

# Landfill Gas Management Plan

Hidden Valley Landfill  
Puyallup, Washington



**Pierce County Recycling, Composting and Disposal, LLC**  
**d.b.a LRI**

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9/18/25

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## CERTIFICATION

I certify that the landfill gas collection and control system described in this Plan meets the requirements specified in WAC 173-408-080. I further certify that this Plan was prepared by me, or under my direct supervision, and that I am a duly Registered Professional Engineer under the laws of the State of Washington.

**Project:** Updated Landfill Gas Management Plan for the  
Hidden Valley Landfill, Pierce County, Washington  
Pierce County Landfill Recycling and Recovery, Inc. (d.b.a. LRI)

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September 18, 2025

Date

## 1.0 INTRODUCTION

This manual is the primary reference document for the operation, maintenance, and monitoring of the landfill gas system at Hidden Valley Landfill during the post-closure period. The landfill gas system consists of a gas extraction well field, one enclosed flare, and a gas condensate recirculation system. This management plan updates a prior version of the *Landfill Gas Management Plan* (Kleinfelder, 2002). Information regarding groundwater monitoring requirements is included in the *Groundwater Monitoring Plan Hidden Valley Landfill* (SCS, 2018).

## 1.1 MANUAL ORGANIZATION

This document contains essential information about the landfill gas system, including its current operation, maintenance, monitoring, recordkeeping, and reporting requirements. The manual is divided into the following sections.

Section 1: Provides general information about the site and the landfill gas collection system, an overview of landfill gas, and a summary of current regulatory requirements.

Section 2: Describes the landfill gas system components and provides procedures for operation and maintenance of the gas system.

Section 3: Provides monitoring procedures and requirements.

Section 4: Provides record keeping and notification requirements.

## 1.2 SITE DESCRIPTION

Hidden Valley Landfill is located in central Pierce County at 17925 Meridian E, in Puyallup, Washington (Figure 1). The site lies in the north half of the northwest quarter of Section 34, Township 19 north, Range 4 east, of the Willamette Meridian. The landfill property is approximately 92 acres in size. The landfill (now closed) includes approximately 56 acres of unlined fill and a 33.5-acre lined cell (East Lined Area), as well as a leachate pre-treatment facility, a transfer station, a recycling center, a compost facility, and other notable areas (see Figure 2).

Hidden Valley Landfill began its operations around 1965 and accepted municipal solid waste (MSW) until December 31, 1998. Originally, the site was operated by the Pierce County Department of Public Works. Land Recovery, Inc. (LRI), a privately-owned solid waste disposal company, purchased the landfill in 1977 and acted as the primary operator until its closure in 1998. Waste disposed at the landfill included MSW, demolition wastes, and commercial waste. Prior to 1985, when regulations changed, small quantities of liquids, sludges, and industrial wastes were reportedly accepted at the landfill.

## 1.3 SITE CLOSURE AND GAS SYSTEM DEVELOPMENT

The landfill was closed in phases. The unlined portion was capped in the summer seasons of 1989 (North Closure – 13 acres), 1992 (Southwest Closure – 26 acres), and 1993 (remaining unlined area – 17 acres). The East Lined Area was capped in the summers of 1998 (about 11.5 acres), 1999 and 2000 (about 22 acres). Closure activities involved installing an engineered geomembrane cap for the unlined area (per WAC 173-304) or a composite geomembrane cap for the lined area (per WAC 173-351), along with the landfill gas recovery system and storm water controls.

The landfill gas system at Hidden Valley Landfill consists of a gas extraction wellfield that includes **118** vertical extraction wells, **2** horizontal extraction wells and associated valves and piping, a gas condensate collection/recirculation system, a flare station with one enclosed ground flare, and **19** subsurface gas monitoring probes. Wellfield components are shown on (Figure 3). The following provides a brief chronology of the development of the landfill gas system at Hidden Valley Landfill.

- In August 1985, initial gas control measures began with the installation of open-flame candle flares stemming from vertical borings installed in the refuse.
- In early 1986, six horizontal gas collectors and an electric blower were installed to actively extract the gas and feed it into a single candle flare.
- Beginning in 1987, gas probes were installed to evaluate potential subsurface gas migration and the need for additional gas control measures.
- In 1988, 20 vertical gas extraction wells (N3 through N22) were installed within the northern portion of the landfill.
- In January 1989, the first enclosed gas flare was installed near the entrance road and scales area. The flare station included two centrifugal blowers and a 2,100 cubic-foot-per-minute (cfm) enclosed ground flare.
- Between October 1989 and December 1992, 36 additional vertical gas wells (N23 through N46 and N54 through N65) were installed sequentially and connected to the flare facility in conjunction with closure activities.
- In 1993, as part of the East Lined Area expansion, a bottom liner was constructed over refuse along the east sideslope of the landfill. This work included the installation of 15 extraction wells (N47 through N53 and N66 through N73). In addition, two horizontal collectors (N HORIZ 1 and N HORIZ 2) were constructed beneath the sideslope liner to provide pressure relief and increase gas collection from the underlying refuse.
- Between 1994 and 1999, 47 vertical extraction wells (E1 through E43) were installed in the East Lined Area.
- In 1995, the second enclosed flare was installed and the blowers were replaced.
- In 1997 the landfill gas condensate recirculation system was installed.
- In 1998, construction began on the landfill gas-to-energy (LFGTE) facility.
- In March 1999, the LFGTE facility began operation.
- In 2011, the internal combustion engines associated with the LFGTE plant were disconnected.
- On 3/16/11, the new flare associated with Notice of Construction (NOC) No.10284 came online.

## **1.4 LANDFILL GAS CHARACTERISTICS**

### **1.4.1 Landfill Gas Production**

Landfill gas is mainly made up of methane and carbon dioxide in roughly equal parts. It forms when waste breaks down without oxygen (anaerobic conditions). Methane gas is combustible when it makes up 5 to 15 percent of air. Landfill gas generation is a continuous process as long as there is sufficient organic matter available for methanogenic decomposition. The rate and duration of gas generation vary between sites, influenced by factors such as the landfills age, the type and moisture content of the waste, the rate at which new waste is added, the size and compaction of the refuse, as well as internal conditions like moisture content, temperature, pH, and nutrient levels. Gas production usually peaks within 1 to 7 years after waste deposition ceases and then declines exponentially over the next 20 to 60 years as the biodegradable material is depleted.

Once the landfill's capacity to store gas is exceeded, positive pressure can force the gas to escape into the surrounding environment. Typically, landfill gas attempts to escape through the surface and disperse into the atmosphere. However, the composite lining system used for the landfill cover system is designed to prevent vertical migration. Despite this, in the unlined portions of the landfill and along the east side of the East Lined Area, positive pressures can cause the gas to migrate through the subsurface.

The Hidden Valley Landfill has not received waste since 1998, which is well over 20 years ago. Without new waste input, gas production declines exponentially over 20 to 60 years. As a result, some well readings indicate poor gas quality, with methane concentrations significantly below the 50-60% range typically considered "excellent performance" within the industry. As the landfill approaches stability and LFG generation drastically declines, wells may be taken off-line and/or decommissioned in accordance with WAC 173-351 and WAC 173-160-381.

### 1.4.2 Air Intrusion

If landfill gas is extracted from the landfill at a rate that exceeds the rate of gas production, air intrusion into the landfill may occur and potentially result in adverse effects on the gas system. Air intrusion can dilute the methane content in the gas stream, making the gas too lean for efficient flare performance. In addition, oxygen is toxic to the methane-producing anaerobic bacteria. Prolonged air intrusion can also result in spontaneous internal refuse fires. Once started, internal landfill fires can be difficult to extinguish. Air intrusion is minimized by following prescribed operating and monitoring practices.

### 1.4.3 Landfill Gas Hazards

Hidden Valley Landfills gas collection and control system is designed to protect human health, the environment, and the property in and around the landfill. However, to safely operate and maintain the gas control facilities, it is important to understand potential hazards attributable to landfill gas.

**Fires and Explosions:** Landfill gas is composed primarily of methane and carbon dioxide. Combustible mixtures of landfill gas and air can develop within confined spaces or unventilated areas on or adjacent to the landfill. Structures are susceptible to gas intrusion through underground utilities, construction joints, or structural cracks in building foundations.

**Asphyxiation:** Methane and carbon dioxide can displace air in confined spaces, resulting in an oxygen-deficient atmosphere. Confined spaces not only include manholes, vaults, and excavations, but also the inside of other poorly vented areas where landfill gas can accumulate. Whenever entrance into a confined space near the landfill is necessary, it is important that the space be properly tested for oxygen levels before entering. Entry must follow all current federal, state, or local regulation safety requirements for confined space entry.

**Toxicity:** Landfill gas can contain a variety of trace gases at low ppm concentrations. Although toxic effects of methane and carbon dioxide on humans are minimal, trace gases can include known human carcinogens. The presence and concentration of these compounds vary from site to site and are directly related to the landfills waste stream composition. Direct exposure to any point sources of gas should be avoided. If exposure is necessary, only trained personnel, using proper safety equipment and procedures, should be involved.

## 1.5 REGULATORY REQUIREMENTS

### 1.5.1 Consent Decree Requirements

The Washington Department of Ecology (Ecology), LRI and Pierce County entered into a Consent Decree (CD) dated January 2, 2004. On September 8, 2015, the CD was amended to require groundwater monitoring in accordance with the *Hidden Valley Landfill Groundwater Monitoring Plan* (SCS Engineers, August 2014). In October 2018, further updates were made to the monitoring plan.

The Consent Decree includes a Cleanup Action Plan for the site. The Cleanup Action Plan describes cleanup activities that are based on information in the *Remedial Investigation Report, Hidden Valley Landfill Site* (February 1991) and the *Feasibility Study Report, Hidden Valley Landfill Site* (May 1992). The Cleanup Action Plan includes (in part) operation of the landfill gas control destruction system, monitoring for landfill gas, and maintenance of the final cover system. The landfill gas control system was installed as part of the overall remedy to limit landfill gas migration and to help reduce groundwater contamination.

### 1.5.2 Solid Waste Regulations

The Hidden Valley Landfill is regulated under the CD further outlined in Section 1.5.1. This includes references to WAC 173-351, *Criteria for Municipal Solid Waste Landfills*. Performance Criteria for landfill gas control measures are outline in WAC 173-351-200 (4), Operating Criteria.

Performance Criteria for LFG management during post closure care is outlined in WAC 173-351-500(2), *Post-Closure Care Requirements*.

### 1.5.3 Air Quality Regulations

The Puget Sound Clean Air Agency (PSCAA) is the lead agency for permitting air emission sources within King, Pierce, Snohomish, and Kitsap counties. PSCAA regulations are titled Regulations I, II, and III. The agency also enforces many federal regulations, e.g., New Source Performance Standards (NSPS) and New Source Review (NSR)

#### 1.5.3.1 PSCAA Regulations

Regulation I contains general requirements for air emission source such as opacity and ambient emission standards, but also requirements such as NSR, pre-construction permitting that does not require NSR Title V operating permit requirements, and continuous emission monitoring rules.

Section 5.05 (d) of PSCAA Regulation I requires annual emission reporting if air contaminants are at or above designated levels. At the Hidden Valley Landfill, NO<sub>x</sub> is the only pollutant that could have triggered the threshold levels from the landfill gas flares. NO<sub>x</sub> emissions were calculated during 1996 and 1998 and found to be 15 and 20 tons, respectively, below the 25-ton annual limit. Since the landfill stopped accepting waste in 1998 and emissions did not increase, the generation of landfill gas for Hidden Valley Landfill reached a maximum, and future emissions above Regulation I levels are not anticipated.

Regulation II consists of control requirements for VOCs from specific types of emission sources. However, municipal landfills are not subject to this regulation.

Regulation III specifies control standards and requirements for several hundred toxic air contaminants (TACs). This regulation requires a new source or modification to a source to assess its emissions of TACs with respect to air quality modeling and health related standards. The Hidden Valley Landfill is subject to this regulation and TAC impacts were assessed in the Notice of Construction for the flares and gas-to-energy facility.

### **1.5.3.2 Landfill Emissions Regulations**

On May 13, 2024, Ecology adopted a new rule, WAC 173-408, which addresses landfill methane emissions and applies primarily to landfills that have accepted waste after 1992. Since the Hidden Valley Landfill continued to receive waste until 1998, it falls under the purview of this new regulation. This rule mandates stringent monitoring, reporting and other measures to manage methane emissions effectively. This rule also requires landfills to submit a Design Plan under WAC 173-408-080, although through the requirements of the CD, the Hidden Valley Landfill has and is required to maintain this Gas Management Plan for the continued operation of the LFG control and destruction system. This document satisfies the requirements within 173-408-080 (2)(a).

## **1.6 SITE PERMITS**

Hidden Valley Landfill stopped accepting waste on December 31, 1998 and is now in post closure regulated under the CD signed by Ecology, LRI, and Pierce County, dated January 2, 2004 and amended on September 8, 2015.

### **1.6.1 Flare Permits**

The first landfill gas flare is permitted under Order of Approval/Notice of Construction (NOC) No. 3229 and began operation in 1989. This NOC requires a minimum flare temperature of 1,400 degrees Fahrenheit and two emission source tests. Source testing was conducted in 1989 and 1990 by Amtest, Inc., Air Quality Division, Preston, Washington.

In February 2011, NOC No. 3229 was modified. The modification included the introduction of a new flare for use at Hidden Valley Landfill. This new flare was rated for a lower flow rate and heat input than the previously permitted flare. The new flare, a Perennial Energy Inc. Model FL-72-29-E enclosed ground flare, was permitted on April 21, 2011 by the PSCAA under NOC No.10284, which canceled and superseded NOC No.3229. The second landfill gas flare was permitted under NOC No. 5646, and as of 2011 is no longer in operation on-site.

The gas-to-energy facility was permitted under NOC No.7578, and as of 2011, the internal combustion engines associated with this NOC are no longer utilized at the site.

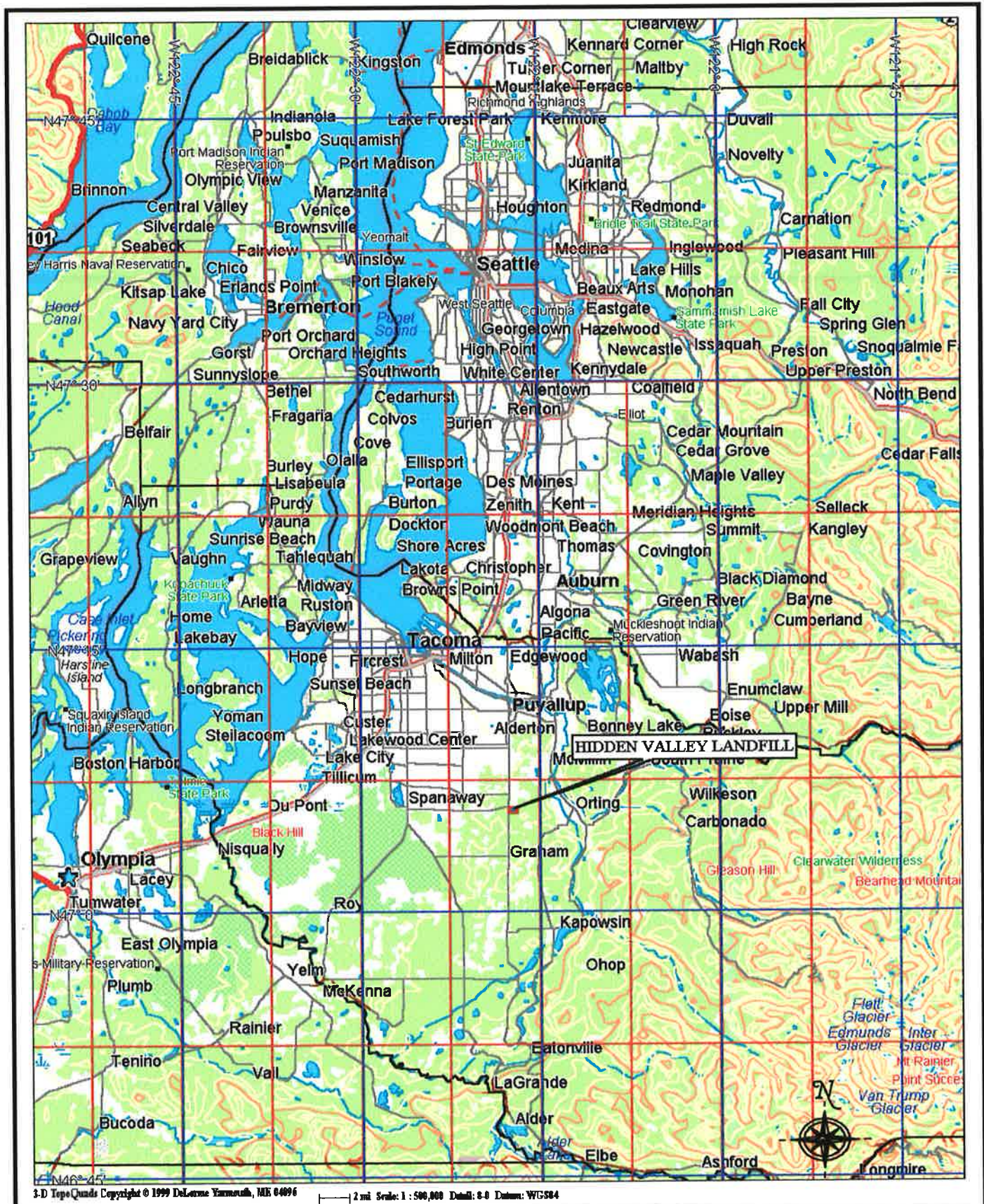
Copies of the facilities air permits are included in Appendix E.

## **1.7 ROLES AND RESPONSIBILITIES**

LRI is responsible for the implementation of this *Gas Management Plan*. LRI will provide personnel or will subcontract the duties of monitoring and maintaining the gas extraction well field, gas condensate collection/recirculation system, and flare station. A third party will be contracted to perform monitoring of the perimeter gas probes and data evaluation and reporting. Qualified personnel trained in the proper use and calibration of the equipment and monitoring instruments will perform all monitoring and maintenance activities. Compiled data and monitoring results will be

reported via semi-annual monitoring reports. If gas concentrations are noted to be above regulatory standards at the property boundary or within any structure, LRI will notify Ecology within 24 hours.

Figure 1. Site Location Map







**KH** KLEINFELDER  
 PROJECT# 60-3051-05 AUGUST 2001

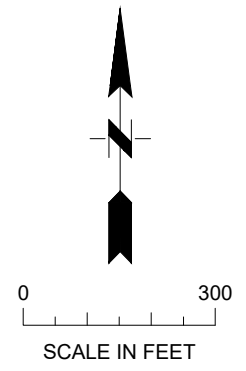
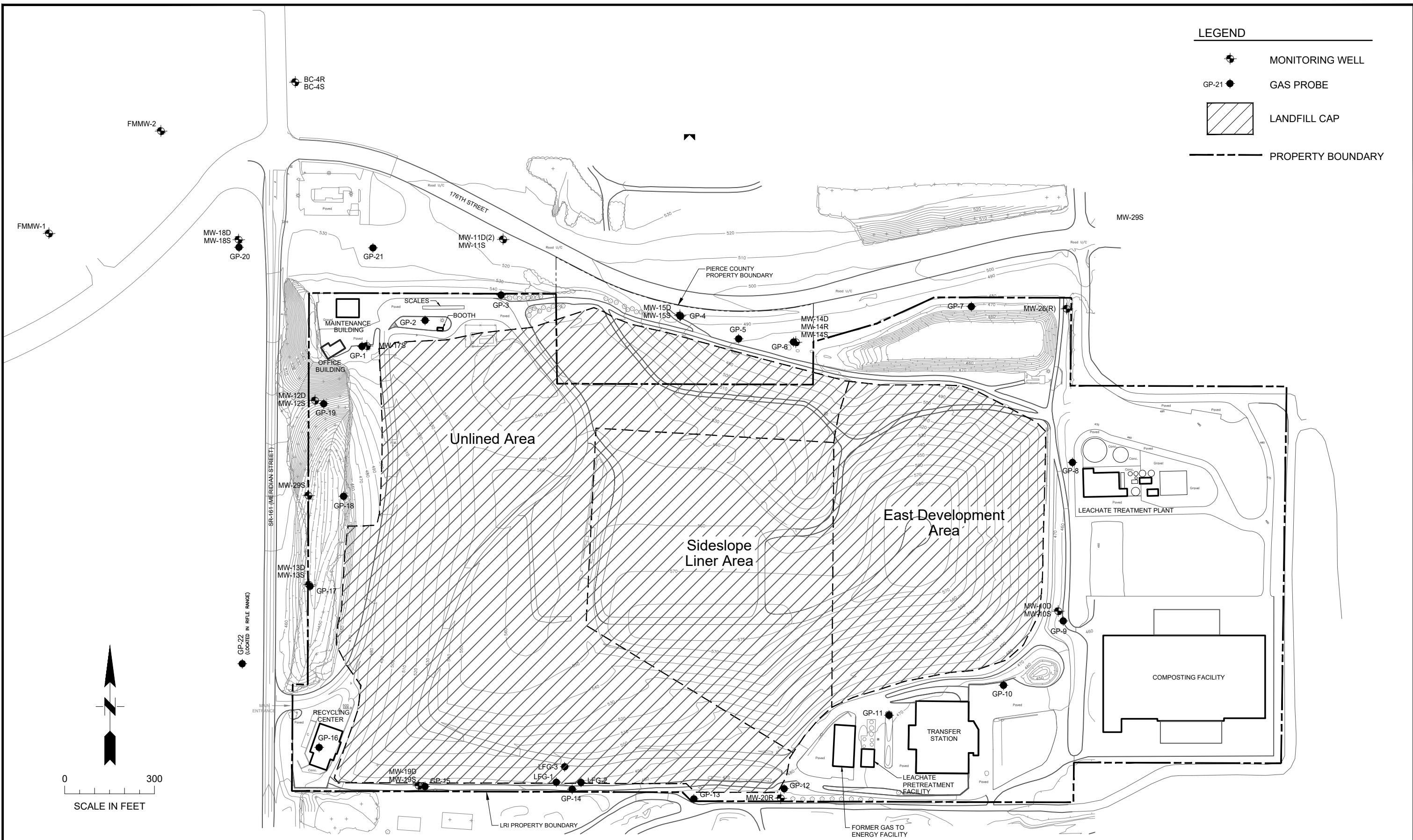
**SITE LOCATION MAP  
 HIDDEN VALLEY LANDFILL  
 PIERCE COUNTY, WASHINGTON**

**FIGURE  
 1-1**

Figure 2. Site Map

**LEGEND**

-  MONITORING WELL
-  GAS PROBE
-  LANDFILL CAP
-  PROPERTY BOUNDARY



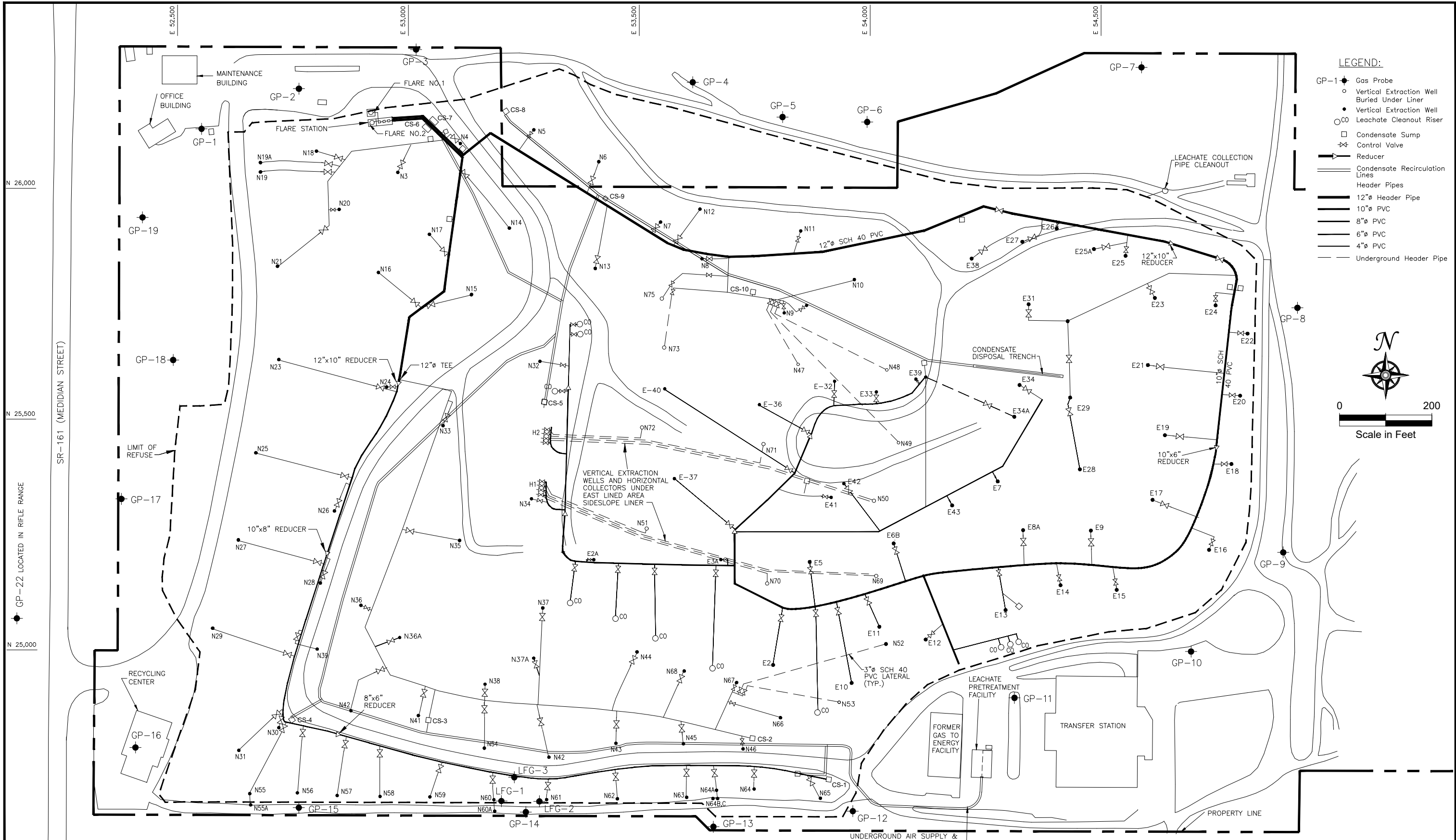
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PROJECT NO.	04225002.09	DES BY	T.H.
SCALE	AS SHOWN	CHK BY	T.B.
CAD FILE	FIGURE 2	APP BY	K.S.

**SITE PLAN**  
 HIDDEN VALLEY LANDFILL  
 PIERCE COUNTY, WASHINGTON

DATE  
AUGUST 2025  
 FIGURE  
2

Figure 3. Gas System Components



NOTE: GAS PIPING SHOWN IN RED IS ROUTED TO THE GAS ENERGY FACILITY

PROJECT NO.	04225002.09	DES BY	T.H.
SCALE	AS SHOWN	CHK BY	T.B.
CAD FILE	FIGURE 3	APP BY	K.S.

**GAS SYSTEM PLAN**  
 HIDDEN VALLEY LANDFILL  
 PIERCE COUNTY, WASHINGTON

DATE	AUGUST 2025
FIGURE	3

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## 2.0 GAS SYSTEM OPERATION AND MAINTENANCE

Landfill gas is continuously produced as the waste decomposes via anaerobic digestion. Failure to remove landfill gas results in the generation of a pressure gradient within the landfill that, in turn, will cause the gas to move along this gradient outward either through the surface or through surrounding soils. The landfill gas collection field is a system of wells and piping through which the gas is extracted from the waste and delivered to the flare station. When a vacuum is placed on the field using vacuum blowers, the gas moves from the waste into the extraction wells, through the valve assemblies and header piping, and to the flare station.

The Hidden Valley Landfill gas system is fully automated. Unless mechanical problems develop, or the collection system is physically damaged, the system should operate continuously. Continual operation of the gas system is essential to provide the required negative pressure to extract gas from the landfill. Equipment outages must be addressed as soon as they are identified because system interruptions can result in gas build-ups and a noncompliance condition.

### 2.1 GAS EXTRACTION WELL FIELD

The landfill gas extraction system consists of 117 vertical and two horizontal gas extraction wells and valve assemblies, as well as, the gas header piping (discussed in section 2.2), and gas condensate collection/recirculation system (discussed in section 2.3).

A total of 117 vertical gas extraction wells are present at the landfill for monitoring (Figure 3). The well casings are installed into 24-inch-diameter borings drilled from 30 to 100 feet deep in the waste. The well casings are fabricated from a combination of 3- and 4-inch, Schedule 40 or Schedule 80, polyvinyl chloride (PVC) pipe. The 4-inch well casing is slotted along the lower 60 percent of the boring depth. Coarse washed drain rock is backfilled around the well screen to approximately 2 feet above the top of the slotted interval. A bentonite well seal is installed above the gravel backfill to minimize air intrusion. The 4- inch, slotted, PVC pipe is joined by a telescoping slip joint to a 3-inch solid PVC riser protruding above the landfill surface. The slip joint accommodates long-term refuse settlement and reduces stress points that could cause casing failure. Native soil is backfilled around the well casing to the surface. A geomembrane boot is installed to eliminate surface water infiltration and gas venting between the outside of the well riser and the geomembrane liner. To prevent potential settlement stress between the liner and the well casing, the geomembrane boot is not attached to the exterior wall of the riser pipe. A bentonite surface seal is placed just beneath the geomembrane liner to provide an additional surface seal. A typical detail for a vertical gas extraction well is shown on (Figure 4).

Efficient operation and maintenance of the gas extraction field is required to maintain minimum methane quantity and quality conditions for operation of the gas flare and to control the escapement of gas from the landfill. This is accomplished by tuning the wellfield such that landfill gas is extracted at approximately the same rate as it is generated. If the collection rate greatly exceeds the gas generation rate, air could be drawn into the landfill along the landfill perimeter and result in a subsurface fire or have other adverse impacts (see Section 1.4.2). Gas generation rates within the landfill vary over time (see Section 1.4; therefore, well field tuning is an ongoing process.

The gas extraction rate from each well is controlled by an adjustment valve (PVC gate valve) located on lateral piping that connects the wellhead to the gas collection header. In addition to the adjustment valve, each well lateral is equipped with a sampling point to permit field measurement of gas composition, static pressure, and extraction rates (velocity pressure). As the valve is opened, the

velocity pressure increases, corresponding to a greater flow of gas through the pipe. If the velocity pressure is zero, there is no flow and the valve is likely closed.

Warning signs of a potential subsurface fire include unusual settlement of the landfill surface, the presence of carbon monoxide (CO) in the landfill gas, or steam or smoke rising from a portion of the landfill cover. If a fire is suspected, notify the operations manager and secure the safety of any persons immediately endangered by the fire. If a subsurface fire is suspected, CO levels should be frequently monitored. Levels exceeding 1,000 ppm indicate an active underground landfill fire, while levels between 100 and 1,000 ppm are considered suspicious and warrant further monitoring. Once gas extraction is discontinued, the CO content should gradually diminish as landfill gas displaces the oxygen and asphyxiates the fire indicating it is the refuse, not the landfill gas that is burning. If high levels of CO are still detected, further investigation is warranted and includes injecting a suppressant agent into the nearby wellfield or opening the interface and smothering it with soil. After the fire is extinguished, the landfill cover may require repair as described in the Post-Closure Manual (see Appendix F).

In November 2023, a performance analysis of the well field was conducted as part of our ongoing landfill gas (LFG) management efforts. The results of this analysis indicated varying levels of performance and landfill gas collection across the well field which is expected given the duration that waste has been present in the landfill. The underperformance of the wells, attributed to the landfills age and lack of new refuse, necessitates a reevaluation of the current wellfield. The Hidden Valley Landfill has not received new refuse since December 1998. Since gas generation rates depend on the amount and age of the waste, the quantity and quality of gas produced will continue to decline as the landfill ages. It is anticipated that it will be necessary to phase out parts of the wellfield in order to maintain a gas quality that is sufficient to operate the flare.

These actions are aimed at optimizing the efficiency of the LFG management system, ensuring continued compliance with environmental regulations and maintaining the effectiveness of the well field as gas generation decreases.

## **2.2 GAS COLLECTION PIPING SYSTEM**

Above ground collection headers constructed of PVC piping convey the extracted landfill gas to the flare facility (see Figure 3). The headers are installed directly on the landfill surface and are valved such that all of the extracted gas will be routed to the flare. The header piping can be rerouted at any time as long as gas migration is controlled.

The collection pipe sizes are based on the systems projected flow rates during peak production conditions. Using these maximum flow conditions, pressure loss calculations were performed to determine the systems total flow rate and pressure requirements for sizing the centrifugal blowers. Short lengths of flexible piping are installed at strategic points along the headers and laterals to accommodate differential settlement and thermal expansion and contraction of the piping system. The piping system is sloped to allow gas condensate to gravity drain into the gas extraction wells and to discharge points located at intervals along the header system (see Section 2.3).

During system operation, the collection piping should be inspected regularly. This inspection is typically performed during well monitoring. Components requiring occasional maintenance, adjustments, or replacement include throttle valves, labcock valves (sample ports), expansion joints, well laterals, and condensate sump connections. Quarterly inspections serve as an initial check to identify items that may require maintenance. Differential settlement may alter the slope of the pipe and affect condensate drainage. Realignment may be required as surface features change over

time. Thermal expansion and contraction, as well as settlement may cause leaks around the flexible couplings or pipe joints. Prompt repair of collection field problems is required to maintain an effective collection system.

Sampling ports and system control valves also require regular inspection. All sampling ports must remain closed or sealed unless they are being tested. This will help limit the amount of oxygen that is mixing with the methane gas, in turn improving the quality of gas. Valves in the collection field must be in working order to regulate the amount of negative pressure that is exerted on the collection field.

## **2.3 GAS CONDENSATE COLLECTION / RECIRCULATION SYSTEM**

Landfill gas production is an exothermic process that results in the generation of a warm saturated gas. When extracted to the landfill surface, the gas cools inside of the collection piping, causing water vapor to condense and form gas condensate. Over time, uncontrolled condensate accumulates within low elevation points along the collection piping that could restrict or block gas flow. To alleviate this condition, the gas collection pipes are sloped such that gas condensate gravity drains back into the gas extraction wells and to discharge points (condensate drains and sumps).

Six condensate drains are located over the East Lined Area. The drains are designed to discharge gas condensate into the refuse. The drains consist of an atmospheric water trap within a larger-diameter screen. The water trap permits the condensate to gravity drain from the header system (which is under negative pressure). As the condensate builds up, it overflows the water trap and discharges into the refuse through the screen. A typical detail for a gas condensate drain is shown on (Figure 5).

Eleven condensate sumps are present over the unlined portion of the landfill. The sumps collect condensate and pump it to a leachate line located over the East Lined Area (see Figure 3). The sumps (for the most part) are former condensate drains. The drains were constructed with a drain pipe outlet rather than a screen. The pipe outlet was plugged when the drains were converted to sumps.

Each condensate sump includes an air-operated positive displacement SOLO Model SP 4000 pump manufactured by QED Environmental Systems, Inc. The operations and installation manual for the SOLO pumps is provided in (Appendix C). The SOLO SP 4000 pumps can pump at a maximum rate of 4.5 gallons per minute (gpm), provide a maximum lift of 200 feet, and will handle the maximum expected condensate volumes. The pumps measure 3 inches in diameter and are 48 inches in length, easily fitting inside the 16-inch diameter sumps. The pumps automatically cycle based on the depth of condensate in the sump. Each pump has been set to cycle when the condensate reaches a depth of approximately 2 to 3 feet. As a precaution, the pumps are set to pump before the condensate level reaches the capped drainage outlet.

Check valves are installed on each pump discharge line to prevent condensate backflow into the sump. The condensate discharge line is connected to the pump through a pitless adapter. As the pump is being lifted out, the pitless adapter disengages and, with the check valve, the condensate discharge line is prevented from backflowing into the sump.

Compressed air to operate the pneumatic pumps is delivered via a 1 ½-inch diameter Standard Dimension Ratio (SDR) 11 high-density polyethylene (HDPE) line from an air compressor located in the leachate pretreatment facility. The compressor is a Gardner-Denver, Model EJBRFB, which

provides compressed air for the leachate facility. It is rated for 100 standard cubic feet per minute (scfm) at 125 pounds per square inch (psi).

Condensate is pumped from the condensate sumps through a 1 ½-inch diameter SDR11 HDPE discharge line to a perforated 1 ½-inch diameter SDR11 HDPE line that allows condensate to percolate into the refuse over the East Lined Area. The 206-foot long leach line was constructed in a 2-foot deep, 3-foot wide gravel-filled trench. The leach line is perforated with 3/16-inch diameter holes at 3-foot spacings. The design will minimize clogging and force the condensate to be distributed over the entire length of the drain field.

Automated monitoring of condensate flow volumes and/or pump cycling is not considered a necessary component of the condensate recirculation system. As such, flow meters or pump cycle counters are not included. Proper operation of the condensate pumps will be confirmed during monthly observations (see Section 3.2).

The condensate collection/recirculation system requires minor periodic maintenance as parts become worn and need replacement. A parts list is included in (Appendix C).

Turning the main air supply valve off can shut down the entire condensate recirculation system. After turning this valve off, it may take 20 to 30 minutes to bleed off air pressure in the condensate recirculation system through one quick-connect coupling vented to the atmosphere. Each individual condensate sump can be taken offline for maintenance. If the condensate collection system must be down for more than 48 hours, provisions must be made to pump the sumps manually to avoid condensate blockage or sump overflow.

Air supply for the condensate recirculation system is provided by an air compressor located within Building No. 5 in the southwest corner of the site. This air compressor is also used for minor air requirements in the old leachate pretreatment facility. The following procedure is provided for condensate recirculation startup assuming the compressor has been shut down:

1. With power to the old leachate pretreatment facility, close the air supply valve at the end of the air compressor storage tank (Valve 1) and turn the air compressor breaker switch to the "ON" position.
2. Using the control box on the front of the air compressor, regulate the outlet pressure to maintain between 80 and 100 psi.
3. Slowly open the valve at the end of the air compressor storage tank (Valve 1) to a fully "OPEN" position. This will pressurize the air supply line to the leachate pretreatment facility. Slowly open all valves up to Valve number 13 within the leachate pretreatment facility.
4. Slowly open the main supply valve to the condensate recirculation system (Valve 13).
5. Check the air pressure at each sump location using a hand-held air pressure meter and the quick-connect riser at the top of the sump. The air pressure must be between 40 and 100 psi for the pneumatic pump to function.
6. Connect the flexible 3/8-inch diameter hose with quick-connect coupling to the pump. The pump is now online. Once the condensate reaches the pre-set level above the bottom of the pump (below the sump-capped outlet pipe), the pump will automatically turn on and discharge condensate into the main collection line.

System maintenance for the air compressor should include the following:

- Oil change and parts/belt inspection (replacement as necessary) on the air compressor every 1,000 hours, and check pressure relief valve every 2,200 hours, replacing as necessary.
- The pressure regulator filter on the air-drying unit should be checked to verify that it is automatically draining every 1,000 hours and be replaced as necessary.

## 2.4 FLARE STATION

The flare station includes the mechanical and electrical equipment and the controls necessary to actively extract landfill gas and discharge it into the flare for destruction. The primary components consist of a scrubber, one blower, and one enclosed flare.

Although Hidden Valley Landfill has seen a decline in LFG production as the age of the waste continues to increase, it is still important to maintain continual operation of the flare facility to ensure that adequate negative pressure is supplied to extract the remaining gas from the landfill.

**Scrubber:** A scrubber, or knockout vessel, is used before the gas enters the blower(s) to remove excess moisture and particulate matter.

**Blowers:** The flare station is equipped with a multistage centrifugal blower, Model 5103 from HSI, powered by a 15-horsepower, 2,960 RPM motor. This blower creates the necessary negative pressure and flow capacity to extract gas from the landfill. To maintain optimal performance, blower usage should be adjusted monthly and in response to changes in landfill gas production and operational needs.

**Landfill Gas Flare:** The flare is a Model FL-72-29-E from Perennial Energy Inc. and has a maximum rated capacity of 500 scfm with a 10:1 turndown ratio.

In accordance with PSCAA permit requirements, the flare operating temperature must be maintained above 1,425 degrees Fahrenheit. The flare system is equipped with a Model CP-1 control panel from Perennial Energy Inc., designed to monitor and regulate operations.

**System Controls:** Gas system operation is controlled by a flame safeguard system and an ultraviolet (UV) flame scanner mounted on the flare stack. A sudden loss of UV emissions triggers an interruption in the milli-amp signal, and the system controls shut down the system and activate an alarm.

**System Startup:** Gas collection system startup is initiated by a switch located adjacent to the Motor Control Center (MCC). Within a few seconds, the blower starts up and begins feeding landfill gas to the main burner. Once the main flame ignition occurs, the flame scanner immediately senses the ultraviolet (UV) emissions and shuts off the pilot system. To relight the system, the controls must be manually reset before the system can be restarted. This is a safeguard feature to prevent the ignition system from continuously recycling in an attempt to reignite the flare. The flare is also equipped with a high temperature alarm feature that shuts down the system if the flare temperature reaches 2,000 degrees Fahrenheit.

**System Maintenance:** The mechanical equipment within the flare station requires regular servicing in accordance with the manufacturer's recommendations. Typical maintenance activities for the flare station include the following:

- Lubrication of the bearings installed on the blower and motor.
- Removal and cleaning of the flame arrester internal bank (if not periodically cleaned, it could become obstructed by particulates or other suspended debris in the gas stream, resulting in a loss of system pressure).
- Replenishing the contents of the propane tanks used for the pilot flame.
- As needed, cleaning or repainting of the various mechanical and electrical components.
- Periodic cleaning of UV scanners, thermal couples, and the inside of the flare.

As landfill gas flow rates decline, replacing the existing flare and blower system will be necessary to ensure efficient wellfield operation.

## **2.5 GAS-TO-ENERGY FACILITY**

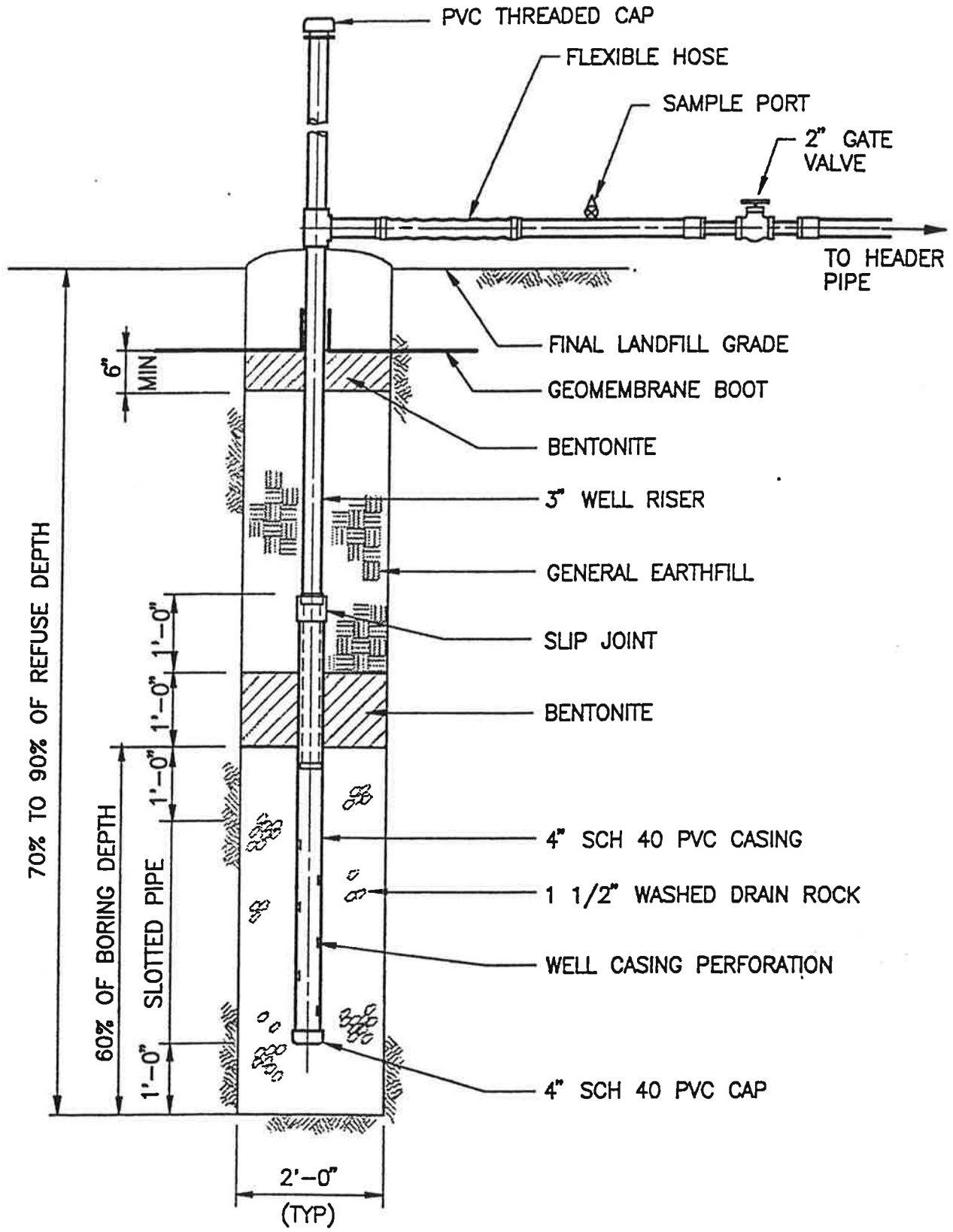
As of 2011, the internal combustion engines associated with NOC No. 7578 are no longer utilized at the site, and the gas-to-energy facility is no longer operational.

## **2.6 GAS MONITORING PROBES**

Gas monitoring probes are installed in the subsurface to check for gas migration, and to assess the site for compliance with gas control requirements at the property line (see Section 3.5).

The Hidden Valley Landfill has 19 gas probes installed around the landfill (see Figure 3). The probes consist of a 6-inch diameter boring drilled to depths ranging from 37 to 160 feet, with a bottom elevation approximately equal to the bottom elevation of the refuse. Each boring contains either one, two, or three solid, ½ -inch PVC pipes connected to an 18-inch length of ½-inch slotted PVC pipe which serves as the sensing tip. The probes are labeled with stamped brass tags and secured within lockable security casings. Figure 6 presents a typical multi-completion gas probe detail. Boring logs and construction details for the gas probes are included in (Appendix A).

Figure 4. Typical Vertical Gas Extraction Well

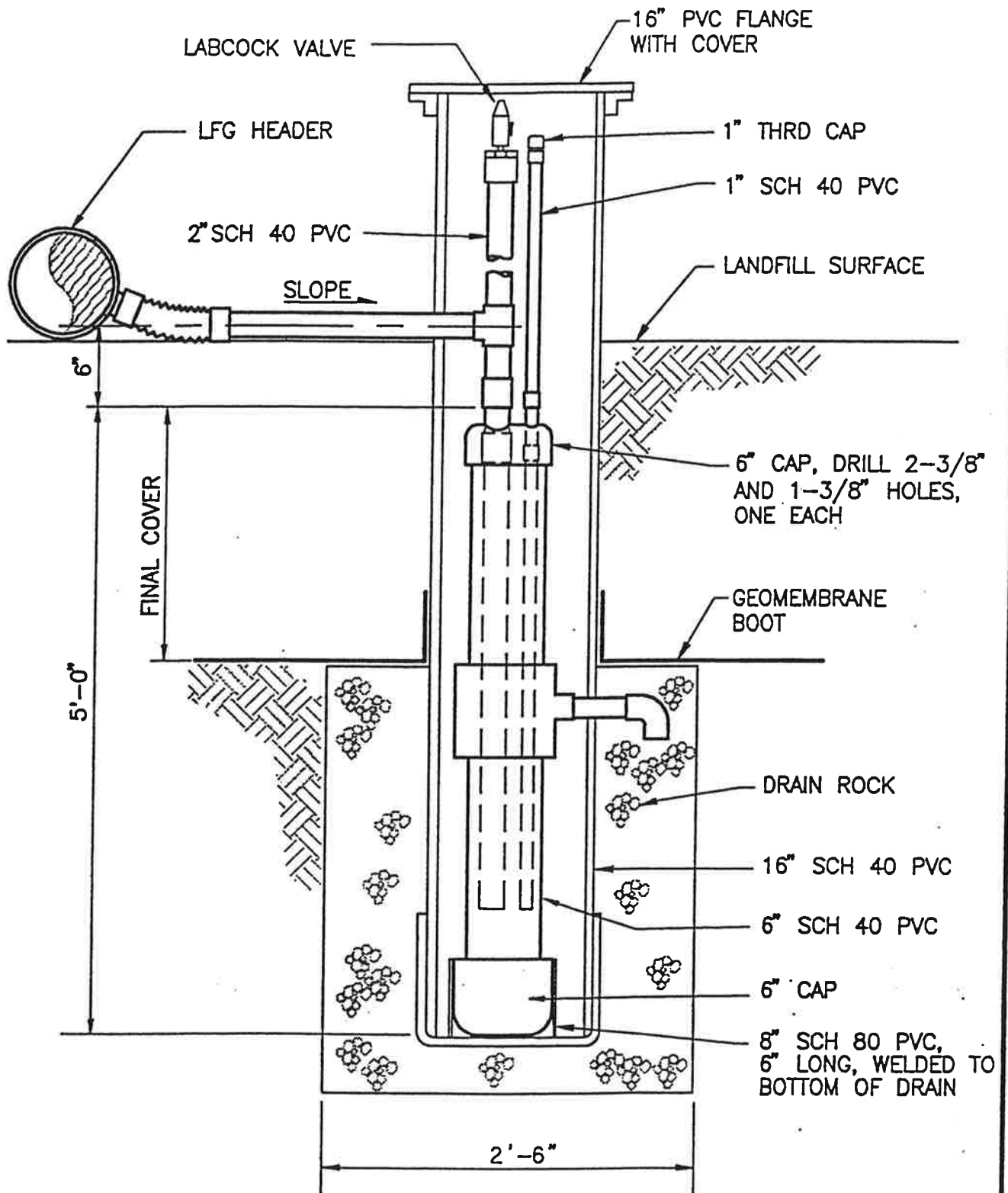


**EMCON**  
Northwest, Inc.

DATE 2-94  
DWN. MLP  
REV. \_\_\_\_\_  
APPR. \_\_\_\_\_  
PROJECT NO. 0202-001.81

Figure 2-1  
HIDDEN VALLEY LANDFILL  
LANDFILL GAS MANAGEMENT PLAN  
TYPICAL VERTICAL GAS  
EXTRACTION WELL

Figure 5. Typical Condensate Drain



NOTE: BACKFILL AROUND CONDENSATE TRAP W/ PEA GRAVEL

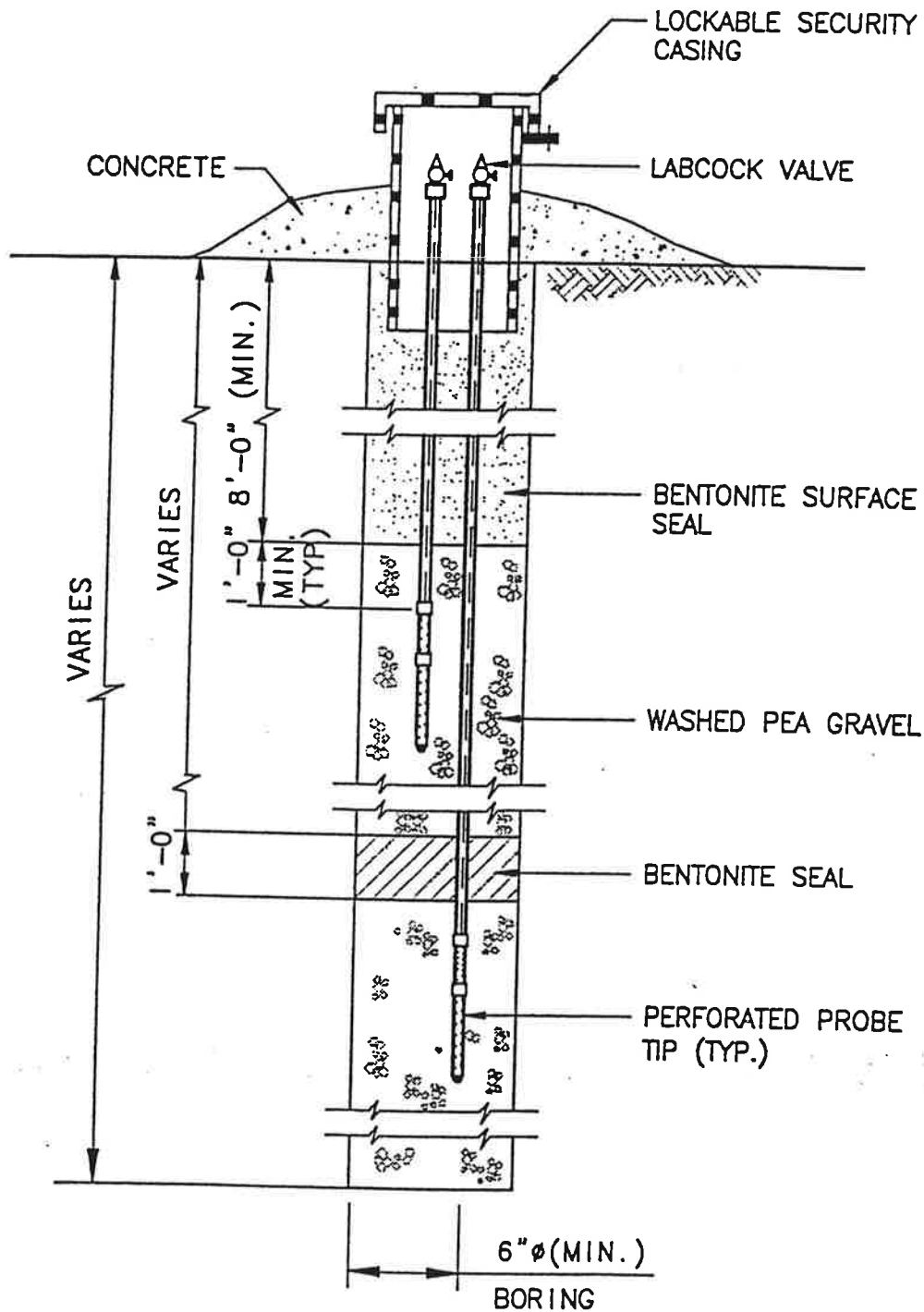


**Emcon**  
Northwest, Inc.

DATE 2-94  
DWN. MLP  
REV. \_\_\_\_\_  
APPR. \_\_\_\_\_  
PROJECT NO.  
0202-001.81

Figure 2-2  
HIDDEN VALLEY LANDFILL  
LANDFILL GAS MANAGEMENT PLAN  
EXISTING CONDENSATE DRAIN DETAIL

Figure 6. Typical Gas Probe



**EMCON**  
Northwest, Inc.

DATE 2-94  
DWN. MLP  
REV. \_\_\_\_\_  
APPR. \_\_\_\_\_  
PROJECT NO. 0202-001.B1

Figure 2-3  
HIDDEN VALLEY LANDFILL  
LANDFILL GAS MANAGEMENT PLAN  
**TYPICAL GAS PROBE DETAIL**

## **3.0 SYSTEM MONITORING REQUIREMENTS**

Performance is assessed through periodic checks at gas wells, probes, and the flare station. Compliance monitoring involves regular inspections of gas probes and on-site structures to ensure adherence to regulatory standards. PSCAA may also require emission testing to verify compliance with air quality standards. All monitoring and maintenance should be conducted by qualified personnel trained in using and calibrating the instruments. Example field forms, provided in Appendix B, must include the date, time, weather conditions, the monitor's name, and the results.

### **3.1 GAS EXTRACTION WELLFIELD MONITORING**

The Hidden Valley Landfill well system is currently monitored monthly. However, the monitoring frequency may be reduced, with Ecology's approval, as areas of the landfill become stable and gas generation rates decline, or increased if the system becomes unbalanced.

During each well-monitoring session, the gas composition and pressure (both static and differential) will be measured. Gas compositions are measured using a GEM-5000 (or similar equipment), as described in Appendix D. Under normal gas control system operations, the methane and carbon dioxide content of the extracted gas should each range from 30 to 50 percent by volume, with an oxygen content of less than 2 percent.

Pressure measurements are used to determine the amount of gas flowing inside a pipe. Pressure is measured using the GEM-5000 (See Appendix D). The GEM-5000 instrument indicates pressure in inches of water column.

An example wellfield daily log form to be completed monthly is included in Appendix B. This form is for performance monitoring purposes only and does not require inclusion in quarterly monitoring reports. Data may also be uploaded directly to established data basis for documentation purposes.

### **3.2 GAS CONDENSATE COLLECTION/RECIRCULATION SYSTEM MONITORING**

The condensate collection/recirculation system should be inspected on a monthly basis. The inspection will include confirmation that the pump is running at each sump location, and an observation for leaks. If a pump is not working, it should be repaired or replaced as soon as possible. An example inspection form to be completed monthly is included in Appendix B. This form should be included in the quarterly monitoring reports (See Section 4).

### **3.3 FLARE FACILITY MONITORING**

The flare facility will be monitored at least monthly for combustion temperature, gas composition, and flow rate. In accordance with PSCAA permit requirements, the flare operating temperature must be maintained above 1,425 degrees Fahrenheit. The temperature is monitored by a thermocouple, installed near the top of the flare, and read using a model CP-1 control panel from Perennial Energy Inc., mounted within an enclosure at the base of the flare. Gas composition and flow rate are measured in the same manner as for the extraction wells (see Appendix D). Recording devices located throughout the flare continuously monitor and record various pieces of data such as temperature and flow.

### **3.4 GAS-TO-ENERGY FACILITY MONITORING**

As noted in Section 2.5, as of 2011, the internal combustion engines associated with NOC No. 7578 are no longer utilized at the site, and the gas-to-energy facility is no longer operational.

### **3.5 GAS PROBE MONITORING**

The Hidden Valley Landfill gas probes are currently monitored monthly. Gas probes GP-1, GP-10, and GP-11 are located within the interior portion of the landfill property. While they may not be primary indicators of gas system performance or indicate migration at the property boundary as defined in the rule, their locations allow for monitoring potential gas migration toward on-site structures. The remaining gas probes are located along or near the property line and are considered compliance probes. Gas probes GP-20, GP-21, and GP-22 are located off-site and are not part of the routine monitoring program. However, they may be monitored if off-site subsurface gas migration is suspected. Circumstances that could lead to such suspicion include elevated gas readings at perimeter probes, detection of methane in utility corridors or structures near the site boundary, or other signs suggesting gas migration beyond the landfill footprint. Given that Hidden Valley Landfill has been closed for nearly 30 years and gas generation has declined significantly, such conditions are considered unlikely.

The gas probes are monitored for the percentage of methane, carbon dioxide, and oxygen, as well as static pressure. The concentration of methane is not allowed to exceed the lower explosive limit (LEL) of 5 percent methane by volume at the property line or beyond (WAC 173-351-200[4][a][ii]). The presence of any methane concentrations, even if below the regulatory standards, should be a concern. If methane is detected in any gas probe above 5 percent methane by volume, Ecology must be notified as outlined in Section 4, and the negative pressure applied to the adjacent extraction wells should be increased to recapture the gas. Static pressure readings should be zero or slightly negative. An example gas probe monitoring form is included in Appendix B. Detailed procedures for gas probe monitoring are included in Appendix D.

### **3.6 BUILDING MONITORING**

The interiors of on-site structures will be monitored quarterly to assess compliance with regulatory standards. The concentration of landfill gas is not allowed to exceed 25 percent of the LEL in the interior space of any on-site structure (WAC 173-351-200[4][a][i]). The monitoring will be performed in the early morning and will include the inhabited space, as well as any crawl space areas. If monthly probe monitoring detects methane concentrations in probes located near on-site structures, the building interior will be checked. The following on-site structures, shown on Figure 2, will be monitored:

- Main Office
- Repair Shop
- Pay/Scale Booths
- Recycle Buildings
- Leachate Treatment Building
- Transfer Station Building
- Compost Building
- Leachate Treatment Plant

An example building monitoring form is included in Appendix B.

Monitoring of off-site structures is required if odors are reported in the structures or if methane is detected at the property boundary and adjacent structures are present. Landfill gas concentrations of no more than 100 parts per million (ppm) by volume are allowed in off-site structures (WAC 173-351-200[4][a][iii]). If off-site monitoring is necessary, appropriate instrument calibration will be performed to ensure the 100-ppm standard can be measured.

## 4.0 RECORD KEEPING AND NOTIFICATION REQUIREMENTS

Copies of all landfill gas system monitoring data must be kept and filed in the site's Operating Record. Copies of monitoring data for the gas probes, condensate sumps, and buildings will be submitted to Ecology on a semi-annual basis as part of the semi-annual monitoring report. The volume of gas consumed at the flare station will be recorded on a monthly basis.

If methane is confirmed to be detected in any gas probe above 5 percent by volume, LRI will immediately take all steps necessary to ensure protection of human health, including the following.

- Adjust the adjacent extraction wellfield to recapture the gas.
- Monitor the probe(s) daily until gas concentrations decrease to below 5 percent by volume.
- Monitor nearby buildings (if present).
- Notify Ecology within 24 hours if detection is confirmed.

If methane is detected in any structure above the performance standard of 25 percent of the LEL, LRI will immediately take all steps necessary to ensure protection of human health, including the following.

- Notify Ecology within 24 hours and then subsequently the Fire Department.
- Evacuate the affected structure(s) as determined appropriate by Ecology and the Fire Department.
- Adjust the adjacent extraction wellfield to recapture the gas.
- Monitor the affected structure(s) daily until gas concentrations decrease to compliance levels.
- Monitor adjacent off-site structures (if present).


Within 7 calendar days of a detection exceeding regulatory limits, the methane levels detected and a description of the steps taken to protect human health and correct the situation will be placed in the site's Operating Record.

Within 60 days of detection exceeding regulatory limits, a remediation plan must be completed and implemented. Ecology will be notified that the plan has been implemented and a copy of the remediation plan will be placed in the site's Operating Record.

## DOCUMENT REVIEW ACKNOWLEDGMENT

By signing below, I acknowledge that I have read and understand the requirements of the *Hidden Valley Landfill, Landfill Gas Management Plan*, revision date September 18, 2025.

<u>Name</u>	<u>Signature</u>	<u>Title</u>	<u>Date</u>
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**Appendix A**  
**Gas Probe Completion Logs**



PROJECT Thun Field Landfill Site

Page 1 of 4

Location Northern Property Line

Boring No. MW-17S (GP-1 a, b, c)

Surface Elevation 548 ft. (MSL)

Drilling Method Air Rotary - 6"

Total Depth 154 feet.

Drilled By Hayes Well Drilling Co.

Date Completed 6/30/87

Logged By Kevin G. Rattue

WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
<p>Steel Security Casing Bentonite Seal 1/2 Inch PVC Riser Pipe 1/2 Inch PVC Screen 2-Inch PVC Riser Pipe 1/2 -Inch SLO20 PVC Screen Pea Gravel</p>		0					
		5	1	Grab	SW	GRAVELLY SAND (0-12'); light gray brown, fine to medium sand; angular gravels, 1/4 inch to 1 inch diameter; slightly moist OUTWASH.	
		10	2	Grab		@ 10': some coarse sand	
		15	3	Grab	SM	SILTY GRAVELLY SAND (12-33'); light blue gray; fine to medium sand; some coarse sand; well sorted gravels, 1/4 inch to 2 inch diameter; slightly moist TILL.	Trace Methane
		20	4	Grab			
		25	5	Grab		some increasing silt.	
		30	6	Grab		@ 30': moist.	
	35	7	Grab	GW	SANDY GRAVEL (33-138'); medium brown; fine to coarse.		



WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Pea Gravel 2-Inch PVC Riser Pipe Bentonite Seal 1/2-Inch SLO20 Screen		35			GW	Sand, poorly graded subangular gravel; 1/4 inch to 1 inch diameter; some silt; moist (OUTWASH.)	
		40	8	Grab			
		45	9	Grab			
		50	10	Grab			
		55	11	Grab		@ 52': increasing gravels; subangular to angular; 1/8 inch to 2 inch diameter; wet.	Trace Methan
		60	12	Grab			
		65	13	Grab		@ 65': wet.	
	70	14	Grab		@ 70': some scattered boulders.	0.3% Methan	



PROJECT Thun Field Landfill Site

Page 3 of (

Boring No. MW-17S

WELL DETAILS	OVA/ TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Pea Gravel  2-Inch PVC Riser Pipe  Bentonite Seal		75			GW		
			80	16	Grab	@ 80': increasing silt	Trace Methane
			85	17	Grab		
			90	18	Grab	@ 90': becoming wet.	
			95	19	Grab		
			100	20	Grab	@ 100': becoming moist.	0.1% Methane
			105	21	Grab		
			110	22	Grab		

SEA-300-025



WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Bentonite Seal  Pea Gravel  2-inch PVC SLO20 Screen  Bentonite Seal		115	23	Grab	GW	SANDY GRAVEL; medium brown; fine to coarse sand; subrounded gravels; less than 1 inch; some silt; slightly moist. (33'-138')	0.5% Methane
		120	24	Grab			
		125	25	Grab			
		130	26	Grab		--- becoming very wet; grading to gray brown; gravels well sorted, 1/2 inch to 3 inch diameter; saturated.	S.W.L.  Conductivity = 2150 T = 23°C pH = 7.6
		135	27	Grab			
		140	28	Grab	GP	Sandy Gravel; (138'-B.O.B.) --- increasing coarse sand; becoming increasingly poorly sorted gravels; 1/2 inch to 1 inch diameter; saturated.	
		145	29	Grab			
		150	30	Grab			Conductivity = 1530 T = 21 pH = 7.
	Boring terminated at 154 feet.						



PROJECT Thun Field Landfill Site

Page 1 of 4

Location (SEE Figure)

Boring No. GP-2

Surface Elevation Approx. 545.5 ft. (MSL)

Drilling Method Air Rotary

Total Depth 120 feet.

Drilled By Hayes Well Drilling Co.

Date Completed 07/01/87

Logged By Kevin G. Rattue

WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
		5			SW	GRAVELLY SAND (0-15'); light brown; fine to coarse sand; poorly sorted angular gravels, 1/8 inch to 1 1/2 inch diameter; moist. (Outwash)	
		10					
		15					
		20				SW	SILTY GRAVELLY SAND (15-29'); light blueish gray; fine to medium sand; silty; subangular gravels; well sorted, 1/8 inch to 1 inch diameter; moist TILL
		25			SP	@ 25': becoming moderately poorly sorted with gravels 1/4 inch to 3/4 inches diameter; fine to medium sand; moist.	
		30			GW	SANDY GRAVELS (29-BOB); gray brown; medium to coarse sand with some fine sand and trace silt; gravels well sorted, 1/8 inch to 2 inches diameter; wet OUTWASH	
		35					



WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Pea Gravel  Bentonite Seal  6-Inch Steel Casing 1/2-inch PVC SL020 Screen Pea Gravel		35			GW		
		40				@ 40': same, moist.	
		45					
		50				@ 50': less fine sand; trace silt; becoming cleaner, well sorted gravel; wet.	
		55					0.7% Methane
		60					
		65				@ 60': increasing silt and fine sand; slightly sticky; wet.	
		70					

## LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revrs Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (GP-3)  
**PAGE** 1 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
1				5			0 - 18.0 feet: SILTY SAND (SM) with cobbles; moderate yellowish-brown, grayish-brown; mostly fine SAND (50%) with few coarse to medium; some non-plastic fines (40%); few gravel (10%); cobbles subrounded and up to 5 inch in size; dry, well graded.  @ 12.0 feet: increase in cobbles to 5-inch.  @ 13.0 feet: change to grayish-brown  @ 16.0 feet: change to yellowish-brown.
2				10			
3				15			
				20			18.0 - 22.0 feet: GRAVELLY SAND (SW); medium grayish -brown, mostly fine to coarse sand (55%); some gravel (40%), subangular to subrounded; trace of fines; moist, well

**REMARKS**

All samples are grab samples. C.G. = combustible gas.



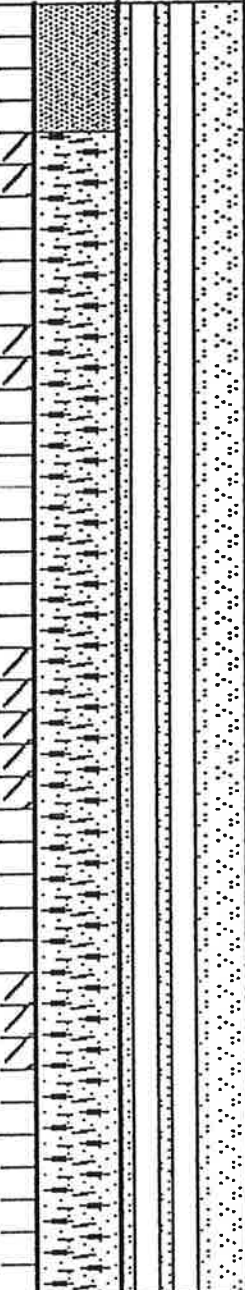
SWEET-EDWARDS/EMCON

T02-01.35.GP23.28/sd:2.7/12/91

# LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revers Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (69-3)  
**PAGE** 2 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
		NO C.G.					graded.
4				25			22.0 - 41.0 feet: SANDY GRAVEL (GW) with boulders; yellowish-brown; fine to coarse gravel (55%) subangular to subrounded, hard; some sand (40%), fine to coarse; boulders up to one foot; few fines (<5%); dry.
5							@ 26.0 feet: increasing moisture.
6		NO C.G.		30			@ 28.0 feet: faster drilling
7				35			
		NO C.G.		40			@ 39.0 feet: increase in moisture, sand is mostly coarse with a trace of lines.

**REMARKS**  
 All samples are grab samples. C.G. = combustible gas.



# LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revers Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (6P-3)  
**PAGE** 3 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
8				41.0				41.0 - 42.5 feet: SAND (SP); yellowish-brown, mostly fine sand (95%) with some medium to coarse, moist, poorly graded.
9				42.5				42.5 - 123.0 feet: SANDY GRAVEL (GW) with cobbles and boulders; medium gray; mostly gravel (60-80%), subangular to subrounded, hard, some sand (20-40%), fine to coarse; trace of fines; boulder to several feet and hard, moderate to well graded, moist.
10		NO C.G.		50				@ 48 feet: easier drilling, moist.  @ 50 feet: gravel is subangular to subrounded pea gravel.
11				55				@ 54 feet: color change to darker gray.
12		NO C.G.		60				

**REMARKS**

All samples are grab samples. C.G. = combustible gas.



# LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revrs Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (GP-3)  
**PAGE** 4 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
13				65				
14		NO C.G.		70				@ 71.0 - 73.0 feet: boulder, white quartzite, slow drilling, dry.  @ 73.0 feet: faster drilling, moist.
				75				
				80				

**REMARKS**  
 All samples are grab samples. C.G. = combustible gas.



# LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revers Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (GP-3)  
**PAGE** 5 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
15				85				@ 82.0 feet: boulder.  @ 84.0 feet: easier drilling.  @ 86.0 feet: slow drilling, boulder - basalt or andesite. @ 86.5 feet: faster drilling increasing silt in matrix. @ 88.0 feet: slower drilling, dense.
16		NO C.G.		90				@ 89.5 feet: boulder.  @ 90.5 - 93.0 feet: boulder - metamorphic
17		NO C.G.		95				@ 96.0 feet: boulder, dusting.  98.0 feet: faster drilling, increase in sand and silt.
				100				

**REMARKS**  
 All samples are grab samples. C.G. = combustible gas.



SWEET-EDWARDS/EMCON

T02-01.35.GP23.28/sd:2.7/12/91

## LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revrs Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (6P-3)  
**PAGE** 6 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
18				<div style="display: flex; align-items: center;"> <div style="margin-right: 5px;">105</div> </div>				<p>@ 102.0 feet: slow drilling, dense, dry - dusting, increase in fine sand and silt.</p> <p>@ 103.0 feet: cobbles, dense.</p> <p>@ 105 feet: cobbles - mostly basalt to andusite.</p> <p>@ 107.0 feet: cobbles.</p> <p>@ 109.0 feet: increase in moisture, very slow drilling (109.0-116.0 feet)</p> <p>@ 116.0 feet: faster drilling, increase in moisture.</p>

**REMARKS**

All samples are grab samples. C.G. = combustible gas.



## LOG OF EXPLORATORY BORING

**PROJECT NAME** Hidden Valley Landfill  
**LOCATION** North Property Line  
**DRILLED BY** Layne Environmental  
**DRILL METHOD** Revers Air  
**LOGGED BY** G. S. Mack

**BORING NO.** GP-23 (69-3)  
**PAGE** 7 OF 7  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 123.00'  
**DATE COMPLETED** 6/27/91

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER FOOT	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
19								<p>@ 122.0 feet: sand is mostly coarse with some fine to medium increasing moisture, wet at 123 feet.</p> <p>Total depth at 123.0 feet.</p>

**REMARKS**

All samples are grab samples. C.G. = combustible gas.



SWEET-EDWARDS/EMCON

T02-01.35.GP23.28/sd:2.7/12/91



PROJECT Thun Field Landfill Site

Page 1 of 3

Location Northern Property Line

Boring No. MW-15 S (GP-4)

Surface Elevation 487

Drilling Method Air Rotary

Total Depth 80 feet

Drilled By Hayes Well Drilling Co.

Date Completed June 24, 1987

Logged By Kevin G. Rattue

WELL DETAILS	OVA/ TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
<p>Security Casing</p> <p>Bentonite Seal</p> <p>2" PVC Riser Pipe</p> <p>1/2" PVC Blank</p>		5			GW	<p><b>SANDY GRAVEL (0-80')</b>; medium brown; medium to coarse sand; some fine sand; angular to subangular gravels; 1/4 inch to 3/4 inch diameter; damp <b>OUTWASH</b></p> <p>@ 15': increasing medium coarse sand.</p> <p>@ 25': grading to olive brown with trace of fine sand; moist.</p> <p>@ 35': becoming wet.</p>	
	Average 1 min/ft	10					
		15					
		20					
		25					
		30					
		35					



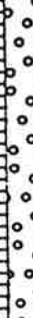

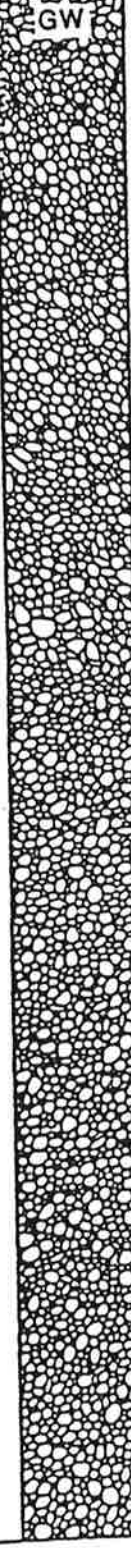


PROJECT

Thun Field Landfill Site

Page 2 of 2

Boring No. MW-15

WELL DETAILS	OVA/ TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Bentonite Seal  2" PVC Riser Pipe  2" PVC Slot Screen  1/2" Slot 20 Screen 		35  40  45  50  55  60  65  70				@ 36': very wet.     @ 51': scattered boulders.  @ 55': increasing coarse gravels and cobbles   @ 62': saturated; medium gray sandy coarse gravel; minimum trace fine sand.	     S.W.L.

Average 2 min/ft



PROJECT Thun Field Landfill Site

Page 1 of 2

Location (See Figure)

Boring No. GP-5

Surface Elevation approx. 480 ft. (MSL)

Drilling Method Air Rotary

Total Depth 58 feet.

Drilled By Hayes Well Drilling co.

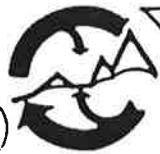
Date Completed 06/25/87

Logged By Kevin G. Rattue

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Bentonite Seal		5			SW	SANDY GRAVELS (0-58'); light medium brown; fine to coarse sand; trace silt, well sorted angular gravels less than 1 inch diameter; moist.	
	Average 1min/ft	10					
Pea Gravel		15				@ 15': increasing silt and increasing gravels.	Trace Methane
		20					
	Average 2min/ft	25				@ 24': becoming wet.	
Bentonite Seal		30					
		35				@ 34': gravels increasing; well sorted, subangular 1 (continued on next page)	



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Pea Gravel 1/2-inch SL020 Screen Average 3min/ft		35			SW.	(continued from previous page); inch to 2 inches in diameter; wet.	0.5% methane
		40				@42': becoming wet, slightly sticky/some silt, otherwise medium coarse sandy gravel.	
		45				@ 50': becoming very wet.	
		50					
		55				@ 55': saturated; color change to medium - dark gray.	S.W.L.
		60				Boring terminated at 58.0 feet.	Conductivity =2272 pH=7.4 T=21°C
		65					
	70						



PROJECT Thun Field Landfill Site

Page 1 of    

Location Northern Property Line

Boring No. TF-14 (GP-6)

Surface Elevation 475 ft (msl)

Drilling Method Air Rotary

Total Depth 98 feet

Drilled By Haves Well Drilling Co.

Date Completed 6/6/86

Logged By F.G. Rattue

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		5	1	Grab		SP	GRAVELLY SAND, (Recessional outwash), light brown medium sand, scattered cobbles, angular gravels ( 1/2"), moist.	Gaseous odor at approx. 10 feet
		10	2	Grab				
		15	3	Grab			---increasing gravels ( 1"), sub-angular to sub-rounded, moist.	
		20	4	Grab			---trace silt.	
		25	5	Grab			---increasing medium and medium fine sand.	
		30	6	Grab			---grading to brownish gray, some fine sands, very moist.	
		35	7					



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
Backfilled with Bentonite Chips Bentonite Seal Bentonite Seal Gravel Pack Gravel Pack Backfilled with Bentonite Chips 2" PVC Sch. 80 SLO10 Screen 2" PVC Sch. 80 Riser Pipe		40	8	Grab		GP	SANDY GRAVELS, (Recessional outwash), medium to dark gray, medium coarse, moist.	
		45	9	Grab			---increasing fine sand.	
		50	10	Grab			---less fine sand increasing medium sand, moist to wet.	
		55	11	Grab		GM	SILTY SAND GRAVEL, (Recessional outwash), brownish gray, fine to coarse sand, "sticky", very wet.	SWL while drilling S.C.= 2700
		60	12	Grab				
		65	13	Grab		GM	SILTY SANDY GRAVEL, (till), light brownish gray, fine to coarse sand, "sticky", very wet.	No flaw
		70	14	Grab			---increasing silt.	



PROJECT Thun Field Landfill

Page 1 of 1

Location Pierce County, Washington

Boring No. MW-16S (GP-7)

Surface Elevation 479.5ft. (MSL)

Drilling Method Air Rotary

Total Depth 72'

Drilled By Hayes Well Drilling

Date Completed 09/25/87

Logged By KGL

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Bentonite Chips</p> <p>2-inch Schedule 40 PVC Riser Pipe</p> <p>3/4 inch PVC pipe</p>		0				GM	<u>Silty Sandy Gravel: (0-5')</u> brown, subrounded cobbles to 10" diameter, wood chips, medium dense, dry.	
		5						<u>Sandy Gravel: (5'-72')</u> brownish gray, broken gravel to 0.5" diameter, fine sand, some brown silt, medium dense, very slightly moist.  @ 10' dark brownish gray, fine to coarse sand, trace silt, medium dense, moist.  loss of air circulation, coarse sand and gravel
<p>Bentonite Chips</p> <p>Washed Pea Gravel</p> <p>2-inch Schedule 40 PVC Riser Pipe</p>		15				GW	increasing fine sand and silt	
		20						boulder at 38'
		25						
		30						



2-Inch Sched. 40 SLO20 Well Screen  
 Washed Pea Gravel  
 Bentonite Pellets  
 Stainless Steel Centralizer

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY	
			NO.	TYPE					
		40				GW	<u>Sandy Gravel:</u> (5-72') grayish brown, broken gravel to 0.5" diameter, fine to medium sand, trace to some silt, medium dense, moist.		
		45							
		50						increase in moisture at 53'	
		55							
		60					GW	at 60' brown, subrounded gravel to 0.5" diameter, fine to medium sand, loose, wet.	
		65							
		70					slightly sticky cuttings		
		75					9/25/87, 1445, terminate boring at 72' driller adds water to develop boring		

Project Thun Field Landfill  
 Project No. T0201.07  
 Location Pierce County, Washington  
 Drilling Method Air Rotary  
 Surface Elevation approx.450 ft. (MSL)  
 Well Elevation \_\_\_\_\_

# --BORING LOG

Boring No. GP-8

Logged by KGR/KGL

Start 9/9/87, 1345

Finish 9/9/87, 1700

Page 1 of 1

Well Construction Details	Penetration Rate	Sample No	Sample Type	Depth	Soil Type		Description
					USCS	Sym.	
Bentonite Chips 1/2-Inch PVC Riser Pipe Washed Pea Gravel 1/2-Inch SLO20 Screen 6"	1-2 min./ft.	1	Grab	0-5			Sandy Gravel: light gray, well sorted to 1.5" diameter, subangular and broken, medium to coarse sand, loose, dry.
	1 min./ft.	2	Grab	5-10	GW		increasing medium sand, dry
	1 min./ft.	3	Grab	10-15			grades to brownish gray, medium dense, moist
	1 min./ft.	4	Grab	15-20			wet cuttings increasing fine sand and some silt, brown, subangular and broken gravel to 2" diam., medium dense, moist.
	.5 min./ft.	5	Grab	20-25			GasTech = 0% on top of casing
	1 min./ft.	6	Grab	25-30	GW		subrounded gravel to 1" diam. medium sand, some silt, medium dense, wet.
	1 min./ft.	7	Grab	30-35			encounter H2O at 28'
				40			Terminate boring at 36.0' 9/9/87, 1437

Remarks: 1) Installed GP-8(A) and PZ-85  
 2) PVC glue on all joints  
 3) Saw-cut slots for piezometer screen  
 4) 0.5" Schedule 40 PVC riser pipe  
 5) Hayes Well Drilling and Pump



Sweet, Edwards & Associates



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
Gravel Pack	3m/ft.	40					40-45' SAND, light gray, medium to coarse, occasional pebbles, saturated.	EC=177
		45					45-50' SAND, as above medium, moderately well sorted, subrounded, saturated.	EC=152
Bentonite Slurry	2m/ft.	50					50-55' SAND, light brown to gray, medium well sorted with numerous subrounded pebbles, saturated.	EC=95
		55					55-60' SAND, as above, becoming less well sorted, and fewer pebbles, saturated.	EC=130
Bentonite Seal	3m/ft.	60					60-65' SILTY SAND, light to medium brown to gray, illsorted, few pebbles, slightly silty, saturated.	EC=110
		65					65-70' SILTY SAND, as above. Saturated.	EC=135
Bentonite Seal	2m/ft.	70					70-75' SILTY SAND, as above. Saturated.	EC=115
		75					75-80' GRAVELLY SILTY SAND (TILL/DRIFT), brownish, gray, medium to coarse sand, well sorted, ... increasing gravel content and silty, saturated.	EC=116
Bentonite Seal	4m/ft.	80					80-85' (TILL/DRIFT), brownish gray with a tinge of reddish brown, illsorted gravel, sand and silt, very wet with irregular flows.	EC=121
		85						

Not Undertaken To Date



PROJECT THUN FIELD LANDFILL

Location Eastern Gate of Landfield

Boring No. TF-10 (GP-9)

Surface Elevation 454.56' a.m.s.l.

Drilling Method Air Rotary

Total Depth 98 feet

Drilled By Johnson Drilling Co.

Date Completed 6/26/85

Logged By K.G. Rattue

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
Cement Bentonite Slurry Gravel Pack 2" PVC sch. 80 riser 2" PVC sch. 80 riser 1" PVC Hydrotip 3/4" riser 2" PVC sch. 80 riser 2" PVC sch. 80 slot screen 2" PVC sch. 80 riser	3m/ft. Avr 2m/ft. 3m/ft. 2m/ft.	0 5 10 15 20 25 30 35 40	Grab Sampling Throughout At 5 Feet Intervals Not Undertaken To Date				0-5' SAND and GRAVEL, light brown, illsorted, loose, very dry with few boulders. 5-10' SAND and GRAVEL, yellowish brown, medium to coarse, sand loose, very dry with occasional pebbles. 10-15' SAND and GRAVEL, as above becoming slightly moist. 15-20' SAND and GRAVEL, light brown, medium to coarse sand, weakly cohesive, few pebbles, slightly moist. 20-25' SAND and GRAVEL, as above becoming coarser and very moist. 25-30' SAND and GRAVEL, light brown to gray, illsorted, very pebbly, saturated. 30-35' SAND and GRAVEL, as above. 35-40' SAND and GRAVEL, as above with increasing medium sand content, saturated.	RWL 27' EC=190 EC=125

Project Thun Field Landfill

# BORING LOG

Project No. T0202.07

Boring No. GP-10

Location Pierce County, Washington

Logged by KGL

Drilling Method Air Rotary

Start 9/10/87

Surface Elevation approx 455 ft. (MSL)

Finish 9/10/87

Well Elevation \_\_\_\_\_

Page 1 of 1

Well Construction Details	Penetration Rate	Sample No	Sample Type	Depth	Soil Type		Description
					USCS	Sym.	
	.5 min./ft.	1	Grab	0-5	GW		Sandy Gravel: bluish gray, broken gravel to 1" diam., medium sand, medium dense, dry.
	.5 min./ft.	2	Grab	5-10	GW / SW		grades to brownish gray, moist Sandy Gravel to Gravelly Sand: brownish gray, fine to medium sand, subangular and broken gravel to 1", some silt, medium dense, moist
	1 min./ft.	3	Grab	10-15			Sandy Gravel: brown, subrounded gravel to 1.5" diameter, fine to coarse sand, trace silt, medium dense, moist
	1 min./ft.	4	Grab	15-20			Gas Tech = 0% on top of casing
	.5 min./ft.	5	Grab	20-25	GW		slight increase in silt content
	1 min./ft.	6	Grab	25-30			encounter H <sub>2</sub> O at 28'
	.5 min./ft.	7	Grab	30-35			
				40			Terminate boring at 36.5' 9/10/87, 1100

- Remarks: 1) Installed GP-10(A) and PZ-10(S)  
 2) PVC glue on all joints  
 3) Saw-cut slots for piezometer screen  
 4) 0.15" Schedule 40 PVC riser pipe  
 5) Hayes Well Drilling and Pump



Sweet, Edwards & Associates

Project Thun Field Landfill  
 Project No. T0201.07  
 Location Pierce County, Washington  
 Drilling Method Air Rotary  
 Surface Elevation approx. 485 ft. (MSL)  
 Well Elevation \_\_\_\_\_

# BORING LOG

Boring No. GP-11  
 Logged by KGL  
 Start 9/10/87, 1420  
 Finish \_\_\_\_\_  
 Page 1 of 2

Well Construction Details	Penetration Rate	Sample No	Sample Type	Depth	Soil Type		Description
					USCS	Sym.	
				0	GM		Silty Gravel (Top Soil): brown, cobbles to 6" diameter, loose, dry.
		1	Grab	5	GW		Sandy Gravel: bouish gray, broken gravel to 2" diam., fine to coarse sand, trace brown silt, medium dense, dry.
		2	Grab	10		increasing fines, brown, slightly moist	
		3	Grab	15			
		4	Grab	20			Gas Tech = 0% on top of casing
		5	Grab	25			
		6	Grab	30			boulder at 29', 10" diam., dark blue grey
		7	Grab	35			Metal flakes from bit notes in cuttings
	8	Grab	40				Gas Tech - 0% on top of casing

Remarks: 1) Installed GP-11(A), GP-11(B) and PZ-11(S)  
 2) PVC glue on all joints  
 3) Saw-cut slots for piezometer screen  
 4) 0.5" Schedule 40 PVC riser pipe  
 5) Hayes Well Drilling and Pump

1/2-Inch PVC Slotted Screen



Sweet, Edwards & Associates

# BORING LOG

Project Thun Field Landfill  
 Project No. T0201.07  
 Location Pierce County, Washington  
 Drilling Method Air Rotary  
 Surface Elevation \_\_\_\_\_  
 Well Elevation \_\_\_\_\_

Boring No. GP-11  
 Logged by KGL  
 Start 9/10/87, 1420  
 Finish 9/11/87, 1230  
 Page 2 of 2

Well Construction Details	Penetration Rate	Sample No	Sample Type	Depth	Soil Type		Description	
					USCS	Sym.		
1/2-Inch PVC Slotted Screen 6"	Washed Pea Gravel 1/2-inch PVC Hiser Pipe	8	Grab	40	GW		Sandy Gravel: brown, subrounded gravel to 1" diameter, coarse sand, trace silt, medium dense, moist	
		.5 min./ft.	9	Grab			45	increasing moisture content
		.5 min./ft.	10	Grab			50	wet cuttings
		1 min./ft.	11	Grab			55	Gas Tech = 0% on top of casing use approximately 60 gallons of water mixed with air to try and develop boring.
		1 min./ft.	12	Grab			60	5-10 gallons of water returned, resume drilling
		.5 min./ft.	13	Grab			65	Driller notes ground water blow out ground water at 66'
		.5 min./ft.					70	Terminate boring at 67', 9/10/87, 1632

Remarks: See Page 1



PROJECT Thun Field Landfill Site

Page 1 of 7

Location (See Figure)

Boring No. MW-20 Regional (GP-12)  
8"-30'

Surface Elevation 464.5 ft. (MSL)

Drilling Method Cable Tool 6"-265'

Total Depth 265 feet

Drilled By Tacoma Pump and Drill

Date Completed 3/3/88

Logged By Patrick Dunn

WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Steel Security Casing Bentonite Chips 2" PVC Riser Pipe 1/2" PVC Riser Pipe 1/2-inch Gas Probe Screen		5			GM	SANDY GRAVELS (0-7'); light olive brown; coarse gravel grained; 5-10% fines; 15-30% fine to medium sand; 15-20% coarse sand to fine gravel; gravels sub-rounded to maximum size of 8 inches; medium dense; dry. (OUTWASH)	
	Trace	10	1	Grab	SM	SILTY GRAVELLY SANDS (7-20'); Brown; 30-40% silt fines; medium to coarse grained; 10-15% fine gravels; trace cobbles; medium density; dry.	
Pea Gravel	Trace	20			GM	SILTY SANDY GRAVELS (20-50'); light brownish gray (2.5 Y, 6/2); 25-35% silt fines; 10-20% fine to medium sand; 20-30% coarse sand to fine gravel; 15-25% coarse gravel; trace to 5% cobbles; medium dense; some open hole; dry.	
Bentonite Slurry	Trace	25	2	Grab		@ 25': in-situ sample of 1/2 inch rounded gravels with sand silt binder.	
		30					
		35					

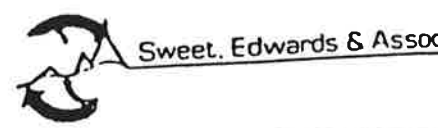
# BORING LOG

Project Thun Field Landfill  
 Project No. T0201.07  
 Location Pierce County, Washington  
 Drilling Method Air Rotary  
 Surface Elevation \_\_\_\_\_  
 Well Elevation \_\_\_\_\_

Boring No. GP-13  
 Logged by KGR  
 Start 9/14/87  
 Finish 9/14/87  
 Page 1 of 1

Well Construction Details	Penetration Rate	Sample NO	Sample Type	Depth	Soil Type		Description
					USCS	Sym.	
				0			Silty Sandy Gravel: tan to buff, well sorted subangular to subrounded gravels to 1.5" diam., fine to coarse sand, loose, wet
	1 min./ft.	1	Grab	5			
	2 min./ft.	2	Grab	10			very wet cuttings
	3 min./ft.	3	Grab	15			Gas Tech = 1.2% on top of casing.
	1-2 min./ft.	4	Grab	20			grades to gray brown with increasing silt and fine to medium sand, angular gravels to 1" diameter, medium dense saturated
	1 min./ft.	5	Grab	25			grades to less silt, gray brown, saturat
	1 min./ft.	6	Grab	30		GM	
	7	Grab	35		GW	Gas Tech = trace level only	
				40			

Remarks: 1) Installed GP-13A and PZ-13S  
 2) PVC glue on all joints  
 3) Saw-cut slots for piezometer screen  
 4) 0.5" Schedule 40 PVC riser pipe  
 5) Hayes Well Drilling and Pump





PROJECT Thun Field Landfill Site

Page 1 of 3

Location (See Figure)

Boring No. MW-19 Shallow, GP-15 (A) (B)

Surface Elevation 490.5 (MSL)

Drilling Method Air Rotary - 6"

Total Depth 80 feet below surface

Drilled By Haves Well Drilling Co.

Date Completed 2/6/88

Logged By Patrick Dunn

WELL DETAILS	OVA TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Steel Security Casing Bentonite Pellets 2" PVC Riser Pipe (1/2" PVC) Gas Probe Screen Washed Pea Gravel Bentonite Pellets		5	1	Grab	GM (FILL)	SAND GRAVELS (0-9'); light olive brown (2.5 Y, 5/4); coarse sand to fine gravel; wood fragments; loose; dry. (FILL)  @ 7-13': color change to dark brown.	
		10	2	Grab	SW/ SP	GRAVELLY SAND to SAND (9-45'); light olive brown (2.5 Y, 5/4); fine to medium grained; 10% slightly plastic fines; 10-15% coarse sand; 10-20% fine to medium gravels; trace cobbles; dense. (OUTWASH)	
		15	3	Grab			
		20	4	Grab		@ 20-30': finer grained.	
		25					
		30	5	Grab		@ 30-43': coarser grained.	
		35					



WELL DETAILS	OVA/ TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Bentonite Pellets  Washed Pea Gravel  2" PVC Riser Pipe  Gas Probe Screen (1/2")  Bentonite Pellets  Washed Pea Gravel		35			SW/ SP	GRAVELLY SAND to SAND (continued)	
		40	6	Grab			
		45				GP	SANDY GRAVELS with occasional <u>Boulders (45-77')</u> ; olive brown (2.5 Y, 4/4); 1/4 to 1 inch gravel; trace 10% slightly plastic fines; 15-30% fine to medium sand; 10% coarse sand; medium dense; dry. (OUTWASH)
		50	7	Grab			
		55					
		60	60	8	Grab		@ 61': wet.
		65					
		70	70	9	Grab		
							Conducti 470 u

2/26/88

Conducti  
470 u



PROJECT Thun Field Landfill

Location (see figure)

Boring No. GP-16

Surface Elevation \_\_\_\_\_

Drilling Method Air Rotary

Total Depth 60 feet

Drilled By \_\_\_\_\_

Date Completed 9/15/87

Logged By KGR

WELL DETAILS	PENE- TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
<p>Cement</p> <p>Bentonite Seal</p> <p>Pea Gravel</p>		0				SANDY GRAVEL (Dirty Outwash)	
		5				Light brown gravels, well sorted 1/4 - 1 1/2" angular - to subangular, medium to coarse sand, some silt, occasional boulders, moist.	
		10				-- Dirty Outwash, medium to course sand, dry, grading to medium brown.	
		15					
		20					
		25				GRAVELY SAND - grayish brown, with tinge of red, medium to course sand, some silt, subrounded to rounded gravels 1/2 - 1" diam., dirty, wet.	
		30					
		35					
		40				-- Saturated.	



PROJECT Thun Field Landfill

Page 2 of 2

Location (see figure)

Boring No. GP-16

Surface Elevation \_\_\_\_\_

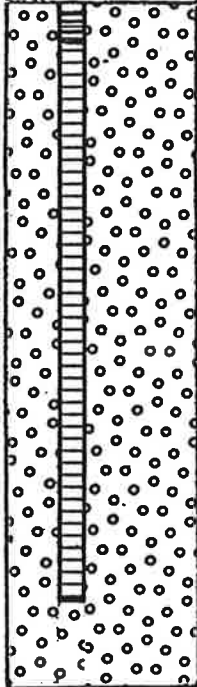
Drilling Method Air Rotary

Total Depth 60 feet

Drilled By \_\_\_\_\_

Date Completed 9/15/87

Logged By KGR

WELL DETAILS	PENE- TRATION TIME/ RATE	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
 Pea Gravel		-40				-- Gravels angular 1/8 to 1 1/2" diam., occasional subangular, saturated.	
		-45				-- Gray brown, well sorted gravels, 1/2 - 3/4" diam.	
		-50				-- Subrounded, 1/4 - 1 1/2" diam.	
		-55				-- Medium to coarse sand, light brown, well sorted gravel, saturated, some silt.	
		-60					



PROJECT Thun Field Landfill Site

Page 1 of 4

Location See figure

Boring No. TF-13 (GP-17)

Surface Elevation 446 ft. (MSL)

Drilling Method Air Rotary

Total Depth 120 feet

Drilled By Hayes Well Drilling Co.

Date Completed 6/6/86

Logged By K. G. Rattue

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Backfilled Gravel Pack Bentonite Seal Concrete seal 1/2" PVC Sch. 80 Riser Pipe 1/2" PVC Sch. 80 SL010 Screen 2" PVC Sch. 80 Riser Pipe</p>		5	1	Grab		SP	GRAVELLY SAND, light brown, fine to medium, angular gravels ( 1/2") moist.	
		10	2	Grab		GP	SANDY GRAVELS, medium to dark gray, medium-coarse sand, sub-rounded to sub-angular gravels ( 1") moist.	
		15	3	Grab				
		20	4	Grab				
		25	5	Grab				
		30	6	Grab				
		35	7	Grab			SP	GRAVELLY SAND, medium to dark gray, medium with trace coarse sand, rounded gravels ( 1"), saturated.

### LOG OF EXPLORATORY BORING

PROJECT NAME Hidden Valley Landfill  
 LOCATION  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch Air Rotary  
 LOGGED BY G. Mack

BORING NO. GP-10  
 PAGE 1 OF 3  
 GROUND ELEV.  
 TOTAL DEPTH 34.50'  
 DATE COMPLETED 12/19/95

SAMPLING METHOD	SAMPLE NUMBER	C.G. PERCENT LEL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
Bag	4'			5				0 to 34.5 feet: SANDY GRAVEL WITH COBBLES AND BOULDERS (GW), yellowish brown, fine to coarse gravel, few fine to coarse sand, trace of fines, cobbles, and boulder to several feet diameter, slightly damp at surface, moist to wet below 24 feet.
Bag	8'	0		10				@ 8.0 feet: decreases in gravel size, no cobbles.  @ 10.0 feet: gravel was coated with silt.
Bag	12'			15				@ 14.0 feet: becoming finer grain size, increase in gravel.
Bag	17.5'	0		20				



**REMARKS**  
 Bag samples collected for lithologic characterization.

EMCON

### LOG OF EXPLORATORY BORING

PROJECT NAME Hidden Valley Landfill  
 LOCATION  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch Air Rotary  
 LOGGED BY G. Mack

BORING NO. GP-10  
 PAGE 2 OF 3  
 GROUND ELEV.  
 TOTAL DEPTH 34.50'  
 DATE COMPLETED 12/19/95

SAMPLING METHOD	SAMPLE NUMBER	C.B. PERCENT LEL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
Bag	25'	0		25				0 to 34.5 feet: SANDY GRAVEL WITH COBBLES AND BOULDERS (GW), continued. @ 20.0 feet: boulder.  @ 23.0 feet: soil getting moist.
Bag	30'			30				@ 30.0 feet: soil is wetter.
Bag	35'	0		35				First water out of hole.
				35				Total depth drilled = 34.5 feet. Total depth sampled = 34.5 feet.
				40				See Page 3 for Well Completion Details.



**REMARKS**

Bag samples collected for lithologic characterization.

EMCON

## LOG OF EXPLORATORY BORING

PROJECT NAME Hidden Valley Landfill  
 LOCATION  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch Air Rotary  
 LOGGED BY G. Mack

BORING NO. GP-10  
 PAGE 3 OF 3  
 GROUND ELEV.  
 TOTAL DEPTH 34.50'  
 DATE COMPLETED 12/19/95

SAMPLING METHOD	SAMPLE NUMBER	C.G. PERCENT LEL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> <div style="margin-bottom: 10px;">55</div> <div style="margin-bottom: 10px;">60</div> </div>				<p><b>WELL COMPLETION DETAILS:</b>                      0 to 6.0 feet: 1/2-inch-diameter, schedule 80 PVC with bottom 2.0 feet perforated with 20 holes using a 3/16-inch drill, and a glued PVC end cap. Total length of PVC was 7.9 feet.</p> <p>0 to 3.0 feet: Baroid holeplug 3/4 bentonite chips hydrated with potable water.</p> <p>3.0 to 35.0 feet: Lonestar Trumix washed pea gravel.</p>



**REMARKS**  
 Bag samples collected for lithologic characterization.

EMCON

### LOG OF EXPLORATORY BORING

PROJECT NAME Hidden Valley Landfill  
 LOCATION  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch Air Rotary  
 LOGGED BY G. Mack

BORING NO. GP-11  
 PAGE 1 OF 3  
 GROUND ELEV.  
 TOTAL DEPTH 35.00'  
 DATE COMPLETED 12/19/95

SAMPLING METHOD	SAMPLE NUMBER	C.G. PERCENT LEL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
Bag	5'			5				<p>0 to 35.0 feet: SANDY GRAVEL WITH SILT, COBBLES AND BOULDERS (GW), yellowish brown, fine to coarse gravel, little fine to coarse sand, trace to few fines, cobbles and boulders to several feet, moist, no odors.</p> <p>@ 7.0 to 9.0 feet: boulder.</p> <p>@ 10.0 feet: gravel was coated with silt.</p> <p>@ 13.0 feet: increasing fines.</p> <p>@ 14.0 feet: boulder.</p> <p>@ 19.0 to 20.0 feet: SILTY zone.</p>
Bag	10'	0		10				
Bag	15'	0		15				
				20				



**REMARKS**

Bag samples collected for lithologic characterization.

EMCON

### LOG OF EXPLORATORY BORING

PROJECT NAME Hidden Valley Landfill  
 LOCATION  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch Air Rotary  
 LOGGED BY G. Mack

BORING NO. GP-11  
 PAGE 2 OF 3  
 GROUND ELEV.  
 TOTAL DEPTH 35.00'  
 DATE COMPLETED 12/19/95

SAMPLING METHOD	SAMPLE NUMBER	C.G. PERCENT LEL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
Bag	21'							0 to 35.0 feet: SANDY GRAVEL WITH SILT, COBBLES AND BOULDERS (GW), continued.
Bag	25'	0		25				@ 24.0 feet: increasing sand.
Bag	30'			30				@ 31.0 feet: increasing fines.
Bag	35'	0		35				Total depth drilled = 35.0 feet. Total depth sampled = 35.0 feet.
				40				See Page 3 for Well Completion Details.



**REMARKS**

Bag samples collected for lithologic characterization.

EMCON

### LOG OF EXPLORATORY BORING

PROJECT NAME **Hidden Valley Landfill**  
 LOCATION  
 DRILLED BY **Tacoma Pump & Drilling**  
 DRILL METHOD **6-inch Air Rotary**  
 LOGGED BY **G. Mack**

BORING NO. **GP-11**  
 PAGE **3 OF 3**  
 GROUND ELEV.  
 TOTAL DEPTH **35.00'**  
 DATE COMPLETED **12/19/95**

SAMPLING METHOD	SAMPLE NUMBER	C.G. PERCENT LBL	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> <div style="margin-bottom: 10px;">55</div> <div style="margin-bottom: 10px;">60</div> </div>				<p><b>WELL COMPLETION DETAILS:</b>                      0 to 6.0 feet: 1/2-inch-diameter schedule 80 PVC with perforated with 34 holes using 3/16-inch drill, and a glued end cap. Total length of PVC was 8.3 feet.</p> <p>0 to 3.0 feet: Baroid holaplug 3/4 bentonite chips hydrated with potable water.</p> <p>3.0 to 35.0 feet: Lonestar Trumix washed pea gravel.</p>



**REMARKS**  
 Bag samples collected for lithologic characterization.

EMCON

## LOG OF EXPLORATORY BORING

PROJECT NAME LRI  
 LOCATION Hidden Valley Landfill  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch ODEX, 4-inch HSA  
 LOGGED BY G. Mack

BORING NO. GP-14  
 PAGE 1 OF 3  
 GROUND ELEV. \_\_\_\_\_  
 TOTAL DEPTH 35.00'  
 DATE COMPLETED 08/23/94

SAMPLING METHOD AND NUMBER	COMBUSTIBLE GAS %gas/%LEL	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
G-5	0/0	-		5				<p>0 to 16.5 feet: SANDY GRAVEL WITH COBBLES AND BOULDERS (GW), yellowish gray to yellowish brown, fine to coarse subangular to subrounded gravel, some fine to coarse sand, trace of silt, boulders to several feet, wood debris, moist. (FILL)</p> <p>@ 6.0 feet: wood chips.</p> <p>@ 8.0 feet: moist, noticeable landfill-like odor.</p> <p>@ 9.0 to 12.0 feet: no returns.</p>
G-10	0/0	-		10				
G-15	0/4	-		15				
G-18				20			<p>16.5 to 21.5 feet: GRAVEL WITH SAND (GW), medium gray to olive gray, fine to coarse subangular to subrounded, hard gravel up to several inches, few to little fine to coarse sand, trace of silt, moist.</p>	

**REMARKS**

G = Grab sample from ODEX air discharge. Combustible gas = 0% gas/0% LEL.





## LOG OF EXPLORATORY BORING

PROJECT NAME LRI  
 LOCATION Hidden Valley Landfill  
 DRILLED BY Tacoma Pump & Drilling  
 DRILL METHOD 6-inch ODEX, 4-inch HSA  
 LOGGED BY G. Mack

BORING NO. GP-14  
 PAGE 3 OF 3  
 GROUND ELEV. \_\_\_\_\_  
 TOTAL DEPTH 35.00'  
 DATE COMPLETED 08/23/94

SAMPLING METHOD AND NUMBER	COMBUST. MLE GAS % gas/% LEL	BLOWE PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
				45				<p><b>WELL COMPLETION DETAILS:</b></p> <p><b>Deep Probe:</b>                      0 to 21.3 feet: Schedule 80 PVC blank riser pipe with 1/8-inch ID Tygon tubing.                      21.3 to 23.2 feet: PVC gas probe tip.</p> <p><b>Shallow Probe:</b>                      0 to 4.0 feet: Schedule 80 PVC blank riser pipe with 1/8-inch ID Tygon tubing.                      4.0 to 5.5 feet: PVC gas probe tip.</p> <p><b>Seals:</b>                      0 to 3.0 feet: Baroid 3/4-inch hole plug - hydrated bentonite chips.                      3.0 to 18.5 feet: Lonestar washed pea gravel.                      18.5 to 20.5 feet: Baroid 3/4-inch hole plug - hydrated bentonite chips.                      20.5 to 35.0 feet: Lonestar washed pea gravel.</p>
				50				
				55				
				60				

**REMARKS**

G = Grab sample from ODEX air discharge. Combustible gas = 0% gas/0% LEL.





WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Gravel Pack</p> <p>Bentonite Seal</p> <p>Backfilled with Bentonite Slurry</p> <p>2" PVC Sch. 80 Riser Pipe</p> <p>2" PVC Sch. 80 SLO10 Screen</p>		35	7	Grab				S.C.=518
		40	8	Grab				
		45	9	Grab			--increasing silt.	S.C.=597
		50	10	Grab		GM	SILTY SANDY GRAVEL, dark gray, fine sand with trace medium sand, slightly oxidized, saturated.	S.C.=894
		55	11	Grab				Flows 150+ gpm
		60	12	Grab				S.C.=859
		65	13	Grab			--increasing medium sand.	S.C.=840
		70	14	Grab		SP	GRAVELLY SAND, medium to dark gray, medium to coarse, trace of silt, angular gravels ( 3/4"), saturated.	Flows 210+ gpm



PROJECT Thun Field Landfill

Page 1 of 1

Location (see figure)

Boring No. GP-18

Surface Elevation \_\_\_\_\_

Drilling Method Air Rotary

Total Depth 30 feet

Drilled By \_\_\_\_\_

Date Completed 9/16/87

Logged By KGR

WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
		0				<p>Silty Sandy Gravels (Till).</p> <p>Gray brown, fine to medium sand, well sorted gravels 1/8 - 1 1/4" diam., moist, sand f-crns, some silt.</p> <p>-- Scattered boulders greater than 1 foot diam.</p> <p>-- Gravels subangular, subrounded, poorly sorted 1/2 - 3/4", some silt, tan, light brown.</p> <p>-- Outwash. Increasing medium to course sand, poorly sorted gravels approximately 1" diam. wet, some silt, wet.</p> <p>-- Increasing subrounded gravels less than 2" diam., gray to light brown, sticky, medium to coarse sand, saturated.</p> <p>Boring depth at 30' bgs.</p>	
		5					
		10					
		15					
		20					
		25					
		30					
		35					
		40					



PROJECT THUN FIELD LANDFILL SITE

Page 1 of 4

Location West of Offices.

Boring No. TF-12(S)(D)

Surface Elevation \_\_\_\_\_

Drilling Method Air Rotary

Total Depth 124 feet

Drilled By Johnson Drilling

Date Completed 4/86

Logged By K.G. Rattue

WELL DETAILS	PENETRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERMEABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
<p>Bentonite Seal</p> <p>Bentonite Slurry</p> <p>2" sch. 80 riser pipe</p> <p>1" PVC riser pipe</p> <p>1" PVC screen</p> <p>Natural Sand and Gravel Backfill</p> <p>2" sch. 80 riser pipe</p>	2m/ft.	5	1	Grab		SM	0-7' <u>SILTY SAND</u> , (Recessional Outwash), light brown, fine to medium sand, trace coarse sand, damp.	
	4m/ft.	10	2	Grab		SW	7-21' <u>SILTY GRAVELLY SAND</u> , (Till?), dark brown, fine to coarse, damp.	
	3m/ft.	15	3	Grab			-increasing sand, decreasing silt, damp.	
		20	4	Grab			-increasing fine sand, silt, damp.	
	4m/ft.	25	5	Grab		GW	21-37' <u>SANDY GRAVELS</u> , (Outwash), light gray, fine to coarse sand, angular gravels, dry.	
	5m/ft.	30	6	Grab			-becoming medium to dark gray, damp.	
		35	7	Grab				



WELL DETAILS	PENE-TRATION TIME/RATE	DEPTH (FEET)	SAMPLE		PERME-ABILITY TESTING	SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE				
		35	7	Grab		GW	GRAVELLY SAND, medium brown, slightly silty, fine to coarse, dry.	
	4m/ft.	40	8	Grab		GM	31-53' <u>SILTY GRAVELLY SAND</u> , medium dark grayish brown, fine to coarse sand, moist.	
		45	9	Grab			same.	
		50	10	Grab			same.	
	4-5m/ft.	55	11	Grab		GM	53-60' <u>GRAVELLY SILTY SAND</u> , (Till), dark brown, fine to medium sand, cohesive silt, very moist.	
		60	12	Grab		GM	60-74' <u>SILTY GRAVELLY SAND</u> , (Outwash), light gray, fine to coarse sand, angular gravel, saturated.	SWL 62' While drilling conductivity = 1100.
	3m/ft.	65	13	Grab			same - saturated.	
		70	14	Grab			same.	
	2m/ft.							



PROJECT Thun Field Landfill Site

Page 1 of 5

Location (See Figure)

Boring No. MW-18 Shallow (6P-20A, B, C)

Surface Elevation 546 ft. (MSL)

Drilling Method Air Rotary - 6"

Total Depth 160 feet below ground surface

Drilled By Hayes Well Drilling Co.

Date Completed 3/2/88

Logged By Patrick Dunn

WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Steel Security Casing					SM	SILTY SAND (0-16'); light olive brown (2.5Y, 5/4); fine grained 20-30% low plasticity fines; 10-15% coarse gravel; loose; dry. (TILL)	
Bentonite Seal	Trace	5				@ 13-13.5': color change to gray.	
		10	1	Grab		SILTY, SANDY GRAVEL to GRAVELLY SILTY SAND (16-42'); light olive brown to grayish brown; medium gravel grained; 1 inch rounded; 15-30% low plasticity fines; 15-30% fine to coarse grained sand; loose; dry. (TILL)	
Washed Pea Gravel		15			GM/SM		
2" PVC Riser Pipe		20	2	Grab			
1/2" Gas Probes	Trace	25					
Bentonite Chips	Trace	30	3	Grab		@ 30': lenticular quartz sands; harder.	
	Trace	35				@ 34-35.5': less fines coarser grained; damp.	





PROJECT Thun Field Landfill Site

Page 3 of     

Boring No. MW-185

WELL DETAILS	OVA/ TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY
			NO.	TYPE			
Bentonite Chips 2" PVC Riser Pipe		75			GP/GM	<u>SANDY GRAVELS to SILTY SANDY GRAVELS (continued).</u>  @ 72': change in color to gray, due to basaltic composition of rock. (OUTWASH)	
		80	7	Grab			
		85					
		90	8	Grab			
		95					
		100	9	Grab		<u>SANDY GRAVELS to SILTY SANDY GRAVELS (72-127')</u> ; olive gray (5Y, 4/2); fine to coarse gravels; 1/2 inch to 1 inch rounded; 10-20% fines; 15-30% fine to coarse sand; dense; damp. (OUTWASH)	
		105					
		110	10	Grab			



WELL DETAILS	OVA/TIP READINGS	DEPTH (FEET)	SAMPLE		SYMBOL	LITHOLOGIC DESCRIPTION	WATER QUALITY	
			NO.	TYPE				
		115			GP/GM	<u>SANDY GRAVELS to SILTY SANDY GRAVES (continued).</u>		
		120	11	Grab				
		125						
		130	12	Grab		SM	<u>SILTY SAND (127-150')</u> ; olive gray (5Y, 4/2); fine to coarse grained; 20-25% low plasticity fines; 5-15% fine gravels; up to 1/2 inch, rounded; drill hole staying open; dense; damp. (TILL) @ 133': Brighter olive color.	
		135						
		140	13	Grab			@ 139': dark andesitic boulders. @ 142': damp. @ 145': wet.	
		145						
		150	14	Grab	GM/SW	<u>SANDY SILTY GRAVELS to GRAVELLY SAND (150- BOB)</u> ; olive brown (2.5Y, 5/4); coarse grained to fine gravel grained; 10-20% fine to medium sand; (continued-)	3/2/88 Conductivity 980 umhos/cm	

# LOG OF EXPLORATORY BORING

GP-21

PROJECT NAME Phase II Remedial Investigation  
 LOCATION Hidden Valley Landfill  
 DRILLED BY Hayes Drilling  
 DRILL METHOD Air-Rotary  
 LOGGED BY John North

BORING NO. MW-25S  
 PAGE 1 OF 9  
 REFERENCE ELEV.  
 TOTAL DEPTH 170.00'  
 DATE COMPLETED 12/13/89

SAMPLE NUMBER	SAMPLE METHOD	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-1	GRAB		<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">5</div> <div style="margin-bottom: 10px;">10</div> <div style="margin-bottom: 10px;">15</div> <div style="margin-bottom: 10px;">20</div> </div>			0 - 20 feet: SANDY GRAVEL; browns; sand fine to coarse; gravel fine to coarse; scattered cobbles; 5-10% silt; moist.	

**REMARKS**

Gas Probes GP-21S and GP-21D installed with MW-25S. Well construction materials: 2" sch 40 flush-threaded PVC blank, 2" sch 40 0.010" factory slotted PVC screen, FILTER PACK = washed pea gravel, SEAL MATERIAL = medium and coarse bentonite chips. Locking steel monument cemented in place at surface.



SWEET-EDWARDS/EMCON

T02-01.21.LRIG2.13a/cj:4.09/10/9

# LOG OF EXPLORATORY BORING

**PROJECT NAME** Phase II Remedial Investigation  
**LOCATION** Hidden Valley Landfill  
**DRILLED BY** Hayes Drilling  
**DRILL METHOD** Air-Rotary  
**LOGGED BY** John North

**BORING NO.** MW-25S  
**PAGE** 2 OF 9  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 170.00'  
**DATE COMPLETED** 12/13/89

SAMPLE NUMBER	SAMPLE METHOD	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-2	GRAB		25				20 - 152 feet: GRAVELLY SAND; browns; sand fine to medium; gravel fine to 0.5", subrounded to subangular; trace silt; slightly moist.  --- @ 30 feet: moisture increasing.
S-3	GRAB		30				
			35				
			40				

**REMARKS**

Gas Probes GP-21S and GP-21D installed with MW-25S. Well construction materials: 2" sch 40 flush-threaded PVC blank, 2" sch 40 0.010" factory slotted PVC screen, FILTER PACK = washed pea gravel, SEAL MATERIAL = medium and coarse bentonite chips. Locking steel monument cemented in place at surface.



# LOG OF EXPLORATORY BORING

GP-22

PROJECT NAME Phase II Remedial Investigation  
 LOCATION Hidden Valley Landfill  
 DRILLED BY Tacoma Pump & Drill  
 DRILL METHOD Air Rotary  
 LOGGED BY John North

BORING NO. MW-23S  
 PAGE 1 OF 2  
 REFERENCE ELEV.  
 TOTAL DEPTH 32.00'  
 DATE COMPLETED 10/31/89

SAMPLE NUMBER	SAMPLE METHOD	GROUND WATER LEVELS	DEPTH IN FT.	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-1	GRAB		5	[Lithologic Column Pattern]	[Well Details Pattern]	0 - 8 feet: SANDY GRAVEL; greys; sands fine to coarse; gravels fine to 3"; with abundant cobbles to approximately 8"; trace silt. (RECESSIONAL)
			10	[Lithologic Column Pattern]	[Well Details Pattern]	8 - 32 feet: GRAVELLY SAND INTERBEDDED WITH SANDY GRAVEL; dark greys; sands fine to coarse, gravels subrounded, fine to 1 inch. (RECESSIONAL)
			15	[Lithologic Column Pattern]	[Well Details Pattern]	Slight moisture.
			20	[Lithologic Column Pattern]	[Well Details Pattern]	

**REMARKS**

Gas probe GP-22 installed with MW-23S. Well construction materials: 2" sch 40 flush-threaded PVC blank, 2" sch 40 .010" factory slotted PVC screen, FILTER PACK = pea gravel, SEAL MATERIAL = bentonite 3/8" pellets, medium bentonite chips. Locking steel monument cemented in place at surface.



SWEET-EDWARDS/EMCON

T02-01.02.LRI.14/cjf:6.09/10/90

# LOG OF EXPLORATORY BORING

**PROJECT NAME** Phase II Remedial Investigation  
**LOCATION** Hidden Valley Landfill  
**DRILLED BY** Tacoma Pump & Drill  
**DRILL METHOD** Air Rotary  
**LOGGED BY** John North


**BORING NO.** MW-23S  
**PAGE** 2 OF 2  
**REFERENCE ELEV.**  
**TOTAL DEPTH** 32.00'  
**DATE COMPLETED** 10/31/89

SAMPLE NUMBER	SAMPLE METHOD	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHO-LOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
S-2	GRAB						<p style="text-align: center;">Bottom of hole at 32 feet.</p>

**REMARKS**

Gas probe GP-22 installed with MW-23S. Well construction materials: 2" sch 40 flush-threaded PVC blank, 2" sch 40 .010" factory slotted PVC screen, FILTER PACK = pea gravel, SEAL MATERIAL = bentonite 3/8" pellets, medium bentonite chips. Locking steel monument cemented in place at surface.





**Appendix B**  
**Field Monitoring Forms**

**Condensate Recirculation Inspection Checklist**  
**Hidden Valley Landfill, Pierce County, Washington**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Signature: \_\_\_\_\_

Weather: \_\_\_\_\_

**Instructions:** Inspect each sump for pump operation and measure condensate fluid level, which should be below the overflow drainage pipe. Note any unusual observations such as soil staining or air leaks in the comments section.

Sump	Operation per Design (Y or N)	(1) Depth to Condensate (ft)	(2) Depth to Bottom (ft)	Height of Condensate (ft) = (2) - (1)	Comments
Sump No. 1					
Sump No. 2					
Sump No. 3					
Sump No. 4					
Sump No. 5					
Sump No. 6					
Sump No. 7					
Sump No. 8					
Sump No. 9					
Sump No. 10					
Sump No. 11					

**Other Remarks:**

# Hidden Valley Landfill Landfill Gas Monitoring of On-site Buildings

Date:  
Weather Conditions:  
Instrument:  
Measured By:

The atmosphere inside buildings at the landfill were monitored for possible intrusion of methane gas. Per WAC 173-351, concentrations of methane in on-site structures must not exceed 25% of the lower explosive limit (LEL). If off-site gas migration is suspected, concentrations of methane in off-site structures must not exceed 100 ppm methane.

The areas monitored included:

- The general overall work area
- Floor drains
- Underground conduit protrusions
- Closed areas where landfill gas could collect, such as under cupboards and inside closets

The gas detection instrument must be calibrated using calibration gas containing methane equal to 50 % LEL. Calibration must be performed before and after the survey is completed.

Checked boxes indicate that the survey revealed **no detectable methane**.

- Main Office - individual office spaces, storage areas and within open crawl-space area.
- Repair Shop – survey atmosphere conditions throughout (lower height levels).
- Pay/Scale Booths – interior of building for both scales.
- Recycle Building – throughout facility and water drainage areas.
- Leachate Treatment Building – all lower level office spaces, restrooms, water drainage system and storage/equipment areas.
- Transfer Station Building – throughout entire building and lower levels.

\_\_\_\_\_  
Signature



# Hidden Valley Landfill

## Landfill Gas Flare Station Data

Date:  
Weather:  
Measured By:

Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate <sup>(a)</sup> (scfm)	Monthly Total <sup>(b)</sup> (scf)
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
COMP 1	12	2792								
COMP 2	12	2792								
									Flare Total:	
COGEN	10	1969								

Field Notes:

(scfm) = standard cubic feet per minute (at standard temperature and pressure)

(a) Flow rate equals the square root of the velocity pressure multiplied by the flow factor

(b) Monthly total equals the flow rate per minute (scfm) x 60 x 24 x days of operation in a given month

# Hidden Valley Landfill

## Landfill Gas Well Field Data

Date: Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.  
 Weather:  
 Measured By:

VSC: Valve Stuck Closed  
 OTS: Open Tested Shut  
 VCO: Valve Cracked Open  
 VSO: Valve Stuck Open

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate	Comments
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
N65	2	79								
N64	2	79								
N64B/C	2	79								
N63	2	79								
N62	2	79								
N61	2	79								
N60A	2	79								
N59	2	79								
N58	2	79								
N57	2	79								
N56	2	79								
N55A	2	79								
N31	3	178								
N30	3	178								
N29	3	178								
N39	3	178								
N27	3	178								
N28	3	178								
N26	3	178								
N25	3	178								
N23	3	178								
N24	3	178								
W COM	12	2792								
N46	3	178								
N66	2	79								
N53	2	79								
N52	2	79								

# Hidden Valley Landfill

## Landfill Gas Well Field Data

Date: Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.  
 Weather:  
 Measured By:

VSC: Valve Stuck Closed  
 OTS: Open Tested Shut  
 VCO: Valve Cracked Open  
 VSO: Valve Stuck Open

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate	Comments
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
N67	3	178								
N68	2	79								
N44	2	79								
N45	3	178								
N43	3	178								
N42	3	178								
N37	2	79								
N38	3	178								
N54	3	178								
N41	3	178								
N40	3	178								
N36	3	178								
N35	3	178								
N33	3	178								
N34	3	178								
N70	3	178								
N69	3	178								
N51	3	178								
N HORIZ 1	3	178								
N HORIZ 2	3	178								
N50	3	178								
N71	3	178								
N72	3	178								
N32	3	178								
SE COMP	10	1969								
S COMP	10	1969								
N16	3	178								

# Hidden Valley Landfill

## Landfill Gas Well Field Data

Date: Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.  
 Weather:  
 Measured By:

VSC: Valve Stuck Closed  
 OTS: Open Tested Shut  
 VCO: Valve Cracked Open  
 VSO: Valve Stuck Open

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate	Comments
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
N15	3	178								
N17	3	178								
N14	3	178								
N4	3	178								
N3	3	178								
N21	3	178								
N20	3	178								
N19	2	79								
N19A	3	178								
N18	3	178								
N5	3	178								
N6	3	178								
N7	3	178								
N12	3	178								
N11	3	178								
E38	3	178								
E27	3	178								
E26	2	79								
E25A	2	79								
E25	2	79								
E24	2	79								
E23	2	79								
E22	2	79								
E20	2	79								
E18	2	79								
E16	2	79								

# Hidden Valley Landfill

## Landfill Gas Well Field Data

Date: Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.  
 Weather:  
 Measured By:

VSC: Valve Stuck Closed  
 OTS: Open Tested Shut  
 VCO: Valve Cracked Open  
 VSO: Valve Stuck Open

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate	Comments
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
E15	2	79								
E14	2	79								
E13	3	178								
E12	2	79								
E11A	2	79								
E10	2	79								
E2	2	79								
E1	2	79								
E2A	2	79								
E3A	2	79								
E4A	3	178								
E6B	3	178								
E43	2	79								
E42	2	79								
E41	2	79								
E37	3	178								
E40	4	317								
E11A	3	178								
E6B	3	178								
E8	2	79								
E9A	2	79								
E8A	3	178								
E17A	2	79								
E19A	2	79								
E21	3	178								
E28	2	79								
E29	3	178								

# Hidden Valley Landfill

## Landfill Gas Well Field Data

Date: Form is suitable, but under normal conditions, data is taken and stored electronically. Form is rarely used.  
 Weather:  
 Measured By:

VSC: Valve Stuck Closed  
 OTS: Open Tested Shut  
 VCO: Valve Cracked Open  
 VSO: Valve Stuck Open

Well Number	Pipe Size	Flow Factor	Field Measurements						Calculated Flow Rate	Comments
			%CH <sub>4</sub>	%CO <sub>2</sub>	%O <sub>2</sub>	Static Pressure	Velocity Pressure	Temp (°F)		
E31A	3	178								
E34A	3	178								
E34	3	178								
E7	2	79								
E33	2	79								
E32	3	178								
E39	2	79								
E36	2	79								
E5	2	79								
N10	3	178								
N9	3	178								
N48	2	79								
N49	2	79								
N47	2	79								
N8	3	178								
N73	2	79								
N75	2	79								
N13	3	178								
COMP 1	12	2792								
COMP 2	12	2792								
COGEN	10	1969								

# Facility Inspection Checklist

## Hidden Valley Landfill, Pierce County, Washington

Name: \_\_\_\_\_


Date: \_\_\_\_\_

Signature: \_\_\_\_\_

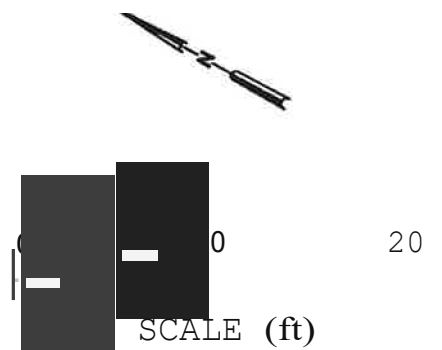
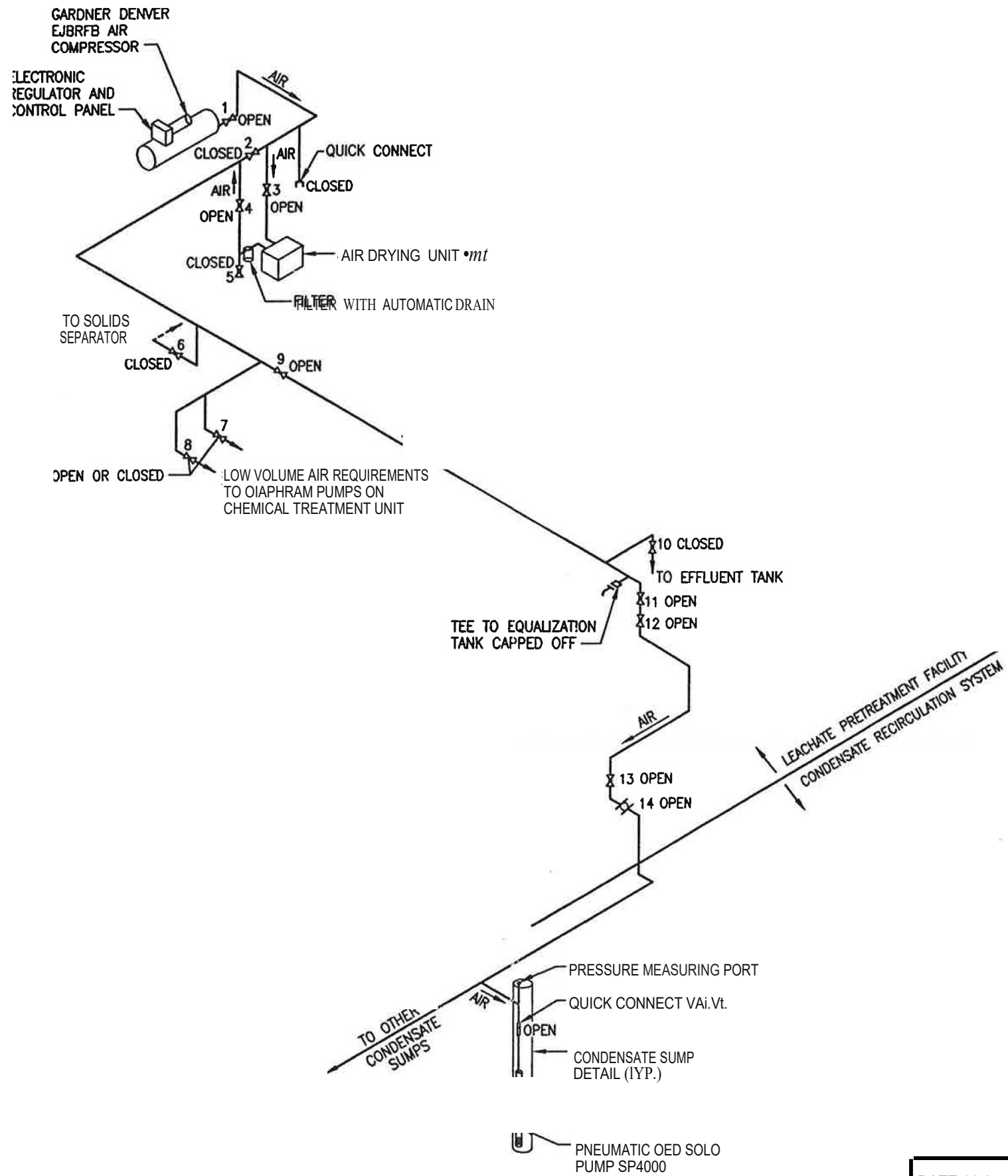
Weather: \_\_\_\_\_

Items	Yes	No	Comments
<b>Cover System</b>			
Settlement Depressions (sinkholes)			
Cracking of Cover Soils			
Inadequate Cover Soil or Rock			
Standing Water			
<b>Vegetation</b>			
Bare or Sparsely Vegetated Areas			
Areas of Dying Vegetation			
Large Root Vegetation (ex. Bushes)			
<b>Stormwater Conveyance System</b>			
Ditch Obstructions or Flat Areas			
Culvert Obstructions			
Catch Basin Debris or Silt Accumulation			
Stormwater Basin Debris or Silt			
<b>Cover Erosion</b>			
Gullies and/or Erosion Scars			
Presence of Seeps			
<b>Vector Control</b>			
Evidence of Ground Burrows			
<b>Leachate Collection &amp; Leak Detection Systems</b>			
Piping or Valve Issues			
Pump or Meter Issues			
Foaming at Pump			

**Other Remarks:**



**Appendix C**  
**Gas Condensate System Reference Material**



@1mcon

DATE 11-97  
 DWN MLP  
 APP KWW  
 REV: KWW  
 PROJECT NO.  
 40202-005.052

Figure 2-1  
 LAND RECOVERY, INC.  
 HIDDEN VALLEY LANDFILL  
 PIERCE COUNTY, WASHINGTON  
**CONDENSATE RECIRCULATION SYSTEM  
 AIR SUPPLY ISOMETRIC**

## Suppliers for the Gas Condensate Recirculation System

<b>Equipment/Material</b>	<b>Supplier</b>
Pneumatic Condensate Pumps	QED Groundwater Specialists P.O. Box 3726 Ann Arbor, MI 48106 (800) 624-2026
Main HDPE Condensate Discharge and Air Supply Lines	Core and Main 602 Valley Ave NE Puyallup, WA 98372 (253) 840-8558
Stainless Steel Piping	Interwest Metals – Floyd Equipment 2208 Pacific Hwy East Fife, WA 98424-1013 (253) 922-0200
Pipe Fittings	Ferguson Plumbing Supply 3517 Pacific Hwy East Tacoma, WA 98424-1120 (253) 922-9060  Core and Main 602 Valley Ave NE Puyallup, WA 98372 (253) 840-8558  Tacoma Screw Products, Inc. 2001 Center Street Tacoma WA 98409-7895 (253) 572-3444  ARG Industrial 6722 20 <sup>th</sup> St E Suite F-100 Fife, WA 98424 (253) 272-0397  Motion 5102 20 <sup>th</sup> St E. Fife, WA 98424 (253) 572-7070  Campbell Manufacturing, Inc. 127 E Spring St Bechtelsville, PA 19505 (800) 523-0224

TQED

*GroundWater  
Specialists*

6095 Jackson Rd,  
P.O. Box 3726  
Ann Arbor, Michigan 48106  
800-624-2026 / In Michigan 313-995-2547

SOLO™

**CONTROLLERLESS  
PNEUMATIC  
PUMP**

# SOLO

SOLO is an intelligent, high-rate pneumatic pump for total fluids applications. It runs itself, with an internal float system and a magnetic "brain" cartridge. The brain senses liquid level in the pump, turning the air supply on when the pump is full, and turning it off as soon as the pump empties. With its built-in brain, SOLO doesn't require air cycle or on-off level control at the wellhead, simplifying system design. All you need above the well caps is a compact air

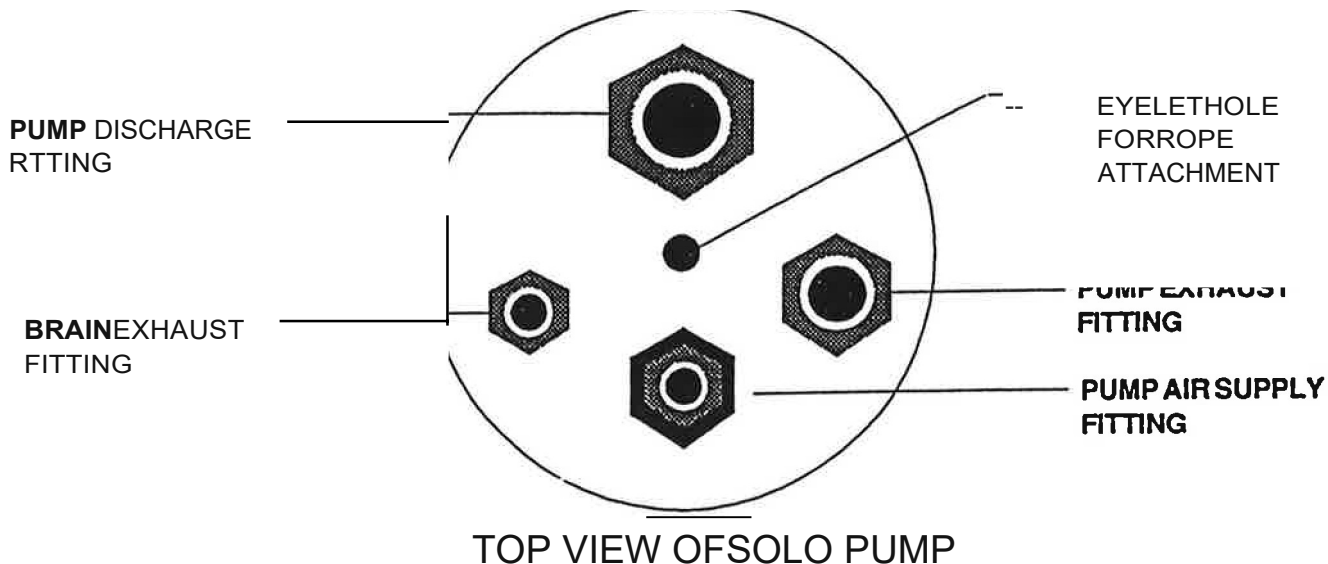
filter/speed control. SOLO is easy to install—just run air to each well. Continued operation is truly hands-off. SOLO constantly reacts to changes in well recovery rate, so it's always pumping at the highest rate possible. It also shuts down automatically if water in the well drops below pumping level. {NOTE: SP4000 requires a minimum of 3.5 feet of liquid in order to pump and the SP2000 requires a minimum of 1 foot of liquid in order to pump} Because cycling is controlled at the pump, SOLOs either refilling or discharging 100% of the time. There's no waiting between active phases of the cycle for the entire length of air supply tubing to re-pressurize. This operating efficiency enables SOLO to deliver pumping rates of up to 4.5 gallons per minute while also saving on air supply requirements. The mechanism in SOLO uses the same high clearance design that has made PULSE PUMP the standard for field performance without clogging or breakdowns.

## TABLE OF CONTENTS

	PAGE
1. INTRODUCTION	1
2. HOW SOLO WORKS	2
3. INSTALLATION:	
A. HOSE/TUBING ATTACHMENT TO TOP OF PUMP	3
B. CAP AND TUBING/HOSE:	
1. PUMPS WITH ALL NYLON TUBING	4
2. PUMPS WITH HOSES AND NYLON TUBING	5
4. OPERATION	6
5. SPECIFICATIONS	7
6. MAINTENANCE	8
WARRANTY	9-10



# HOSE/TUBING ATTACHMENTS TO TOP OF SOLO PUMP



<b>3/4" O.D. TUBE</b>	PUSH HOSE/TUBING DOWN TO THIAOBAAB ENGAGEMENT (MINIMUM)	<b>1/2" TUBE</b>	PUSH TUBING DOWN FLUSH WITH THE FITTING'S NUT	<b>3/8" O.D. TUBE</b>	PUSH HOSE/TUBING DOWN TO FIFTH BARB ENGAGEMENT (MINIMUM)	<b>1/4" ruse</b>	PUSH TUBING DOWN FLUSH WITH THE FITTING'S NUT
-----------------------	---	------------------	---	-----------------------	--	------------------	---

1	CLAMP	PLACEMENT	7 BARBS (TAPERED)	<b>PUMP EXHAUST FITTING</b>	CLAMP PLACEMENT	3 BARBS (TAPERED) [ = 17 BARBS (TAPERED) ]	<b>PUMP BRAIN EXHAUST FITTING</b>
2							
3							
4							
5							

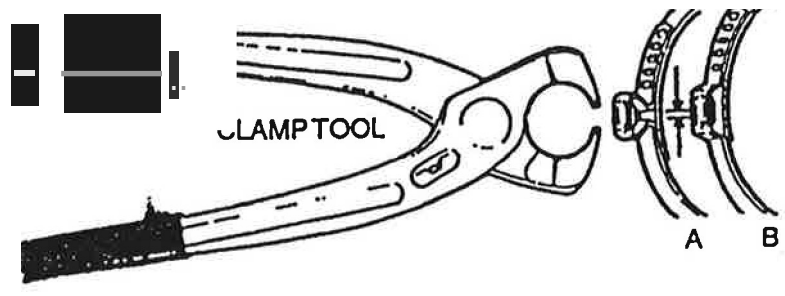
  

6	<b>PUMP DISCHARGE FITTING</b>
7	

## TIGHTENING THE CLAMPS

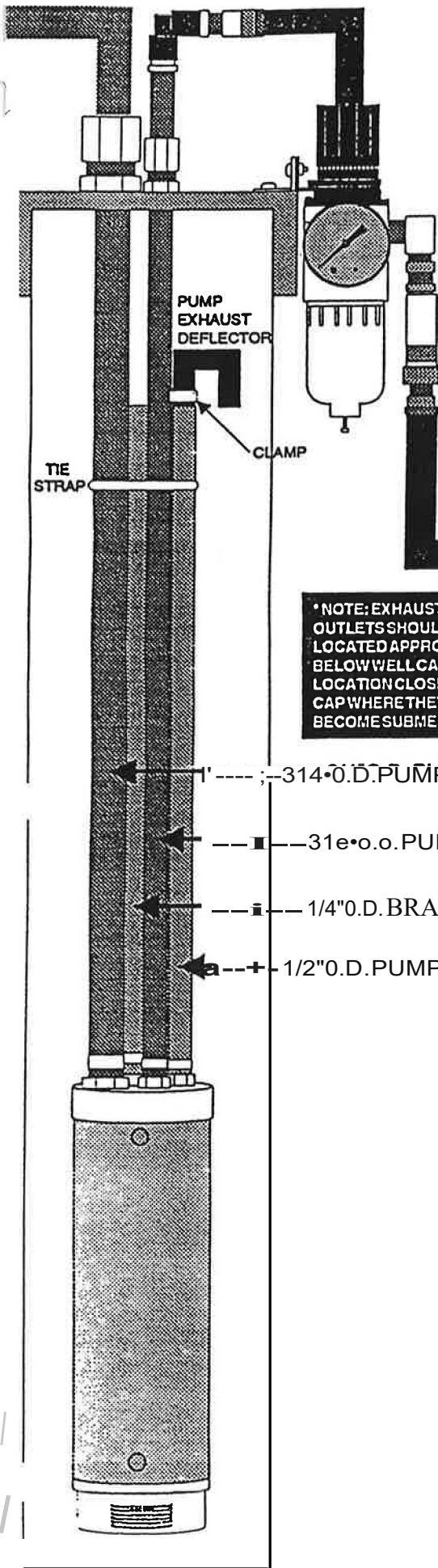


PLACE CLAMP TOOL OVER THE DIMPLED EAR PORTION OF THE CLAMP AND SQUEEZE EAR TOGETHER (AS SHOWN BELOW).



A. CLAMP IN CLOSED POSITION  
 B. CLAMP IN OPEN POSITION

# ALL NYLON TUBING 4, 6, 8" CAPS



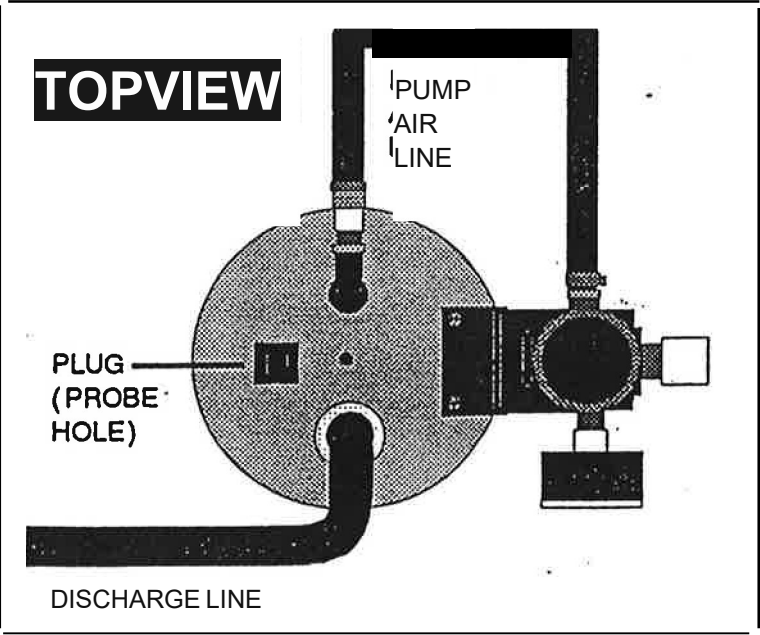
1. LOWER PUMP TO DESIRED DEPTH.
2. ONCE PUMP DEPTH HAS BEEN DETERMINED, MEASURE OFF APPROXIMATELY 1 FT. (OF TUBING LENGTH {MEASURED FROM THE TOP OF WELL CASING}) FROM BOTH THE PUMP EXHAUST LINE AND THE BRAIN EXHAUST LINE.\*
3. CUT BOTH EXHAUST LINES.
4. ATTACH THE PUMP EXHAUST DEFLECTOR TO THE PUMP EXHAUST LINE. {SEE PAGE 3 FOR CLAMP INSTRUCTIONS}

SUPPLY AIR IN FROM COMPRESSOR

\* NOTE: EXHAUST TUBING OUTLETS SHOULD BE LOCATED APPROX. 1' BELOW WELL CAP OR IN A LOCATION CLOSE TO THE CAP WHERE THEY WILL NOT BECOME SUBMERGED.

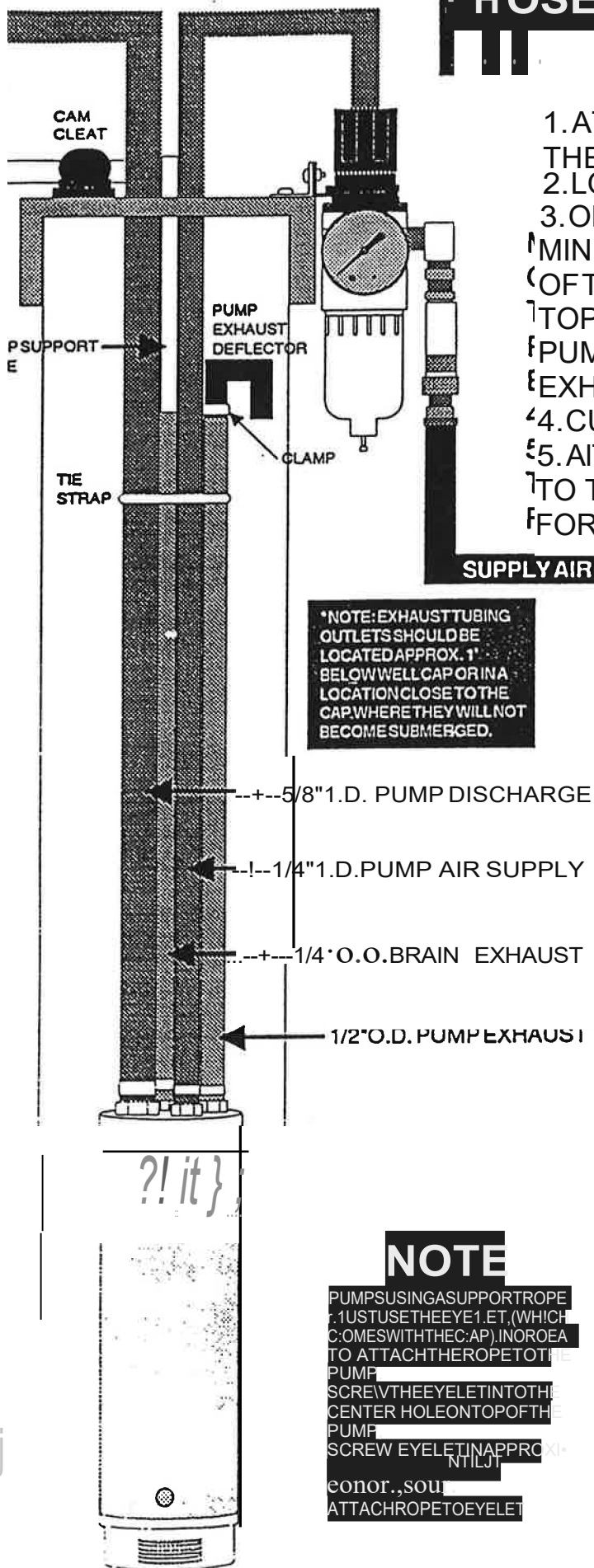
5. TIE STRAP ALL TUBING INTO ONE BUNDLE APPROXIMATELY 4-6" BELOW WHERE YOU CUT OFF YOUR EXHAUST LINES.
6. PASS PUMP DISCHARGE AND AIR SUPPLY LINES THROUGH THE WELL CAP.
7. RE-ADJUST PUMP TO DESIRED DEPTH.
8. TIGHTEN WELL CAP FITTINGS DOWN ONTO AIR/DISCHARGE LINES.

- ← 3/4" O.D. PUMP DISCHARGE
- ← 3/8" O.D. PUMP AIR SUPPLY
- ← 1/4" O.D. BRAIN EXHAUST
- ← 1/2" O.D. PUMP EXHAUST



# HOSE AND TUBING COMBINATION

## 4, 6, 8" CAP



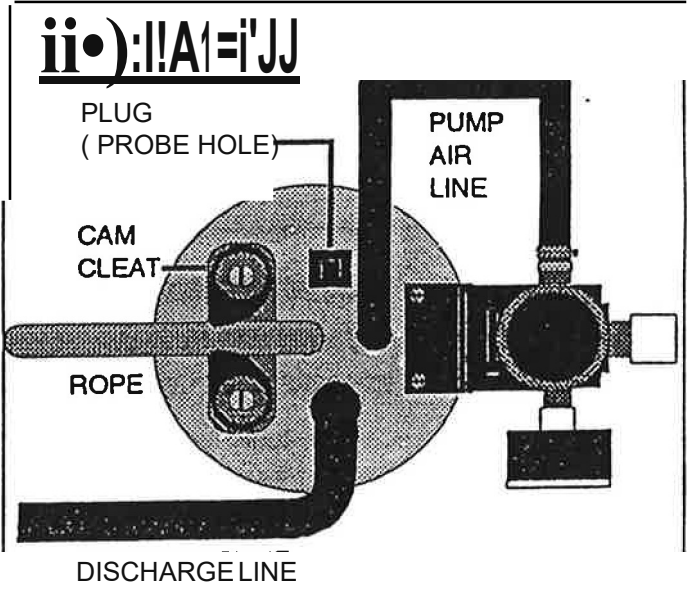
1. ATTACH EYELET FOR SUPPORT ROPE TO THE TOP OF THE SOLO PUMP. ATTACH ROPE.
2. LOWER PUMP TO DESIRED DEPTH.
3. ONCE PUMP DEPTH HAS BEEN DETERMINED, MEASURE OFF APPROXIMATELY 1 FT. OF TUBING LENGTH (MEASURED FROM THE TOP OF WELL CASING) FROM BOTH THE PUMP EXHAUST LINE AND THE BRAIN EXHAUST LINE.\*
4. CUT BOTH EXHAUST LINES.
5. ATTACH THE PUMP EXHAUST DEFLECTOR TO THE PUMP EXHAUST LINE. (SEE PAGE 3 FOR CLAMP INSTRUCTIONS)

**SUPPLY AIR IN FROM COMPRESSOR**

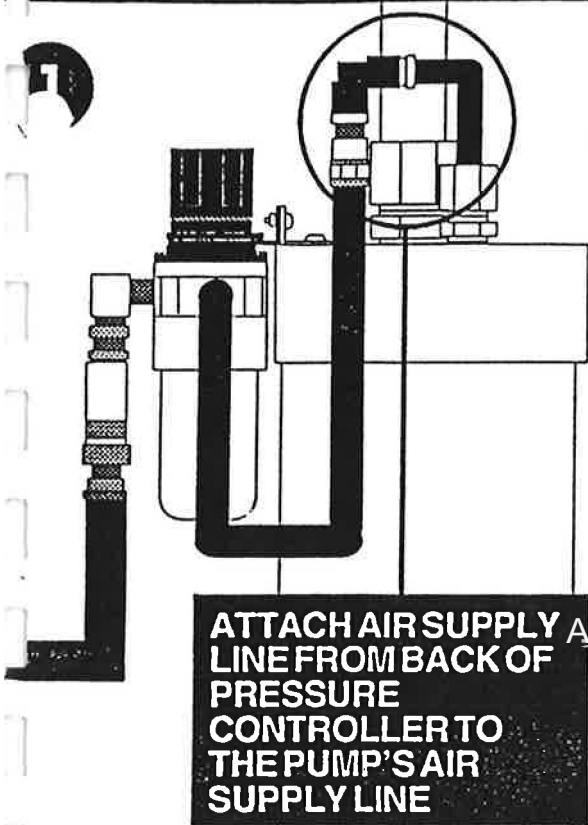
**\*NOTE: EXHAUST TUBING OUTLETS SHOULD BE LOCATED APPROX. 1' BELOW WELL CAP OR IN A LOCATION CLOSE TO THE CAP, WHERE THEY WILL NOT BECOME SUBMERGED.**

6. TIE STRAP ALL TUBING INTO ONE BUNDLE APPROXIMATELY 4-6" BELOW WHERE YOU CUT OFF YOUR EXHAUST LINES.
7. PASS PUMP DISCHARGE AND AIR SUPPLY LINES THROUGH THE WELL CAP.
8. RE-ADJUST PUMP TO DESIRED DEPTH.
9. PASS PUMP SUPPORT ROPE THROUGH CAM CLEAT TO HOLD PUMP INTO POSITION.

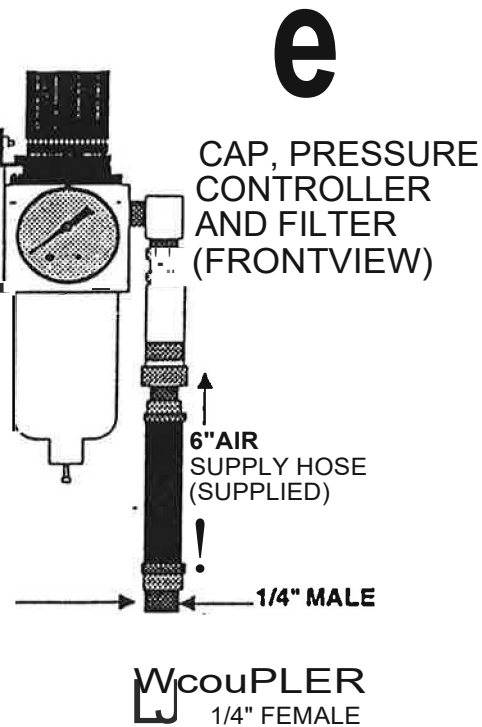
**NOTE**  
 PUMPS USING A SUPPORT ROPE MUST USE THE EYELET (WHICH COMES WITH THE CAP) IN ORDER TO ATTACH THE ROPE TO THE PUMP. SCREW THE EYELET INTO THE CENTER HOLE ON TOP OF THE PUMP. SCREW EYELET IN APPROXIMATELY 1/2" FROM THE CENTER HOLE. SCREW EYELET IN APPROXIMATELY 1/2" FROM THE CENTER HOLE. ATTACH ROPE TO EYELET.



# PUMP OPERATION AND ATTACHMENTS



**ATTACH AIR SOURCE HERE**



P, PRESSURE CONTROLLER AND FILTER (FRONTVIEW)

AIR SUPPLY HOSE FITTING OPTIONS:



1/2"



3/8"

## PRESSURE CONTROL ADJUSTMENTS

PRESSURE CONTROL KNOB

TURNING CLOCKWISE INCREASES PRESSURE  
TURNING COUNTER-CLOCKWISE DECREASES PRESSURE

**MINIMUM 40 P.S.I.**  
**MAXIMUM 100 P.S.I.**

NOTE: FLOW RATE IS DEPENDENT ON THE AMOUNT OF AIR PRESSURE THAT IS RECEIVED BY THE PUMP. FLOW RATES CAN BE INCREASED BY INCREASING AIR PRESSURE TO THE PUMP AND FLOW RATES CAN BE DECREASED BY DECREASING AIR PRESSURE TO THE PUMP.

**ADJUST AIR PRESSURE TO DESIRED PRESSURE**

AIR SOURCE

1  
1

;

**e**

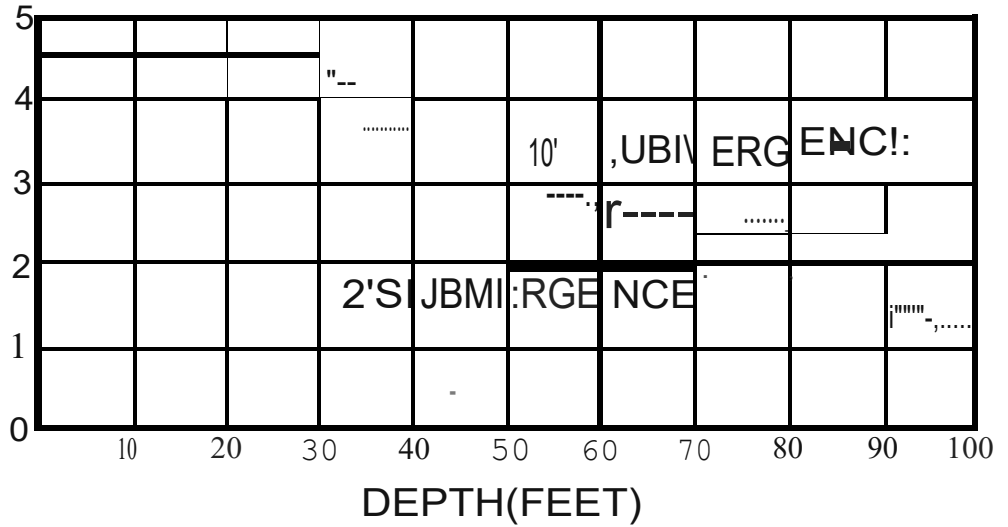
1  
1

# 4000 SPECIFICATIONS

<p>DIAMETER: 3.0"                  LENGTH: 48"                  WEIGHT: 11.5LBS                  FITTINGS: TYPE-BARB                  SIZES-DISCHARGE 5/8" ID (3/4" OD)                  AIR 1/4" ID (3/8" OD)                  EXHAUST 3/8" ID (1/2" OD)                  VENT, (BRAIN) 3/16" ID (1/4" OD)</p>	<p>PRESSURE REGULATOR/ALTEA DIMENSIONS:                  WIDTH-3"(OUTFROMCAP)                  WIDTH-S"(PARALLELTOCAP)                  HEIGHT-2-1/2"(ABOVECAP)                  OVERALLENGTH-6-1/2"</p>	<p>PUMP TYPE: POSITIVE GASDISPLACEMENT                  PUMPVOLUME: 1.9UTERS (.5GALLONS) Nominal                  MAXIMUMFLOWRATE-4.5 G.P.M.                  MATERIALSOFCONSTRUCTION: BODY-STAINLESSSTEEL                  HOUSINGS-0-TAL                  CHECKBALLS-TEFLON                  FITTINGS-BRASS                  AIR REQUIREMENTS: MINIMUM-40 P.S.I.                  MAXIMUM-100P.S.I.</p>
---	--	---

## P4000 FLOW RATES

FLOW(GPM)  
 AT 100 P.S.I.

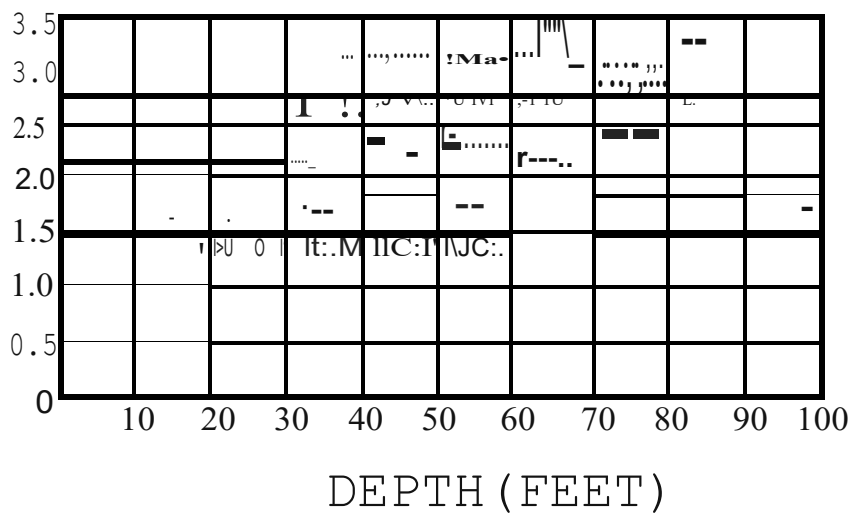


## P2000 SPECIFICATIONS

<p>DIAMETER: 3.0"                  LENGTH: 24"                  WEIGHT: 8.5LBS                  FITTINGS: TYPE-BARB                  VENT, (BRAIN) 3/16" ID (1/4" OD)                  SIZES-DISCHARGE 1/2" ID (3/4" OD)                  AIR 1/4" ID (3/8" OD)                  EXHAUST 3/8" ID (1/2" OD)</p>	<p>PRESSURE REGULATOR/FILTEA DIMENSIONS:                  WIDTH-3"(OUTFROMCAP)                  WIDTH-S"(PARALLELTOCAP)                  HEIGHT-2-1/2"(ABOVECAP)                  OVERALLENGTH-6-1/2"</p>	<p>PUMP TYPE: POSITIVE GASDISPLACEMENT                  PUMPVOLUME: .36LFTERS (0,095GALLONS) Nominal                  MATERIALS OFCONSTRUCTION: BODY-STAINLESSSTEEL                  HOUSINGS-0-TAL                  CHECKBALLS-TEFLON                  FITTINGS-SRASS                  AIRREQUIREMENTS: MINIMUM-40 P.S.I.                  MAXIMUM-100P.S.I.</p>
--	---	---

## P2000 FLOW RATES

FLOW(GPM)  
 AT 100 P.S.I.



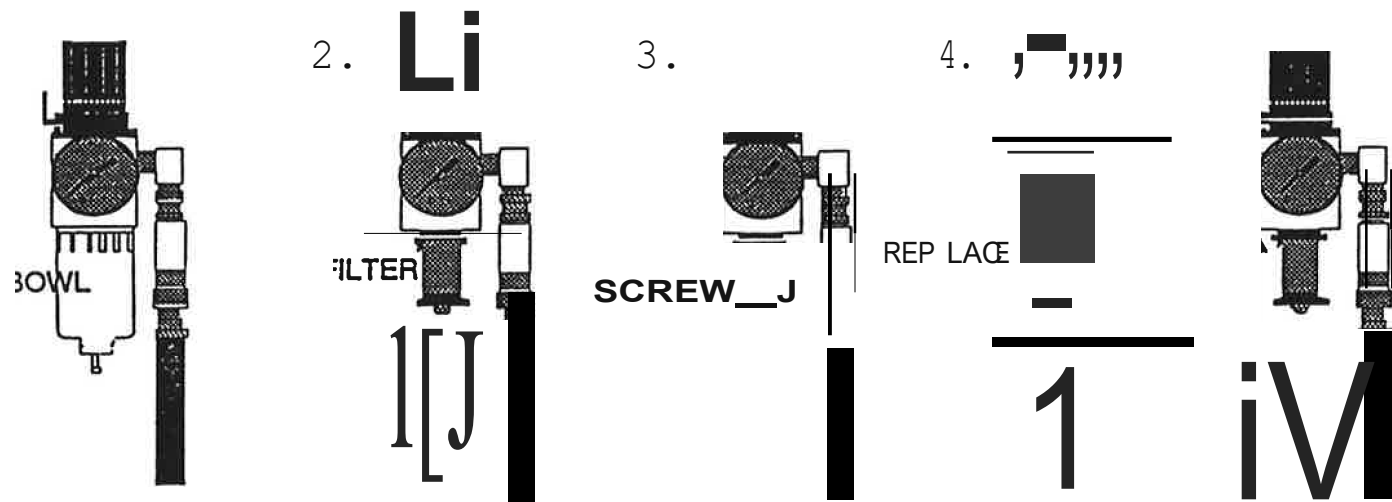
-OACCESS Fil TEA ELEMENT SIMPLY UNSCREW Fil TEA BOWL COUNTERCLOCKWISE.

1PLETELY REMOVE Fil TEA BOWL.

2O REMOVE FILTER UNSCREW HOLDING SCREW LOCATED ATBTOTTOM OFFILTER ASSEMBLY.

3)NCE SCREW ISREMOVED THE Fil TEA ASSEMBLY SHOULD COME APART AS SHOWN(4.) DISCARD OLD FILTER AND REPLACE WITH NEW ONE. REASSEMBLE FILTER ASSEMBLY AS IT WAS ORIGINALLY.

4) REATTACH FILTER AND THEN FILTER BOWL IN THE SAME MANNER AS THEY WERE REMOVED.



NOTE: REPLACEMENT FILTER ELEMENTS MAY BE PURCHASED THROUGH Q.E.D. PART NUMBER 36861

## SP4000 PACKAGES

SOLO PUMP, WELL CAP AND REGULATOR FILTER  
SOLO PUMP PACKAGES INCLUDE:

### SOLO PUMP PACKAGES:


WELL DIAMETER	HOSE OR TUBE	PART NUMBER
41NCH	HOSE	SP4000A
	TUBE	SP4000B
61NCH	HOSE	SP4000C
	TUBE	SP4000D
81NCH	HOSE	SP4000E
	TUBE	SP4000F

## SP2000 PACKAGES

SOLO PUMP, WELL CAP AND REGULATOR FILTER  
SOLO PUMP PACKAGES INCLUDE:

### SOLO PUMP PACKAGES:

WELL DIAMETER	HOSE OR TUBE	PART NUMBER
41NCH	HOSE	SP2000A
	TUBE	SP2000B
61NCH	HOSE	SP2000C
	TUBE	SP2000D
81NCH	HOSE	SP2000E
	TUBE	SP2000F



**Appendix D**  
**Landfill Gas and Extraction Well Monitoring Procedures**

## LANDFILL GAS MONITORING PROCEDURES

The following are step-by-step procedures for landfill gas monitoring. Always refer to the instrument manufacturers manual for operational instructions.

**Obstructions/Water Vapor:** During instrument operation at any location (gas well, probe or gas header), the operator must be alert for the presence of moisture. Small droplets of moisture should not cause concern, but excess moisture will damage detector elements, making the instrument inoperable. Before connecting a gas/oxygen detector to a gas probe, the operator should check for possible probe obstructions and/or the presence of water.

### Gas Analyzer Calibration Procedure:

1. Turn on the tablet and the gas analyzer.
2. Connect the tablet to the gas analyzer using the Bluetooth feature.
3. Connect the red tubing to the red port on the gas analyzer.
4. Connect the clear tubing to the white port on the gas analyzer.
5. Retrieve the calibration gas, unscrew the cap, and attach the regulator.
6. Open the gas analyzing software on the tablet and navigate to the calibration page from the main menu.
7. Zero the methane:
  - a. Let the gas analyzer run exposed to ambient air until stability is reached.
8. Zero the oxygen:
  - a. Connect the clear hose to the regulator on the calibration gas until stability is reached.
  - b. Note: There is currently no way to zero the CO<sub>2</sub>.
9. Span the methane:
  - a. Attach the white hose to the regulator on the calibration gas and let the gas analyzer run until stability is reached.
10. Span the oxygen:
  - a. Let the gas analyzer run exposed to ambient air until stability is reached.
11. Navigate to the pressure page and calibrate the pressure readings by zeroing the pressure.
12. Store the calibration file to complete the gas calibration process.

### Gas Composition Measurement Procedure:

1. Ensure the gas analyzer is calibrated.
2. Prepare to take gas composition measurements at each monitoring probe location.
3. If using a backpack, place the exhaust hose (red hose) outside the bag to prevent gas buildup.
4. At the monitoring probe:
  - a. Check the type of fitting needed and adjust accordingly.
  - b. Attach the white hose (analyzing hose) to the gas probe port.
5. Press the analyze function on the tablet.
  - a. Allow the gas analyzer to run until the values stabilize (values will be highlighted in green).
6. Once stable, stop the analyzation process.
  - a. Save the reading and record it in your notes.
7. Before analyzing the next probe, purge the system:
  - a. Press the purge function on the tablet.

- b. Wait until the purge is complete (the clock will stop counting down).
8. Once purge is complete:
  - a. Gas composition measurements may be taken at the next probe.

## EXTRACTION WELL MONITORING PROCEDURES

The following are step-by-step procedures for extraction well monitoring. Always refer to the instrument manufacturers manual for operational instructions.

**Obstructions/Water Vapor:** During instrument operation at any location (gas well, probe or gas header), the operator must be alert for the presence of moisture. Small droplets of moisture should not cause concern, but excess moisture will damage detector elements, making the instrument inoperable. Before connecting a gas/oxygen detector to a gas probe, the operator should check for possible probe obstructions and/or the presence of water.

### Gas Analyzer Calibration Procedure:

1. Switch on the instrument and completed the instrument warm up.
2. On the main gas read screen, select the 'Menu' Key.
3. Select key 2 'Gas Check'.
4. Select key 1 'Gas Check'.
5. Disconnect all tubing.
6. Select 'Fresh Air' by using the enter key.
7. Let the pump run for 90 seconds and select soft key 'check'.
8. A message will display 'Please wait for timer to reach zero'.
9. When complete a message will display 'Check complete'.
10. Read status field on the right-hand side of the screen.
11. Retry Calibrate Record
  - a. Calibrate
  - b. If the calibration was successful, the results will be saved and you make select 'soft key exit'. You are now ready to begin sampling.
  - c. If the calibration was unsuccessful, re-try or troubleshoot.

### Gas Composition Measurement Procedure:

1. Ensure the gas analyzer is calibrated.
2. If using LSGAM – all necessary ID codes and information have been uploaded from LSGAM to the analyzer.
3. The instrument has the correct time and date set.
4. The water trap filter is fitted and is clean and dry.
5. The battery has a good charge.
6. The channels CH<sub>4</sub>, H<sub>2</sub>S, and CO have been zeroed, without gas concentration present.
7. If necessary check the span calibration with a known concentration calibration gas.
8. Take readings.

# Appendix E

## Landfill Permits



*Governed by a local Board of Health*

www.tpchd.org

April 14, 2014

Hidden Valley Landfill  
John Rodgers  
17925 Meridian St E  
Puyallup, WA 98375-9603

**RE: Solid Waste Permit Renewal for Hidden Valley Landfill  
Permit #: 27-016 PT0009035**

Dear John Rodgers:

This letter serves to request renewal of your solid waste permit for Hidden Valley Landfill located at 17925 Meridian ST E, Puyallup, Washington. The current permit for this facility expires on June 02, 2014.

Please submit the enclosed Solid Waste Permit Renewal Application to the Tacoma-Pierce County Health Department by **May 12, 2014**.

Thank you for your attention in this matter. If you have any questions, please contact me at (253) 798-6574.

Sincerely,

A handwritten signature in black ink that reads "David Bosch".

David Bosch  
Environmental Health Specialist II  
Environmental Health Division/Waste Management

Attachments

DGB:sr



Tacoma - Pierce County  
**Health Department**  
*Healthy People in Healthy Communities*

## Solid Waste Handling Permit Renewal Application

### Part I. General Information

Permit No.: 27-016 / PT0009035

Due Date: May 12, 2014

Facility Name: Hidden Valley Landfill

Street Address: 17925 Meridian ST E, Puyallup, Washington

Mailing Address: 17925 Meridian St E, Puyallup, WA 98375-9603

Facility Phone #: (253) 875-2104

Type of Facility: 0416 - Facility Review/Permit

Facility Owner(s): PCRCD, LLC

Facility Manager: John Rodgers

The permit for the above named facility shall reflect current operations and structures present at the facility. To insure that the permit represents the current status of the facility, please check the appropriate box next to the topic listed below. Please provide a short summary in the space provided on page two for all boxes checked yes. If the space is not adequate, please provide an attachment. If you have any questions, please call **David Bosch** at (253) 798-6574 or call (253) 798-6047.

Is there a change in the:

- |   |                              |  |
|---|------------------------------|--|
| Permit application:                         | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved application |
| Waste Stream:                               | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved application |
| Waste Volumes:                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved application |
| Plan of Operation:                          | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved plan        |
| Env. Monitoring Plans, including schedules: | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved plan        |
| Facility Structures:                        | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved specs       |
| Closure Plan/Financial Assurance cost Est.  | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved plan        |
| Applicable Bond:                            | <input type="checkbox"/> Yes | <input type="checkbox"/> No, Refer to current approved bond        |



JUN 03 2014

*Governed by a local Board of Health*

June 2, 2014

John Rodgers  
Pierce County Recycling, Composting and Disposal, LLC dba LRI  
17925 Meridian St E  
Puyallup, WA 98375

**RE: Hidden Valley Landfill Post-Closure Care Permit No. 27-016 for 2014-2015**

Dear Mr. Rodgers:

This letter serves to transmit the Post-Closure Care Permit for the Hidden Valley Landfill owned by Pierce County Recycling, Composting and Disposal, LLC dba LRI (LRI). The Tacoma-Pierce County Health Department regulates the post-closure care of this landfill under the authority of RCW 70.95 and in accordance with WAC 173-304 and WAC 173-351.

The Post-Closure Care Permit for the Hidden Valley Landfill, located at 17925 Meridian Street East, Puyallup, Washington, is conditional and will expire on June 2, 2015. The Health Department understands there is a continuing conversation between LRI and the Washington Department of Ecology as to whether the substantive requirements in the new version of WAC 173-351 (adopted November 2012) are applicable to the Hidden Valley Landfill while under the Consent Decree. If necessary, the Health Department may amend the post-closure permit once agreement has been reached on this issue.

Please note that Ecology has the regulatory authority to appeal, within 30 days, the issuance of this permit. If you receive no written notice from Ecology within the given time period, you may assume they concur with this issuance.

If you have any questions regarding this matter, please contact David Bosch, Environmental Health Specialist II, at (253) 798-6574 or [dbosch@tpchd.org](mailto:dbosch@tpchd.org), or me, at (253) 798-6528 or [jsherman@tpchd.org](mailto:jsherman@tpchd.org).

Sincerely,

A handwritten signature in black ink, appearing to read "John Sherman".

John Sherman, Program Manager  
Environmental Health Division/Waste Management

JS:DB:sr

Enclosure

cc: Kevin Lakey, SCS Engineers  
Steve Wamback, Pierce County Sustainable Resources  
Peter Lyon, Ecology Solid Waste Program, SWRO (certified mail)  
Mohsen Kourehdar, Ecology Toxics Cleanup Program, SWRO

G:\LIBSHARE\SRCPROWASTE\Facilities\HVLV\2014\Post Closure Care Permit 2014-15.docx

**Municipal Solid Waste Landfill**  
Post-Closure Care Permit

Issued Pursuant to  
Chapter 173-351-700 WAC

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Post-Closure Care Permit Number: 27-016

Date of Issuance June 2, 2008

Date of Expiration June 2, 2015

Date of Next Annual Permit Renewal June 2, 2015

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Facility Name: Hidden Valley Landfill  
Facility Location: 17925 Meridian Street East, Puyallup, WA  
Facility Owner/Operator: Pierce County Recycling, Composting and Disposal, LLC  
dba LRI ("the permittee")  
John Rodgers, Vice President  
Address: 17925 Meridian Street East  
Puyallup, WA 98375  
Telephone: (253) 847-7555; Facsimile (253) 847-7713  
Tax Parcels: 0419273024, 0419273040, and 0419342015

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Post-Closure Care Permit Issuance:

The permittee, noted above, is hereby authorized to continue post-closure activities of the closed municipal solid waste landfill unit(s) under the terms and conditions of this post closure care permit and in accordance with WAC 173-351; *Criteria for Municipal Solid Waste Landfills*.

**Director of Health**



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Anthony L-T Chen, MD, MPH, Director of Health

## Hidden Valley Landfill Post-Closure Care Permit

### I. Description

The permittee, Pierce County Recycling, Composting, and Disposal, LLC dba LRI (LRI), is allowed to perform post-closure care activities at the Hidden Valley Landfill located at 17925 Meridian Street East, Puyallup, Washington (Parcel # 0419273024, 0419273040, and 0419342015). The landfill consists of approximately 56 acres of unlined landfill and about 31 acres of lined area. The lined area is comprised of 18 acres on a side slope abutting refuse and 13 acres on native or engineered soil. The landfill was capped in five major phases. The North Closure occurred in 1989 and consisted of approximately 13 acres. The Southwest Closure occurred in 1992 and comprised approximately 26 acres. In 1993, the side slope area of the landfill was capped with a small area in the northwest corner that consisted of about 17 acres. The Partial Closure was conducted in 1998 and consisted of 11.43 acres. The Final Closure was conducted in 1999 and 2000 and consisted of approximately 22 acres. The landfill closures completed in 1989, 1992, and 1993 were constructed in accordance with WAC 173-304 (synthetic 60-mil geomembrane). The landfill closures conducted in 1998, 1999, and 2000 were constructed in accordance with WAC 173-351 (a composite cap with low permeability soil and a synthetic 60-mil geomembrane or a geosynthetic clay liner and a synthetic 60-mil geomembrane).

### II. General Conditions

1. **Post-Closure Care Activities** – The permittee is authorized to perform post-closure care activities and must abide by the conditions set forth in the Specific Conditions of this post-closure care permit until this post-closure care permit expires or is revoked.
2. **Compliance with All Conditions of Permit** – All conditions of this permit shall be followed or accomplished for the permittee to remain in compliance. Compliance requirements shall be met in the specified time period. For the purposes of this permit, the permit holder is responsible for all acts and omissions of contractors and agents of the permittee.
3. **Compliance Inspections** – Any duly authorized officer, employee, or representative of the Tacoma-Pierce County Health Department may enter and inspect the facility at any reasonable time to determine compliance with the requirements of WAC 173-351 and WAC 173-304 and applicable standards of Chapter 28, *Solid Waste Handling Standards*, of the Tacoma-Pierce County Board of Health Regulations, Resolution 2004-3550 (Chapter 28).
4. **Compliance with all Laws and Regulations** – The permittee must comply with the applicable requirements of WAC 173-351, WAC 173-304, and Chapter 28, *Solid Waste Handling Standards*, of the Tacoma-Pierce County Board of Health Regulations. Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state or local statutes, ordinances or regulations.

5. **Display of Permit** – This post-closure care permit, with conditions, shall be displayed or stored in a manner that allows easy access by site personnel.
6. **Suspensions and Revocations** – This permit is subject to suspension or revocation if the Health Department finds that:
  - a) the post-closure care permit was obtained by misrepresenting or omitting any information that could potentially have affected the issuance of the permit, or will affect the post-closure care of the facility; or
  - b) the site is being operated in violation of RCW 70.95, WAC 173-304, WAC 173-351, or local statutes, ordinances, or regulations; or
  - c) there has been a violation of any of the conditions contained in this permit.

The permittee may appeal any such suspension or revocation in accordance with WAC 173-351-760.

7. **Public Health Emergency** – In the event a state of emergency is declared, or an imminent risk to public health exists, the Health Department may temporarily suspend or waive permit provisions or operational conditions, or may impose additional permit provisions or operational conditions, for such period deemed necessary in the sole discretion of the local health officer or his/her designee. An emergency or imminent risk to public health requires, as applicable, a declaration by the President of the United States, the Governor of the State of Washington, the Pierce County Executive or a health order issued by the local health officer as provided by law.

8. **Transferability**

- a) This permit is transferable only upon prior written approval of the Health Department and after a demonstration has been made that the prospective transferee will be able to and provides an express commitment to comply with applicable laws and regulations, permit conditions, and other requirements to which the prospective transferor is subject.
- b) Upon transfer of ownership of all or part of a facility, a provision must be included in the property deed indicating the period of time during which the facility has been disposing of solid waste, a description of the solid waste contained within, and the fact that the records for the facility have been filed with the Health Department. The deed must also refer to a map, which must be filed with the county clerk, showing the limits of the active areas as defined in WAC 173-351-100.

9. **Appeals** – Whenever the Health Department denies or suspends a permit for a solid waste disposal site, it shall, upon request of the applicant or permit holder, grant a hearing on the denial or suspension within 30 days of the request being made. Notice of the hearing shall be given to all interested parties including the county or city having jurisdiction over the site. The health officer shall notify the applicant or permit holder of his or her determination in writing within 30 days of the hearing. Any party aggrieved by the determination may appeal to the pollution control hearings board by filing a notice of

appeal with the hearings board within 30 days of receiving the determination of the health officer. The hearings board shall hold a hearing in accordance with the provisions of the Administrative Procedure Act, RCW 34.05, as presently constituted or hereafter amended.

10. **Annual Permit Renewal** – The permittee shall apply for renewal of the facility's permit annually, in accordance with WAC 173-351-720(5). Therefore, the next permit renewal date is **June 2, 2015**. The permittee is authorized to continue all activities allowed under the current permit if the Health Department has not rendered a decision on renewal by the current permit's expiration date, provided that the permittee has timely submitted a complete application for permit renewal.

11. **Modification/Amendments**

a) Should the permittee desire to modify this permit, the permittee must file a modification application at least 30 days before the intended modification. A modification application must be made on forms authorized by the Health Department and the Washington State Department of Ecology.

b) In order to allow for permit modifications to be authorized at the time of permit renewal, the permittee may combine the application required for a permit modification with the application required for a renewal permit at the time of permit renewal.

c) If necessary to protect public health or the environment, this post-closure care permit may be amended by the Health Department in accordance with WAC 173-351. More stringent restrictions may be imposed on the facility during the time period the permit is valid. Amendments will be made in writing and will become specific conditions of the permit.

12. **Severability** – If any provision or condition of this permit is found to be invalid, the remainder of this permit and its conditions shall not be affected and remain in full effect.

### III. Specific Permit Conditions

1. **Consent Decree** – The permittee shall abide by the Consent Decree between Pierce County Public Works, LRI, and the Washington Department of Ecology executed January 2004.

2. **Post-Closure Plan** – The permittee shall continue post-closure care activities in accordance with the *Post Closure Plan* dated November 9, 2001, and WAC 173-351. In accordance with WAC 173-351-600(3)(a)(ii), during the post-closure care period, the permittee must annually adjust the post-closure cost estimate for inflation. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation. The permittee shall submit to the Health Department written **quarterly** inspection reports for the cover system maintenance activities described in the plan.

3. **Landfill Gas Management Plan** – The permittee shall manage landfill gas from the Hidden Valley Landfill in accordance with the *Landfill Gas Management Plan* dated January 2, 2002. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation. The permittee shall submit to the Health Department written **quarterly** inspection reports for the maintenance of the condensate recirculation sumps described in the plan. Reports must be submitted within two weeks of conducting the inspections.
4. **Groundwater Monitoring Plan** – The permittee shall conduct groundwater monitoring at the Hidden Valley Landfill in accordance with the *Groundwater Compliance Monitoring Plan* dated February 2001, and the Health Department letter to Kleinfelder dated April 21, 2003, describing certain modifications to this plan. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation.
5. **Annual Report** – The permittee shall submit a report by April 1 of each year describing the previous year's activities.
6. **Leachate Pretreatment Facility** – The permittee shall comply with its Industrial Wastewater Discharge Permit issued by Pierce County Utilities Department on January 15, 2014 (expiring April 15, 2016 and as renewed). All modifications, amendments and reissuance of this permit shall be forwarded to the Health Department. The permittee shall maintain a daily inspection log describing volumes of leachate influent, treatment, and effluent information as well as maintenance activities associated with the components of the leachate collection and leak detection systems of the Hidden Valley Landfill.
7. **Leak Detection Systems Inspections and Sampling Requirements** – The permittee shall perform, at a minimum, quarterly inspections of the sideslope liner leak detection and hydraulic gradient control systems. If liquids are present at a depth requiring pumping, a sample shall be collected and analyzed for leachate constituents listed in Appendix I and Appendix II of WAC 173-351. Such analysis is required only on a quarterly basis.
8. **Post-Closure Cost Estimate Annual Adjustments** – The permittee shall annually review and adjust the post-closure cost estimates and shall submit these adjustments to the Health Department for review and approval no later than October 1 of each year.

**Post-Closure Care Permit  
Conditional**



Tacoma - Pierce County

**Health Department**

*Healthy People in Healthy Communities*

Permit Number: 27-016

Annual Permit Renewal Date: June 2, 2015

Type of Facility:                      MSW Landfill [ X ]                      Transfer Station [ ]                      Recycling [ ]  
Biosolids Utilization [ ]                      Composting [ ]                      Incinerator [ ]                      Other [ ]

This certifies that Pierce County Recycling, Composting and Disposal, LLC dba LRI

Engaged in the business of Post-Closure Care Activities at the Hidden Valley Landfill

Is permitted in accordance with WAC 173-351, WAC 173-304 and RCW 70.95

BY   
Anthony L-T Chen, MD, MPH, Director of Health

**THIS CERTIFICATE IS REVOCABLE FOR CAUSE AND IS NOT TRANSFERABLE**

June 2, 2015

John Rodgers  
Pierce County Recycling, Composting and Disposal, LLC dba LRI  
17925 Meridian St E  
Puyallup, WA 98375

**RE: Hidden Valley Landfill Post-Closure Care Permit No. 27-016 for 2015-2016**

Dear Mr. Rodgers:

This letter serves to transmit the Post-Closure Care Permit for the Hidden Valley Landfill owned by Pierce County Recycling, Composting and Disposal, LLC dba LRI (LRI). The Tacoma-Pierce County Health Department regulates the post-closure care of this landfill under the authority of RCW 70.95 and in accordance with WAC 173-304 and WAC 173-351.

The Post-Closure Care Permit for the Hidden Valley Landfill, located at 17925 Meridian Street East, Puyallup, Washington, is conditional and will expire on June 2, 2016.

Please note that Ecology has the regulatory authority to appeal, within 30 days, the issuance of this permit. If you receive no written notice from Ecology within the given time period, you may assume they concur with this issuance.

If you have any questions regarding this matter, please contact David Bosch, Environmental Health Specialist II, at (253) 798-6574 or [dbosch@tpchd.org](mailto:dbosch@tpchd.org), or me, at (253) 798-6538 or [acomstock@tpchd.org](mailto:acomstock@tpchd.org).

Sincerely,



Andy Comstock  
Program Manager  
Environmental Health Division/Waste Management

AC:DB:sr

Enclosure

cc: Kevin Lakey, SCS Engineers  
Steve Wamback, Pierce County Sustainable Resources  
Peter Lyon, Ecology Solid Waste Program, SWRO (certified mail)  
Mohsen Kourehdar, Ecology Toxics Cleanup Program, SWRO

**Municipal Solid Waste Landfill**  
Post-Closure Care Permit

Issued Pursuant to  
Chapter 173-351-700 WAC

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Post-Closure Care Permit Number: 27-016

Date of Issuance June 2, 2008

Date of Expiration June 2, 2016

Date of Next Annual Permit Renewal June 2, 2016

---

Facility Name: Hidden Valley Landfill  
Facility Location: 17925 Meridian Street East, Puyallup, WA  
Facility Owner/Operator: Pierce County Recycling, Composting and Disposal, LLC  
dba LRI ("the permittee")  
John Rodgers, Vice President  
Address: 17925 Meridian Street East  
Puyallup, WA 98375  
Telephone: (253) 847-7555; Facsimile (253) 847-7713  
Tax Parcels: 0419273024, 0419273040, and 0419342015

---

Post-Closure Care Permit Issuance:

The permittee, noted above, is hereby authorized to continue post-closure activities of the closed municipal solid waste landfill unit(s) under the terms and conditions of this post closure care permit and in accordance with WAC 173-351, *Criteria for Municipal Solid Waste Landfills*.

**Director of Health**



---

Anthony L-T Chen, MD, MPH, Director of Health

## Hidden Valley Landfill Post-Closure Care Permit

### I. Description

The permittee, Pierce County Recycling, Composting, and Disposal, LLC dba LRI (LRI), is allowed to perform post-closure care activities at the Hidden Valley Landfill located at 17925 Meridian Street East, Puyallup, Washington (Parcel # 0419273024, 0419273040, and 0419342015). The landfill consists of approximately 56 acres of unlined landfill and about 31 acres of lined area. The lined area is comprised of 18 acres on a side slope abutting refuse and 13 acres on native or engineered soil. The landfill was capped in five major phases. The North Closure occurred in 1989 and consisted of approximately 13 acres. The Southwest Closure occurred in 1992 and comprised approximately 26 acres. In 1993, the side slope area of the landfill was capped with a small area in the northwest corner that consisted of about 17 acres. The Partial Closure was conducted in 1998 and consisted of 11.43 acres. The Final Closure was conducted in 1999 and 2000 and consisted of approximately 22 acres. The landfill closures completed in 1989, 1992, and 1993 were constructed in accordance with WAC 173-304 (synthetic 60-mil geomembrane). The landfill closures conducted in 1998, 1999, and 2000 were constructed in accordance with WAC 173-351 (a composite cap with low permeability soil and a synthetic 60-mil geomembrane or a geosynthetic clay liner and a synthetic 60-mil geomembrane).

### II. General Conditions

1. **Post-Closure Care Activities** – The permittee is authorized to perform post-closure care activities and must abide by the conditions set forth in the Specific Conditions of this post-closure care permit until this post-closure care permit expires or is revoked.
2. **Compliance with All Conditions of Permit** – All conditions of this permit shall be followed or accomplished for the permittee to remain in compliance. Compliance requirements shall be met in the specified time period. For the purposes of this permit, the permit holder is responsible for all acts and omissions of contractors and agents of the permittee.
3. **Compliance Inspections** – Any duly authorized officer, employee, or representative of the Tacoma-Pierce County Health Department may enter and inspect the facility at any reasonable time to determine compliance with the requirements of WAC 173-351 and WAC 173-304 and Environmental Health Code Chapter 11 of the Tacoma-Pierce County Board of Health Regulations, Resolution #2014-4410.
4. **Compliance with all Laws and Regulations** – The permittee must comply with the applicable requirements of WAC 173-351, WAC 173-304, and Environmental Health Code Chapter 11 of the Tacoma-Pierce County Board of Health Regulations, Resolution #2014-4410. Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state or local statutes, ordinances or regulations.

---

**Tacoma-Pierce County Health Department – Hidden Valley Landfill Solid Waste Permit**

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5. **Display of Permit** – This post-closure care permit, with conditions, shall be displayed or stored in a manner that allows easy access by site personnel.
6. **Suspensions and Revocations** – This permit is subject to suspension or revocation if the Health Department finds that:
  - a. the post-closure care permit was obtained by misrepresenting or omitting any information that could potentially have affected the issuance of the permit, or will affect the post-closure care of the facility; or
  - b. the site is being operated in violation of RCW 70.95, WAC 173-304, WAC 173-351, or local statutes, ordinances, or regulations; or
  - c. there has been a violation of any of the conditions contained in this permit.

The permittee may appeal any such suspension or revocation in accordance with WAC 173-351-760.

7. **Public Health Emergency** – In the event a state of emergency is declared, or an imminent risk to public health exists, the Health Department may temporarily suspend or waive permit provisions or operational conditions, or may impose additional permit provisions or operational conditions, for such period deemed necessary in the sole discretion of the local health officer or his/her designee. An emergency or imminent risk to public health requires, as applicable, a declaration by the President of the United States, the Governor of the State of Washington, the Pierce County Executive or a health order issued by the local health officer as provided by law.
8. **Transferability**
  - a. This permit is transferable only upon prior written approval of the Health Department and after a demonstration has been made that the prospective transferee will be able to and provides an express commitment to comply with applicable laws and regulations, permit conditions, and other requirements to which the prospective transferor is subject.
  - b. Upon transfer of ownership of all or part of a facility, a provision must be included in the property deed indicating the period of time during which the facility has been disposing of solid waste, a description of the solid waste contained within, and the fact that the records for the facility have been filed with the Health Department. The deed must also refer to a map, which must be filed with the county clerk, showing the limits of the active areas as defined in WAC 173-351-100.
9. **Appeals** – Whenever the Health Department denies or suspends a permit for a solid waste disposal site, it shall, upon request of the applicant or permit holder, grant a hearing on the denial or suspension within 30 days of the request being made. Notice of the hearing shall be given to all interested parties including the county or city having jurisdiction over the site. The health officer shall notify the applicant or permit holder of his or her determination in writing within 30 days of the hearing. Any party aggrieved by the determination may appeal to the pollution control hearings board by filing a notice of

appeal with the hearings board within 30 days of receiving the determination of the health officer. The hearings board shall hold a hearing in accordance with the provisions of the Administrative Procedure Act, RCW 34.05, as presently constituted or hereafter amended.

10. **Annual Permit Renewal** – The permittee shall apply for renewal of the facility's permit annually, in accordance with WAC 173-351-720(5). Therefore, the next permit renewal date is **June 2, 2016**. The permittee is authorized to continue all activities allowed under the current permit if the Health Department has not rendered a decision on renewal by the current permit's expiration date, provided that the permittee has timely submitted a complete application for permit renewal.

#### 11. **Modification/Amendments**

- a. Should the permittee desire to modify this permit, the permittee must file a modification application at least 30 days before the intended modification. A modification application must be made on forms authorized by the Health Department and the Washington State Department of Ecology.
  - b. In order to allow for permit modifications to be authorized at the time of permit renewal, the permittee may combine the application required for a permit modification with the application required for a renewal permit at the time of permit renewal.
  - c. If necessary to protect public health or the environment, this post-closure care permit may be amended by the Health Department in accordance with WAC 173-351. More stringent restrictions may be imposed on the facility during the time period the permit is valid. Amendments will be made in writing and will become specific conditions of the permit.
12. **Severability** – If any provision or condition of this permit is found to be invalid, the remainder of this permit and its conditions shall not be affected and remain in full effect.

### III. **Specific Permit Conditions**

1. **Consent Decree** – The permittee shall abide by the Consent Decree between Pierce County Public Works, LRI, and the Washington Department of Ecology executed January 2004.
2. **Post-Closure Plan** – The permittee shall continue post-closure care activities in accordance with the *Post Closure Plan* dated November 9, 2001, and WAC 173-351. The permittee shall update the *Post Closure Plan* to include the substantive requirements of WAC 173-351-500(2) (November 08, 2012 version).

Additionally, in accordance with WAC 173-351-600(3)(a)(ii), during the post-closure care period, the permittee must annually adjust the post-closure cost estimate for inflation. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation. The permittee shall submit to the Health Department written

quarterly inspection reports for the cover system maintenance activities described in the plan.

3. **Landfill Gas Management Plan** – The permittee shall manage landfill gas from the Hidden Valley Landfill in accordance with the *Landfill Gas Management Plan* dated January 2, 2002. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation. The permittee shall submit to the Health Department written **quarterly** inspection reports for the maintenance of the condensate recirculation sumps described in the plan. Reports must be submitted within two weeks of conducting the inspections.
4. **Groundwater Monitoring Plan** – The permittee shall conduct groundwater monitoring at the Hidden Valley Landfill in accordance with the *Groundwater Compliance Monitoring Plan* dated February 2001, and the Health Department letter to Kleinfelder dated April 21, 2003, describing certain modifications to this plan. Any revisions, additions or modifications shall be approved by the Health Department prior to implementation.
5. **Annual Report** – The permittee shall submit a report by April 1 of each year describing the previous year's activities.
6. **Leachate Pretreatment Facility** – The permittee shall comply with its Industrial Wastewater Discharge Permit issued by Pierce County Utilities Department on January 15, 2014 (expiring April 15, 2016 and as renewed). All modifications, amendments and reissuance of this permit shall be forwarded to the Health Department. The permittee shall maintain a daily inspection log describing volumes of leachate influent, treatment, and effluent information as well as maintenance activities associated with the components of the leachate collection and leak detection systems of the Hidden Valley Landfill.
7. **Leak Detection Systems Inspections and Sampling Requirements** – The permittee shall perform, at a minimum, quarterly inspections of the sideslope liner leak detection and hydraulic gradient control systems. If liquids are present at a depth requiring pumping, a sample shall be collected and analyzed for leachate constituents listed in Appendix I and Appendix II of WAC 173-351. Such analysis is required only on a quarterly basis.
8. **Post-Closure Cost Estimate Annual Adjustments** – The permittee shall annually review and adjust the post-closure cost estimates and shall submit these adjustments to the Health Department for review and approval no later than October 1 of each year.

**Post-Closure Care Permit  
Conditional**



Tacoma - Pierce County  
**Health Department**  
*Healthy People in Healthy Communities*

Permit Number: 27-016

Annual Permit Renewal Date: June 2, 2016

Type of Facility:                      MSW Landfill [  ]                      Transfer Station [  ]                      Recycling [  ]  
Biosolids Utilization [  ]                      Composting [  ]                      Incinerator [  ]                      Other [  ]

This certifies that Pierce County Recycling, Composting and Disposal, LLC dba LRI

Engaged in the business of Post-Closure Care Activities at the Hidden Valley Landfill

Is permitted in accordance with WAC 173-351, WAC 173-304 and RCW 70.95

BY   
Anthony L-T Chen, MD, MPH, Director of Health

THIS CERTIFICATE IS REVOCABLE FOR CAUSE AND IS NOT TRANSFERABLE



# Puget Sound Clean Air Agency

Startup 3-16-11

HEREBY ISSUES AN ORDER OF APPROVAL  
TO CONSTRUCT, INSTALL, OR ESTABLISH

Notice of  
Construction No. 10284

Registration No. 21331

Date  
**APR 21 2011**

Perennial Energy, Inc. Model FL-72-29-E Enclosed Ground Flare, rated for 500 cfm of landfill gas.

**APPLICANT**

Eric Sonsthagen  
Pierce Co Recycling Composting and Disposal LLC  
17925 Meridian E  
Puyallup, WA 98373

**OWNER**

Pierce Co Recycling Composting and Disposal LL  
17925 Meridian E  
Puyallup, WA 98373

**INSTALLATION ADDRESS**

Pierce Co Recycling Composting and Disposal LLC, 17925 Meridian E, Puyallup, WA, 98373

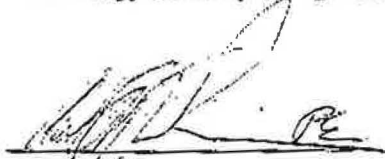
**THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS**

1. Approval is hereby granted as provided in Article 6 of Regulation 1 of the Puget Sound Clean Air Agency to the applicant to install or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of the Puget Sound Clean Air Agency.
2. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
3. This landfill gas flare shall achieve a minimum of 98% destruction of all non-methane organic compounds or reduce the outlet NMOC concentration to less than 20 ppm by volume, dry basis as hexane at 3 percent Oxygen.
4. Pierce County Recycling Composting and Disposal shall install and operate a continuous temperature indicator and recorder on the flare. Temperature records shall be maintained on file at the site.
5. Pierce County Recycling, Composting and Disposal shall either install a device that records flow to the flare at least every 15 minutes, remove any installed bypass line valves, or secure any bypass valves in the closed position with a car-seal or a lock and key. A visual inspection of the seal or closure mechanism shall be performed and logged at least once per month. All bypasses of the flare shall be logged.
6. Pierce County Recycling Composting and Disposal shall test emissions from the flare within 180 days of startup, using the test methods specified in 40 CFR 60.754(d) and submit the test report to the Puget Sound Clean Air Agency within 60 days after the testing. by 2/12/11
7. Pierce County Recycling Composting and Disposal shall submit a testing plan to the Puget Sound Clean Air Agency in accordance with Section 3.07 of Regulation 1 before a source test is conducted.
8. Pierce County Recycling Composting and Disposal shall operate the flare at a set point temperature consistent with either that recommended by the manufacturer or that used during the most recent source test.
9. This Order of Approval cancels and supersedes Order of Approval No. 3229 dated May 18, 1989.

**Order of Approval for NC No. 10284****APPEAL RIGHTS**

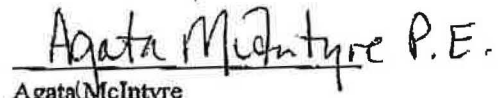
APR 21 2011

Pursuant to Puget Sound Clean Air Agency's Regulation I, Section 3.17 and RCW 43.21B.310, this Order may be appealed to the Pollution Control Hearings Board (PCHB). To appeal to the PCHB, a written notice of appeal must be filed with the PCHB and a copy served upon Puget Sound Clean Air Agency within 30 days of the date the applicant receives this Order.



Claude Williams  
Reviewing Engineer

ms

  
Agata McIntyre  
Senior Engineer

Municipal Solid Waste Landfill  
Transition Permit

Issued Pursuant to  
WAC 173-351-700

Transition Permit Number 27-016

Date of Issuance June 29, 1994

Date of Expiration February 27, 2002

Date of Renewal June 6, 1995

Date of Renewal April 30, 1996

Date of Renewal April 18, 1997 (Amended June 12, 1997)

Date of Renewal April 15, 1998

Date of Renewal February 27, 2001

Facility Name: Hidden Valley Landfill  
Facility Location: 17925 Meridian Street East, Puyallup, WA  
Facility Owner/Operator: Land Recovery, Inc.  
("the permittee") Harvey Doman, General Manager (253)847-7555  
c/o Address: P.O. Box 73057  
Puyallup, WA 98373

Transition Permit Issuance:

The permittee, noted above, is hereby authorized to continue operation of the existing municipal solid waste landfill unit(s) under the terms and conditions of this transition permit and in accordance with local ordinances, and Chapter 173-351 WAC.

*Federico Cruz Velasco MD*

Signed (Health Officer or Designee)

# HIDDEN VALLEY LANDFILL TRANSITION POST-CLOSURE PERMIT

## DESCRIPTION

The permittee, Land Recovery, Inc. (LRI), is allowed to perform post-closure activities at the Hidden-Valley Landfill located at 17925 Meridian South. The landfill consists of approximately 56-acres of unlined landfill and about 31-acres of lined area. The lined area is comprised of 18-acres on a side slope abutting refuse and 13-acres on native or engineered soil. The landfill was capped in five major phases. The North Closure occurred in 1989 and consisted of approximately 13-acres. The Southwest Closure occurred in 1992 and comprised of approximately 26-acres. In 1993, the side slope area of the landfill was capped with a small area in the northwest corner than consisted of about 17-acres. The Partial Closure was conducted in 1998 and consisted of 11.43-acres. The Final Closure was conducted in 1999 and 2000 and consisted of approximately 22-acres. The landfill closures completed in 1989, 1992, and 1993 were constructed in accordance with WAC 173-304 (synthetic 60-mil geomembrane). The landfill closures conducted in 1998, 1999, and 2000 were constructed in accordance with WAC 173-351 (i.e., a composite cap).

## GENERAL CONDITIONS

1. LRI is authorized to perform post-closure activities and must abide by the conditions set forth in the Specific Conditions of this transition permit until this transition permit expires, is revoked, or the full permit is issued in accordance with Section 700 of Chapter 173-351 WAC, Criteria for Municipal Solid Waste Landfills (WAC 173-351).
2. This transition post-closure permit must be renewed annually, in accordance with WAC 173-351-720(1)(a)(i) until either expiration or a full permit is issued.
3. This transition post-closure permit may be modified (amended) by the TPCHD in accordance with WAC 173-351-720(5). More stringent restrictions may be imposed on the facility during the time period this transition permit is valid. Modifications will be made in writing and become specific conditions of the permit.
4. This permit is subject to suspension or revocation if the TPCHD finds:
  - A. That the transition permit was obtained by misrepresentation or failure to disclose any relevant information that could potentially have affected the issuance of this transition permit;
  - B. That the site is in violation of Chapter 70.95 RCW, WAC 173-351 or local statutes, ordinances, or regulations; or
  - C. That there has been a violation of any of the conditions contained in this permit.

LRI may appeal any such suspension or revocation in accordance with WAC 173-351-760.

5. All conditions of this transition post-closure permit shall be followed or accomplished for LRI to remain in compliance. Compliance schedules shall be met by the specified time period. LRI is responsible for all acts and omissions of contractors and agents of LRI.
6. Any duly authorized officer, employee, or representative of the Tacoma-Pierce County Health Department (TPCHD) may enter and inspect the facility at any reasonable time to determine compliance with WAC 173-351, WAC 173-304 and local solid waste ordinances.
7. LRI must comply with WAC 173-351, Criteria for Municipal Solid Waste Landfills.
8. The permit (with conditions) shall be displayed or stored in a manner that allows easy access by site personnel.
9. Nothing in this permit shall be construed as excusing LRI from compliance with any applicable federal, state, or local statutes, ordinances or regulations.

#### SPECIFIC CONDITIONS

1. By the end of August 2001, LRI must perform the remaining quality assurance construction activities outlined in the *Final Construction Report for the East Development Area* dated December 11, 2000. The report describing these activities must be submitted to the TPCHD by October 15, 2001.
2. LRI must submit a "complete permit application" in order to obtain a Full Post-Closure Permit for this facility. The complete permit application must contain the information outlined in Kleinfelder's letter dated February 2, 2000, and the following revised and updated reports: Post-Closure Care and Maintenance Plan; the Landfill Gas Management Plan; and the Groundwater Compliance Monitoring Plan. The Post-Closure Care Plan shall include a description of maintaining the integrity and effectiveness of the final cover, a description of maintaining the operation of the leachate collection system, a description of future uses of the property and an updated post closure cost plan. The complete permit application must be submitted to the TPCHD by either **June 1, 2001**, or in accordance with the Hidden Valley Landfill Consent Decree, whichever is earlier.
3. Any repairs to the final cover cap of the landfill must be approved by the TPCHD prior to constructing. LRI shall submit appropriate documentation to assure that all repairs are conducted with current engineering and quality assurance standards.
4. This permit expires on **February 27, 2002**, or when a Full Post-Closure Permit is issued.

TACOMA-PIERCE COUNTY HEALTH DEPARTMENT  
CONDITIONAL  
SOLID WASTE HANDLING PERMIT

PERMIT #: 27-016 EXPIRATION DATE: February 27, 2002

TYPE OF FACILITY: LANDFILL [ X ] TRANSFER STATION [ ] RECYCLING [ ]  
BIOSOLIDS UTILIZATION [ ] COMPOSTING [ ] INCINERATOR [ ] OTHER [ ]

THIS CERTIFIES THAT Land Recovery, Inc.

ENGAGED IN THE BUSINESS OF Post-Closure Activities at the Hidden Valley Landfill

IS PERMITTED IN ACCORDANCE WITH RCW 70.95, WAC 173-304 and WAC 173-351

BY Federico Cruz Valdes MD

DIRECTOR OF HEALTH

THIS CERTIFICATE IS REVOCABLE FOR CAUSE AND IS NOT TRANSFERABLE

# Puget Sound Air Pollution Control Agency

**HEREBY ISSUES AN ORDER OF APPROVAL  
TO CONSTRUCT, INSTALL, OR ESTABLISH**

Notice of  
Construction No. 3229

Date MAY 18 1999

**One landfill gas collection system with 16 wells and a McGill Landfill Gas Flare, 9'dia. by 40' high,  
with propane pilot**

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HARVEY DORMAN, LAND RECOVERY INC  
PO BOX 73057  
PUYALLUP WA 98373

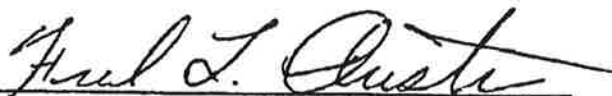
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HARVEY DORMAN, LAND RECOVERY INC  
PO BOX 73057  
PUYALLUP WA 98373

### INSTALLATION ADDRESS

Hidden Valley Landfill (Thun Field), 17925 MERIDIAN E, PUYALLUP, WA, 98373

### THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Air Pollution Control Agency to the applicant to install, alter or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of PSAPCA.
2. Compliance with this ORDER and its conditions does not relieve the owner or operator from the responsibility of compliance with Regulations I or II, RCW 70.94 or any other emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply.
3. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
4. The combustion zone will provide for a minimum combustion temperature of 1400 degrees F.
5. The combustor will be provided with an ultraviolet flame scanner which senses flame-outs and shuts down the system operation and automatically prevents venting of malodorous landfill gas into the atmosphere.
6. Following initial system startup and balancing, the flare shall be tested within 60 days in accordance with PSAPCA approved testing procedures.
7. The owner shall collect and analyze landfill gas emissions from up stream and downstream of the combustor flame. Analysis shall include methane, CO<sub>2</sub>, O<sub>2</sub>, HCl, and trace organic and inorganic gases. Initial data shall be reported to PSAPCA.
8. The owner shall retest the flare one year from the date of the initial test in accordance with PSAPCA approved testing procedures.
9. The owner shall submit an operation and maintenance plan including a proposed flare testing plan for approval by PSAPCA.



**FREDRICK L. AUSTIN**  
Reviewing Engineer

hw



**Anita J. Frankel**  
Air Pollution Control Officer

# Puget Sound Air Pollution Control Agency

HEREBY ISSUES AN ORDER OF APPROVAL  
TO CONSTRUCT, INSTALL, OR ESTABLISH

Registration No. 21331

Notice of  
Construction No. 5645

Date OCT 10 1994

One Landfill Gas Flare at 1,500 cfm.

DAVID VONASEK, MGR LANDFILL GAS SVCS

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EMCON NORTHWEST, INC  
18912 N CREEK PARKWAY, STE 100  
BOTHELL WA 98011-8016

O LAND RECOVERY, INC (J CRANDALL)  
W PO BOX 73057  
N PUYALLUP WA 98373  
E  
R

### INSTALLATION ADDRESS

PIERCE CO PUBLIC WRKS LND RECOVERY (HIDDEN VALLEY LND FILL), 17925 MERIDIAN E, PUYALLUP, WA, 98373

### THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Air Pollution Control Agency to the applicant to install or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of PSAPCA.
2. Compliance with this ORDER and its conditions does not relieve the owner or operator from the responsibility of compliance with Regulations I, II or III, RCW 70.94 or any other emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply. Section 5.05(e) of Regulation I requires that the owner or operator must develop and implement an operation and maintenance (O&M) plan to assure continuous compliance with Regulations I, II, and III.
3. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
4. The federal New Source Performance Standards (NSPS) found in 40 CFR Part 60, Subpart WWW, for Municipal Solid Waste (MSW) Landfills apply to this permit.

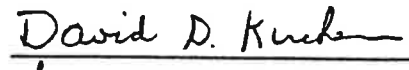


CLAUDE M. WILLIAMS  
Reviewing Engineer

MEJ



JAY M. WILLENBERG  
Reviewing Engineer



for DENNIS J. McLERRAN  
Air Pollution Control Officer



# Puget Sound Clean Air Agency

Notice of  
Construction No. 7578

Registration No. 21331

Date OCT 24 2000

## HEREBY ISSUES AN ORDER OF APPROVAL TO CONSTRUCT, INSTALL, OR ESTABLISH

Three Caterpillar G3516 Internal Combustion Engine Generator Sets producing 950 KW each from Landfill Gas.

### APPLICANT

**Jody Snyder**  
**Land Recovery Incorporated**  
**PO Box 73057**  
**Puyallup, WA 98373**

### OWNER

**Harvey Doman**  
**Land Recovery Incorporated**  
**PO Box 73057**  
**Puyallup, WA 98373**

### INSTALLATION ADDRESS

**Land Recovery Incorporated, 17925 Meridian St E, Puyallup, WA, 98373**

### THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Clean Air Agency to the applicant to install or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of the Puget Sound Clean Air Agency.
2. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
3. Land Recovery Inc shall not exceed the following one hour average limits from the three Caterpillar G3516 internal combustion engines as measured by a compliance source test that follows the requirements of Regulation I, Section 3.07:
  - (a) 0.60 g/BHP-hr of NO<sub>x</sub> (EPA Method 7E), and
  - (b) 2.5 g/BHP-hr of CO (EPA Method 10).
4. Land Recovery Inc shall reduce the Non-Methane Organic Compounds (NMOC) in the landfill gas, using these engine/generator sets, by 98 weight percent, or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen.
5. Land Recovery Inc shall develop an emission testing plan following Regulation I, Section 3.07, and conduct a source test of each of the three Caterpillar G3516 internal combustion engines within 60 days of approval, to demonstrate compliance with Condition Nos. 3(a), 3(b) and 4 above, and submit all source test reports to the Puget Sound Clean Air Agency within 60 days of the date of the test unless otherwise approved by the Control Officer.
6. To monitor compliance with Condition Nos. 3(a) and 3(b) above, Land Recovery Inc shall either conduct annual source tests as in Condition No. 5, or shall perform quarterly monitoring using an exhaust gas analyzer meeting the specifications contained in: (I) Steady-State Exhaust Analysis System of Appendix D-Steady-State Short Test Equipment of Subpart S-Inspection/Maintenance Program Requirements of Part 51 of Chapter 1, Title 40 of the Code of Federal Regulations in effect as of July 1, 2000. Any monitoring result that indicates noncompliance with the conditions in this Order shall be reported to the Agency within 30 days. Otherwise, a report of the combined quarterly results shall be submitted with the annual emission reports of Regulation I, Section 5.05(d).

7. Land Recovery Inc shall maintain logs of the three Caterpillar G3516 internal combustion engine operating hours and shall use these logs with emissions factors based on the most recent source test results to report annual emissions required by Regulation I, Article 5.

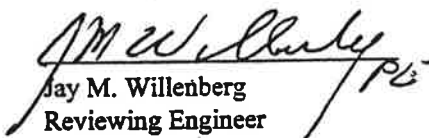
8. Land Recovery Inc shall not exceed 5% opacity from the three Caterpillar G3516 internal combustion engines stacks aggregated for 3 minutes in any 1-hour as measured by WDOE Method 9A.

APPEAL RIGHTS

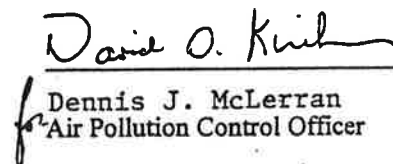
Pursuant to Puget Sound Clean Air Agency's Regulation I, Section 3.17 and RCW 43.21B.310, this Order may be appealed to the Pollution Control Hearings Board (PCHB). To appeal to the PCHB, a written notice of appeal must be filed with the PCHB and a copy served upon Puget Sound Clean Air Agency within 30 days of the date the applicant receives this Order.

 *C. Williams* P.E.

Claude Williams  
Reviewing Engineer  
mej

 *J. M. Willenberg* P.E.

Jay M. Willenberg  
Reviewing Engineer

 *David O. Krieb*  
for Dennis J. McLerran  
Air Pollution Control Officer