS		140			No recovery, gravel and sand, ~60% gravel, 90% of gravel is fine-grained, 10% coarse grained (up to 6")
					145			No coarse gravel at 145'
	30 70 100/5"	6	SS		150			HP-34B-6 at 150' Well graded sand with silt and gravel (SW), ~10% fines, ~40% fine grained, subangular to subrounded gravel, sand is 70% coarse grained, subangular, dark yellowish brown, 10 YR 4/4, saturated, very dense
					155			Trace coarse gravel at 154 to 156'

Continued Next Page

DEPTH (ft.) 120 125 130 135 140 145 150 155

WELL DIAGRAM

Bentor Slurry

BWC OLY 12/13/96

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 23-3037-01 BORING/WELL NUMBER MW-34B

PROJECT NAME Olympic View Sanitary Landfill DATE COMPLETED October 21, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
						SW		
	25 60 100/3"	7	SS		160			Well graded sand with silt and gravel (SW), ~10% fines, ~40% fines grained, subangular to subrounded gravel, sand is 60% coarse, rounded, 60% quartz, 40% mafic, dark brown 10 YR 3/3, saturated, very dense
					165			
								HP-34B-7 at 170'
	35 75 75	12	SS		170			Well graded sand with gravel (SW), trace silt ~40% fine grained, subrounded gravel, trace coarse gravel, sand is 50% coarse graiend, 50% fine to medium grained, 60% quartz, 40% mafic, dark brown 10 YR 3/3, saturated, dense
					175			Trace 4-6" cobbles at 174-177'
	50 50 100/3"	3	SS		180			Well graded sand with gravel (SW), trace fines, gravel is ~30% fine grained, subrounded, sand is mostly coarse-grained, subrounded, 50% quartz, 50% mafic, dark brown 10 YR 3/3, saturated, very dense trace 4-6" cobbles at 185'
					185			
						SM		HP-34B-8 at 190'
	40 70 80	8	SS		190			Silty sand (SM), trace fine gravel ~40% fines, sand fine grained, trace medium to coarse grained, dark greyish brown 10 YR 4/2, saturated, hard, 2" silt lens at 190.3
						SW		
					195			

DEPTH (ft.)	WELL DIAGRAM
160	
165	
170	Bentonite Slurry
175	
180	
185	
190	Bentonite Seal
	Fine Sand
195	

Continued Next Page

BWC OLY 12/1

Parametrix, Inc.

BORING/WELL CONSTRUCTION LOG

PROJECT NUMBER 23-3037-01 BORING/WELL NUMBER MW-34B

PROJECT NAME Olympic View Sanitary Landfill DATE COMPLETED October 21, 1996

continued from previous page

PID (ppm)	BLOW COUNTS	RECOVERY (inches)	SAMPLE ID.	EXTENT	DEPTH (ft.)	U.S.C.S.	GRAPHIC LOG	GEOLOGIC DESCRIPTION
	30 45 100	3	SS			SW		Well graded sand with gravel (SW), trace silt, ~30% fine grained subrounded gravel, trace coarse gravel, sand is ~75% medium to coarse grained, subangular, dark brown 10 YR 3/3, saturated, very dense
						GW		Trace cobbles at 198'
	65 175/5"	8	SS		200			Well graded gravel with silt and sand (SW), ~10% fines, ~20% fine to coarse grained, subrounded, sand 50% quartz, 50% mafic, gravel is 80% fine grained, subrounded, very dark greyish brown 10 YR 3/2, saturated, very dense
					205			Trace cobbles at 201-106'
								HP-34B-9 at 209'
	120 200/5"	9	SS		210	ML		Gravelly silt (ML) ~10% fine to coarse grained, subangular to subrounded sand, 30% fine grained subrounded to subangular gravel, trace coarse grained gravel, nonplastic, yellowish brown 10 YR 5/6, saturated, silt cementing grains, TILL
						GM		
	100 200/4"	4	SS		215			Silty gravel with sand (GM), ~20% fines, ~20% fine to coarse grained subrounded sand, sand is 50% quartz, 50% mafic, gravel is 90% fine grained, subangular to subrounded, 10% coarse grained, yellowish brown 10 YR 5/4, saturated, dense
								End of boring at 218'
					220			
					225			
					230			
					235			

DEPTH (ft.)	WELL DIAGRAM
200	Filter Pack Sand; 4" Sch. 40 PVC 0.020 Slot
205	
210	Bentonite Chips
215	
220	
225	
230	
235	

BWC OLY 12/13/96

PROJECT: PROJECT NAME Project Location More Project Location			**Well Log Explanation** MW-34C and MW-34C(R)
BORING LOCATION:			ELEVATION AND DATUM:
DRILLING CONTRACTOR:			DATE STARTED: / DATE FINISHED:
DRILLING METHOD:			TOTAL DEPTH: / SCREEN INTERVAL:
DRILLING EQUIPMENT:			DEPTH TO WATER: / FIRST / COMPL. / CASING:
SAMPLING METHOD:			LOGGED BY:
HAMMER WEIGHT:	DROP:		RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

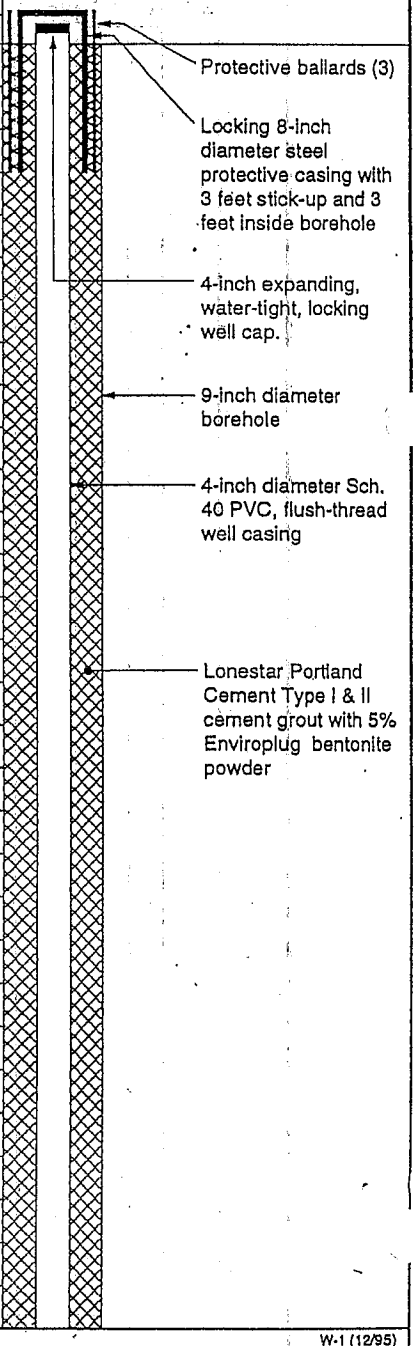
Notes

1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."
2. Soil color described according to Munsell Color Chart.
3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions. Solid lines represent approximate boundaries observed within sample intervals.
4. OVM = organic vapor meter, reading in parts per million.

First water level ▽

PROJECT: OLYMPIC VIEW SANITARY LANDFILL Kitsap County, Washington				**Compilation Log of Well Nos. MW-34C and MW-34C(R)**
BORING LOCATION: Approximately 30 feet from MW-34A				ELEVATION AND DATUM: Top of casing elevation = 199.89 feet above MSL
DRILLING CONTRACTOR: Layne Christensen				DATE STARTED: 1/16/97	DATE FINISHED: 1/20/97
DRILLING METHOD: Dual tube percussion hammer				TOTAL DEPTH: 108 feet	SCREEN INTERVAL: 83-98 feet bgs
DRILLING EQUIPMENT: AP-1000				DEPTH TO WATER: FIRST 43 ft (bgs) COMPL. 37.05 ft (toc)	CASING: 4-inch dia. Sch. 40 PVC
SAMPLING METHOD: Grab samples from Cyclone				LOGGED BY: M. C. Ledesma	
HAMMER WEIGHT: ---		DROP: ---		RESPONSIBLE PROFESSIONAL: T. Hariu	CALIF. REG. NO. 5907

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl. geo. inter. Surface Elevation: ---
2					SILT (ML) Olive brown (2.5Y 4/4), moist, 95% non plastic fines, 5% fine sand, some roots.
4					
6					
8					
10				0.0	
12					
14					
16					
18					
20					Begin mottling with dark yellowish brown (10YR 4/6), increase fines to 100% non plastic fines
22					
24					
26					
28					
30					



W-1 (12/95)

Project No. 3946	Geomatrix Consultants	Figure A-2

3946.003

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Compilation Log of Well Nos. MW-34C and MW-34C(R)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl. geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
32					SILT (ML) (continued) No mottling, increase sand content to 5% fine sand, increase gravel content to 5% coarse rounded gravel	9-inch diameter borehole
34						4-inch diameter Sch. 40 PVC, flush-thread well casing
36					POORLY-GRADED SAND with GRAVEL (SP) Dark grayish brown (2.5Y 4/2), moist, 80% medium sand, 15% fine to coarse rounded gravels, 5% fines	
38						
40				0.0		Lonestar Portland Cement Type I & II cement grout with 5% Enviroplug bentonite powder
42					Wet ATD ▽	
44						
46					POORLY-GRADED SAND with SILT and GRAVEL (SP-SM) Very dark grayish brown (2.5Y 3/2), wet, 60% medium sand, 30% fine to coarse subrounded gravel, 10% fines	
48						
50						
52						
54						Enviroplug bentonite slurry
56					WELL-GRADED SAND with SILT and GRAVEL (SW-SM) Olive brown (2.5Y 4/4), wet, 60% fine to coarse sand, 30% fine to coarse rounded gravels, 10% fines	
58						
60				0.0		
62						
64						
66						

W-2 (12/95)

Project No. 3946 | Geomatrix Consultants | Figure A-2

3946.004

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Compilation Log of Well Nos. MW-34C and MW-34C(R) (cont

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
66					WELL-GRADED SAND with SILT and GRAVEL (SW-SM) (continued)	9-inch diameter borehole
68					WELL-GRADED GRAVEL with SILT and SAND (GW) Dark gray (5Y 4/1), wet, 60% fine to coarse rounded gravel, 30% medium sand, 10% fines	4-inch diameter Sch. 40 PVC, flush-thread well casing
70				0.0		
72						Enviroplug bentonite slurry
74						
76					WELL-GRADED GRAVEL with SAND (GW) Dark greenish gray (5G 4/1), wet, 75% fine to coarse rounded gravel, 25% medium to coarse sand	
78						Colorado 20/40 mesh silica sand
80				0.0		
82						
84						
86						
88					Increase fine to coarse gravel content to 85%, decrease sand content to 15% fine to medium sand	Colorado 10/20 mesh silica sand
90				0.0	WELL-GRADED SAND with SILT (SW-SM) Olive brown (2.5Y 4/4), wet, 80% fine to coarse sand, 10% fine rounded gravel, 10% fines	
92					WELL-GRADED GRAVEL with SAND (GW) Dark greenish gray (5G 4/1), wet, 75% fine to coarse rounded gravel, 20% medium sand, 5% fines	4-inch diameter Sch. 40 PVC, flush-thread, factory-slotted well screen with 0.02-inch slot
94				0.0		
96					WELL-GRADED GRAVEL (GW) Dark greenish gray (5G 4/1), wet, 90% fine to coarse rounded gravel, 10% fine to medium sand	
98					POORLY-GRADED GRAVEL (GP) Dark greenish gray (5G 4/1), wet, 90% fine subangular gravel, 10% medium sand	4-inch-diameter Sch. 40 PVC, flush-thread bottom plug
100						

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Compilation Log of Well Nos. MW-34C and MW-34C(R) (cont.)

Depth (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
102					POORLY-GRADED GRAVEL (GP) (continued)	9-inch diameter borehole
104						
106						Colorado 10/20 mesh silica sand and sloughed native material
108					Boring completed to 108 feet below ground surface. Well screen interval from 83 to 98 feet below ground surface.	
110					Note: This log is a compilation of stratigraphy observed in wells MW-34C and MW-34C(R). The upper 90 feet of this log represents soil samples described during the installation of MW-34C. Well MW-34C(R) was drilled approximately 15 feet east of well MW-34C. The original well MW-34C was abandoned.	
112						
114						
116						
118						
120						
122						
124						
126						
128						
130						
132						
134						
136						

W-2 (12/95)

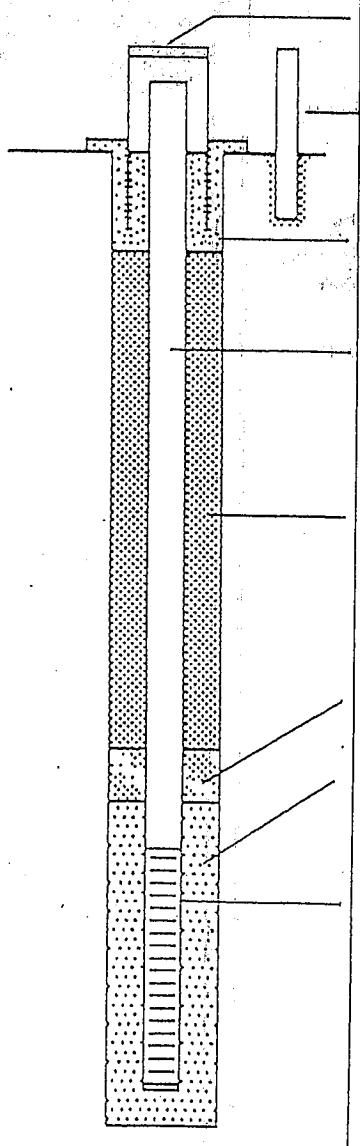
ENTERED

RESOURCE PROTECTION WELL REPORT

PROJECT NAME: Olympic View Landfill
WELL IDENTIFICATION NO. MW-34C
DRILLING METHOD: Percussion Hammer
DRILLER: Pat Gagnon
FIRM: Layne
SIGNATURE: Pat Gagnon
CONSULTING FIRM: Geomatrix
REPRESENTATIVE: MARIA LEDESMA

START CARD NO. 17238
COUNTY: KITSAP
LOCATION: SW ¼ NE ¼ SEC 10 TWN 23 N
STREET ADDRESS OF WELL: Olympic View Landfill, Barney White Rd, Port Orchard, WA
WATER LEVEL BELOW GROUND SURFACE: 38.6
GROUND SURFACE ELEVATION: N/A
DATE(S) INSTALLED: 1-20-97
DATE(S) DEVELOPED: 1-22-97

AS-BUILT



TOTAL DEPTH OF BORING 99 FT.

WELL DATA

STEEL SURFACE MONUMENT
W/LOCK 3 FT. ABOVE G.L.
PROTECTIVE POSTS 3

CONCRETE SURFACE SEAL 0 TO 3 FT.

WELL CASING +2.5 TO 83 FT.
SCHEDULE 40 PVC DIA. 4"

ANNULAR SEALANT 3 TO 40 FT.
MATERIAL Cement/bentonite
40 to 77.5
Enviroplug grout

SEAL 77.5 TO 79 FT.
20-40 Colorado Silica

FILTER PACK 79 TO 99 FT.
MATERIAL: 10-20 Colorado Silica

SCREEN INTERVAL 83 TO 98 FT.
SCHEDULE 40 PVC DIA. 4
020 FACTORY SLOTTED

HOLE DIAMETER
9.5 IN. 0 TO 99 FT.
____ IN. ____ TO ____ FT.

FORMATION DESCRIPTION

0-20 BROWN SILTY CLAY

20-70 GRAYISH SANDY GRAVEL OCCASIONAL COBBLE

70-99 GRAYISH SAND WITH GRAVELS - HEAVING

RECEIVED
FEB 24 1997
DEPARTMENT OF ECOLOGY
SHORELANDS AND
WATER RESOURCES PROGRAM

Layne Christensen Company
1401 E. 26th Street - Tacoma, WA 98421 - (206) 572-3727 Fax (206) 572-3730

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

ENTERED

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. A 11634
UNIQUE WELL I.D. # MW-34C
Water Right Permit No. 23-1W-10 G

(1) OWNER: Name USA WASTE, INC. Address 155 N. REDWOOD DR. SAN RAFAEL CA 94903

LOCATION OF WELL: County KITSAP SW 1/4 NE 1/4 Sec 10 T. 23N N., R. 1W WM

(2a) STREET ADDRESS OF WELL (or nearest address) 10015 SW BARNEY WHITE RD, PORT ORCHARD WA

(3) PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐ ☐ Irrigation ☐ Test Well ☐ Other ☑ ☐ DeWater

(4) TYPE OF WORK: Owner's number of well (if more than one) _____
Abandoned ☑ New well ☐ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 4 inches. Drilled 98 feet. Depth of completed well 88 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 4" Diam. from _____ ft. to _____ ft.
Welded ☐ _____" Diam. from _____ ft. to _____ ft.
Liner installed ☐
Threaded ☑ _____" Diam. from 88 ft. to 0 ft.

Perforations: Yes ☐ No ☐
Type of perforator used _____
SIZE of perforations _____ in. by _____ in.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.
_____ perforations from _____ ft. to _____ ft.

Screens: Yes ☑ No ☐
Manufacturer's Name _____
Type _____ Model No. _____
Diam. _____ Slot size _____ from _____ ft. to _____ ft.
Diam. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel packed: Yes ☑ No ☐ Size of gravel _____
Gravel placed from _____ ft. to _____ ft.

Surface seal: Yes ☐ No ☐ To what depth? _____ ft.
Material used in seal _____
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? _____ Depth of strata _____
Method of sealing strata off _____

(7) PUMP: Manufacturer's Name _____
Type: _____ H.P. _____

(8) WATER LEVELS: Land-surface elevation above mean sea level _____ ft.
Static level _____ ft. below top of well Date _____
Artesian pressure _____ lbs. per square inch Date _____
Artesian water is controlled by _____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? _____
Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test _____
Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.
Airtest _____ gal./min. with stem set at _____ ft. for _____ hrs.
Artesian flow _____ g.p.m. Date _____
Temperature of water _____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Bentonite slurry	88	3
concrete	3	0

Original MW-34C

RECEIVED
MAR 20 1997
DEPARTMENT OF ECOLOGY
SHORELANDS AND
WATER RESOURCES PROGRAM

Work Started 1-21-97 19. Completed 1-21-97 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME LAYNE CHRISTENSEN COMPANY (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address 4101 E. 29TH ST., TACOMA, WA 98422

(Signed) _____ (WELL DRILLER) License No. 1628

Contractor's Registration No. LAYNECC043L7 Date 2-20, 1997

(USE ADDITIONAL SHEETS IF NECESSARY)

PROJECT: OLYMPIC VIEW SANITARY LANDFILL Kitsap County, Washington		# Well Log Explanation MW-36		
BORING LOCATION:		ELEVATION AND DATUM:		
DRILLING CONTRACTOR:		DATE STARTED:		DATE FINISHED:
DRILLING METHOD:		TOTAL DEPTH:		SCREEN INTERVAL:
DRILLING EQUIPMENT:		DEPTH TO WATER: FIRST	COMPL.	CASING:
SAMPLING METHOD:		LOGGED BY:		
HAMMER WEIGHT:	DROP:	RESPONSIBLE PROFESSIONAL:		REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl. geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	MW36-GGW-86					

Notes

1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."
2. Soil color described according to Munsell Color Chart.
3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions. Solid lines represent approximate boundaries observed within sample intervals.
4. OVM = organic vapor meter, reading in parts per million.
5. Odor, if noted, is subjective and not necessarily indicative of specific compounds or concentrations

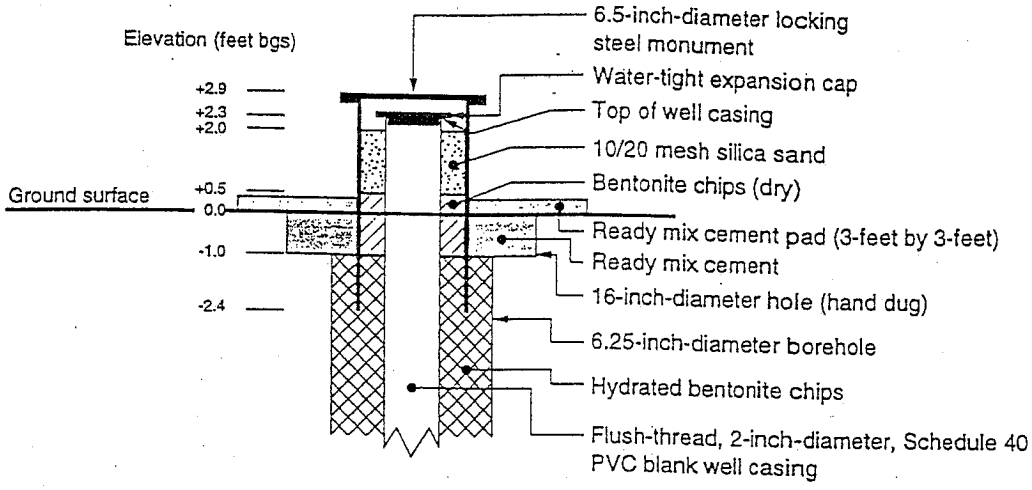
Interval of recovered soil core collected with standard penetration split-spoon sampler

Cored interval with no recovery

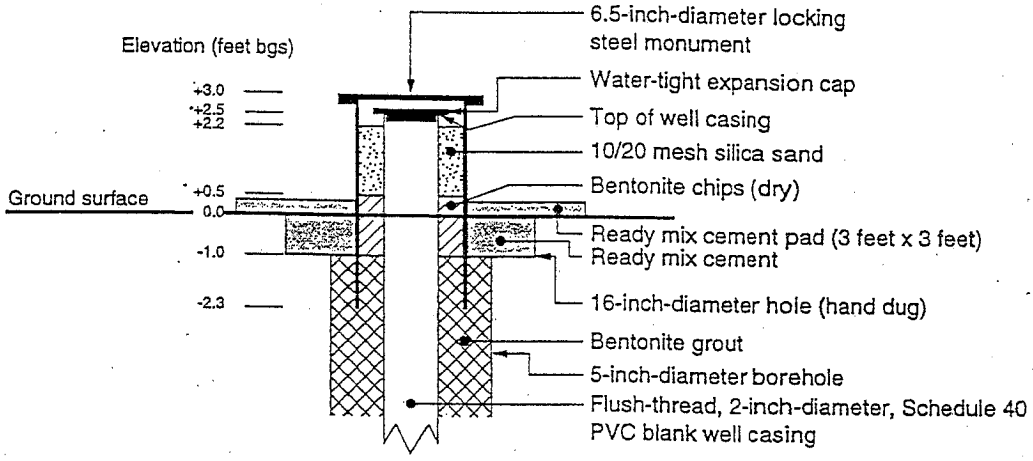
Interval of exposed screen for collection of discrete depth groundwater sample, with sample identification

mw-36

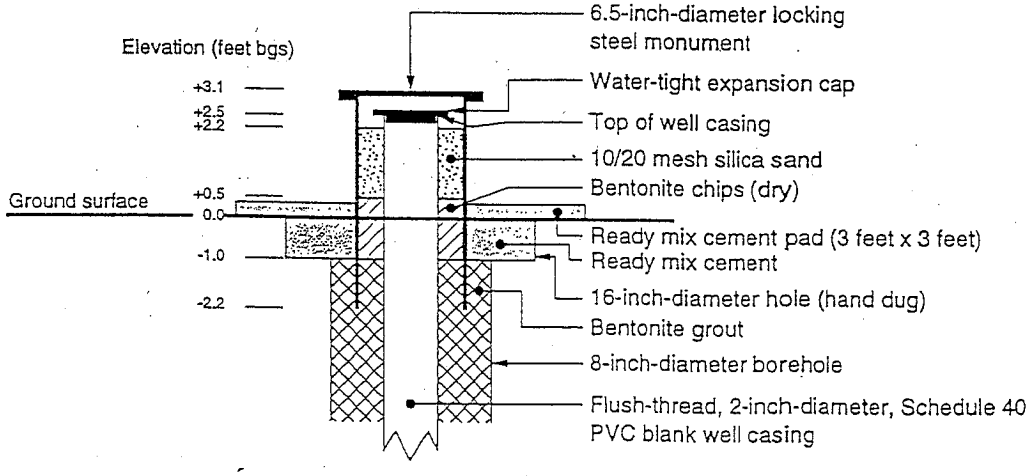
Well MW-15R



Well MW-36



Well MW-39



GEOMATRIX

SCHEMATIC MONITORING WELL
SURFACE COMPLETION DIAGRAM
Olympic View Sanitary Landfill
Kitsap County, Washington

Project No.
3946.03

Figure
A-2

s:\3946.03\w_9907\001.ai

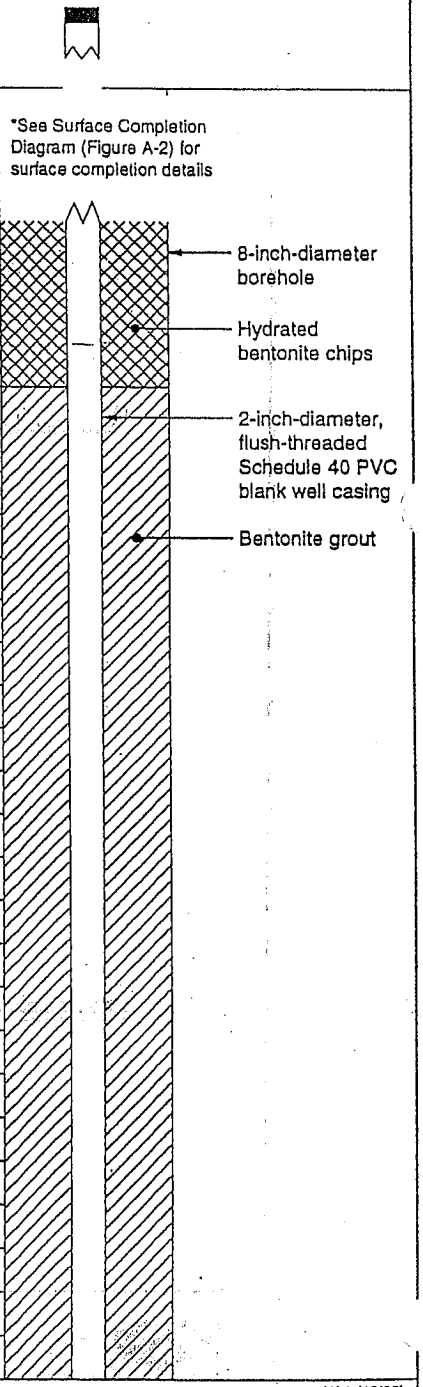
PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36

BORING LOCATION: 450 feet north of MW-34 well cluster		ELEVATION AND DATUM: 189.39 feet at top of casing (TOC), 1929 NGVD	
DRILLING CONTRACTOR: Tacoma Pump and Drilling, Inc.		DATE STARTED: 6/22/99	DATE FINISHED: 6/25/99
DRILLING METHOD: Hollow stem auger		TOTAL DEPTH: 100.5 feet bgs	SCREEN INTERVAL: 90.6-100.0 feet bgs
DRILLING EQUIPMENT: Mobile B-61 HDX		DEPTH TO WATER: FIRST 34.0 feet bgs; COMPL. 30.55 feet TOC	CASING: 2-in.-diam. Schedule 40 PVC
SAMPLING METHOD: Standard penetration split-spoon drive sampler		LOGGED BY: T. Gavigan	
HAMMER WEIGHT: 140 pounds	DROP: 30 inches	RESPONSIBLE PROFESSIONAL: T. Gavigan	REG. NO. Ca. RG 6782

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/LEL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.
					Surface Elevation: ---
1					SILT (ML) Dark brown (10YR 3/3), moist, 80% fines, 20% organic material, low plasticity, firm
2					Olive gray (5Y 5/2), 90% fines, 10% organic material, trace fine sand
3					
4					
5			11		
6					
7					
8					
9					Trace reddish brown mottling, 100% fines, trace fine sand
10			7		
11					
12					
13					
14					
15			6		

WELL CONSTRUCTION DETAILS



W-1 (12/95)

Project No. 3946.03	Geomatrix Consultants	Figure A-4

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PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36 (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/LEL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl geo. inter.	WELL CONSTRUCTION DETAILS
16					SILT (ML) (continued)	8-inch-diameter borehole
17						2-inch-diameter, flush-threaded Schedule 40 PVC blank well casing
18						Bentonite grout
19					No mottling, 95% fines, 5% fine sand	
20			7			
21						
22						
23						
24						
25			12			
26						
27						
28					SILT with SAND (ML) Olive gray (5Y 5/2), moist, 80% fines, 20% fine sand, firm, low plasticity	
29						
30						
31			9			
32						
33						

W-2 (12/95)

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36 (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/EL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS
34					SILT with SAND (ML) (continued)	8-inch-diameter borehole
35			7		SANDY SILT (ML) Olive gray (5Y 5/2), wet, 60% fines, 40% fine sand, low plasticity, soft	2-inch-diameter, flush-threaded Schedule 40 PVC blank well casing
36						Bentonite grout
37						
38						
39						
40			6			
41						
42					POORLY-GRADED SAND (SP) Dark grayish brown (2.5Y 4/2), wet, 95% fine to medium sand, 5% fines, trace coarse sand	
43						
44						
45			26		Silty sand	
46						
47						
48						
49						
50			65		Reddish brown mottling	
51						

W-2 (12/95)

Project No. 3946.03 | Geomatrix Consultants | Figure A-4 (cont.)

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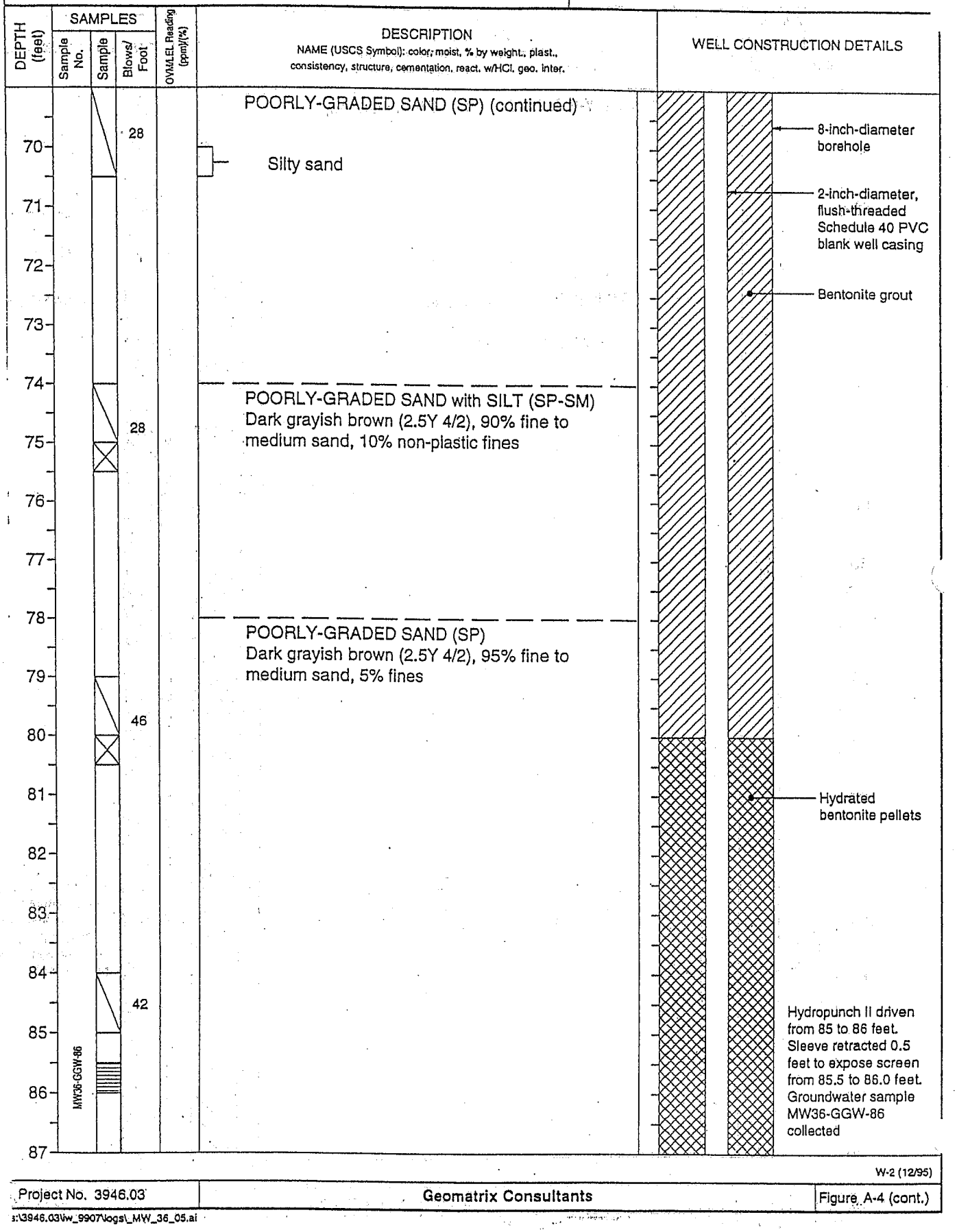
PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36 (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM/LEL: Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS
52					POORLY-GRADED SAND (SP) (continued)	8-inch-diameter borehole
53						2-inch-diameter, flush-threaded Schedule 40 PVC blank well casing
54						
55			54		Sand fraction fine to coarse Dark yellowish brown	Bentonite grout
56						
57						
58						
59			37 50 1"			
60						
61						
62						
63						
64						
65	MW36-GGW-66					Hydropunch II driven from 64 to 66 feet. Sleeve retracted 0.5 feet to expose screen from 65.5 to 66.0 feet. Groundwater sample MW36-GGW-66 collected
66						
67						
68						
69						

PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36 (cont.)



W-2 (12/95)

Project No. 3946.03 | Geomatrix Consultants | Figure A-4 (cont.)

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PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-36 (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/LEL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight, plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS
88					POORLY-GRADED SAND (SP) (continued)	Hydrated bentonite pellets
89						8-inch-diameter borehole
90			17			2-inch-diameter, flush-threaded Schedule 40 PVC blank well casing
91						2-inch-diameter, flush-threaded Schedule 40 PVC well screen with 0.020-inch factory-made slots
92						
93						
94						10/20 mesh silica sand
95			22			
96						
97						
98						
99						
100			10			
101						Sloughed native material
102						
103					Refusal at 102.5 feet bgs. Well installed to 100.5 feet bgs.	
104						
105						

W-2 (12/95)

Project No. 3946.03 | Geomatrix Consultants | Figure A-4 (cont.)

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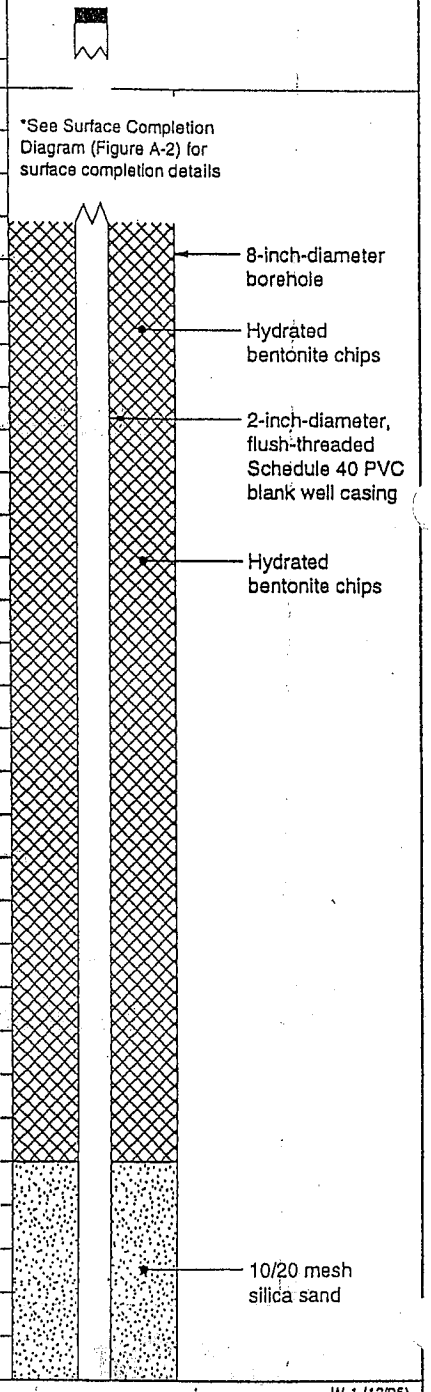
PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-39

BORING LOCATION: 725 feet N15°E of P-4	ELEVATION AND DATUM: 189.92 feet at top of casing (TOC), 1929 NGVD	
DRILLING CONTRACTOR: Tacoma Pump and Drilling, Inc.	DATE STARTED: 6/23/99	DATE FINISHED: 6/23/99
DRILLING METHOD: Hollow stem auger	TOTAL DEPTH: 25.5 feet bgs	SCREEN INTERVAL: 15.6-25.0 feet bgs
DRILLING EQUIPMENT: Mobile B-61 HDX	DEPTH TO WATER: FIRST 15.5 feet bgs; COMPL. 18.96 feet TOC	CASING: 2-in.-diam. Schedule 40 PVC
SAMPLING METHOD: Standard penetration split-spoon drive sampler	LOGGED BY: T. Gavigan	
HAMMER WEIGHT: 140 pounds; DROP: 30 inches	RESPONSIBLE PROFESSIONAL: T. Gavigan	REG. NO. Ca. RG 6782

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/LEL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.
					Surface Elevation: ---
1					POORLY-GRADED SAND (SP) Brown (10YR 5/3), moist, 85% fine to medium sand, 10% fine to coarse subrounded gravel, 5% fines [FILL]
2					
3					
4			13		
5					
6					
7					
8					Grayish brown (2.5Y 5/2) [NATIVE]
9			46		
10					
11					
12					
13					Poorly-graded sand with gravel
14			40		
15					

WELL CONSTRUCTION DETAILS



W-1 (12/95)

Project No. 3946.03 | Geomatrix Consultants | Figure A-5

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PROJECT: OLYMPIC VIEW SANITARY LANDFILL
Kitsap County, Washington

Log of Well No. MW-39 (cont.)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM/EL Reading (ppm)/(%)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS
16			16		POORLY-GRADED SAND (SP) (continued)	8-inch-diameter borehole
					Wet	
17						2-inch-diameter, flush-threaded Schedule 40 PVC blank well casing
18					Dark greenish gray (5BG 3/1)	
19			5			10/20 mesh silica sand
20						
21						2-inch-diameter, flush-threaded Schedule 40 PVC well screen with 0.020-inch factory-made slots
22						
23						
24			9		SANDY SILT (ML) Dark grayish brown (2.5Y 4/2), moist, 60% fines, 40% fine sand, wood fragments, roots	
25			17		No organic material Silty sand with gravel	2-inch-diameter, flush-threaded Schedule 40 PVC bottom plug
26					Dark greenish gray (5BG 3/1)	2-inch-diameter borehole
27					Boring completed to 26.0 feet bgs. Well installed to 25.5 feet bgs.	Sloughed native material
28						
29						
30						
31						
32						
33						

W-2 (12/95)

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BORING LOG

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
2405 140th Ave NE
Suite 107
Bellevue, WA 98005
800-727-6393
FAX (206) 746-6747

PROJECT: OVSL
HOLE #: MW-42
PROJECT LOCATION: Port Orchard, WA
DIAMETER: 8"
JOB NUMBER: 04204027.09
TOTAL DEPTH: 33'
GEOLOGIST/ENGINEER: S. Bond
DATE STARTED: 8/2/09
DRILLER: Cascade
DATE COMPLETED: 8/2/09
DRILL RIG: CME 55 Limited Access
SAMPLING DEVICE: 18" Split Spoon
DRILLING METHOD: Hollow-Stem Auger
PAGE: 1 OF: 2

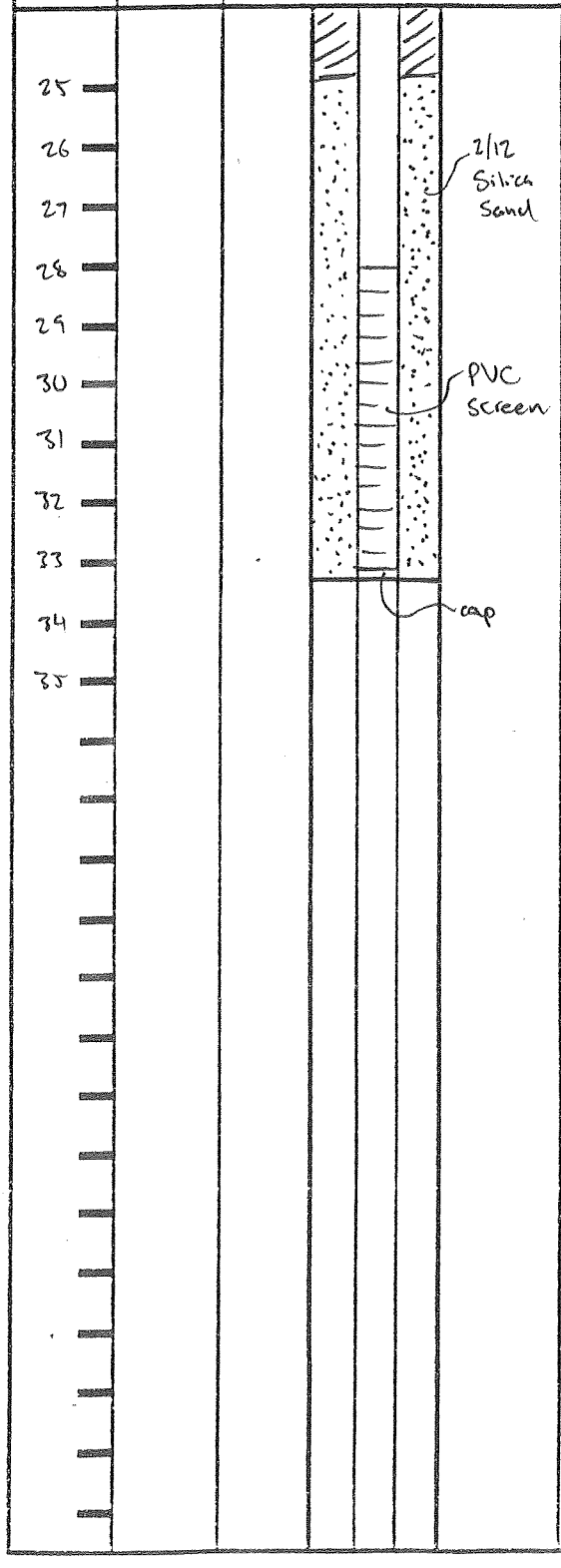
DEPTH (ft)	LAB SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
0–1					SM	- Moist to wet, brown, gravelly, silty, fine to medium SAND with trace organics
5–6.5		7/8" Bentonite Chips (Hydrated)	5	28/50.6"		- Damp, grey-brown, fine to medium SAND with fine, sub-rounded gravel
8					SP	
10–11.5			10	50.4"		- Damp, grey-brown, fine to medium SAND with trace fine gravel
13		2" PVC				
15–16.5			15	50.6"		- Damp, grey-brown, fine to medium SAND with trace fine gravel
20–21.5			20	50.6"		
21						-21' - Damp, grey, fine to coarse SAND with fine gravel
22					SW	

BORING LOG

PROJECT: OVSL HOLE/WELL #: MW-42

JOB NUMBER: 042044027.09 PAGE: 2 OF: 2

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS/FOOT	USCS SYMBOL	DESCRIPTION
25				24/15/15	SW	- Damp to wet, fine to coarse, gravelly SAND with silt
26		2/12 Silica Sand				-26' - Wet, medium to coarse, SAND with fine gravel
27						
28						
29						
30		PVC screen		50-6"		- Wet, fine to medium, grey, SAND
31						-31' - Wet, grey, fine gravelly, medium to coarse SAND
32						
33						
34		cap				
35						



BORING LOG

SCS ENGINEERS
ENVIRONMENTAL CONSULTANTS
2405 140th Ave NE
Suite 107
Bellevue, WA 98005
800-727-6393
FAX (206) 746-6747

PROJECT: OVSL
HOLE #: MW-43
PROJECT LOCATION: Port Orchard, WA
DIAMETER: 8"
JOB NUMBER: 042040027.09
TOTAL DEPTH: 30'
GEOLOGIST/ENGINEER: S. Bond
DATE STARTED: 3/2/09
DRILLER: Cascade
DATE COMPLETED: 3/2/09
DRILL RIG: CME 55 Limited Access
SAMPLING DEVICE: 18" Split Spoon
DRILLING METHOD: Hollow-Stem Auger
PAGE: 1 OF: 2

DEPTH (ft)	LAB SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / FOOT	USCS SYMBOL	DESCRIPTION
0						- Dark brown, moist to wet, fine to coarse, gravelly SAND with silt
5			5' – 6.5'	13/18-6"	SP	- Moist, grey-brown, fine to medium SAND with fine gravel
10		3/8" Bentonite Chips (hydrated)	10' – 11.5'	27/50.5"		- Damp, grey-brown, fine to medium SAND with fine to medium gravel
15		2" PVC	15' – 16.5'	50-6"		- Damp to moist, grey-brown, fine to medium SAND with trace fine gravel
20			20' – 21.5'	28/14/14	SP	- Damp to moist, fine gravelly, fine to medium SAND, grey-brown
25		2/12 Silica Sand				

BORING LOG

PROJECT: OVSL HOLE/WELL #: MW-43

JOB NUMBER: 04204027.09 PAGE: 2 OF: 2

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS/ FOOT	USCS SYMBOL	DESCRIPTION
25		7/12 Silica Sand	25		SP	- Moist to wet, fine to gravelly, fine to medium, grey-brown SAND
26			26.5			
27						
28						
29		PVC Screen				
30			30			-29.5' - Brown, moist, silty, fine to medium SAND
		cap	31.5			

6.8 Groundwater Monitoring Network Concentration Trend Tables

Table 3-1: Concentrations (ug/L) of Chemicals of Concern in Performance Well MW-19C during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	2/22/2016	5/17/2016	8/29/2016	11/14/2016	5/25/2017	11/13/2017	5/16/2018	11/12/2018	5/29/2019	11/13/2019	5/27/2020	11/19/2020
Trichloroethylene	1	-	**1.1**	**1.2**	**1.2**	0.99	0.91	**1.2**	-	**1**	**1.1**	**1**	0.99 (ND)	**1.1**
Vinyl chloride	0.2	-	0.01	-	0.025	0.029	-	-	0.012 (ND)	0.038	0.026	0.046	0.018 (ND)	0.044
Arsenic	0.462	4.27	**2.6**	**2.32**	**2.92**	**2.88**	**2.5**	**2.94**	**2.47**	**2.76**	**2.61**	**3**	**2.74**	**2.94**
Iron	300	1,900	140	240	180	120	190	220	170	150	190	200	190	200
Manganese	50	730	**940**	**890**	**1,100**	**1,200**	**880**	**1,200**	**930**	**1,100**	**1,200**	**1,200**	**1,100**	**1,200**
Ammonia	190	190	**520**	**400**	**490**	**670**	**470**	**460**	**430**	**470**	**470**	**480**	**430**	**450**

Located between Old Barney White Landfill and the leachate surface impoundment.

Well is screened from 85 to 90 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

Table 3-2: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-15R during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	0.22	0.23	0.24	0.24	0.239	-
Iron	300	1,900	110	110	110	60	60	-
Manganese	50	730	10	10	4	2	2	**Decreasing**
Ammonia	190	190	36	30	30	30	30	-

Located west of Phase II landfill area, adjacent to opposing side of Wetland C.

Well is screened from 23 to 33 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-3: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-34A during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.03	0.03 (ND)	0.03 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	0.45	0.452	**0.464**	**0.47**	**0.482**	-
Iron	300	1,900	60	60	60	180	170	-
Manganese	50	730	3	2	2.5	2	3	-
Ammonia	190	190	30	40	35	35	31	-

Located west of Old Barney White Landfill.

Well is screened from 28 to 48 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-4: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-34C during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.12	0.09	0.07	0.05	0.05	**Decreasing**
Arsenic	0.462	4.27	**84.6**	**84.6**	**44.9**	**32.7**	**36.9**	-
Iron	300	1,900	**148,000**	**155,000**	**77,000**	**78,000**	**84,000**	-
Manganese	50	730	**5,900**	**5,500**	**5,500**	**3,000**	**3,300**	-
Ammonia	190	190	31	34	34	34	31	-

Located west of Old Barney White Landfill.

Well is screened from 83 to 98 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-5: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-39 during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	**1.7**	**1.77**	**1.78**	**2.09**	**2.39**	-
Iron	300	1,900	**33,600**	**33,700**	**33,700**	**38,000**	**40,000**	-
Manganese	50	730	**430**	**460**	**450**	**500**	**470**	-
Ammonia	190	190	**390**	**440**	**490**	**530**	**520**	-

Located northwest of the Phase II Landfill Area, adjacent to Wetland.

Well is screened from 15 to 25 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-6: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-42 during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.58	0.58	0.58	0.47	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.13	0.09	0.05	0.08	0.08	-
Arsenic	0.462	4.27	**1.73**	**1.78**	**1.81**	**1.79**	**1.85**	**Increasing**
Iron	300	1,900	**26,800**	**24,900**	**24,800**	**24,400**	**24,400**	-
Manganese	50	730	**4,800**	**4,500**	**4,300**	**4,100**	**4,100**	**Decreasing**
Ammonia	190	190	**6,200**	**5,900**	**5,800**	**5,500**	**5,500**	-

Located near northwest corner of leachate surface impoundment.

Well is screened from 28 to 33 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-7: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Compliance Well MW-43 during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	0.05	0.056	0.108	0.073	0.071	-
Iron	300	1,900	**1,230**	**1,510**	**3,280**	**2,230**	**8,500**	-
Manganese	50	730	**340**	**100**	**90**	**80**	**80**	**Decreasing**
Ammonia	190	190	80	50	52	52	52	**Decreasing**

Located near southwest corner of leachate surface impoundment.

Well is screened from 25 to 30 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-8: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Downgradient Well MW-29A during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	**1.94**	**2.04**	**2.16**	**2.12**	**2.11**	-
Iron	300	1,900	**4,630**	**4,260**	**4,300**	**4,120**	**4,420**	-
Manganese	50	730	**1,390**	**1,350**	**1,290**	**1,290**	**1,430**	-
Ammonia	190	190	90	80	120	120	120	**Decreasing**

Located west of leachate surface impoundment.

Well is screened from 19 to 24 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-9: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Downgradient Well MW-32 during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.5	0.66	0.71	0.58	0.57	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	**0.43**	**0.38**	**0.35**	**0.33**	**0.32**	**Decreasing**
Arsenic	0.462	4.27	**13.8**	**10.2**	**10.5**	**10.6**	**10.7**	-
Iron	300	1,900	**2,000**	**750**	**720**	**790**	**820**	-
Manganese	50	730	**2,800**	**2,300**	**2,000**	**2,400**	**2,700**	-
Ammonia	190	190	39	39	120	120	70	-

Located west of Old Barney White Landfill, adjacent to Wetland D.

Well is screened from 15 to 21 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-10: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Downgradient Well MW-33A during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	**0.468**	**0.618**	**0.705**	**0.509**	**0.696**	-
Iron	300	1,900	**5,000**	**2,200**	**2,400**	**2,200**	**9,000**	-
Manganese	50	730	**80**	**200**	46	44	**99**	-
Ammonia	190	190	**300**	**300**	**300**	130	**210**	-

Located west of Old Barney White Landfill, adjacent to opposing side of Wetland D.

Well is screened from 5 to 20 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-11: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Downgradient Well MW-33C during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	**2.55**	**2.6**	**2.65**	**2.8**	**2.87**	**Increasing**
Iron	300	1,900	300	290	265	110	230	-
Manganese	50	730	**220**	**210**	**210**	**170**	**190**	-
Ammonia	190	190	30	30	40	40	40	-

Located west of Old Barney White Landfill, adjacent to opposing side of Wetland D.

Well is screened from 30 to 40 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect

Table 3-12: 95% Upper Confidence Limits (ug/L) of Chemicals of Concern in Downgradient Well MW-36A during Five-Year Review Period (2016 to 2020)

	Cleanup Level (ug/L)	Background (ug/L)	95% UCL 2016	95% UCL 2017	95% UCL 2018	95% UCL 2019	95% UCL 2020	Trend (2005-2020)
Trichloroethylene	1	-	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	0.46 (ND)	-
cis-1,2-dichloroethylene	35	-	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	0.81 (ND)	-
Vinyl chloride	0.2	-	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	0.02 (ND)	-
Arsenic	0.462	4.27	**0.586**	**0.58**	**0.592**	**0.596**	**0.585**	-
Iron	300	1,900	130	110	130	170	170	-
Manganese	50	730	6	3	3	3	3	-
Ammonia	190	190	30	30	31	31	31	-

Located northwest of Old Barney White Landfill.

Well is screened from 90 to 100 feet bgs.

Bold Red font indicates an exceedance of the cleanup level and background concentration.

95% Upper Confidence Limit (UCL) calculated using previous three years of data.

Trend evaluated by Sen's Non-Parametric Test for Trend using sample data from January 2005 to December 2020.

ND - Non detect