Final Remedial Investigation and Feasibility Study (RI/FS) Report Washington State Penitentiary, Walla Walla, Washington

Prepared for

Washington State Department of Corrections

November 2012

Prepared by

Parametrix

and

HWA GeoSciences Inc.

Department of Corrections
Washington State

Final
Remedial Investigation and Feasibility Study (RI/FS) Report Washington State Penitentiary, Walla Walla, Washington

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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KEY TERMS

µg/l	micrograms per liter
µg/m^3	micrograms per cubic meter
AOCs	areas of concern
ARARs	applicable, relevant and appropriate requirements
bgs	below ground surface
BMPs	best management practices
BNSF	Burlington Northern Santa Fe Railroad
BTEX	benzene, toluene, ethyl benzene, and xylenes
CAOs	cleanup action objectives
CAP	Cleanup Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CI	Correctional Industries
Cl	chlorine
CLARC	Cleanup Levels and Risk Calculations
cm	centimeters
COCs	Contaminants of concern
cPAHs	Carcinogenic Polyaromatic Hydrocarbons
CPEO	Center for Public Environmental Oversight
CPOC	conditional point of compliance
CSI/A	Contaminant Source Identification/Assessment
CSM	conceptual site model
DCE	dichloroethylene
DHC	*Dehalococcoides sp*.
DOC	Washington State Department of Corrections
E&E	Ecology and Environment, Inc.
Ecology	Washington State Department of Ecology
EM	electromagnetic
EPA	Environmental Protection Agency
ft^2	square feet
GE	General Electric Company
GPR	Ground penetrating radar
GPS	global positioning system
GRO	Gasoline Range Organics

KEY TERMS (CONTINUED)

H	hydrogen
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
HRC®	Hydrogen Release Compound
HWA	HWA Geosciences Inc.
IMU	Intensive Management Unit
IRIS	Integrated Risk Information System
J&E	Johnson & Ettinger
LEL	lower explosive limit
LUCIP	Land Use Control Implementation Plan
LUST	leaky underground storage tank
MCLs	Washington State Maximum Contaminant Levels
mg/kg	milligrams per kilogram
MNA	Monitored natural attenuation
MTCA	Model Toxics Control Act
mV	millivolts
MW	monitoring wells
O&M	operation and maintenance
PA	Preliminary Assessment
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCE	perchloroethylene or tetrachloroethylene
PCULs	preliminary cleanup levels
PID	photoionization detector
PLP	Potential Liable Party
POC	Point of Compliance
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
RME	reasonable maximum exposure
SAP	Sampling and Analysis Plan
SFVs	standard formula values
Site	WSP facilities and WSP Landfill

KEY TERMS (CONTINUED)

Sudbury Road Landfill	Sudbury Road Municipal Landfill
TCE	trichloroethylene
TDSs	Total Dissolved Solids
TP	Test Pits
TPH	Total Petroleum Hydrocarbons
TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
UCL	upper confidence limit
UST	Underground Storage Tank
VOCs	volatile organic compounds
WAC	Washington Administrative Code
WARM	Washington Ranking Method
WSP	Washington State Penitentiary

1. INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

The Washington State Department of Corrections (DOC) is the Potential Liable Party (PLP) responsible for completing the Remedial Investigation/Feasibility Study (RI/FS) at the Washington State Penitentiary (WSP) in Walla Walla, Washington. The DOC retained Parametrix, Inc. to implement the RI/FS, including updating the RI/FS Work Plan, conducting the RI field investigation, interpreting the field data, and preparing an RI/FS report.

The objectives of the RI/FS are as follows:

- Identify the source(s) of the chlorinated solvents observed in downgradient groundwater monitoring wells (MW).
- Determine whether historical activities at the WSP have caused on-site soil, soil vapor, or groundwater contamination that could affect off-site groundwater.
- Characterize the nature and extent of contamination that can be reasonably identified in areas of concern (AOCs) at the WSP site.
- Determine if any known contaminants are migrating onto WSP property from upgradient locations.
- Evaluate potential cleanup action alternatives for addressing contamination identified by the RI field investigation, and select a preferred alternative that meets requirements specified in the Model Toxics Control Act (MTCA) regulation.

1.2 REGULATORY STATUS

The RI/FS described in this report was stipulated under a 2008 Agreed Order (No. 6200) between the Washington State Department of Ecology (Ecology) and the Washington State Department of Corrections. Two independent events precipitated the concerns and investigations that led to the Agreed Order. In 1991, an anonymous complainant alleged that hazardous waste was improperly disposed in the WSP Landfill and the former power plant storm drain. In response to this allegation, Ecology conducted an Initial Investigation in 1992. This investigation was followed by an early notice letter informing WSP that potential contamination existed in the debris landfill. The WSP Landfill was added to Ecology’s Confirmed and Suspected Contamination Sites List on June 8, 1992 (Ecology 1992a).

The second event involved an assessment of results from groundwater sampling conducted in 1993 at locations west of the WSP. Chlorinated solvents were detected in groundwater samples collected from monitoring wells located adjacent to the western WSP property boundary, upgradient of the Sudbury Road Municipal Landfill (Sudbury Road Landfill) and downgradient of the WSP Landfill (see Figure 1) (Ecology 1993). The wells are located on property owned by the City of Walla Walla, which operates the Sudbury Road Landfill. The active area of this landfill is located approximately 2 miles to the west of the WSP.

From April 3, 1995, until June 29, 1995, Ecology conducted a Site Hazard Assessment at the WSP Landfill. Based on the data collected during this assessment, the WSP was given a ranking of “3” on August 22, 1995 (a “1” represents the highest relative risk, and a “5” is the lowest). The “3” ranking is based on the potential for human exposure through the groundwater pathway. Due to this ranking, the WSP was placed on the Hazardous Sites List.

1.3 DEFINITION OF THE SITE

For the purpose of this work plan, the “Site” is defined by the property boundaries of the WSP, including the WSP facilities and WSP Landfill (Site). The site definition may be updated by new information as it becomes available. A site area map can be seen in Figure 1.

1.4 SITE LOCATION AND ADJACENT LAND USES

The WSP is an active state corrections facility located in the southeastern corner of the state of Washington in the City of Walla Walla. The current address is 1313 North 13th Avenue. The Site consists of the WSP facility, the closed WSP Landfill, and the surrounding undeveloped and agricultural land owned by the State of Washington. The WSP property, including all parcels, structures, and improvements both inside and outside the confined areas, has been expanded numerous times over the years and currently occupies 560 acres. The WSP Landfill is northwest of the facility and occupies 7.7 acres.

The Site is situated on the northern slope of the east-west-trending Walla Walla Valley. The valley is gently undulating and of low local relief. The Site elevation generally ranges from 850 to 950 feet above mean sea level with general sloping toward the west (HWA 1998).The facility is located within the SE 1/4 Section 13 and the NE 1/4 Section 24, Township 7 North, Range 35 East, and the SW 1/4 Section 18, and the NW 1/4 Section 19, Township 7 North, Range 36 East, Willamette Meridian in Walla Walla County, Washington.

The Site is bounded on the east by privately-owned land and on the west by the wastewater application section of the Sudbury Road Landfill and several upgradient groundwater monitoring wells owned by Sudbury Road Landfill. State Highway 125 and more privately-owned land bounds the Site on the north (see Figure 1). The Site is bounded on the south by Mill Creek and a drainage pond located on a privately-owned parcel that receives stormwater from the WSP and other properties in its vicinity. Properties to the east and south of the WSP include junkyards and industrial, fuel, and agricultural-chemical facilities. A Burlington Northern Santa Fe Railroad (BNSF) line that serves local industries is located along the southern edge of the property. The City of Walla Walla also bounds the Site on the south. The WSP is topographically and hydraulically upgradient of the Sudbury Road Landfill and downgradient of properties to the east and south (Ecology 2009a).

1.5 HISTORICAL AND CURRENT FACILITY USE

In 1883, the Territorial Governor authorized the selection of a suitable site for a penitentiary. In 1885, Walla Walla was chosen. Construction began in 1886 using bricks manufactured in nearby Dixie from the fine clay beds there. The WSP opened for operation on May 10, 1887, as the historical starting point for Washington State Corrections. To provide needed jobs for the prisoners, a one-story jute mill for the manufacture of sacks was built in 1892. In 1921, the jute mill was transformed into a license-plate factory, which continues to operate today, producing approximately 3,000,000 sets of plates each year. Today, the property consists of multiple parcels that total 560 acres (DOC 2009a).

The WSP currently consists of approximately 90 buildings on-site, and active expansion projects are underway (see Figure 1). WSP employs approximately 1,289 staff members. Four different institutions house offenders at different custody levels: Maximum, Close, Medium, and Minimum security.

The Correctional Industries (CI) program at WSP provides jobs for offenders in a metal fabrication shop, a license plate factory, a welding shop, and a garment factory, where offender clothing, staff uniforms, and other similar items are made. There is also a sign shop that makes road signs for the state and counties, and a furniture refurbishing shop that does wood and upholstery restoration. Other site activities that provide jobs for the offenders include: food service, janitorial, and various prison operation and maintenance (O&M) functions including a photo processing shop, X-ray, dental and medical laboratories, laundry and former dry cleaning operations, motor pool, fix-it shop, and grounds maintenance facility (Ecology 2000).

1.6 ENVIRONMENTAL SITE REGULATION AND COMPLIANCE HISTORY

According to Ecology records, compliance concerns at the facility were first reported in March 1990, immediately after the WSP was declared a large quantity generator of dangerous waste, per WAC 173-303. At this time, the WSP was penalized for improper waste management, shipping, labeling, and handling. In November 1994, the WSP was again cited for numerous large quantity generator violations. During a 2001 hazardous waste inspection, several more hazardous waste violations were found. AOC No. 6 shown in Appendix A is the area related to the hazardous waste violations.

The most recent hazardous waste administrative order was issued in 2002 by Ecology to WSP. In this order, WSP was penalized $54,000, which was reduced to $43,200 because of implementation of an employee hazardous waste training program and creation of an on-site environmental compliance position. WSP completed a contingency plan in 2004 and a facility inspection plan in 2005 to further facilitate regulatory compliance.

The waste generator status of WSP, which is based on the amount of dangerous waste generated each month, has gone from large to medium to small quantity generator basis in the last 10 years. From 2000 to 2004, WSP was a large quantity generator. WSP was a medium quantity generator from 2004 until 2005, and since then, has been a small quantity generator. Several hazardous waste inspections have been conducted over the last 20 years to confirm that WSP was filing the correct generator status and complying with hazardous waste regulations. Summaries of these inspections are given below (Ecology 2009b).

On August 1, 1990, a hazardous waste inspection was conducted at the WSP. During this inspection, several compliance problems were observed, including improper waste discharges; accumulation past time limit; and failure to designate wastes, label hazardous waste containers, file a manifest exception report, conduct facility inspections, have a contingency report, or have a training plan (Ecology 1994).

Another hazardous waste inspection was conducted on November 8, 1994, when further violations were observed, including failure to designate waste according to required procedures, send dangerous waste to a permitted facility, provide required notice of a spill or discharge to Ecology, adequately label containers, provide a personnel training program, develop a schedule for maintenance and inspection of all monitoring equipment, prepare a contingency plan, or conduct weekly inspections of dangerous waste accumulation areas and containers. Documented waste materials included antifreeze, perchloroethylene sludge, lacquer thinner, still bottoms, spent methylene chloride, photochemicals, and petroleum naphtha solvent (Ecology 1999).

Additional environmental incidents were a report of a leaky underground storage tank (LUST) and alleged dumping of chemicals into the powerhouse stormwater drain and into the WSP Landfill. The LUST, reported to Ecology in April 1996, was a 500-gallon diesel tank with a hole in the end. DOC reported to Ecology that the LUST had been removed and 30 to

35 tons of petroleum-contaminated soil had been excavated for disposal at the Sudbury Road Landfill. The LUST location is shown in Appendix A and is denoted by “T_{11}.”

1.7 WSP LANDFILL HISTORY

The WSP Landfill served as the principal disposal site for DOC construction and demolition debris, ash from the penitentiary boiler, and yard and farm waste from the former state farm from the early 1970s until 1987 (HWA 1998). According to DOC, the facility was constructed in conformance to the regulations in effect at the time (Chapter 173-301 Washington Administrative Code [WAC]). When the landfill was created in the early 1970s, a culvert was installed in the natural swale of an east-west-trending intermittent drainage channel to allow drainage to continue to flow under the landfill. The construction details and materials used for the culvert are unknown. Portions of the drainage channel were filled with construction/demolition debris, yard and farm waste, and boiler ash. The fill covers approximately 7 acres (see Figure 2). Portions of the fill on either side of an unpaved road are referred to as the East Cell and the West Cell (HWA 1998).

The West Cell is 4.3 acres and is bordered on the south by a gravel road and a cornfield, on the west by an alfalfa field, on the north by the two unlined drainage ponds, and on the east by the north-south access road and the East Cell. At closure, both cells were reportedly covered with a 1-foot-thick cover of native soils (probably silts of the Palouse formation). Subsequently, the West Cell was used as a pasture and manure composting area. Construction debris was reportedly exposed at ground surface, apparently as a result of agricultural tilling (Ecology 2000). No landfill controls such as liners, leachate collection systems, or stormwater management equipment exist at the landfill.

The East Cell is 3.4 acres and is bordered on the north by an alfalfa field, on the east by the drainage channel that receives stormwater from the north parking lot and Intensive Management Unit (IMU), and on the south and on the west by a gravel road. For some time after the landfill closure, the East Cell served as a fenced pasture for cattle. Structures formerly on this cell include a large feeding trough on the southwest side of the cell, a watering trough in the southeast corner, and two open sheds on the north-central portion. Brick, concrete, rebar debris, cow manure, and hay were scattered across the cell at the ground surface. Currently, the East Cell is not used as a pasture and no structures remain in place. The East Cell soil cover, though apparently undisturbed, was subsequently covered with 9 to 12 inches of boiler ash (Ecology 2000).

In December 1991, Ecology received an anonymous complaint alleging that hazardous substances had been disposed of in the closed WSP Landfill. Materials allegedly dumped were hazardous chemicals, solvents, paints, thinners, and medical wastes. Ecology placed the WSP Landfill on the Confirmed and Suspected Contaminated Sites List in June 1992 after conducting an initial site investigation of the WSP Landfill on March 11, 1992 (Parametrix 1995).

From 1991 through 1998, groundwater monitoring data from samples collected downgradient of the WSP and at the WSP Landfill indicated that concentration levels for volatile organic compounds (VOCs) in the shallow alluvial aquifer sometimes exceeded MTCA Method A standards, and more often exceeded the more stringent Washington State Maximum Contaminant Levels (MCLs) for drinking water (Table 1). Levels of nitrate-nitrogen and Total Dissolved Solids (TDSs) sometimes exceeded MCLs for drinking water. VOCs detected within the groundwater include trichlorofluoromethane, perchloroethylene (PCE, also called tetrachloroethylene), trichloroethylene (TCE), and chloroform. Toluene has been confirmed as a contaminant in surface water at the WSP Landfill (HWA 1998).

1.8 PREVIOUS INVESTIGATIONS AND EXISTING DATA

1.8.1 1984 PCB Appraisal

In August 1984, the General Electric Company (GE) Apparatus and Engineering Services conducted a site-wide polychlorinated biphenyl (PCB) transformer inspection and prepared a PCB Regulatory Compliance Report for the WSP (GE 1984). Of the 92 oil-filled transformers existing at that time, 90 were inspected, as well as oil-containing circuit breakers and oil-filled disconnects. The results of this inspection indicated that two transformers had “running leaks” and action was taken to provide containment. No confirmation exists on how much oil actually leaked, what the leak affected, or if the oil actually contained PCBs. The data plates on the transformers only listed insulating oil. As a precaution, the WSP decided to label the contents as PCB oil without testing (DOC 2009c). The locations of these two transformers, while in operation or while stored for disposal, are unknown. Some equipment known to contain PCBs was temporarily stored in a building east of the Big Yard between Buildings E50 and G50 (DOC 2009b). Apparently this building no longer exists, and its exact former location is unknown.

1.8.2 1992 Initial Investigation

In March 1992, Ecology conducted an Initial Investigation at the WSP due to anonymous complaints of chemical dumping in the WSP Landfill. During the investigation, no contamination was visibly apparent. The migration pathway of concern noted was groundwater. The investigation noted that a 10-inch-diameter well in the east part of the landfill was not abandoned properly. The investigation also noted that livestock carcasses had been disposed of near the northeast edge of the pond with numerous animal bones littered around the Site (Ecology 1992b).

As part of the Initial Investigation, multiple letters were sent to former employees of WSP, the County Health Department, and the contractor used during the closure of the WSP Landfill in order to gather further information. All respondents of this letter claimed to have no knowledge of any inappropriate dumping at the WSP Landfill (Ecology 1992b). Because no evidence was found to support these claims, the Initial Investigation determined that the Site needed to be carried forward in the MTCA process.

1.8.3 1995 Site Hazard Assessment

Based upon the findings of the Initial Investigation, a Site Hazard Assessment was conducted by SAIC in April 1995 in order to gather information on past and present waste management activities and other site-specific environmental data. This assessment was conducted in order to score the Site following the Washington Ranking Method (WARM) Scoring Manual guidelines. Sites are ranked on a scale of 1 to 5, with 1 representing the highest level of concern, and 5 the lowest, relative to all other assessed/ranked sites in the state. The overall ranking given to the WSP Landfill after the field site hazard assessment was “3” (Ecology 1995).

No field measurements or samples were collected at this time. Suspected hazardous substances listed at this time were PCE and TCE. The quantities of these hazardous substances were listed as unknown. The routes in which these hazardous substances were available were listed as air and groundwater. No details about the source(s) of these hazardous substances were discussed; however, it was noted that TCE and PCE were found in the two WSP monitoring wells downgradient of the WSP Landfill and upgradient of the Sudbury Road Landfill. The site hazard checklist noted that the WSP Landfill cover was not maintained and did not have run-on/runoff control or a consistent thickness of cover material.

The checklist also noted that the landfill was unlined and that liquid wastes may have been disposed in the WSP Landfill (Ecology 1995).

1.8.4 1995 Site Assessment

Parametrix, Inc. performed a Site Assessment evaluation of the closed WSP Landfill in June 1995. The purpose of the evaluation was to compile data on the landfill history and site conditions and evaluate the types of disposed materials, the contaminant migration potential, and the landfill condition (Parametrix 1995). The assessment concluded that the WSP Landfill did not present an imminent threat to human health or the environment that required immediate remedial actions. However, the assessment also concluded that there was insufficient information to confirm or rule out the possibility that contaminants might be buried in the WSP Landfill (Parametrix 1995).

1.8.5 1996 UST Removal

Beginning in August 1995, DOC performed Underground Storage Tank (UST) removal activities at the WSP. Over a period of 8 months, six 500-gallon USTs and one 1,000-gallon UST containing diesel were decommissioned (See Appendix A). All seven USTs were used to supply diesel for several emergency generators on-site. Tank removal operations were followed by post-excavation soil sampling to evaluate whether any soil contamination existed. Soil samples were typically collected from the walls and bottom of each excavation pit. In all but one location, the four wall samples were composited at the lab into two samples for analysis (either north and east, or south and west). Typically, three stockpile samples from the soil removed at each pit location were collected and composited as one sample for analysis. Samples were analyzed for Total Petroleum Hydrocarbons (TPH) as Diesel (TPH-D) using method WTPH-D (DOC 1996).

Upon removal, all seven tanks and associated piping were described as having no visible holes, abrasions, or corrosion. No visible signs of contamination, nor any odors, were observed at any of the seven tank pit locations. The report states that a field instrument was not used at any of the excavations to determine whether hydrocarbon contamination was present or further excavation and sampling were necessary (DOC 1996). Contrary to the report, there is anecdotal evidence that a field device may have been used (DOC 2009c).

Two additional USTs were found in July 2009 during construction activities at WSP. The approximate location of the two USTs is shown in Appendix A and is denoted by “$T_{13.}$” The origin of the USTs is unknown. The tanks were decommissioned on July 31, 2009 (DOC 2009d). Based on visual observations during the removal, the tanks are thought to have contained fuel oil. One tank was estimated to be approximately 500 gallons while the second tank was estimated to be approximately 1,000 gallons. The tanks were filled with sand in-place. Soil samples were collected from the sidewalls and floor of the excavation and were analyzed for TPH as Gasoline (TPH-G) and benzene, toluene, ethyl benzene, and xylenes (BTEX) using method NWTPH-Gx/802 1B; and TPH-D and Heavy Oil Range Hydrocarbons were analyzed using method NWTPH-Dx. Sample results are shown in Table 6 and were below applicable soil screening levels. Approximately 62 cubic yards of soil were disposed at the Finley Buttes Landfill in Boardman, Oregon. The remaining excavated soils were landfarmed on-site in accordance with Ecology requirements and were finally used as fill material for road construction activities at WSP.

1.8.6 1998 Preliminary Hydrogeologic Evaluation for WSP Landfill

In 1998, HWA Geosciences Inc. (HWA) was contracted by DOC to perform a preliminary hydrogeologic evaluation of the closed landfill at the WSP. This evaluation was designed to provide a preliminary understanding of the hydrogeologic characteristics of the area and to evaluate surface water and groundwater quality in the area of the WSP Landfill. In addition, the investigation was designed to evaluate the presence of landfill soil gas at the WSP Landfill. The HWA investigation consisted of two phases. The first phase was conducted during February 1998 and the second was completed in July 1998.

During the first phase, HWA installed four monitoring wells (MW-1 through MW-4 at the WSP Landfill (see Figure 1), and subsequently collected groundwater samples for laboratory analysis. HWA also sampled two existing Sudbury Road Landfill monitoring wells (SLF-9 and SLF-10; see Figure 1), and collected stormwater samples from an intermittent drainage near the WSP Landfill.

During the second phase, HWA collected additional groundwater samples from the four WSP Landfill monitoring wells and three Sudbury Road Landfill monitoring wells (SLF-7, SLF-9, and SLF-10). No stormwater samples were collected during the second phase because none were observed in the intermittent drainage. A methane survey was also completed in the area of the WSP Landfill. HWA also installed 28 Geoprobe® borings in May 1999 and collected soil and soil gas samples for analysis. The results are shown in Tables 6 and 8, respectively. Based on the results of the Geoprobe® boring sampling, monitoring well MW-5 was installed in October 1999 by HWA where Geoprobe® boring GP-13 was previously installed (HWA 2002). Field monitoring of VOCs from the soil samples did not indicate the presence of contaminants; therefore, soil analyses were not run on samples collected from the boring for monitoring well MW-5.

Water Quality Standards for Ground Waters of the State of Washington (Chapter 173-200 WAC) were used for evaluation of the analytical results, where applicable. Exceedances based on these criteria included total dissolved solids, iron, manganese, nitrate-nitrogen, TCE, and PCE. Results of the soil gas survey indicated combustible gas in the east and west cells of the WSP landfill.

1.8.7 1999 Sudbury Road Landfill Site Contaminant Source Identification/Assessment Report

In 1999, Ecology completed a Contaminant Source Identification/Assessment (CSI/A) study for potential sources of VOCs detected in the upgradient groundwater monitoring wells at Sudbury Road Landfill. The Sudbury Road Landfill is immediately west of, and downgradient of, the WSP. The CSI/A was conducted under a Site Assessment Cooperative Agreement between Ecology and the Environmental Protection Agency (EPA).

The CSI/A study included a review of public and governmental documents, research on the contaminant’s use and properties, interviews of officials and residents, and a field reconnaissance (Ecology 1999).

Sudbury Road Landfill groundwater monitoring data for 1991 through 1998 indicated that groundwater quality in the shallow aquifer was being impacted by upgradient sources. In some samples, nitrate, TDS, and VOCs exceeded Washington State Groundwater Quality Standards. VOCs detected in the Sudbury Road Landfill’s upgradient monitoring wells included PCE, TCE, trichlorofluoromethane, and chloroform (Ecology 1999). The CSI/A study concluded that because contaminant concentrations are generally higher in the upgradient wells and lower in the downgradient wells, the Sudbury Road Landfill was not the suspected source of the VOC contamination (Ecology 2000).

Recommendations made at the conclusion of this study included the execution of a Preliminary Assessment (PA) that focused on the WSP Landfill while also evaluating past and present prison institutional operations.

1.8.8 2000 Preliminary Assessment Washington State Penitentiary Narrative Report

In 2000, Ecology released a PA report (Ecology 2000). The purpose of the PA was to assess the immediate or potential threat to human health and the environment in the area of the WSP and to collect information to support a decision on further action under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). PA activities consisted of research and file review. Conclusions based on the PA included the following:

- The shallow sedimentary aquifer was impacted by VOCs, and the WSP Landfill has been assessed as a high potential source of the contamination.
- There was no information that indicated that Mill Creek or the Walla Walla River was impacted by either runoff or shallow groundwater from the WSP property. However, because the streams ultimately receive water from the penitentiary site, there was a possible threat to human health and the environment.
- Because of the nature of the suspected contamination, there were opportunities for soil exposure and air hazards; however, the threat was judged to be low.

1.9 SCOPE OF RI/FS

1.9.1 Areas of Concern

Based on the preliminary site conceptual model and evaluation of existing data, AOCs and potential AOCs for the Site were identified during the RI scoping (E&E 2009). An AOC was defined as having the following characteristics:

- Containing one or more contaminants, confirmed by either laboratory analysis or documented observations of a release; and
- Presenting a reasonable concern that contaminants have affected soil or groundwater and may present a risk of contaminant migration or exposure to human health or the environment.

A potential AOC was defined as an area with the following characteristics:

- Information from the site history indicates that a hazardous material was used or stored in the area; and
- There is a reasonable concern that a spill or release may have occurred.

A map with locations and descriptions of the AOCs is included in Appendix A. This map was presented in the RI planning documents, as described in the following section.

1.9.2 RI Planning Documents

Ecology and Environment, Inc. (E&E) prepared a draft RI/FS Work Plan for the WSP under contract to Ecology, which was submitted to Ecology in June 2009 (E&E 2009). The DOC subsequently assumed direction of the RI/FS under the Agreed Order and retained Parametrix, Inc. to participate in discussions with DOC and Ecology and to update the Work Plan, based on the results of these discussions. The Final RI/FS Work Plan (Parametrix 2010) retained the structure and much of the content of the Work Plan prepared by E&E, incorporated updates and revisions from a supplemental data search completed by Parametrix, and was approved by Ecology following detailed discussions between Ecology and the DOC. The Work Plan includes three appendices: Sampling and Analysis Plan (SAP); Quality Assurance Project Plan (QAPP); and Health and Safety Plan.

1.9.3 Water Well Inventory

A water well inventory was developed for evaluation of wells within a 1-mile radius of WSP. The purpose of this inventory was to identify past and present land use and to identify potential wells that may need to be sampled as part of the remedial investigation field work based on the likelihood that the wells could be affected by potential contamination sources identified at WSP.

1.9.4 RI Field Investigation

The purpose of the RI field investigation was to further develop the conceptual model of the Site and subsurface conditions of the WSP Landfill and other AOCs. The RI field investigation methods and rationale are described in detail in the SAP appendix of the Work Plan and consisted of the following activities:

- Drilling boreholes for installation of new monitoring wells;
- Collecting soil samples from the borings for chemical analysis;
- Constructing and developing the monitoring wells;
- Conducting a geophysical survey of the landfill to check for buried metallic objects;
- Excavating test pits at the landfill at locations identified by the geophysical survey;
- Drilling soil probes at the landfill and other specific AOCs to check for the presence of soil contamination and the presence of VOCs in soil gas;
- Collecting soil gas samples for laboratory analysis of VOCs;
- Completing the four quarterly RI groundwater monitoring events by sampling new monitoring wells, selected pre-existing monitoring wells, and local water wells (if sufficiently documented); and
- Collecting surface water samples in the drainage below the WSP landfill.

1.9.5 Vapor Intrusion Evaluation

Ecology requested that a vapor intrusion evaluation be conducted as part of the RI/FS process to determine if vapor intrusion presents a potential risk to human health at the Site. A vapor intrusion evaluation was conducted following the RI field investigation to determine if low concentrations of VOCs detected in groundwater beneath the Site had the potential to adversely impact indoor air quality in overlying buildings.

2. WATER WELL INVENTORY

2.1 PURPOSE AND DEVELOPMENT

A joint water well inventory effort was undertaken between Ecology and Parametrix. The purpose of this inventory was twofold:

- To identify past and present land use surrounding WSP.
- To identify potential wells that might need to be sampled as part of the remedial investigation field work.

To develop the water well inventory, the Ecology Well Logs Database was used to query all records within a 1-mile radius of WSP.

2.2 INVENTORY TABULATION

From the Well Logs Database query, information such as address, well type, well depth, construction, and owner's names were tabulated for further evaluation. A total of 214 well log records were located during the Ecology well log query (Table 2). Of the wells that were tabulated, total depths ranged from 8 feet below ground surface (bgs) to 1,618 feet bgs. Well log records indicate that more than half of the wells within the 1-mile radius of WSP were for resource protection, less than five percent (seven wells) had been decommissioned, and that 59 of the 214 were for water supply.

2.3 INVENTORY EVALUATION

Resource protection wells ranged in depth from ten to 1,123 feet bgs. Owners of resource protection wells were primarily commercial food processors, WSDOT, Bonneville Power Administration, the City, and WSP. Of the 59 water supply wells, depths ranged from 20 feet bgs to 1,618 feet bgs and owners tended to be industrial facilities along with WSP and food processors. However, the majority of the water supply wells was operated by private homeowners or was public water supply wells.

An evaluation of the surrounding domestic water supply wells was accomplished by plotting these wells on a diagram for visual assessment (Figure 3). Wells located downgradient of the WSP facility and within the upper aquifer were identified on the diagram, since potential contaminants would have the best chance of appearing in the water supply at these locations. A cluster of private homes with domestic wells located to the southwest of WSP was noted as the only potential area of concern. Of these downgradient wells, their construction, geology, and hydrogeology was also evaluated and found that none of the inventoried wells were at locations or in aquifers likely to be affected by potential contamination sources identified at WSP. Therefore, sampling of inventoried water wells was not incorporated into the RI field work. However, if future WSP groundwater data show a change in potential impacts to off-site water wells, sampling of these wells may be considered.

2.4 WSP IRRIGATION WELL

During the record search performed for the 1995 Site Assessment (Parametrix 1995), it was discovered that in 1956 an irrigation well (No. 4; no longer used) had been drilled near the current southeast corner of the WSP Landfill (see Figure 2). The well log for this well shows an upper well casing 24 inches in diameter extending from the surface to a depth of 300 feet, a 20-inch diameter casing from 290 to 414 feet, and a 16-inch diameter casing from 383 to 525 feet, at which point no further casing was used and the well was finished as an open hole in basalt to a depth of 1,004 feet. An inspection report by Ecology from 1992 (Ecology 1992b) noted that the well was not properly decommissioned, and that a copy of the Ecology water well closure regulations would be sent to the WSP officials. The Ecology records described the well casing as 10 inches in diameter, which differs from the well log record.

Although it cannot be confirmed, it is assumed that Well No. 4 was properly constructed and maintained while in use. Due to the fact that this well was not properly decommissioned as reported in the Initial Investigation by Ecology (Ecology 1992), the potential exists for this well to act as a vertical migration pathway for contamination from the upper aquifer to the underlying basalt aquifer. However, this potential is minimal due to the following factors:

- The top of the basalt aquifer is approximately 500-feet deep in the WSP area, and is overlain by 250 to 300 feet of clay separating it from the upper gravel aquifer.
- These old irrigation wells were likely drilled by cable tool, which means the well casing was driven behind the borehole, creating a reasonably tight friction fit over the 525 feet well casing driven through the unconsolidated formations above bedrock.
- The basalt aquifer is under confined conditions, with a potentiometric surface of approximately 50 feet below ground surface in the WSP area (HWA 1998). The upper alluvial aquifer appears unconfined in the WSP area. Water levels measured in the CDL monitoring wells during February and July 1998 indicate first encountered groundwater in the gravel aquifer ranges from approximately 40 to 80 feet below ground surface. Therefore, an upward gradient likely exists between the basalt aquifer and the upper aquifer.

3. RI FIELD INVESTIGATION METHODS

3.1 GEOPHYSICAL INVESTIGATION

A geophysical survey was conducted at the WSP Landfill prior to intrusive investigation measures. The geophysical survey was performed on both cells to assess the potential presence of drums or other metal containers buried at the landfill.

Parametrix retained geophysicist Philip Duoos to conduct the survey. The survey was completed utilizing magnetometer and electromagnetic (EM) methodologies. The magnetometer records magnetic gradients that may be affected by ferrous objects (drums, rebar, metallic debris, etc.). The survey was performed on transects spaced on a 20-foot grid across the suspected landfill area. The magnetometer measured and recorded data, and stationing was recorded using a global positioning system (GPS) unit. The data was combined to create a map of magnetic anomalies in the landfill. The magnetometer survey identified areas with high concentrations of buried ferrous material.

EM survey equipment measures ground conductivity through electromagnetic induction. The EM survey was primarily used along the suspected landfill boundaries to help delineate the extent of fill. Ground penetrating radar (GPR) was also attempted, but was mostly useless because of the very limited depth penetration in silty soils. The results of the survey were utilized in the selection of locations for soil gas sample points, test pit locations, and other landfill investigation activities as discussed. A copy of the geophysical report, which further discuses methodology and findings, is included as Appendix B.

3.2 LANDFILL TEST PITS

Sixteen test pits were completed with a track-mounted excavator at the former WSP Landfill. The test pits were completed to assess the presence, thickness, and composition of landfill materials. Test pit locations (see Figure 2) were determined by investigating areas which contained anomalies identified during the geophysical survey. The test pits were excavated and sampled in general accordance with the Final RI/FS Work Plan (Parametrix 2010). Test pits were completed to depths of 6 to 18 feet. Results of the geophysical survey are included in Appendix B. Test pit logs are included in Appendix C.

Test Pits (TP) TP-01 and TP-02 were completed in areas outside of identified anomalies to assess the sensitivity of the geophysical method, and to identify the approximate extent of the historic landfill. Significant metallic debris was not observed at either test pit location, although 3 to 6 feet of fill material, including construction debris (brick, concrete, and ash), was present at the locations.

Test pits completed in the vicinity of anomalies identified in the eastern half of the landfill (east of the north-south access road) contained significant debris, including brick, metallic debris (damaged drums and cans), and glassware. Burned fill or ash was observed at most locations. The material appeared to be older, consistent with reported filling of the area from east to west. Up to 16 feet of fill was observed at TP-14, and 5 to 7 feet of fill observed at other test pit locations. Damaged, soil-filled metal drums were observed at TP-5 and TP-16. The drums did not contain liquids or other suspect materials. Organic odors or elevated photoionization detector (PID) readings were not observed during test pit excavations.

Test pits completed west of the north-south access road also contained significant construction and burn debris. However, construction debris in these pits contained more wood, concrete, piping, fencing material, and plastic than observed in test pits completed to the east. This was interpreted to be younger fill material. The fill materials also appeared to be thicker in this area, typically 7 to 10 feet thick, with up to 15 feet of fill observed at TP-13. A crushed 55-gallon drum was observed at TP-9. The drum did not contain liquids or other suspect materials. Drums or other suspect containers were not observed at other locations. Organic odors or elevated PID readings were not observed during test pit excavations.

In general, test pits completed at the locations of anomalies identified during the geophysical survey encountered significant metallic debris. The debris consisted of either multiple metallic objects (containers, signage, fence material), or single large objects (steel beams or rebar-containing concrete). Groundwater was not encountered in any of the test pits.

Soil samples were collected from selected test pits based on site observations. Samples were collected from pits where a significant thickness or amount of landfill debris included apparent containers (drums, buckets). Eleven samples were collected from depths between 4 and 18 feet bgs for analysis. Samples were collected directly from the excavator bucket and were placed in labeled laboratory-provided sample containers using nitrile gloves and clean stainless steel spoons. Soil samples for VOC analysis were collected in accordance with EPA 5035A methodology.

3.3 SOIL PROBE BORINGS

A total of 13 soil probe borings were completed by the hydraulic-push method to assess shallow soil conditions at or near suspected contamination source areas (see Figure 1), in accordance with the Work Plan and the SAP (Parametrix 2010). These probes were installed by Environmental West Exploration of Spokane, Washington, by drillers licensed in the State of Washington. Soil probe geologic logs are included in Appendix D.

Steel pipe (2-inch diameter) was driven into the ground using a hydraulic impact driver. Soil samples were then retrieved through the stainless-steel sampler with a high-density polyethylene (HDPE) liner.

Field staff collected continuous depth soil samples from the hydraulic-push borings. Soil samples were placed in labeled laboratory-provided sample containers using nitrile gloves and clean stainless steel spoons. Soil samples for VOC analysis were collected in accordance with EPA 5035A methodology.

The borings were completed to depths of 12 to 20 feet. Generally, soils encountered in the borings consisted of 1 to 3 feet of fill overlying native silts. Fill typically consisted of sand and gravel with occasional debris (e.g., bricks). Exceptions to this included Borings I-P8 and I-P9, completed on the west and south sides of the Crafts Building (former dry cleaner), respectively. These borings were completed adjacent to underground utilities, and encountered 6 to 7 feet of gravelly fill. Groundwater was not encountered in any of the soil probe borings.

Elevated PID readings were observed in soil samples collected from Borings I-P1 (west side of laundry), I-P2 (north side of former auto shop), and I-P9 (south side of crafts building). Elevated PID readings or other field evidence of contamination was not noted at the other borings.

3.4 SOIL GAS PROBES

Fourteen soil gas probes were completed at locations in the closed landfill (see Figure 2) and four soil gas probes (see Figure 1) were completed at AOCs where the potential presence of VOCs has been identified (AOCs 2, 3, 5, and 6; see Appendix A). Soil probe borings were completed adjacent to selected gas probe locations for lithologic purposes. Boring logs for the soil gas probe locations are included in Appendix E.

Soil gas samples were collected by driving a slotted stainless steel pipe to varying depth intervals between 4 and 22 feet bgs with the soil probe drilling rig. A gas sampling vacuum pump was attached to the probe and connected to field sampling equipment consisting of a PID and a four-gas (oxygen, hydrogen sulfide, carbon monoxide, and lower explosive limit [LEL]) meter.

In general, elevated PID readings were not observed at the soil gas sampling locations. PID readings may have been affected by the presence of methane in the soil, which interferes with PID lamp operation and depresses the sensitivity of the device.

Soil gas oxygen content varied in the soil gas sampling locations. Oxygen may have been displaced at some locations by methane or other gases. Hydrogen sulfide was not detected in any of the borings. Carbon monoxide concentrations ranged from 0 to 500 ppm. Carbon monoxide appeared to be roughly co-located with elevated methane (measured as %LEL). Methane concentrations in borings ranged from 0 to greater than 100 percent LEL (100% LEL = 5% methane by volume). The highest methane concentrations were observed in Borings P-4 and P-5, located along the southern edge of the eastern (older) portion of the closed landfill. See Table 3 for the results of the field gas measurements. Based on observations of test pits completed in the vicinity of the soil gas probes (TP-5, TP-14, and TP-15), the area is underlain by approximately 6 to 14 feet of landfill material, including organic material. Groundwater was not encountered in any of the gas probe soil borings.

Based on the preliminary soil gas sampling, two soil gas samples were collected from Borings I-P2 and P-4 for laboratory analyses. Boring P-4 (AOC 1, the closed landfill area) was selected because field screening indicated the highest LEL reading detected during field screening of the borings. Boring I-P2 (AOC 5, located on the north side of former auto shop) was selected because field screening indicated the highest PID reading detected during field screening of the borings.

3.5 MONITORING WELLS

A total of ten new monitoring wells (MW-6 through MW-15) were installed at WSP during the RI field investigation, at locations shown on Figure 1. These wells were drilled by Environmental West Exploration of Spokane, Washington, by drillers licensed in the State of Washington. Geologic logs and construction diagrams for these new monitoring wells are included in Appendix F.

Environmental West Exploration utilized a Schramm T300 air rotary drilling rig to install monitoring wells at WSP. The soil borings were drilled by advancing a 6-inch-diameter threaded steel casing with a down-hole hammer drilling bit. Undisturbed soil samples were collected at depth intervals selected by the field geologist by withdrawing the down-hole hammer and sampling with a 2.5-inch-diameter split spoon sampler driven by a 140-pound hammer with a 30-inch drop.

Soil samples collected for analysis were generally selected from shallow soils (less than 30 feet bgs). Soil samples were placed in labeled laboratory-provided sample containers using nitrile gloves and clean stainless steel spoons. Soil samples for VOC analysis were collected in accordance with EPA 5035A methodology.

Upon reaching the targeted depth below the water table, a monitoring well consisting of 2-inch-diameter Schedule 40 polyvinyl chloride (PVC) screen and riser pipe was installed in the borehole, and was designed and completed in compliance with Chapter 173-160 WAC regulations pertaining to resource protection wells. The wells were completed to depths of 30 to 106 feet.

Completed monitoring wells were developed by the drilling contractor by surging and pumping, to remove residual fine particles from the well installation process. Well development was continued until turbidity decreased and ground water parameters (temperature, pH, specific conductance, and dissolved oxygen) stabilized.

3.6 GROUNDWATER SAMPLING

Groundwater samples were collected from four pre-RI monitoring wells (MW-1, MW-2, MW-3, and MW-5), the ten new monitoring wells, and the three Sudbury Road Landfill monitoring wells located adjacent to the western WSP property boundary (SLF-7, SLF-9, and SLF-10).The locations of these monitoring wells are shown on Figure 1. In accordance with the Work Plan, four quarterly groundwater monitoring events were completed:

- July 2010: Conventionals and VOCs.
- October 2010: Conventionals, VOCs, heavy metals, polynuclear aromatic hydrocarbons (PAH), and TPH.
- February 2011: Conventionals and VOCs.
- June 2011: Conventionals, VOCs, heavy metals, PAHs, and TPH.

Groundwater samples were collected by purging and sampling all monitoring wells using flow rates of 0.2–0.3 liters per minute (L/min) with an electric submersible pump. Using a flow-through cell, temperature, dissolved oxygen, pH, and redox were recorded. Prior to sampling, all four water quality parameters were within 5 percent for three consecutive readings. The pump was disconnected from the flow-through cell and the sample was collected from the pump in the appropriate sample containers. Field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth were recorded in a field logbook. Groundwater monitoring field data records and laboratory reports for each of the sampling events are included in Appendices G and H, respectively.

3.7 SURFACE WATER

Surface water runoff was not sampled during any of the four quarters of the remedial investigation. Notes and observations of weather conditions from field personnel indicated a lack of precipitation. While the selected surface water stations were not directly observed during field work, it is extremely unlikely that running or even standing surface water would have been encountered during the quarterly sampling events.

4. HYDROGEOLOGIC CONDITIONS

4.1 GEOLOGY

Detailed site geology and hydrogeology were determined by evaluation of test pits, borings and wells installed at the Site prior to and during RI field investigation activities. Findings from the evaluation are described below.

4.1.1 Regional Geology

Surficial deposits in the area of the WSP are mapped as Palouse Formation, typically consisting of loess (windblown non-stratified glacial silt). The Palouse Formation overlies alluvial deposits consisting of sands and gravels in clay, silt, or sand matrix (Ringold Formation). Based on regional data, the alluvial deposits consist of approximately 200 feet of sands and gravels in the project area and are underlain by 250 to 300 feet of lacustrine clay. Flow basalts of the Columbia River Group underlie the clay unit.

4.1.2 Site Geology

Geologic logs of the monitoring well borings and other subsurface investigations were evaluated to develop the following descriptions of stratigraphic units encountered at the WSP site. The order of stratigraphic sequence described below is from youngest to oldest (shallowest to deepest) units. Interpreted soil and geologic units are shown on the geologic cross sections (Figures 4, 5, and 6).

Fill: Fill soils observed during the RI/FS typically consisted of silt and sand with gravel and occasional construction material (brick or asphalt). Fill soils were generally thin (1 to 3 feet thick) and were encountered during the drilling of MW-6, -10, -11, and -13. No fill material was observed in the remaining monitoring wells drilled as part of this investigation.

Loess: Loess deposits (windblown, non-stratified silt) were observed in all borings except MW-6. Loess ranged from approximately 8 to 50 feet thick at the RI/FS boring locations. The loess was very soft, generally moist and of varied color (brown, light brown, dark brown, reddish brown, tan, and tannish brown).

Alluvium: Alluvial deposits directly underlying the loess generally consisted of gravelly sands and sandy gravels. The gravel is typically weathered, subrounded basalt. Varying quantities of silt or silty layers were present in the alluvium. Occasional cobbles and boulders were also encountered during drilling. The alluvial deposits extended to at least 106 feet in the RI/FS monitoring wells; however, based on the previous site investigations, the alluvial deposits extend to greater than 100 feet. The formation was not fully penetrated during monitoring well drilling. According to logs for water wells at the Site, the gravels at the Site are underlain by a thick (approximately 250 feet) sequence of clays separating the gravels from underlying formations.

Basalt: According to logs for water wells at the Site, the top of the basalts in the vicinity is approximately 500 feet bgs.

The monitoring well logs (Appendix F) provide more detail on subsurface conditions observed during the borehole construction.

4.2 HYDROGEOLOGY

4.2.1 Regional Hydrogeology

Two main aquifers occur in the Walla Walla area, and are referred to as the gravel aquifer and the deeper, basalt aquifer. The gravel aquifer is approximately 200 feet thick in the WSP area, and is overlain by the Palouse Formation loess (Parametrix 1995). The top of the basalt aquifer is approximately 500 feet deep in the WSP area. The two aquifers are separated by 250 to 300 feet of clay. Groundwater in the basalt aquifer is under confined conditions, with a potentiometric surface of approximately 50 feet bgs in the WSP area (Parametrix 1995). The gravel aquifer appears unconfined in the WSP area. Hydrogeologic studies in the Walla Walla area indicate a westward horizontal gradient in the gravel aquifer and a net upward vertical groundwater gradient from the basalt aquifer to the gravel aquifer (Parametrix 1995).

4.2.2 Site Hydrogeology

Depth to water levels measured in the RI/FS monitoring wells during installation indicate that first encountered groundwater in the gravel aquifer ranges from approximately 24 to 82 feet bgs at the Site in July 2011 (Table 4). The groundwater elevation in MW-6 is approximately 30 feet higher than the other site monitoring wells. This well was completed in alluvial soils, and the groundwater elevation represents groundwater perched on fine-grained soils within the alluvium. This water level elevation was not incorporated into water level elevation contour maps or gradient calculations. Generally, site groundwater (excluding MW-6) ranges from approximately 40 to 99 feet bgs depending on location. Groundwater fluctuation appears to range between 4 and 5 feet between wet and dry seasons based on the current data collected from the remedial investigation.

Based on the groundwater gradient interpreted from groundwater levels measured during the field investigations and sampling events, groundwater flow in the project area is generally to the west. Figures 7 through 12 depict the groundwater potentiometric surface for the Site between July 2010 and December 2011. The figures show a consistent groundwater gradient to the west of the Site with slight mounding near MW-5 in the east of the Site. Based on the potentiometric surface shown on the six figures, it appears groundwater flows radially from MW-5 in all directions; however, the groundwater flow is predominantly to the west in the area with a short flow path to the east.

Groundwater velocity can be described by the relationship $V=Ki/\theta$, where “V” is the groundwater particle velocity, “k” is the hydraulic conductivity, “i” is the groundwater gradient, and “θ” is the porosity. Using an assumed porosity of 0.25 to 0.30 (typical for sands and gravels), hydraulic conductivities ranging from 20.13 to 45.35 feet/day (HWA 1998), and gradients of 0.0023 to 0.0026 measured in July 2010 and February 2011, we calculated a velocity of 55 to 170 feet/year. This is consistent with groundwater velocities of 35 to 140 feet/year calculated as part of the previous hydrogeologic study (HWA 1998).

5. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Performance of cleanup actions under MTCA (WAC 173-340-710) requires identification of applicable, relevant and appropriate requirements (ARARs). Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that; while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site; address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site.

The potential ARARs for the Site include:

- **Chemical-Specific**: Typically health- or risk-based values that when applied to site-specific conditions represent cleanup standards.
- **Location-Specific**: Related to the geographical position and/or physical condition of the site and may affect the type of cleanup action selected for the site.
- **Action-Specific**: Usually technology-based or activity-based requirements or limitations on actions or conditions taken with respect to specific hazardous substances.

Action-specific requirements do not determine the selected cleanup action alternative, but indicate how or to what level a selected alternative must perform. Table 5 identifies ARARs for each medium of concern.

6. FIELD INVESTIGATION RESULTS

6.1 REGULATORY SCREENING LEVELS

Analytical results from soil, groundwater, and surface water samples generated from multiple field investigations were compiled and compared to screening levels using Ecology's Cleanup Levels and Risk Calculations (CLARC) database as a search reference (Tables 1, 6, and 7). Screening levels for the project are defined as constituent concentrations above which the levels may pose a threat to human health or the environment. The screening levels are derived from the following:

- Soil:
  - Washington State Department of Ecology MTCA Methods A and B (Chapter 173-340 WAC)
- Groundwater:
  - Washington State Department of Ecology MTCA Methods A and B (Chapter 173-340 WAC)
  - Washington State Department of Health Drinking Water Quality Standards – Primary and Secondary Maximum Contaminant Levels (MCLs) for Group A Public Water Supplies (WAC 246-290-310)
- Surface Water:
  - Washington State MTCA Method B (Chapter 173-340 WAC)
  - Washington State Fresh Surface Water Quality Standards for the Protection of Human Health and for Aquatic Life (WAC 173-201A-240)
  - Federal Clean Water Act Surface (Fresh) Water Standards for Aquatic Life (CWA 304)

Subsequent to RI/FS activities described in the Draft RI/FS (Parametrix 2012), the EPA revised toxicity information for PCE and TCE and updated the Integrated Risk Information System (IRIS) screening levels. In response to the changes at the federal level, Ecology developed new Method B and Method C levels for PCE and TCE. The revised levels were provided by Ecology in June 2012. The evaluation of contaminants, cleanup levels, and remedial technologies presented in this Final RI/FS rely on the newly published values for PCE and TCE. The PCE and TCE cleanup levels are listed in Tables 1 and 13.

Discussion of the results in comparison to the screening levels above is presented in the following sections.

Soil gas concentrations observed during one historic subsurface investigation and RI field investigation activities are presented in Table 8. Soil gas concentrations measured at the WSP Landfill were not evaluated versus screening levels; however, soil gas concentrations measured at the WSP facility are evaluated versus screening levels in Section 7.

6.2 SOIL SAMPLING

Soils were tested for a comprehensive set of chemical parameters: total petroleum hydrocarbons (TPH, diesel, and oil), aromatic hydrocarbons, heavy metals, VOCs, and PAHs. Table 6 lists all soil samples collected at the WSP facility including those collected from prior investigations compared to the selected screening levels. Samples and constituent concentrations exceeding the screening levels for soil consisted of the following:

- GP-13 from the surface to 12 feet bgs from the Phase 2 soil and groundwater investigation HWA (HWA 2002). Concentrations ranged from 0.68 milligrams per kilogram (mg/kg) to 2.40 mg/kg PCE.
- Multiple locations during the remedial investigation including:
  - Soil from MW-10 well installation at 4 feet bgs; 140 mg/kg gasoline.
  - Soil from the Former Drycleaner Area boring I-P9 at 4 and 12 feet bgs; 1.6 mg/kg and 12 mg/kg PCE, respectively.
  - Soil from the Former Accumulation Area boring WH-P1 at 4 feet bgs; 0.024 mg/kg PCE.
  - Soil from the Landfill test pits TP-3 (7 feet bgs), TP-8 (10 feet bgs), and TP-10 (15 feet bgs); 0.024 mg/kg PCE, 940 mg/kg lead, and 0.0110 mg/kg total Carcinogenic Polyaromatic Hydrocarbons (cPAHs) as benzo(a)pyrene, respectively.

6.3 SOIL GAS SAMPLING

Soil gas was collected from two test borings that showed indications of combustible gas or organic vapors based on measurements with field instruments. Gas samples from these borings (P-4 and I-P2) were obtained by filling an evacuated metal canister provided by the laboratory. The samples were tested for volatile organic compounds. Field gas readings are shown in Table 3, and lab results are shown in Table 8. Methane above 1 percent by volume was detected at P-4 in the landfill, which is consistent with the results of studies conducted in the 1990s. A number of VOCs were detected at low levels; however, PCE and TCE, the VOCs of interest, were not detected. Further discussion of the soil gas results is contained in Section 7.

6.4 GROUNDWATER SAMPLING

Six quarterly groundwater sampling events were conducted as part of the RI field investigation, in accordance with the Work Plan and the SAP. Pre-RI and RI monitoring wells at WSP were sampled, and samples were also collected from monitoring wells SLF-7, SLF-9, and SLF-10, located on Sudbury Road Landfill property adjacent to the western WSP property line. Monitoring well locations and results are shown on Figure 13, and monitoring data are provided in Table 1. Select results that exceed screening levels are noted on Figure 13 and all results exceeding screening levels are noted in Table 1.

Chemicals that exceeded screening levels in Site groundwater are summarized as follows:

- PCE: MW-5, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14.
- TCE: MW-2, MW-3, MW-4, MW-8.
- Total cPAHs as benzo(a)pyrene: MW-2, MW-3, MW-13, MW-14.

- Arsenic: MW-7, MW-8.
- Chromium: MW-5, MW-8, MW-12, MW-15.
- Manganese: MW-1, MW-2, MW-3, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-14.
- Sodium: MW-1, MW-2, MW-7, MW-8, MW-10, MW-11, MW-12, MW-13, MW-14.
- Total Dissolved Solids: MW-1, MW-11, MW-13.
- Nitrate: MW-1, MW-2, MW-3, MW-4, MW-7, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14.
- Nitrite: MW-3, MW-4.

6.5 CONSTITUENTS OF CONCERN

Evaluations of historical data and new data generated by investigations performed during the RI/FS resulted in an enhanced understanding of site geology and hydrostratigraphy, groundwater quality, and subsurface conditions at the Site. Based this understanding of conditions at the Site, the constituents of concern are summarized below by media:

- Surface Water – No constituents of concern.
- Soil – Gasoline range organics, PCE, lead, total cPAHs as benzo(a)pyrene.
- Groundwater – Manganese, TCE, PCE, total cPAHs as benzo(a)pyrene.

Sodium and total dissolved solids were also detected above their screening levels; however, the screening levels for sodium and total dissolved solids are based on secondary maximum contaminant levels. Contaminants of concern (COCs) with only secondary effects for people, such as color, taste, and odor, were not considered; therefore, sodium and total dissolved solids were eliminated as COCs.

Arsenic was identified above its screening level in groundwater at MW-7 and MW-8 only. Arsenic is a naturally occurring metal constituent that is present in native soil and groundwater. Arsenic has only been detected on-site during one sampling event in July 2010 and arsenic exceeded the screening level during only one of the six quarterly monitoring events. The screening level exceedance occurred directly after installation and development of monitoring wells MW-7 and MW-8. Arsenic dissolved in groundwater has not been detected at the Site. Therefore, these results appear to be anomalous or the result of development activities and arsenic was eliminated as a COC.

Chromium was identified above its screening level in groundwater at MW-5, MW-8, MW-12, and MW-15. Chromium is a naturally occurring metal constituent that is present in native soil and groundwater. Each of the four wells only had one exceedance of the screening level for chromium for one of the six quarterly monitoring events. Chromium was detected in MW-15, which is interpreted as the upgradient well at the Site, at a concentration above the screening level. The chromium concentration in MW-15 was similar to the other three screening level exceedances. Therefore, these results appear anomalous or the result of development activities and chromium was eliminated as a COC.

Nitrates and nitrites are ionic substances widely found in the environment as byproducts of fertilizers and septic systems. Nitrate is typically elevated in the Walla Walla region due to agricultural practices (Steinkampf 1989). Also, the WSP facility has operated in the past on a septic-type sanitary wastewater disposal system; however, the facility is currently discharging all sanitary wastewater to the publicly owned treatment works. Nitrate and nitrite are primarily attributable to the agricultural practices in the region; therefore, nitrate and nitrite were eliminated as COCs.

7. CONCEPTUAL SITE MODEL

The conceptual site model (CSM) identifies the primary contaminant sources, release mechanisms, transport mechanisms, secondary contaminant sources, potential pathways, and exposure routes. Existing chemical data, site characterization data, and identification of potential human and ecological receptors were used to develop the model presented in Figure 14. Further discussion of the CSM is presented below.

7.1 PRIMARY SOURCES OF CONTAMINATION AND PRIMARY RELEASE MECHANISMS

The primary contaminant sources with contaminant concentrations that could potentially be hazardous to human and ecological receptors as determined by an exceedance of screening levels in soil are:

- The former landfill;
- Historical releases and residual contamination from de-minimus spills and motor pool operations near Building A50;
- Historical releases and residual contamination from de-minimus spills and dry cleaning operations near Buildings C30 and F20; and
- Historical releases and residual contamination from de-minimus spills and hazardous waste handling operations near Building D20.

Dust is the primary potential release mechanism for contaminants associated with the soil; however, surface soil samples were not collected.

7.2 SECONDARY SOURCES AND RELEASE MECHANISMS

When a released contaminant is retained in an environmental medium, such as soil, the medium functions as a secondary source for further chemical release. Secondary release mechanisms for contaminants present at the Site greater than screening levels include the following:

- Leaching from soil to groundwater;
- Volatilization from soil to air; and
- Volatilization from groundwater to air.

The degree of contaminant leaching is limited by contaminant concentrations, chemical properties of the contaminants, groundwater chemical properties, physical properties of the soil, characteristics of the groundwater flow system, and precipitation recharge. Volatilization is controlled by the concentration and chemical properties of the contaminants and physical properties of the soil and groundwater.

7.3 PATHWAYS AND POTENTIAL RECEPTORS

An exposure pathway is a mechanism by which receptors are assumed to contact COCs. The U.S. Environmental Protection Agency (EPA 1989) describes a complete exposure pathway in terms of four components:

- A source and mechanism of chemical release (e.g., a release of COCs to the subsurface)

- A retention or transport medium (e.g., groundwater)
- A receptor at a point of potential exposure to a contaminated medium (e.g., commercial worker using impacted groundwater)
- An exposure route at the exposure point (e.g., dermal exposure to groundwater)

If any of these four components is not present, then a potential exposure pathway is considered incomplete and is not evaluated further in a risk assessment. If all four components are present, a pathway is considered complete.

Potential exposure routes to chemicals in soil for human and ecological receptors at the Site include the following:

- **Dermal/Direct Contact:** Exposure to chemicals in soil at the Site may occur through direct contact with soil. Direct contact is a potential exposure route for current and future on-site workers, visitors, or residents. Burrowing or ground-dwelling mammals and invertebrates may be exposed directly to the soil contaminants.
- **Inhalation:** Particulates (dust) from soil can be transported by air and inhaled by potential on-site and off-site receptors. Emissions of volatile chemicals from soil may also be transported as vapors by air. Terrestrial biota could also be exposed to chemicals volatilizing to outdoor air, but if this exposure actually occurs the duration of exposure is expected to be relatively short. Burrowing animals may be exposed to volatile air contaminants in underground stagnant air while spending time within the burrow.
- **Ingestion:** Ingestion of chemicals in site soil is a primary potential exposure route for human and ecological receptors. Uptake by plants is also a potential exposure route.

Potential exposure routes to chemicals in groundwater for human and ecological receptors at the Site include the following:

- **Dermal/Direct Contact:** Exposure to chemicals in groundwater at the Site may occur through direct contact with groundwater. Direct contact is a potential exposure route for current and future on-site workers, visitors, or residents; however, impacted groundwater is not currently used or available on-site. Off-site drinking water wells is a potential exposure pathway for off-site well owners; however, contaminants do not presently extend to off-site wells.
- **Inhalation:** Emissions of volatile chemicals from groundwater may also be transported as vapors by air.
- **Ingestion:** Ingestion of chemicals in site groundwater is a potential primary exposure route for human and ecological receptors. Uptake by plants is also a potential exposure route. However, impacted groundwater is not currently used for consumption and irrigation nor is it readily available on-site or present in off-site wells.

Potentially complete exposure pathways include the following:

- Current/Future Indoor Worker:
    - Inhalation of vapors from the subsurface (groundwater and soil) in indoor air.
    - Direct ingestion of contaminated groundwater potentially used as drinking water.

- Current/Future Construction/Utility or Outdoor Worker:
  - Incidental surface or subsurface soil ingestion and dermal contact
  - Inhalation of dust from the surface or subsurface soil in outdoor air.
  - Inhalation of vapors from groundwater potentially used for irrigation.
  - Dermal contact with groundwater potentially used for irrigation.
- Current/Future Site Visitor or Resident (adult/child):
  - Incidental ingestion or dermal contact with surface or subsurface soil.
  - Inhalation of dust from surface or subsurface soil in outdoor air.
  - Inhalation of vapors from the subsurface (groundwater and soil) in indoor air.
  - Inhalation of vapors from groundwater potentially used for irrigation.
  - Dermal contact with groundwater potentially used for irrigation.
- Off-site Well Owner and Well-owner Visitor:
  - Ingestion or dermal contact with drinking water or irrigation water.
  - Inhalation of vapors from groundwater potentially used for irrigation.
  - Dermal contact with groundwater potentially used for irrigation.
- Ecological Receptors:
  - Incidental soil or groundwater ingestion and dermal contact.
  - Inhalation of vapors from the subsurface soil in outdoor air or in a burrow.
  - Inhalation of dust from surface or subsurface soil in outdoor air.
  - Inhalation of vapors from or dermal contact with groundwater potentially used for irrigation.
  - Ingestion of groundwater potentially used for irrigation.

7.4 FATE AND TRANSPORT

This section describes the general fate and transport processes for metals, petroleum, cPAHs, TCE, and PCE that may be applicable to this Site.

The primary contaminant transport mechanism is dispersion caused by seepage of groundwater through the Site’s shallow soil horizons. Leachable contaminants in the soils can be mobilized during infiltration of precipitation or stormwater runoff through the unsaturated zone and affect groundwater in the primary aquifer.

As the chemical equilibrium of the groundwater changes (largely due to mixing with contaminated material and changes in dissolved gas concentrations, pH, and redox potential), metals have the potential to precipitate from solution and adsorb onto the aquifer matrix. Arsenic, chromium, and manganese are more mobile under reducing conditions. Metals dissolved in groundwater are transported downgradient west of the Site. These metals can be transported downgradient as dissolved components or can adsorb to the aquifer matrix.

Petroleum constituents and cPAHs can desorb from contaminated soil particles into water infiltrating through the unsaturated subsurface and ultimately into groundwater, to be transported in the downgradient direction where they may resorb to clean soil particles. Analytical data suggest that petroleum constituents are transported only a short distance within the unsaturated subsurface at concentrations of concern. Dissolved petroleum constituents are typically subject to biodegradation by naturally occurring aerobic soil bacteria.

The chlorinated solvents migrating through the Site within groundwater are subject to both aerobic and anaerobic degradation. The biodegradation of PCE or TCE occurs primarily through reductive dechlorination, which is an anaerobic process. Existing site conditions suggest an aerobic condition due to high levels of dissolved oxygen and oxidation reduction potential (ORP). Since none of the daughter products to be expected from degradation of these solvents were detected (i.e., dichloroethylene and vinyl chloride), the dechlorination process appears to be a very small part of the degradation process occurring at the Site. With the average groundwater flow of 55 to 170 feet/year calculated in Section 4.2.2, dilution and dispersion appear to be the dominant mechanisms currently present at the Site.

Vapor migration from soil and/or groundwater is a potential transport mechanism at the Site. The occurrence of such migration has not been established. However, concentrations of volatile constituents in both soil and groundwater are such that there is a potential for vapor migration to occur.

8. VAPOR INTRUSION EVALUATION

As presented previously, groundwater beneath the WSP site has been impacted by low concentrations of VOCs. Based on the presence of VOCs in groundwater, Ecology raised a concern regarding potential vapor intrusion issues for site residents and/or site workers. The following sections present a summary of the vapor intrusion evaluation for the WSP site.

8.1 APPROACH AND METHODOLOGY

Current site conditions suggest that vapor intrusion to indoor air is a potentially complete exposure pathway. Conditions that favor vapor intrusion include:

- The presence of VOCs in groundwater beneath the Site;
- The presence of inhabited buildings overlying subsurface contamination; and
- The exceedance of groundwater VOC concentrations above generic screening levels for the protection of human health.

The vapor intrusion evaluation was conducted to determine if low concentrations of VOCs detected in groundwater beneath the Site have the potential to impact indoor air quality in overlying buildings. The methodology for the vapor intrusion evaluation was based on EPA’s vapor intrusion guidance (EPA 2002), Ecology’s Draft *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology 2009c), and the available data at the Site.

Site-specific indoor air samples were not collected as part of the RI. In addition, soil gas data is limited and generally did not include laboratory analysis of VOCs. Therefore, the vapor intrusion evaluation focused on existing groundwater data to assess the potential for constituents to volatilize from groundwater and migrate into overlying structures. Groundwater constituents detected at the Site were compared to the generic screening levels included in the Draft *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, which were developed for protection of indoor air under most circumstances (Ecology 2009c). Based on the results of the groundwater screening, additional evaluation of data and site-specific information utilized the EPA’s Johnson and Ettinger (J&E) vapor intrusion model(s) as the primary tool to predict the potential indoor air concentrations in site buildings (Weaver 2005). The specific steps for evaluation of vapor intrusion at the Site included:

1. Review of available groundwater data, determination of appropriateness, and identification of vapor intrusion COCs.
2. Statistical analysis of the groundwater data, including calculation of 95 percent upper confidence limit (UCL) and reasonable maximum exposure (RME) for each vapor intrusion COC identified.
3. The maximum concentration and RME for each vapor intrusion COC were compared to Ecology groundwater screening levels developed for protection of indoor air in overlying buildings.
4. Inputting the RME into the J&E groundwater screening model to predict indoor air concentrations in overlying buildings. EPA default parameters were generally used for the screening model application.

5. Comparison of the predicted indoor air concentrations to the MTCA Method B indoor air cleanup levels.
6. Vapor intrusion COCs which had predicted indoor air concentrations exceeding screening levels were further evaluated utilizing the advanced J&E groundwater model to predict indoor air concentrations. Site-specific and EPA default parameters were used for the advanced model application.
7. Comparison of the predicted indoor air concentration to MTCA Method B indoor air cleanup levels.
8. Determination of the potential for vapor intrusion to present a risk to site residents and/or workers based on the modeled results.

8.2 DATA EVALUATION AND USE

The existing monitoring well network at the Site includes monitoring wells MW-1 through MW-3, MW-5 through MW-15, SLF-7, SLF-9, and SLF-10 (see Figure 1). In general, groundwater samples have been collected from the monitoring well network on a quarterly basis since June 2010 (four monitoring events; June 2010 through July 2011 with the exception of MW-15 which was installed in fall 2011). All of the monitoring well samples were analyzed for VOCs (as well as other constituents) during that time period. Therefore, all VOC data from the 16 monitoring wells for the period between June 2010 and July 2011 is appropriate for inclusion in the vapor intrusion analysis and is shown on Table 9.

8.2.1 Identification of Vapor Intrusion COCs

As part of the conservative approach to the vapor intrusion evaluation, all VOCs detected in groundwater at the Site are considered vapor intrusion COCs and were carried forward for analysis. Based on the groundwater monitoring conducted since June 2010, vapor intrusion COCs at the Site include:

- Vinyl chloride
- Chloroform
- Trichloroethylene
- Toluene
- Tetrachloroethylene
- Sec-butylbenzene
- Naphthalene

With the exception of vinyl chloride, all of the above constituents were detected in at least one monitoring well on at least one occasion. Vinyl chloride was included as a vapor intrusion COC because it is a known breakdown product of TCE and PCE, is relatively volatile, and has higher toxicity compared to other constituents (thus, resulting in very low cleanup levels). The inclusion of vinyl chloride as a vapor intrusion COC is consistent with the conservative nature of this vapor intrusion evaluation.

8.2.2 Statistical Analysis

A limited statistical analysis of the groundwater data was completed to calculate a RME limit for input into the J&E model(s). Ecology's MTCA Stat97 software (Ecology 1997) was used for the statistical analysis as follows:

- For data sets with greater than 50 percent non-detects, the maximum measured concentration was utilized as the RME.
- For all other data sets, a 95 percent UCL was calculated using the following steps:
  1. (1) One-half the detection limit was used for all non-detects.
  2. (2) A distribution test was performed using the MTCA Stat97 software. The software evaluates the distribution of the data set and determines if the data are normal, lognormal, or another distribution.
  3. (3) Based upon the distribution of the data, the MTCA Stat97 software recommends an appropriate 95 percent UCL estimation method, and this recommended 95 percent UCL was selected as the RME for the individual vapor intrusion COC.

The results of the statistical calculations are included on Table 10. As shown, only TCE, PCE, and chloroform were detected at sufficient frequency such that a 95% UCL could be calculated. The MTCA Stat97 reports for TCE, PCE, and chloroform are included in Appendix I. Based on the statistical analysis, the following concentrations were compared to MTCA groundwater screening levels and were used as inputs to the J&E models:

Constituent	Maximum Concentration Detected (µg/l)	RME (µg/l)
Vinyl Chloride	0.2 U[a]	0.1
Chloroform	2.6	0.968
Trichloroethylene	3.3	1.34
Toluene	2.1	2.1
Tetrachloroethylene	5.3	0.61
Sec-Butylbenzene	0.89	0.89
Naphthalene	0.23	0.23

[a] Not detected above the method detection limit of 0.2 micrograms per liter (µg/l).

8.3 GROUNDWATER SCREENING LEVELS

The maximum detected concentration at the Site and the calculated RME were compared to generic groundwater screening levels to assess whether additional evaluation of vapor intrusion COCs and vapor intrusion was necessary. The groundwater screening levels were obtained from the Draft *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (Ecology 2009c). These screening levels were specifically developed by Ecology using conservative assumptions for the protection of human health associated with indoor air quality. The screening levels are those concentrations in groundwater that are not expected to cause an exceedance of the MTCA Method B cleanup level for indoor air.

As shown on Table 10, when considering the RME for all vapor intrusion COCs, TCE was the only constituent with a RME exceeding the groundwater screening level. When considering the maximum concentration detected, chloroform and PCE were also detected above the groundwater screening level. The remaining vapor intrusion COCs are considered low contributors to the overall risk via vapor intrusion. Based on the information reviewed, TCE is the primary driver of vapor intrusion risk at the Site, if any. However, in order to conduct a conservative analysis, all vapor intrusion COCs identified above were carried forward in the J&E model analysis as described in the following sections.

8.4 JOHNSON AND ETTINGER SCREENING MODEL

The first next step of the vapor intrusion evaluation included screening of the identified vapor intrusion COCs using the EPA's J&E Screening Groundwater Model (EPA 2004). The intent of the screening analysis was to provide a preliminary determination as to whether any of the VOCs detected in groundwater at the Site has the potential to impact indoor air quality and exceed MTCA Method B indoor air cleanup levels. As discussed above, vapor intrusion COCs that exceed pre-determined criteria (MTCA Method B indoor air cleanup levels) would be further evaluated using the advanced version of the J&E groundwater model which allows greater analysis and ability to input site-specific information. The following provides the assumptions used in the screening model analysis and modeling results and evaluation.

8.4.1 Model Assumptions

The J&E volatilization model was developed by EPA (2004) and is based on the theoretical model developed by Johnson and Ettinger (1991). The J&E model incorporates convective and diffusive mechanisms for estimating the transport of contaminant vapors emanating from subsurface soils, soil gas, or groundwater into indoor spaces located directly above the source of contamination (EPA 2004). Validation studies of the J&E model report that the model predicts indoor air concentrations that are in good qualitative and quantitative agreement with detailed three-dimensional numerical modeling of radon transport into houses (Loureiro et al. 1990).

The J&E model provides an estimated attenuation coefficient that relates the vapor concentration in the indoor space to the vapor concentration at the source of the contamination (EPA 2004). Inputs to the model include chemical properties of the contaminant, soil zone properties, and structural properties of the building. The J&E model operates under several assumptions:

1. The model operates under steady-state conditions (i.e., enough time has passed for the vapor plume to have reached the building of interest directly above the source of contamination and for vapor concentrations to have reached their maximum values).
2. Contaminant vapors enter the structure primarily through cracks and openings in the walls and foundation.
3. Convective transport occurs primarily within the zone of influence of the building, and vapor velocities decrease rapidly with increasing distance.
4. Diffusion dominates vapor transport between the source of contamination and the building zone of influence.
5. All vapors present below the building will enter the building unless the floors and walls are perfect vapor barriers.
6. All soil properties in any horizontal plane are homogeneous.
7. The contaminant is homogeneously distributed within the zone of contamination.

8. The extent of contamination is greater than that of the building floor in contact with the soil.
9. Vapor transport occurs in the absence of convective water movement within the soil column and in the absence of mechanical dispersion.
10. The model does not account for transformation processes (biodegradation, hydrolysis, etc.).
11. The soil layer in contact with the structure floor and walls is isotropic (i.e., does not vary with distance) with respect to permeability.
12. Both the building ventilation rate and the difference in dynamic pressure between the interior of the structure and the soil surface are constant values.

Further explanation of these assumptions and information on the model theory can be obtained from Johnson and Ettinger (1991) and EPA (2004).

8.4.2 J&E Screening Model Results

EPA default parameters were used in the screening model unless otherwise stated. Modification of the default parameters to site-specific information included depth to groundwater and soil type. Depth to groundwater was estimated at 75 feet bgs, which corresponds to the approximate water table observed during groundwater monitoring events in monitoring well MW-5. Silt was used as the soil type in the J&E screening model, which corresponds to the vadose zone soil type of loess (Palouse Formation) encountered across the WSP site.

The estimated indoor air concentration in a typical building as predicted by the J&E screening model is shown on Table 11. The maximum groundwater concentration detected and the calculated RME for each vapor intrusion COC was used as the groundwater concentration input for all vapor intrusion COCs to obtain a range of predicted indoor air concentrations and was compared to the MTCA Method B cleanup levels in Table 11.

As shown, TCE exceeded the MTCA Method B indoor air cleanup level when the maximum groundwater concentration detected was used, but was below the MTCA Method B cleanup level when the RME was considered. Due to the conservative nature of this vapor intrusion evaluation and the uncertainty associated with the J&E model, further evaluation was conducted for TCE.

Based on the evaluation, it is not expected that the remaining constituents pose any elevated risk to site residents. Additional evaluation of TCE using site-specific data in the advanced J&E groundwater model is summarized below.

8.5 JOHNSON AND ETTINGER ADVANCED MODEL

The advanced J&E groundwater model was designed to provide a more complex evaluation of vapor intrusion associated with contaminated groundwater. It differs significantly from the screening model in that it can be modified to include site-specific information relating to soil type; soil zones with differing thicknesses and properties; depth to groundwater; length, width, and height of overlying buildings; and building air exchange rates. The following provides the assumptions used in the model, site-specific and default parameters, and the modeling results.

8.5.1 Assumptions and Data Input

Table 12 summarizes the default parameters as recommended by the EPA (2004) and the available site-specific parameters for the WSP site. A summary of the model inputs is provided below:

- Chemical specific groundwater concentrations (TCE maximum = 3.3 µg/l, 95 percent UCL = 1.34 µg/l).
- The depth to the water table was estimated at 75 feet, which corresponds to the approximate water level depth in monitoring well MW-5.
- Groundwater temperatures were not collected and therefore the EPA (2004) default temperature of 10 degrees C was adopted.
- Depth below grade represents the depth from the soil layer to the bottom of the enclosed space. Site-specific measures of this parameter were not available; therefore, the EPA (2004) default parameters for slab-on-grade (15 centimeters [cm]) and basement (200 cm) were adopted for the modeling. Existing residential buildings (Buildings D-70 and D-80) used in the analysis have at least partial basements; therefore, the basement scenario was used and provided a conservative approach. Occupational buildings (Buildings F-20 and C-30) used in the analysis do not have basements, such that the occupational scenario used the slab-on-grade value of 15 cm.
- Soil type represents a conservative estimate of the soil properties throughout the WSP site. Geologic cross-sections suggest site soils contain loess (silt) in the upper zone (0 to 40 feet bgs) and sands and gravels in the lower zone (40 to greater than 75 feet bgs). These soil types were used in the model as Stratum A and Stratum B, respectively.
- Soil properties (bulk density, total porosity, and water-filled porosity) were not collected as part of sampling; therefore, the EPA (2004) default parameters for silt (Stratum A) and sand (Stratum B) were used.
- Floor thickness represents the thickness of the concrete floor. Since no site-specific information was available and may vary across buildings, the EPA (2004) default value of 10 cm was adopted.
- Building pressure differential describes the wind effects on the structure, stack effects due to heating of the interior air, and unbalanced mechanical ventilation that result in a negative pressure with respect to the soil surface generated within the structure. Since no site-specific properties were available, the EPA (2004) default value of 40 g/cm-s^2 was adopted.
- Seam crack width represents the area from which vapors transport from the soil to the indoor air of the structure. Since no site-specific properties were available, the EPA (2004) default value of 0.1 cm was adopted.
- The indoor exchange rate is the rate at which air is ventilated in the structure. Since no site-specific properties were available, the EPA (2004) default value of 0.25 (1iters/hour) was adopted.

- Building enclosed space (length, width, and height) volumes were estimated for on-site buildings based on information provided by WSP. Several buildings were evaluated based on the site-specific data, which included 9,500 square feet (ft^2) and 18,500 ft^2 residential buildings (based on the smallest and largest residential floor size at the Site) and 7,200 ft^2 and 97,160 ft^2 occupational buildings (based on the smallest and largest occupational buildings at the Site).

The following provides the results of the advanced vapor intrusion modeling for TCE at the WSP site.

8.5.2 Johnson and Ettinger Advanced Modeling Results

As described above, a mix of EPA default parameters and site-specific information was used in a variety of scenarios for the advanced J&E groundwater model. The scenarios were completed to provide a range of predicted indoor air concentrations based on modified conditions. As shown in Table 9, the maximum concentration detected and the calculated RME (from Table 10) was used as the groundwater concentration input for TCE to obtain a predicted indoor air concentration. The predicted indoor air concentrations under various scenarios were compared to the MTCA Method B cleanup levels.

The predicted indoor air concentration for TCE under various residential scenarios ranged from 0.03 micrograms per cubic meter ($\mu g/m^3$) (large building and 95% UCL) to 0.1 $\mu g/ m^3$ (small building and maximum detected concentration). None of the predicted concentrations exceed the MTCA Method B indoor air cleanup level for TCE of 0.1 $\mu g/m^3$ (Table 11). Based on the J&E vapor intrusion modeling under very conservative assumptions, it does not appear that groundwater impacted by VOCs beneath the Site poses a risk to long-term site residents.

The predicted indoor air concentration for TCE under various occupational scenarios ranged from 0.0096 $\mu g/m^3$ (large building and 95 percent UCL) to 0.092 $\mu g/m^3$ (small building and maximum detected concentration). None of the predicted concentrations exceed the MTCA Method B indoor air cleanup level for TCE of 0.1 $\mu g/m^3$ (Table 11). It should be noted that the MTCA Method C (industrial) indoor air cleanup level for TCE is 1 $\mu g/m^3$. Therefore, it appears that the predicted indoor air concentrations for TCE under conservative assumptions for occupational workers is significantly below any level of concern and does not pose a risk to site workers.

9. CLEANUP STANDARDS

Cleanup standards consist of two components:

- Cleanup Levels (CULs): Chemical concentrations.
- Points of Compliance: Point at which the cleanup levels must be met.

Cleanup standards are established in accordance with WAC 173-340-700 through 173-340-760.

The cleanup standards proposed for the Site are determined based on exposures to human health and the environment. As documented within previous sections of this report, soil and groundwater are impacted with COCs above screening levels; therefore, cleanup standards are developed for these media. The cleanup standard selection process for the Site is described in the following sections.

9.1 PRELIMINARY CLEANUP LEVELS

MTCA regulations require that the cleanup levels used to evaluate remediation alternatives for the Site be "…at least as stringent as all applicable state and federal laws…" (RCW 70.105D.030 (2)(e)). State and federal laws described in WAC 173-340-710 may impose additional requirements at the discretion of Ecology.

Where applicable, the CULs were updated based on the most recent toxicity data in Ecology's Cleanup Levels and Risk Calculation (CLARC) database, EPA's IRIS database or EPA's Health Effects Assessment Summary Tables (HEAST) database.

A conservative approach was used to select standards that were most protective of human health and the environment for soil and groundwater. Selected standards by which media were evaluated against are listed below. The CULs listed below are considered preliminary as Ecology will determine the final CULs for the facility.

9.1.1 Soil Preliminary Cleanup Levels

The following preliminary cleanup levels were selected for soil COCs:

- MTCA Method B Soil Cleanup Levels for Unrestricted Land Use (Chapter 173-340 WAC, Equations 740-1 and 740-2 under WAC 173-340-740(3) (standard MTCA Method B equations, which were used to calculate MTCA Method B standard formula values (SFVs) in the CLARC Database).

A terrestrial ecological evaluation was not conducted for the facility due to exclusion granted by WAC 173-340-7491(1)(b) which states:

> All soil contaminated with hazardous substances is, or will be, covered by buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed to the soil contamination. To qualify for this exclusion, an institutional control shall be required by the department under WAC 173-340-440. An exclusion based on planned future land use shall include a completion date for such future development that is acceptable to the department.

All areas where soil concentrations are above the screening levels presented earlier will be covered with a physical barrier that eliminate contact by terrestrial ecological receptors. The preliminary cleanup levels (PCULs) for the soil and groundwater COCs are summarized in Table 13.

9.1.2 Groundwater Preliminary Cleanup Levels

Standards applicable to groundwater COCs include federal and state drinking water standards (MCLs and federal MCL Goals, which are Groundwater ARARs in the CLARC Database) and Equations 720-1 and 720-2 under WAC 173-340-720(4) (standard MTCA Method B equations, which were used to calculate MTCA Method B standard formula values (SFVs) in the CLARC Database). For those COCs with MCLs, the federal and state primary MCLs are identical.

Following is a summary of the groundwater PCUL identification steps:

1. For each COC with a federal or state primary MCL:
    a) That MCL was selected as the initial standard (WAC 173-340-705(2)(a) and 720(4)(b)(i)).
    b) If substituting the MCL as the groundwater PCUL and solving Equation 720-1 for HQ resulted in HQ greater than 1, the standard was revised to make the HQ less than or equal to 1 (WAC 173-340-705(5)).
    c) If substituting the MCL as the groundwater PCUL and solving Equation 720-2 for risk resulted in excess cancer risk greater than $1x10^{-5}$, the standard was revised to make the risk less than or equal to $1x10^{-5}$ (WAC 173-340-705(5)).
2. If no MCL was available for a COC, then the MTCA Method B groundwater SFVs were used as the standard.

MCLs and MTCA Method B groundwater SFVs used in the PCUL development process were available from the CLARC Database, which was updated in June 2012. The PCULs for the soil and groundwater COCs are summarized in Table 13.

9.2 LANDFILL CLEANUP STANDARD ANALYSIS

9.2.1 Soil Cleanup Standards

COC concentrations in soil were compared to the PCULs developed for the facility. A discussion of each COC and the relationship to the PCUL are discussed below:

- The toxicity equivalency for Carcinogenic Polyaromatic Hydrocarbons (cPAHs) as equivalent to benzo(a)pyrene were calculated and were compared to the PCUL for benzo(a)pyrene. Detections were noted in borings I-P1 and WH-P1at depths of 4 feet bgs. Detections were also noted in WSP Landfill test pits TP-3, TP-5, TP-10, and TP-16 at depths of 7 to 15 feet bgs. The total toxicity equivalencies for benzo(a)pyrene ranged from 0.060 mg/kg to 0.110 mg/kg. The total toxicity equivalency detections for benzo(a)pyrene did not exceed the cleanup level of 0.14 mg/kg in any soil samples collected.
- Gasoline Range Organics (GRO) detections were noted in the boring for MW-10 and WSP Landfill test pits TP-3 and TP-16 at depths of 6, 7, and 12 feet bgs, respectively. The GRO detections ranged from 11 mg/kg to 140 mg/kg. The GRO detections exceeded the cleanup level of 100 mg/kg in the boring for MW-10 with a value of 140 mg/kg at a depth of 6 feet bgs.
- Lead detections were noted in the borings for MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, and MW-13; boring WH-P1 and PH-P1; and WSP Landfill test pits TP-3, TP-5, TP-8, TP-10, and TP-16 at depths ranging from 4 to 15 feet bgs. The

lead detections ranged from 7.6 mg/kg to 940 mg/kg. The lead detections exceeded the cleanup level of 250 mg/kg in the WSP Landfill test pit TP-8 with a value of 940 mg/kg at a depth of 10 feet bgs.

- PCE detections were noted in borings GP13, I-P6, I-P9, MP-P1, WH-P1 and WSP Landfill test pits TP-3 and TP-10 at depths ranging from 3 to 15 feet bgs. The PCE detections ranged from 0.0025 mg/kg to 12 mg/kg. The PCE detections did not exceed the cleanup level of 476.2 mg/kg in any soil samples collected.

Based on the analysis above GRO and lead are the COCs with concentrations that have exceeded the preliminary cleanup levels for the Site. Therefore, the feasibility study will address the occurrence of GRO and lead concentrations above PCULs within soil.

9.2.2 Groundwater Cleanup Standards

COC concentrations in groundwater within the CPOC were compared to the PCULs developed for the facility. A discussion of each COC and the relationship to the PCUL are discussed below:

- The toxicity equivalency for cPAHs as equivalent to benzo(a)pyrene were calculated and were compared to the PCUL for benzo(a)pyrene. Detections were noted in wells MW-2, MW-3, MW-5, MW-6, MW-9, MW-13, and MW-14 since 2010. Detections were also noted in Sudbury Landfill monitoring wells SLF-9 and SLF-10. The total toxicity equivalencies for benzo(a)pyrene have ranged from 0.0073 µg/l to 0.0656 µg/l. The total toxicity equivalency detections for benzo(a)pyrene have not exceeded the cleanup level of 0.12 µg/l at the Site since monitoring began.
- Manganese detections were noted in all monitoring wells except MW-5 and SLF-10 since 1998. The manganese detections have ranged from 11 µg/l to 35,000 µg/l. The detections of manganese have not exceeded the cleanup level of 2,200 µg/l in any monitoring wells since October 2010. The detections of manganese exceeded the cleanup level in wells MW-6, MW-7, and MW-8 once each prior to October 2010. The range of detections above the PCUL was 2,400 µg/l (MW-6; 10/26/2010) to 35,000 µg/l (MW-8; 7/29/2010).
- PCE detections were noted in monitoring wells MW-5, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, SLF-7, SLF-9, and SLF-10 since 1998. The PCE detections have ranged from 0.13 µg/l to 5.3 µg/l. The detections of PCE have exceeded the cleanup level of 5 µg/l within monitoring well MW-5 only once. That exceedance was during the July 2010 monitoring event. Subsequent monitoring in MW-5 (5 events) yielded no PCE concentration above 5 µg/l.
- Trichloroethylene (TCE) detections were noted in monitoring wells MW-1, MW-2, MW-3, MW-4, MW-8, MW-9, MW-10, MW-11, MW-12, MW-14, and SLF-9 since 1998. The TCE detections have ranged from 0.32 µg/l to 6.56 µg/l. The detections of TCE have exceeded the cleanup level of 4 µg/l within monitoring wells MW-2, MW-3, and MW-4 since monitoring began. No TCE concentration above 4 µg/l has been detected at the site since 1999.

Based on the analysis above, no COCs have exceeded the PCULs concentrations within the past year. Therefore, the feasibility study will not address groundwater.

9.3 POINT OF COMPLIANCE

WAC 173-340-200 defines “Point of Compliance” (POC) as the point or points where cleanup levels established in accordance with WAC 173-340-720 through 173-340-760 shall be attained.

WAC 173-340-740(6) defines the standard soil POC based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway as the soils throughout the site from the ground surface to 15 feet below the ground surface. This represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of site development activities. This also corresponds to the POC for terrestrial ecological receptors. However, in accordance with WAC 173-340-740(6)(f), since the Landfill was allowed to contain hazardous substances the site may comply with cleanup standards provided:

(i) The selected remedy is permanent to the maximum extent practicable using the procedures in WAC 173-340-360;

(ii) The cleanup action is protective of human health;

(iii) The cleanup action is demonstrated to be protective of terrestrial ecological receptors under WAC 173-340-7490 through 173-340-7494;

(iv) Institutional controls are put in place under WAC 173-340-440 that prohibit or limit activities that could interfere with the long-term integrity of the containment system;

(v) Compliance monitoring under WAC 173-340-410 and periodic reviews under WAC 173-340-430 are designed to ensure the long-term integrity of the containment system; and

(vi) The types, levels and amount of hazardous substances remaining on-site and the measures that will be used to prevent migration and contact with those substances are specified in the draft cleanup action plan.

10. TECHNOLOGY IDENTIFICATION AND SCREENING

In the following sections, cleanup action alternatives are developed from cleanup technologies to meet the goals of the cleanup in accordance with MTCA requirements and guidelines. The process of developing cleanup action alternatives begins with a broad overview of all types of cleanup technologies. The list of technologies is given a cursory screening to eliminate any technologies that do not apply to the COCs or site-specific conditions. The technologies are then given a more comprehensive screening before being retained or rejected. The retained technologies are then combined to create a range of alternatives that represent various approaches to achieving the cleanup action objectives (CAOs).

10.1 CLEANUP ACTION OBJECTIVES

The following CAOs have been established for the cleanup action alternatives:

- Reduce or eliminate human exposure with contaminated soil that exceed preliminary cleanup levels.
- Reduce or eliminate risks to ecological receptors from contaminated soil that exceed preliminary cleanup levels.
- Use permanent solutions to the maximum extent practicable (which includes consideration of cost-effectiveness).

10.2 TECHNOLOGY SCREENING CRITERIA

Three criteria were established to screen the potential cleanup technologies identified for the Site. These include (in order of application):

- **Technical Feasibility**: Engineering factors related to the ability of the technology to function effectively and achieve meaningful progress toward the CAOs, based on site-specific characteristics, including the nature and extent of indicator chemicals, waste/source type and locations, site hydrogeology, and time required to achieve preliminary cleanup levels.
- **Implementability**: Administrative issues related to the technology, including government regulatory approvals, construction schedule, constructability, access, monitoring, operation and maintenance, and community concerns.
- **Cost**: The relative cost of the technology, including initial capital and future annual operating, maintenance, and monitoring costs, compared to other similarly applied technologies is a component of the screening process. However, since this screening presents a preliminary view of the cleanup technologies, costs were not evaluated quantitatively but were evaluated relative to each similar technology.

The goal of the screening process is to select the most practicable technologies from among each category of similar technologies.

10.3 TECHNOLOGY SCREENING

This section presents the results of the technology screening process. A comprehensive list of relevant technologies was developed using professional knowledge and judgment, experience, and screening information prepared by the EPA, Center for Public Environmental

Oversight (CPEO), and other organizations for sites across the United States. The results of the screening evaluation are summarized in Table 14. The retained technologies are described in further detail below in relation to the specific medium of concern, site-specific characteristics, and potential application of the retained technologies. The retained technologies shown in Table 14 result from several factors: qualitatively evaluating the potential technologies based on screening information prepared by EPA, CPEO, and other organizations for sites across the United States; using the screening criteria listed above; and are ultimately based on the experiences gained at similar sites as well as professional knowledge and judgment. Below are more complete descriptions of the retained technologies and their applicability to the Site. Long-term monitoring would be conducted in conjunction with all cleanup action alternatives.

10.3.1 Land Use Controls

Land use controls provide protection from exposure to soil through the use of non-engineered or legal controls that limit land or resource use, such as access controls and property restrictions. Although land use controls provide no reduction of toxicity, volume, or mobility of contaminants, they can reduce or eliminate direct exposure pathways and resultant risk. Land use controls are usually most effective when used in combination with other measures, such as source removal, containment, and monitored natural attenuation.

For soil, land use controls could potentially include both engineering controls and institutional controls (ITRC 2008). Engineering controls could include signage and fencing providing warning and deterrence of exposure to soils impacted with contaminants above preliminary cleanup levels. Cleanups with engineering controls involve ongoing evaluation, site inspections, periodic repairs, and sometimes replacement of remedy components.

Institutional controls are non-engineered instruments, such as administrative and/or legal controls intended to minimize the potential for human exposure to contamination by limiting land or resource use. Institutional controls may be used to supplement engineering controls to ensure their ongoing effectiveness, or they may be selected as a stand-alone response. Institutional controls can be divided into four categories: governmental controls, proprietary controls, enforcement and permit tools with institutional control components, and informational devices. Current regulations restrict installation of water wells within 1,000 feet of a landfill (WAC 173-160-171(3)(a)(vi)). Each of these four institutional controls may be used at the Site for limiting exposure to soil.

10.3.2 Soils

Two technologies applicable to contaminated soils at the Site were retained. The retained technologies include:

- In Situ Biological Treatment: Monitored Natural Attenuation.
- Containment: Landfill Capping using either:
  - Geosynthetic Cover; or
  - Low Permeability Soil or Asphalt Cover
  - Permeable Soil Cover

10.3.2.1 In Situ Biological Treatment: Monitored Natural Attenuation

Monitored natural attenuation (MNA) is feasible for soil. The natural attenuation processes include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil. These in situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants. Periodic monitoring is necessary to demonstrate that contaminant concentrations continue to decrease at a rate sufficient to ensure that they do not become a health threat.

According to Washington State Model Toxics Control Act (MTCA) as described under WAC 173-340-370(7), natural attenuation as a remediation alternative is most appropriate for sites with the following characteristics:

- Source control has been conducted to the maximum extent practicable;
- Leaving contaminants on-site during the restoration time frame does not pose an unacceptable threat to human health or the environment;
- There is evidence that natural biodegradation or chemical degradation is occurring and will continue to occur at a reasonable rate at the Site; and
- Appropriate monitoring is conducted to ensure that the natural attenuation process is taking place and that human health and the environment are protected.

MNA could be applied to the various areas of soil at the facility which contain soil contamination above PCULs. However, MNA would only be applied for soil at the facility if other cleanup technologies including land use controls and/or low permeability caps were used to limit exposure and minimize the migration of contaminants within the soil.

10.3.2.2 Containment: Landfill Capping

Landfill capping is a containment technology that forms a barrier between the contaminated media and the surface, thereby shielding humans and the environment from the harmful effects of its contents and perhaps limiting the migration of the contents. Cap design ranges from low permeability geomembrane designs that reduce over 99% of infiltration to more permeable soil coves. The cap design should be selected based on the necessity to reduce infiltration into the contaminated subsurface to reduce the potential for contaminants to leach from the Site. Water allowed to seep through the barrier and saturate the contaminated soil ultimately flows into groundwater and contaminating the groundwater with the contaminants found in the soil.

Landfill capping does not lessen the toxicity, mobility, or volume of contaminants, but they do limit migration. They are most effective where most of the underlying soil is above the water table. Cap integrity must not be compromised by present and/or future land use activities and institutional controls are often required to protect the cap.

Three methods for landfill capping are considered applicable to contaminated soils at the site and include:

- Low permeability caps composed of a combination of a geomembrane (typically HDPE or PVC) and/or a low permeability soil layer. These cap systems typically reduce contaminant migration to a fraction of 1 percent of the pre-capping contaminant migration. A low permeability cap designed in accordance with current landfill regulations (WAC 173-351) could be used at the WSP Landfill to reduce or eliminate surface precipitation and stormwater run on from infiltrating through the refuse contained within the landfill. Also, low permeability caps consisting of asphalt or concrete could be used in other areas of the facility where soil contamination exists above soil preliminary cleanup levels.

- Low permeability soil caps, which are typically composed of a layer of engineered low permeability soil placed over the waste, graded to create positive drainage and planted with grasses to reduce erosion and aide in evapotranspiration. With these caps, infiltration is reduced through the water holding properties of soils and evapotranspiration. Depending on weather patterns and topography, it is possible to devise landfill covers that meet the requirements for remediation but contain no low-permeability geomembrane barrier layer. These covers usually employ a layer of soil on top of the landfill where grass, shrubs, or trees grow for the purpose of controlling erosion and removing water from the soil. These cap systems provide a barrier, however, are less effect on reducing infiltration. A low permeable soil cap designed based on landfill closure regulations that were effective at the time the facility stopped receiving wastes (WAC 173-304) could be effective in providing a direct contact barrier and reducing infiltration. Its effectiveness is enhanced because of the absence of groundwater contamination and arid conditions at the WSP.
- Permeable soil covers, which typically consist locally obtained, unimproved soil, provide only a barrier to direct contact with the waste and through grading eliminate low spots within the landfill cover that collect water and focus infiltration. Permeable soil covers are typically planted with vegetation to address erosion concerns and enhance evapotranspiration. A permeable soil cover is currently in place at the WSP landfill and considering the absence of groundwater contamination appears to be effective in reducing the migration of contaminants from soil and waste to groundwater. Improving areas of the WSP Landfill where waste is exposed at the surface and where surface water run-off is collecting in low spots could be effective in providing a direct contact barrier and further reducing some infiltration.

Because of the nature of waste, the absence of leaching potential to groundwater, and the arid environment, the low permeability soil cover and permeable soil cover technologies are considered effective applications for the WSP landfill soil contamination and will be carried forward. Asphalt covers are considered appropriate for other areas with soil contamination and will also be carried forward.

11. CLEANUP ACTION ALTERNATIVES

Considering the nature and extent of contamination, MTCA requirements for selection of cleanup actions (WAC 173-340-360) and the cleanup action technologies retained after screening, the following cleanup action alternatives have been assembled for the soil contamination present at the Site:

1. Monitored Natural Attenuation (MNA), Land Use Controls, and improvement to the existing permeable soil cover.
2. Low Permeability Soil Cap with Monitored Natural Attenuation and Land Use Controls.
3. No Action.

11.1 ALTERNATIVE 1: MNA, LAND USE CONTROLS AND PERMEABLE COVER IMPROVEMENTS

Alternative 1 consists of the following:

- Soils that Exceed PCULs:
    - MNA.
    - Land use controls to prevent exposure at the landfill site and areas with soil contamination near Building A50.
    - Improving the existing soil cap to provide a direct contact barrier, reduce infiltration, and enhance evapotranspiration.
- Decommissioning of Irrigation Well No. 4, and environmental monitoring wells to achieve requirements for WAC 173-160-381.

11.1.1 Description

Alternative 1 would continue source control actions previously completed at WSP. These actions include implementation of best management practices (BMPs) regarding management of chemicals used in the various Correctional Industry activities at WSP. WSP would avoid disturbing contaminated soils, put in place institutional controls to provide protection from direct contact with contaminated soils, improve the existing permeable soil cap at the WSP landfill, and would maintain post closure care at the WSP landfill using Chapter 173-304 WAC as a design guideline. Institutional controls are adequate for the soils near Building A50 due to the contamination above CULs occurring at depth and the existence of clean soils and gravel above the contamination. The clean soils and gravel above the contamination will be maintained while contamination above CULs exists. Further, monitoring wells and Irrigation Well No. 4 will be decommissioned to meet the requirements of WAC 173-160-381.

11.1.1.1 Soil Institutional Controls

Institutional controls in the form of deed restrictions would be implemented for soil where contaminant levels exceed PCULs. The institutional controls would prohibit soil excavation or disturbance within the specified area and depth intervals without prior consultation with Ecology. This would include the landfill area as well as the area surrounding Building A50 where soil contaminants exceed PCULs. For the landfill area, the perimeter of the property, which includes the landfill area is fenced and signed, with access solely through secured points of entry. Further, the landfill area is a “no access allowed” area and constantly monitored by prison security. The Building A50 soil contamination is within secured areas, completely enclosed with security fencing and constantly patrolled. Signage will be added to this area to identify potential hazards at depth.

The DOC will make use of existing property fencing, signage, and security monitoring as land use controls for the WSP landfill. Annual inspections and repairs as necessary would be conducted to maintain the institutional controls.

Institutional controls in the form of deed restrictions would be implemented for the WSP Landfill. The deed restrictions would contain the following restrictions:

- Activities that disturb the soil and gravel cover near Building A50 are prohibited.
- Activities that disturb the landfill soil cover or waste are prohibited (e.g., vehicle travel, livestock access, etc.).
- Modification of the existing stormwater drainage facilities at the WSP Landfill are prohibited without prior consultation with Ecology.
- A negative easement for the WSP Landfill would limit the use of the property.

11.1.1.2 Soil Monitored Natural Attenuation

Monitoring of soils would be completed as follows:

- Concentrations of COCs in subsurface soils would be assessed if excavation activities took place within the areas where contamination exists above PCULs.

11.1.1.3 Decommissioning of Irrigation Well No. 4 and Groundwater Monitoring Wells

Irrigation Well No. 4 will be decommissioned in accordance with WAC 173-160-381 (1) (a) as follows:

- Remove debris and accumulated sediment from the well bore to the extent feasible, using an appropriate drilling method. Dispose of removed materials per applicable regulations.
- Survey the well with a downhole TV camera to evaluate the condition and depth intervals of the well casings.
- Seal the open bedrock borehole (525 feet to 1,004 feet); allow grout to set.
- Perforate and pressure-grout the 16-inch-diameter casing (383 feet to 525 feet).
- Perforate and pressure-grout the 20-inch-diameter casing (290 feet to 383 feet).
- Perforate and pressure-grout the 24-inch-diameter casing (5 feet to 290 feet).
- Seal the upper casing with cement (0 feet to 5 feet).
- Document the coordinates of the well by a licensed surveyor.
- Submit the well decommissioning report to Ecology.

The 14 groundwater monitoring wells will be decommissioned by perforating the casings to within 5 feet of the surface and pressure grouting and installing concrete surface seals. Coordinates and decommissioning documentation will be submitted to Ecology as required in WAC 173-160.

11.1.1.4 Improve the Existing Permeable Soil Cap

The existing permeable soil cap will be improved and maintained to prevent direct contact with refuse and to reduce infiltration. Soil cap improvements will consist of:

- Adding between six inches and two feet native soil to areas of the existing soil cap to cover refuse and to eliminate low spots and depressions that focus infiltration. The area requiring permeable soil cap improvements is approximately 1.8 acres.
- Establish new native plantings to enhance evapotranspiration.
- Monitor soil cap vegetation and erosion as part of institutional control inspections. Make improvements as needed to address settlement, erosion, and plant mortality.

11.1.2 Cost

Alternative 1 consists of the following items:

- Land Use Engineering Controls including fencing around the WSP Landfill and signage.
- Improving the existing permeable soil cap to cover all exposed waste and reduce depressions that focus infiltration.
- Ongoing maintenance of the land use engineering controls and associated documentation.
- Decommissioning of Irrigation Well No. 4.
- Decommissioning of the 14 groundwater monitoring wells in accordance with Chapter 173-160-381.
- General project management, alternative design, construction oversight, and contingency for Alternative 1 are estimated based on percentages of the estimated construction and O&M costs.

Based on the items above, the total estimated net present value for Alternative 1 is $443,733. Appendix J contains a detailed breakdown of the estimated costs associated with Alternative 1.

11.2 ALTERNATIVE 2: LANDFILL CAP WITH INSTITUTIONAL CONTROLS

Alternative 2 consists of the following:

- Soils that Exceed PCULs:
    - Landfill capping using a low permeability soil cap and low permeability asphalt cap.
    - Land use controls to prevent exposure.
- Decommissioning of Irrigation Well No. 4 and 14 groundwater monitoring wells.

11.2.1 Description

Alternative 2 will install a low permeability landfill cap over soils that contain contaminants at concentrations above PCULs (See Figure 15). The cap for the WSP Landfill will consist of an engineered soil cap designed and installed using Chapter 173-304 WAC as a design guideline. A low permeability soil cap was selected instead of a geomembrane cap because it will provide similar protections for direct contract with waste and groundwater; achieves ARARs, and is less costly to construct and maintain than a geomembrane cap. The low permeability caps for the other areas with soil contaminant concentrations above PCULs will consist of a minimum of 2.5 inches of asphalt overlaying the surface soil. The decommissioning of Irrigation Well No. 4 is identical to Alternative 1.

The WSP Landfill soil cap provides for closure of the existing landfill. The closure area is approximately 8 acres. Generally, this requires excavation/ embankment, grading and compacting subgrade, construction of a landfill cover system, road construction and grading, and stormwater perimeter ditch. The cover system would consist of a 24-inch soil layer on top of the landfill, and an 18-inch side slope layer overlaid with an 8-inch rock armor layer for the sloping areas. All road access would consist of embankment material and crushed surfacing.

The other area to be capped includes approximately 1 acre around Building A50. The low permeability cap at this area will include approximately 6 inches of crushed rock with 2.5-inch thick asphalt. Site preparation for the cap will include excavation of subgrade and installation of stormwater control facilities. The material generated by the subgrade excavation will be used to regrade areas at the WSP Landfill.

11.2.1.1 Institutional Controls

Soil institutional controls for Alternative 2 will be similar to Alternative 1 except the WSP Landfill will be capped with a new low permeability soil cap and the other areas of soil contamination will be capped with asphalt. Annual inspections and repairs as necessary would be conducted to maintain the institutional controls. Groundwater institutional controls for Alternative 2 will be identical to Alternative 1.

11.2.1.2 Monitored Natural Attenuation

Monitoring for natural attenuation of soils for Alternative 2 will be identical to Alternative 1.

11.2.2 Cost

Alternative 2 consists of the following items:

- Land Use Engineering Controls including fencing around the WSP Landfill and signage around all areas of soil contamination above PCULs.
- Soil caps at the WSP Landfill in accordance with Chapter 173-304 WAC and asphalt caps at the other areas where soil contamination exceeds PCULs (See Figure 15).
- Ongoing maintenance of the land use engineering controls and associated documentation.
- Decommissioning of Irrigation Well No. 4.
- Decommissioning of the 14 groundwater monitoring wells in accordance with WAC 173-160-381.
- General project management, alternative design, construction oversight, and contingency for Alternative 2 are estimated based on percentages of the estimated construction and O&M costs.

Based on the items above, the total estimated net present value for Alternative 2 is $1,900,794. Appendix J contains a detailed breakdown of the estimated costs associated with Alternative 2.

11.3 ALTERNATIVE 3: NO ACTION

Alternative 3 consists of allowing the Site to remain in its present condition with no measures to reduce or monitor soil contamination. The No Action alternative has no related costs.

12. EVALUATION OF CLEANUP ACTION ALTERNATIVES

MTCA established minimum requirements and procedures for selecting cleanup actions in WAC 173-340-360. The minimum requirements include threshold requirements and other requirements discussed below.

12.1 THRESHOLD REQUIREMENTS

MTCA requires that all cleanup actions meet the threshold requirements that are part of the minimum requirements. This section uses the threshold requirements to evaluate the list of three alternatives developed. Under MTCA, cleanup action alternatives must meet the following threshold requirements as defined in WAC 173-340-360(2)(a):

- Protection of human health and the environment.
- Compliance with cleanup standards.
- Compliance with ARARs.
- Provision for compliance monitoring.

Each alternative is evaluated individually against the threshold criteria in the following sections.

12.1.1 Protection of Human Health and the Environment

As a threshold criterion, protection of human health and the environment addresses whether a cleanup action alternative would result in sufficiently low residual risk to human and ecological receptors after completion of the alternative.

Protection of human health and the environment would be unchanged from present conditions for Alternatives 1 and 3 because the contaminated soil would not be remediated; however, under Alternative 1, potential exposures would be reduced because areas with soil contamination above PCULs are either overlain by asphalt or covered by a soil cover and further negated through institutional controls.

Alternative 2 would be protective of human health and the environment because exposures and associated risks to the soils with contaminant concentrations above PCULs would be limited or negated because of the low permeability cap and implementation of institutional controls. However, residual concentrations of the COCs beneath the low permeability caps would remain above regulatory levels.

12.1.2 Compliance with Cleanup Standards

Compliance with cleanup standards is defined by meeting the requirements of WAC 173-340-700 through WAC 173-340-760.

Alternatives 1 and 2 comply with cleanup standards by attaining cleanup levels at the point(s) of compliance within a reasonable period of time and in accordance with WAC 173-340-720(8)(c) and WAC 173-340-740(6)(f). Alternatives 3 potentially allows contact with soils that contain contaminants above PCULs and all three alternatives leave soil contamination with concentrations above PCULs in place.

12.1.3 Compliance with ARARs

Compliance with ARARs for all alternatives requires, in addition to meeting cleanup standards, that the actions also meet location-specific and action-specific state and federal requirements. Alternatives 1 through 3 meet this threshold criterion for soil. However, as discussed above, Alternatives 3 potentially allows contact with soils that contain contaminants above PCULs and all three alternatives leave soil contamination with concentrations above PCULs in place.

12.1.4 Provide for Compliance Monitoring

Compliance monitoring requirements are defined in WAC 173-340-410. Compliance monitoring includes: 1) "protection monitoring" to confirm that human health and the environment are adequately protected during implementation of an alternative; 2) "performance monitoring" to confirm that cleanup standards or other performance standards have been attained; and 3) "conformation monitoring" to monitor the long-term effectiveness of the remedy after completion of the alternative.

Alternatives 1 and 2 would include performance monitoring during cleanup action to evaluate the effectiveness of the treatment and determine that the CAOs had been met. Performance monitoring would be provided during operation and maintenance activities for Alternatives 1 and 2 to determine that either soil MNA is occurring and effective. Compliance monitoring would be a component of any alternative selected as the final remedy for the Site.

12.2 OTHER REQUIREMENTS

In addition to the threshold requirements, WAC 173-340-360(2)(b) requires cleanup actions to meet "other requirements" or "additional requirements" that are part of the minimum requirements for the alternatives. These other requirements include the following:

- Use permanent solutions to the maximum extent practicable including consideration for public concerns.
- Provide for a reasonable restoration time frame.
- Consider additional performance criteria.

12.2.1 Permanent Solutions

This section describes the permanent solutions criteria and compares each of the alternatives regarding the criteria.

12.2.2 Permanent Solutions Criteria

WAC 173-340-360(2)(b)(i) requires, to the maximum extent practicable, the use of permanent solutions. Permanence criteria are further defined in WAC 173-340-360(3).

The determination of "maximum extent practicable" is based on a "disproportionate cost analysis," which evaluates the costs and benefits of the alternatives. Seven criteria are cited in WAC 173-340-360(3)(f) as appropriate to evaluate alternatives for the disproportionate cost analysis determination.

The specified criteria below will be used to evaluate the cleanup action alternatives:

- **Protectiveness—**addresses overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, the time required to reduce the risk and attain cleanup standards, the on-site and off-site risks resulting from implementation, and improvement of the overall environmental quality. This criterion is derived from the evaluation of the other criteria.

- **Permanence—**addresses the degree to which a cleanup action alternative reduces the inherent toxicity, the ability of contaminants to migrate in the environment, or the quantity of contaminated material.
- **Cost—**used to consider the costs of performing the alternative, including capital, long-term operation and maintenance, monitoring, and institutional costs. Alternative costs are compared on a net present value basis. Known implementation difficulties with quantifiable cost impacts are included in the cost estimates. Table 15 includes a summary of the construction (capital) and yearly O&M costs for the cleanup action alternatives. Detailed cost estimates are located in Appendix J. Costs are available from four sources: the professional opinion of Parametrix's design engineers, quotes requested from remediation firms, published literature, and similar projects. All costs are order-of-magnitude preliminary estimates that will be used to evaluate and compare the alternatives.
- **Effectiveness Over the Long-Term—**based on the degree of certainty that the alternative will be a success, the long-term reliability, the magnitude of residual risk, and the effectiveness of controls required to manage treatment of residual or remaining waste.
- **Management of Short-Term Risks—**addresses short-term effects on human health and the environment while the alternative is being implemented. The evaluation includes consideration of the following factors:
    - Risk to Site workers.
    - Risk to the community.
    - Risk to the environment (short-term ecological risk).
- **Technical and Administrative Implementability—**addresses the degree of difficulty in implementing the alternative. Implementability issues are important because they address the potential for delays, cost overruns, and failure. Implementability is evaluated by considering the following:
    - Technical Feasibility: Technical feasibility addresses the potential for problems during implementation of the alternative and related uncertainties. The evaluation includes the likelihood of delays due to technical problems and the ease of modifying the alternative, if required.
    - Availability of Services and Materials: The availability of experienced contractors and personnel, equipment, and materials needed to implement the alternative.
    - Administrative Feasibility: The degree of difficulty anticipated due to regulatory constraints and the degree of coordination required among various agencies.
    - Scheduling: The time required until cleanup action would be complete, and any difficulties associated with scheduling.
    - Complexity and Size: The more complex or larger a cleanup action, the more difficult it is to construct or implement. Sufficient space must be available at the

  Site to enable efficient implementation of the alternative in a manner that achieves the specific time constraints.

  - Other Considerations: Monitoring requirements, access for construction, operation and maintenance, integration with existing operations, current or potential cleanup action, and other factors were considered in accordance with WAC 173-340-410.

- **Consideration of Public Concerns—**public participation is an integral part of MTCA. Ecology's goal is to provide the public with timely information and meaningful opportunities for participation. This goal is met through a public participation program that includes:
  - The early planning and development of a site-specific public participation plan.
  - The provision of public notices.
  - Public meetings or hearings.
  - The participation of regional citizen's advisory committees.

12.2.2.1 Permanent Solutions Evaluation

In the following subsections, Alternatives 1 and 2 are evaluated against the permanent solutions criteria. Alternative 3 does not meet all the threshold criteria as required by MTCA and is not carried forward for further analysis.

Protectiveness

Alternatives 1 and 2 meet the goal of protectiveness because they all provide a permanent method of containment and reduce or eliminate exposure pathways. All alternatives leave contaminated soil in place and the alternatives depend on institutional controls to limit exposures.

Permanent Reduction in Toxicity, Mobility, and Volume

Both alternatives provide permanent reduction in the mobility of contaminants in the environment with the installation of the soil cover or low permeability caps; however, the alternatives provide a slightly lesser permanent reduction because the low permeability caps only eliminates water infiltration into the subsurface and has no effect on toxicity or volume of the soil contamination left in place. However, the mobility of contaminants remaining in the soil and the potential for contamination leaching to groundwater is greatly reduced or eliminated with the presence of the caps.

Cost

The costs for all three alternatives are discussed in Section 11 and are summarized in Table 15. The net present value of Alternative 1 is approximately $443,733. The net present value of Alternative 2 is approximately $1,900,794. There is no cost associated with Alternative 3.

Long-Term Effectiveness

Both alternatives are effective for soil contamination because containment would effectively reduce or minimize the risks to human health and the environment associated with the contaminants left in place. Institutional controls would be in place to ensure effectiveness of the cleanup action and to minimize exposure scenarios.

Alternative 1 would be less effective over the long-term compared to the other alternative because the residual risk is greater due to contaminated soil being left in place with potential exposure pathways through leaching available for contaminants with concentrations greater than the PCULs.

Alternative 2 would be similar in long-term effectiveness because of the implementation of the low permeability caps.

Management of Short-Term Risks

Short-term risks for implementation of the alternatives are relatively low. Standard construction safety and traffic controls will be needed to provide safe operations. The primary risk to Site workers would be construction accidents during construction activities. Direct exposure to contaminated soil would be limited because the quantity of soil and method of excavation or treatment do not typically require direct worker contact. Any contaminated soil generated during construction activities would be managed in accordance with applicable laws for disposal. Short-term risks would be the least for Alternative 1 because of less construction associated with the alternative.

The increased risk to the community for the alternatives would primarily result from the increased traffic and construction resulting from the cleanup actions. This risk can be controlled through increased traffic control and site security during cleanup action activities.

Short-term risks to the environment would be minimized by acquiring and maintaining compliance with required construction permits. Also, site security and the use of the Site as a penitentiary help to minimize exposures to the environment.

Implementability (Technical and Administrative)

Implementation of construction activities at the WSP would be challenging due to security measures and processes necessary to perform work at the facility. Access restrictions could limit the complete implementation of either alternative.

Alternative 2 is technically and administratively implementable and low permeability soil caps have been used at multiple facilities; however, due to the limited access at the Site and the complexity of the construction compared to Alternative 1, Alternative 2 is less readily implementable than Alternative 1.

Alternative 1 is the most technically and administratively implementable as construction is limited and would occur in areas outside of the secured portions of the WSP.

Consideration of Public Concerns

Ecology prepared a public participation program in accordance with WAC 173-340-410 for the Site. The DOC and Ecology will take into consideration reasonable public comments with respect to the final cleanup action for the soil contamination at the Site.

12.2.3 Reasonable Restoration Time Frame

This section describes each reasonable restoration time frame criterion and compares each of the alternatives regarding the criteria. Alternative 3 does not meet all the threshold criteria as required by MTCA and is not carried forward for further analysis.

12.2.3.1 Reasonable Restoration Time Frame Criteria and Evaluation

Specific requirements and procedures for determining whether a cleanup action provides for a reasonable restoration time frame, as required under WAC 173-340-360(2)(b)(i), are provided in WAC 173-340-360(4). Factors to be considered when determining whether a cleanup action provides for a reasonable restoration time frame and a discussion regarding the alternatives follow:

- Potential risk posed by the Site to human health and the environment—Currently, the only risks posed by the Site are from direct exposure to the contaminated soil or to the occasional worker who may encounter contaminated soil during trenching activities. Due to these risks, Alternative 1 poses the greatest potential risk since a low permeability cap is not included. The majority of the facility is paved thereby reducing the chance of direct exposure to contaminated soil. Procedures can be taken to protect the worker's health during trenching activities.
- Practicability of achieving a shorter restoration time frame—The cleanup time frame is probably greater than 50 years for Alternatives 1 and 2.
- Current and future use of the Site, surrounding area, and associated resources that are or may be affected by releases from the Site—The current use of the Site, surrounding area within the CPOC, and associated resources are not anticipated to change within the foreseeable future. New receptors will not be introduced and further impacts to resources are not anticipated.
- Availability of alternative water supply—An alternative water supply is not necessary for the Site because any water used by current Site occupants comes from the municipal water supply.
- Likely effectiveness and reliability of institutional controls—Institutional controls, including excavation limitations and notifications, will be effective and reliable in preventing contact with the contaminated soil under both alternatives. Reliability of the engineered controls in Alternative 1 (i.e., soil cover) is slightly less because a permeable soil cover is more susceptible to disturbance than an engineered low permeability cap.
- Ability to control and monitor migration of hazardous substances—The migration of contaminants within the soil will be controlled by either alternative.
- Toxicity of hazardous substances at the Site—The toxicity of the contamination at the Site does not warrant a fast restoration time frame. Direct exposure to the contaminated soil is unlikely due to the current and future use of the Site.

Based on consideration of all the sub-criteria associated with the evaluation of the reasonable restoration time frame, as well as the various scenarios associated with the Site, Alternatives 1 and 2 both provide restoration within a reasonable time frame.

12.2.4 Additional Performance Criteria

In addition to meeting the minimum requirements, MTCA provides direction regarding the requirements of alternatives on a number of other performance criteria. These criteria and the performance of the alternatives based on the criteria are described below. Alternative 3 does not meet all the threshold criteria as required by MTCA and is not carried forward for further analysis.

12.2.4.1 Institutional Controls and Financial Assurances

WAC 173-340-360(2)(e) requires cleanup actions to use institutional controls and financial assurances where required under WAC 173-340-440. Alternatives 1 and 2 will require engineering and institutional controls to reduce or eliminate exposures to soil and groundwater contamination above PCULs. Alternative 1 would allow for greater financial assurances to be given due to the less complex nature of the cleanup action and the limited cost as compared to Alternative 2.

12.2.4.2 Release and Migration

Cleanup actions under MTCA (WAC 173-340-360(2)(f)) are required to prevent or minimize present and future releases and migration of hazardous substances in the environment. Alternative 2 prevents the migration of hazardous substances from the soil through the use of caps and containment.

12.2.4.3 Remediation Levels

Cleanup actions under MTCA (WAC 173-340-360(2)(h) that use remediation levels shall meet each of the minimum requirements specified above. Cleanup actions that use a remediation level are required, in part, to conduct a determination that a more permanent cleanup action is not practicable, based on a disproportionate cost analysis and a demonstration that the action is protective of human health and the environment. Remediation levels are not included as part of the implementation of the cleanup action alternatives.

12.3 PREFERRED ALTERNATIVE

Based on the analysis discussed above, Alternative 2, involving land use controls and low permeability caps would be scored as the recommended preferred alternative. Table 16 provides a scoring matrix for the comparison of each alternative. Each criterion is listed with a value of zero through four as the score for each alternative. A score of zero denotes the alternative did not achieve the criterion or the criterion was not applicable to that alternative. A score of four denotes that alternative is the best at conforming to the criterion as compared to the other alternatives.

As shown by Table 16, Alternative 2 more closely matches the evaluation criteria set forth by MTCA; however, based on a disproportional cost analysis, Alternative 1 is the recommended preferred alternative. The incremental degree of benefits of the low permeability caps alternatives is minimal compared to Alternative 1 because the restoration time frame is not substantially decreased. The risks and potential exposure scenarios for human health and the environment associated with Alternative 1 compared to Alternative 2 are minimal and do not justify a greater than four-fold cost differential.

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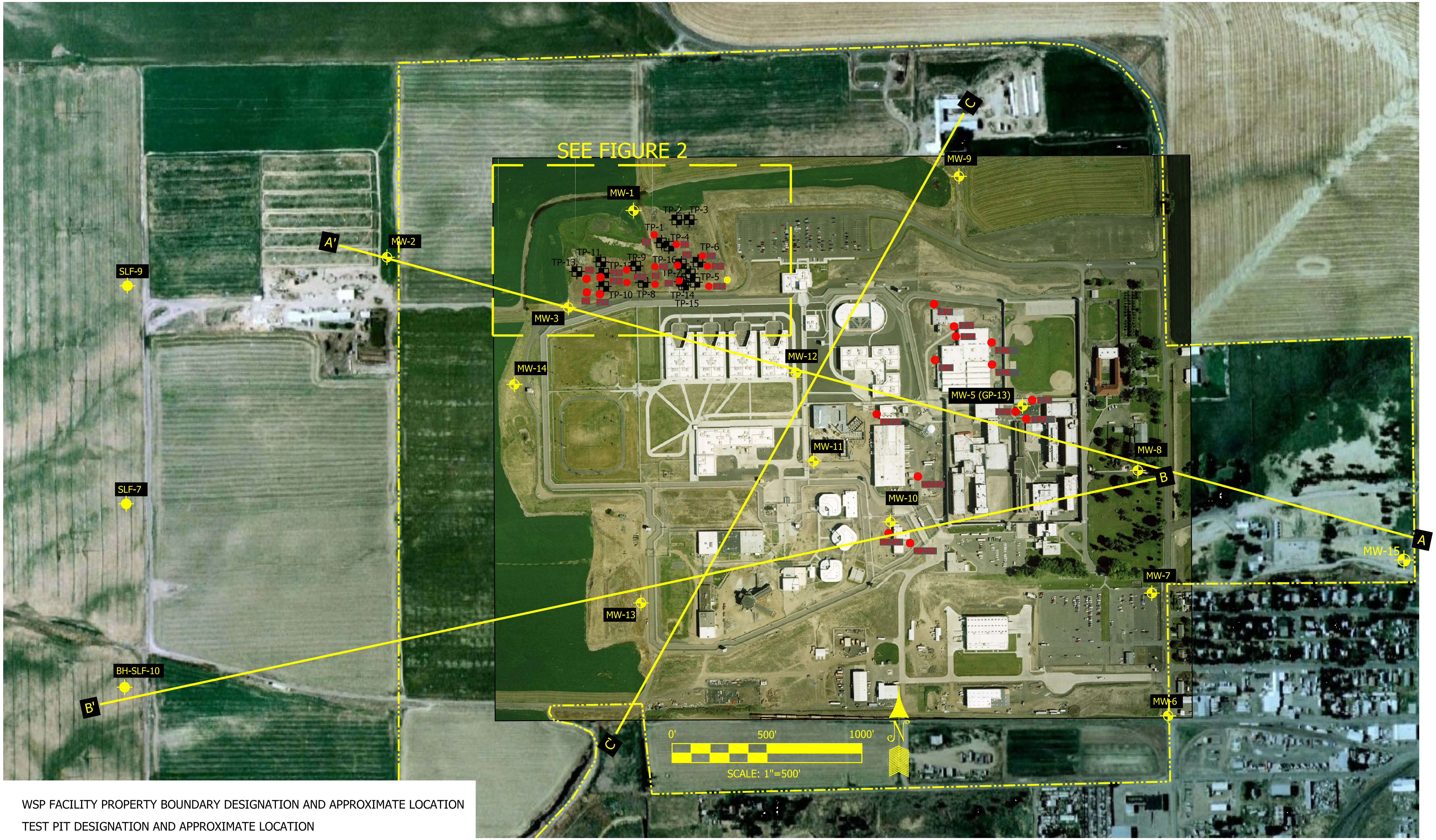
Figures



—··—	WSP FACILITY PROPERTY BOUNDARY DESIGNATION AND APPROXIMATE LOCATION
TP-1 ⊞	TEST PIT DESIGNATION AND APPROXIMATE LOCATION
MW-15 ⊕	WASHINGTON STATE PENITENTIARY GROUND WATER MONITORING WELL
SLF-10 ⊕	SUDBURY ROAD LANDFILL GROUND WATER MONITORING WELL
I-P9 ●	SOIL BORING DESIGNATION AND APPROXIMATE LOCATION
Ⓦ	IRRIGATION WELL #4 DESIGNATION AND APPROXIMATE LOCATION

BASE MAP PROVIDED BY WSP AND © BY GOOGLE EARTH

HWA GEOSCIENCES INC.

WASHINGTON STATE PENITENTIARY
WALLA WALLA, WASHINGTON

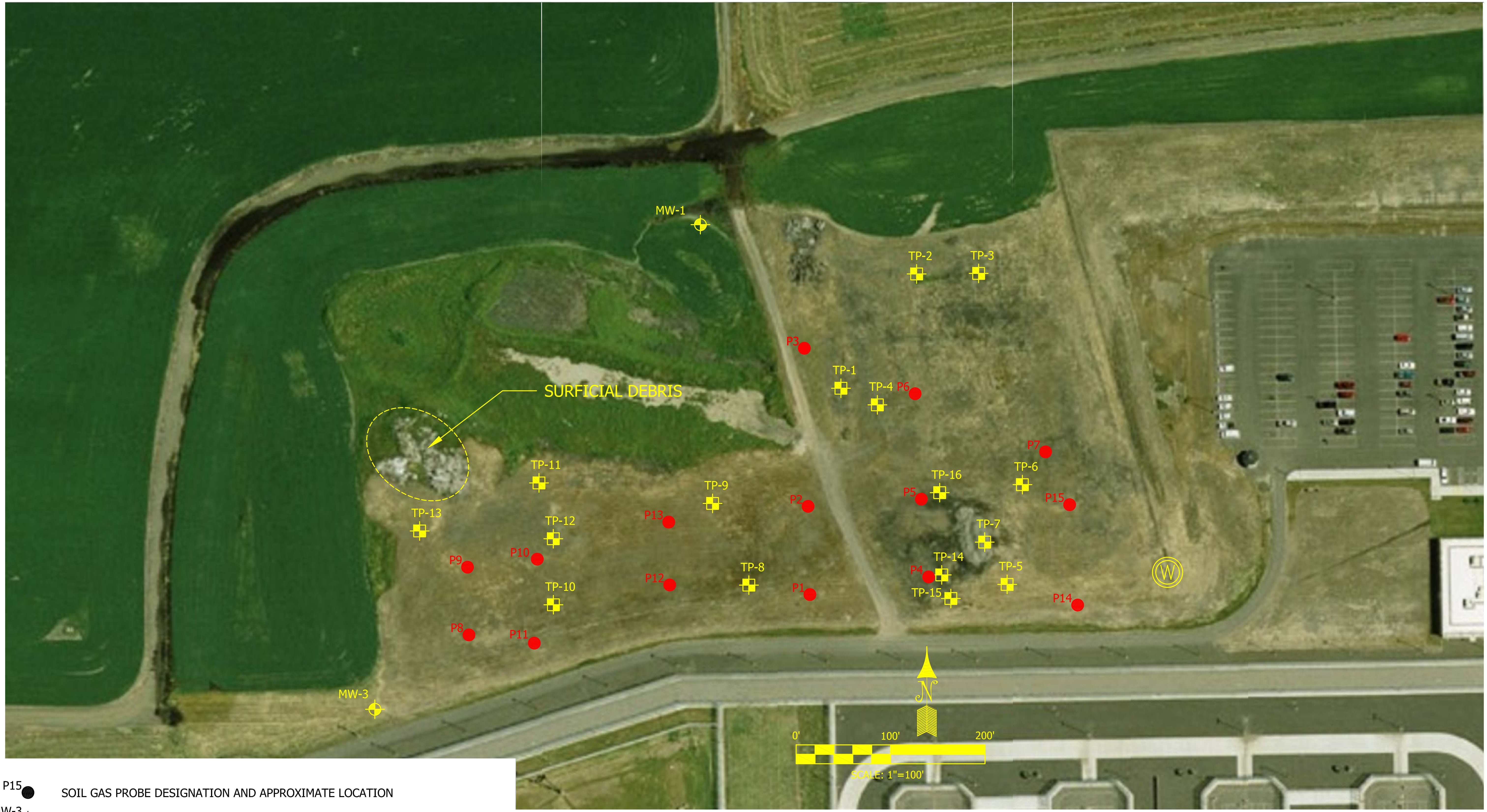
SITE AND
EXPLORATION
PLAN

DRAWN BY EFK
CHECK BY VA
DATE 06.23.11

FIGURE NO.
1

PROJECT NO.
2009-138-21
Task 100

S:\2009 PROJECTS\2009-138-22 WSP RI FS\CADD\HWA 2009-138.DWG <FIG 1 (2)> Plotted: 3/13/2012 3:54 PM



P15 ● SOIL GAS PROBE DESIGNATION AND APPROXIMATE LOCATION

MW-3 ⌖ WASHINGTON STATE PENITENTIARY GROUND WATER MONITORING WELL

TP-1 ▣ TEST PIT DESIGNATION AND APPROXIMATE LOCATION

Ⓦ IRRIGATION WELL #4 DESIGNATION AND APPROXIMATE LOCATION

HWA GEOSCIENCES INC.

WASHINGTON STATE PENITENTIARY
WALLA WALLA, WASHINGTON

TEST PIT LOCATION
LANDFILL AREAS

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DATE
06.23.11

FIGURE NO.
2

PROJECT NO.
2009-138-21
Task 100

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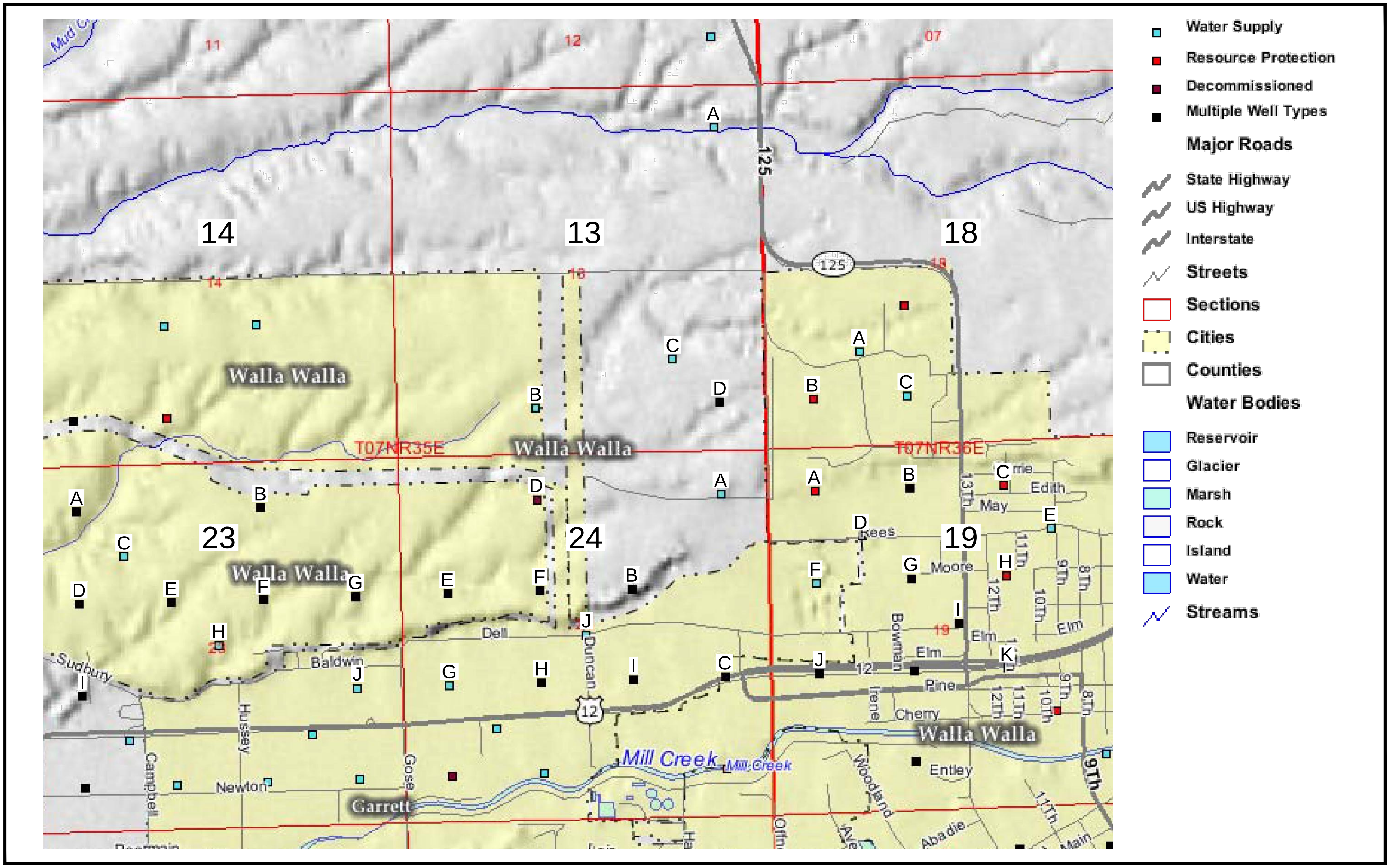
S:\2009 PROJECTS\2009-138-22 WSP RI FS\CADD\HWA 2009-138.DWG <FIG -2> Plotted: 12/16/2011 1:29 PM



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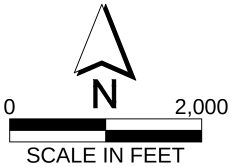
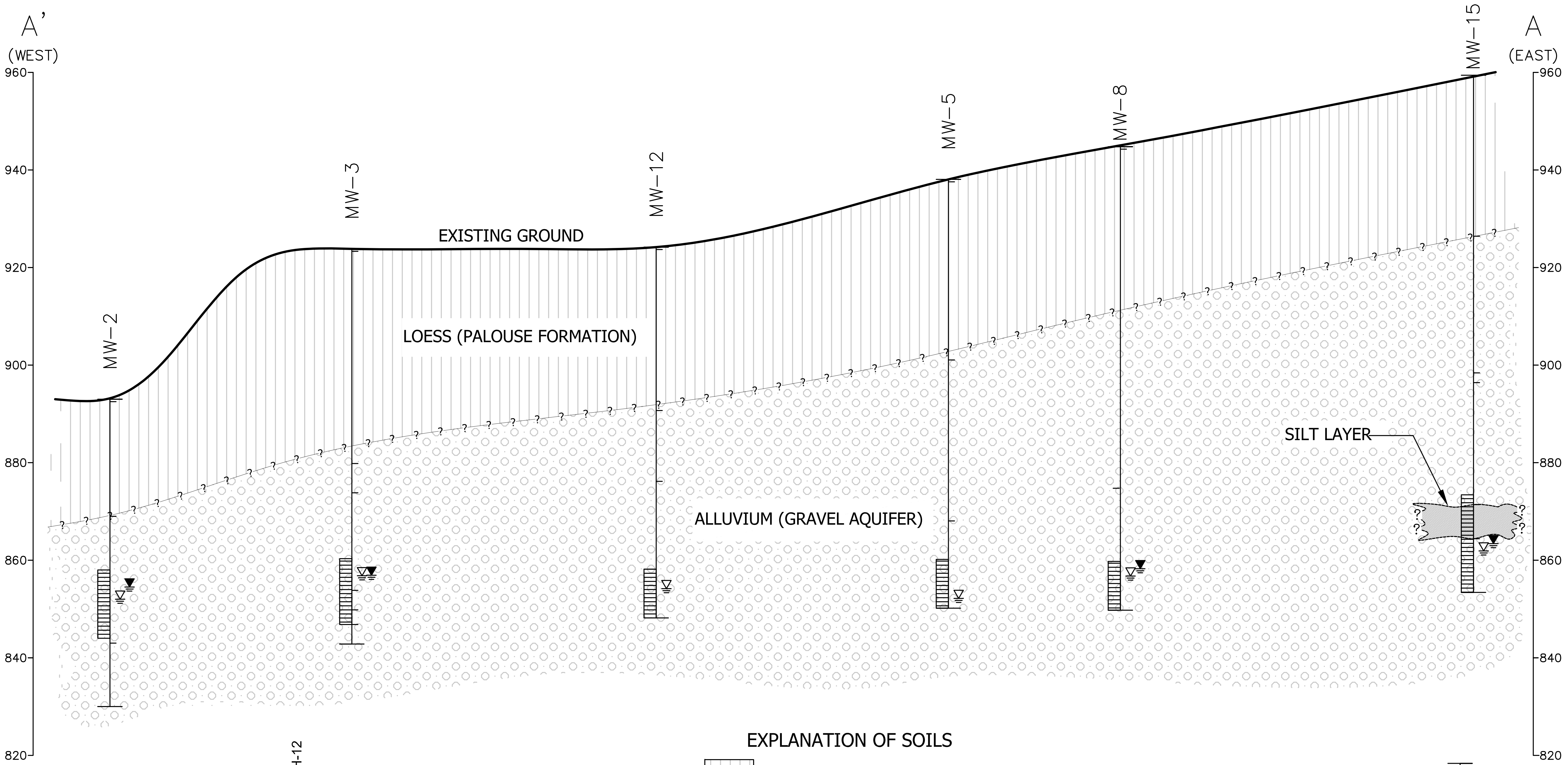


SOURCE: WASHINGTON STATE DEPARTMENT OF ECOLOGY

Figure 3
Water Well Inventory
Washington State Penitentiary
Walla Walla, Washington



LEGEND

ANALYTICAL RESULTS
IN MICROGRAMS PER LITER (ug/l)

TPH - TOTAL PETROLEUM HYDROCARBONS
PCE - TETRACHLOROETHENE
TCE - TRICHLOROETHENE
VC - VINYL CHLORIDE
TCPAH - TOTAL CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS
METALS - RCRA EIGHT METALS

BH-12	BOREHOLE DESIGNATION
▼	GROUND WATER LEVEL IN WELL AFTER WATER LEVEL STABILIZED
▽	GROUND WATER LEVEL AT TIME OF DRILLING
—?—?—?—	INFERRED GEOLOGIC CONTACT
▤	SCREENED INTERVAL
⊥	BOTTOM OF BORING

EXPLANATION OF SOILS

▥	LOESS (PALOUSE FORMATION) - yellow to brown SILT
○	ALLUVIUM (GRAVEL AQUIFER) - brown to gray SAND and GRAVEL

SPECIAL NOTE

THE SUBSURFACE CONDITIONS SHOWN ARE BASED ON WIDELY SPACED BORINGS AND SHOULD BE CONSIDERED APPROXIMATE. FURTHER, THE CONTACT LINES SHOWN BETWEEN UNITS ARE INTERPRETIVE IN NATURE AND MAY VARY LATERALLY OR VERTICALLY OVER RELATIVELY SHORT DISTANCES ON SITE.

SCALE
20'
400'

HWA GEOSCIENCES INC.

WASHINGTON STATE PENITENTIARY
WALLA WALLA, WASHINGTON

GEOLOGIC CROSS
SECTION
A-A'

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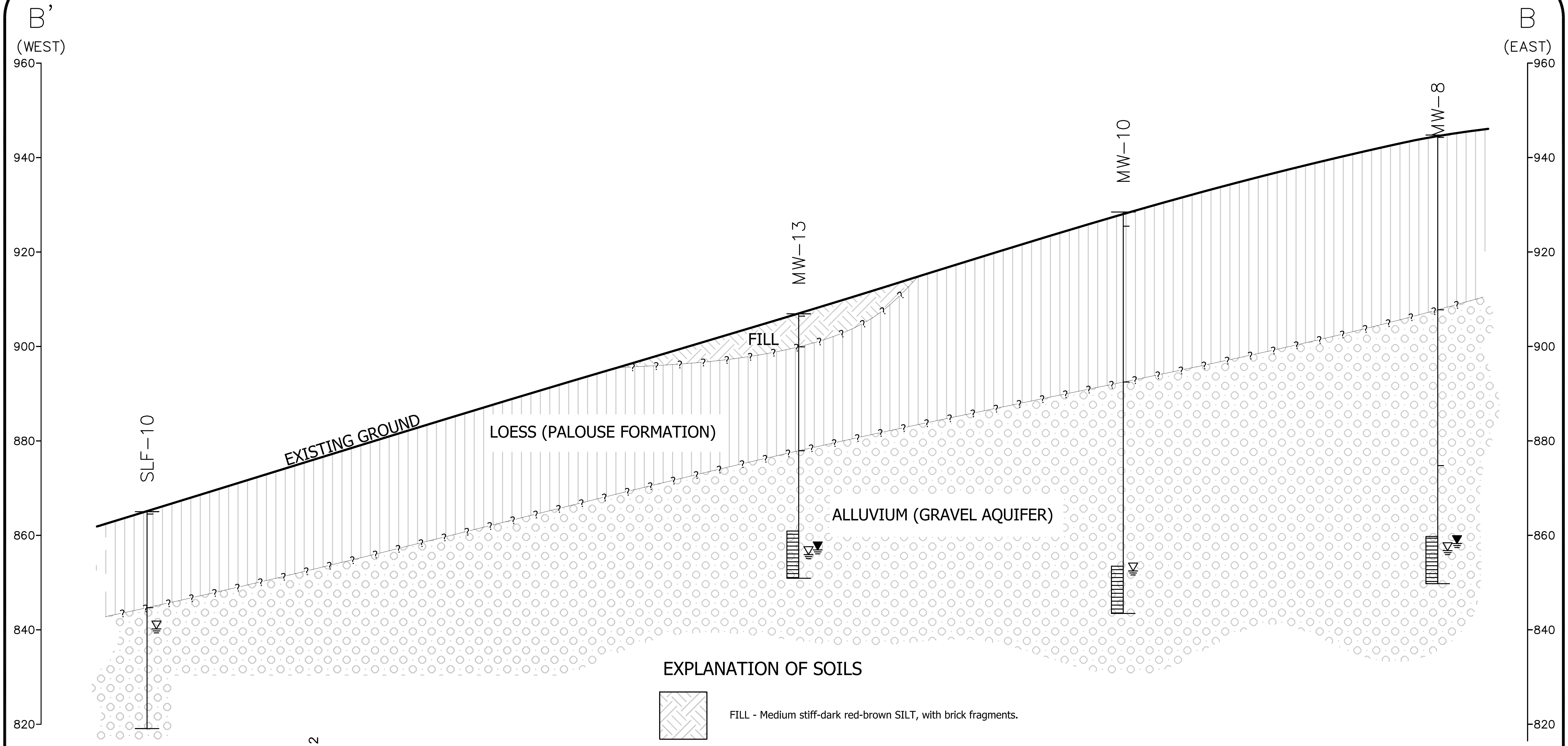
DATE
06.23.11

FIGURE NO.
4

PROJECT NO.
2009-138-21
Task 100

S:\2009 PROJECTS\2009-138-22 WSP RI FS\CADD\HWA 2009-138.DWG <FIG 4> Plotted: 3/5/2012 1:10 PM



EXPLANATION OF SOILS

▨	FILL - Medium stiff-dark red-brown SILT, with brick fragments.
▥	LOESS (PALOUSE FORMATION) - yellow to brown SILT
○	ALLUVIUM (GRAVEL AQUIFER) - brown to gray SAND and GRAVEL

LEGEND

ANALYTICAL RESULTS
IN MICROGRAMS PER LITER (ug/l)

TPH - TOTAL PETROLEUM HYDROCARBONS
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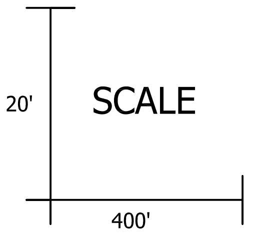
METALS - RCRA EIGHT METALS

BH-12	BOREHOLE DESIGNATION
▼	GROUND WATER LEVEL IN WELL AFTER WATER LEVEL STABILIZED
▽	GROUND WATER LEVEL AT TIME OF DRILLING
—?—?—?—?—	INFERRED GEOLOGIC CONTACT
▤	SCREENED INTERVAL
⊥	BOTTOM OF BORING

SPECIAL NOTE

THE SUBSURFACE CONDITIONS SHOWN ARE BASED ON WIDELY SPACED BORINGS AND SHOULD BE CONSIDERED APPROXIMATE. FURTHER, THE CONTACT LINES SHOWN BETWEEN UNITS ARE INTERPRETIVE IN NATURE AND MAY VARY LATERALLY OR VERTICALLY OVER RELATIVELY SHORT DISTANCES ON SITE.



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GEOLOGIC CROSS
SECTION
B-B'

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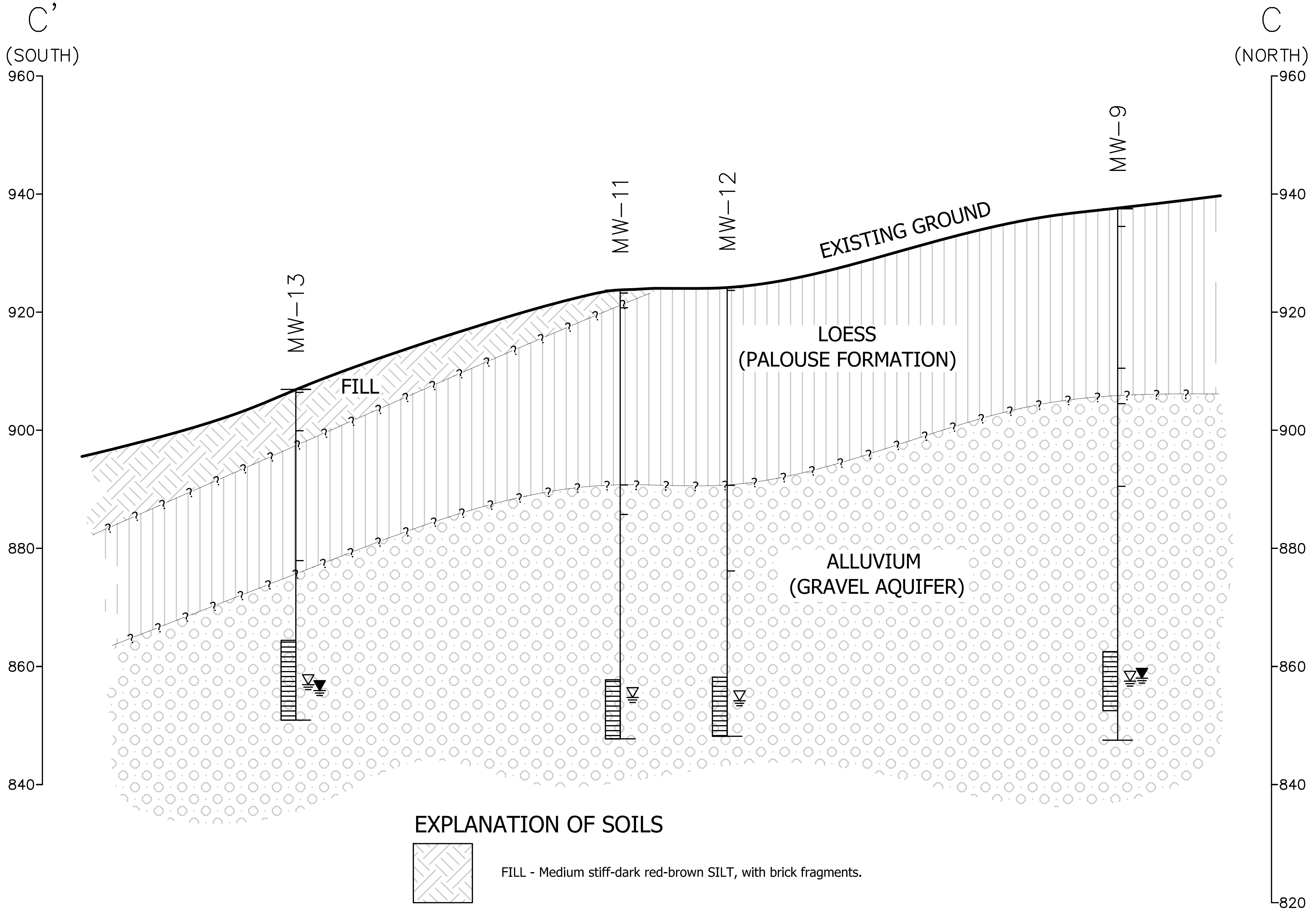
FIGURE NO. 5
PROJECT NO. 2009-138-21
Task 100

BASE MAP PROVIDED BY

S:\2009 PROJECTS\2009-138-22 WSP RI FS\CADD\HWA 2009-138.DWG <FIG 5> Plotted: 3/5/2012 1:02 PM



EXPLANATION OF SOILS

▨ FILL - Medium stiff-dark red-brown SILT, with brick fragments.

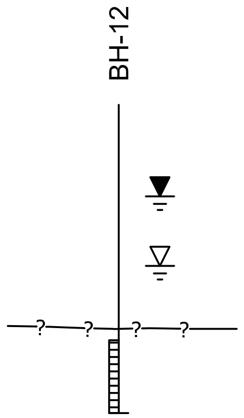
▥ LOESS (PALOUSE FORMATION) - yellow to brown SILT

○ ALLUVIUM (GRAVEL AQUIFER) - brown to gray SAND and GRAVEL

LEGEND

ANALYTICAL RESULTS
IN MICROGRAMS PER LITER (ug/l)

TPH -	TOTAL PETROLEUM HYDROCARBONS
PCE -	TETRACHLOROETHENE
TCE -	TRICHLOROETHENE
VC -	VINYL CHLORIDE
TCPAH -	TOTAL CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS
METALS -	RCRA EIGHT METALS



BOREHOLE DESIGNATION

GROUND WATER LEVEL IN WELL AFTER WATER LEVEL STABILIZED

GROUND WATER LEVEL AT TIME OF DRILLING

INFERRED GEOLOGIC CONTACT

SCREENED INTERVAL

BOTTOM OF BORING

SPECIAL NOTE

THE SUBSURFACE CONDITIONS SHOWN ARE BASED ON WIDELY SPACED BORINGS AND SHOULD BE CONSIDERED APPROXIMATE. FURTHER, THE CONTACT LINES SHOWN BETWEEN UNITS ARE INTERPRETIVE IN NATURE AND MAY VARY LATERALLY OR VERTICALLY OVER RELATIVELY SHORT DISTANCES ON SITE.

20'
SCALE
400'

BASE MAP PROVIDED BY

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WASHINGTON STATE PENITENTIARY
WALLA WALLA, WASHINGTON

GEOLOGIC CROSS
SECTION
C-C'

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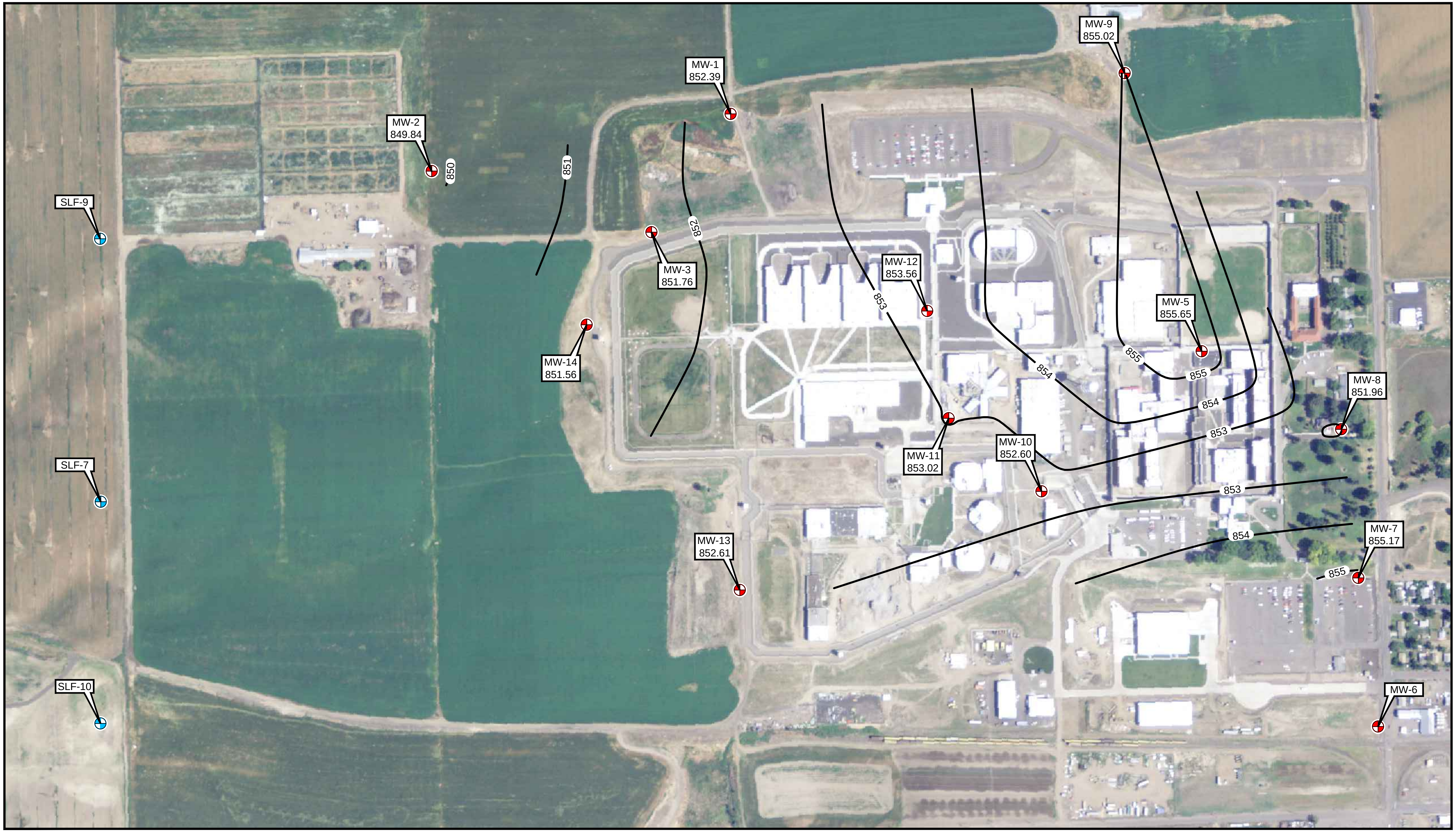
CHECK BY VA
DATE 06.23.11

FIGURE NO.
6

PROJECT NO.
2009-138-21
Task 100



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 400'

SCALE IN FEET

LEGEND

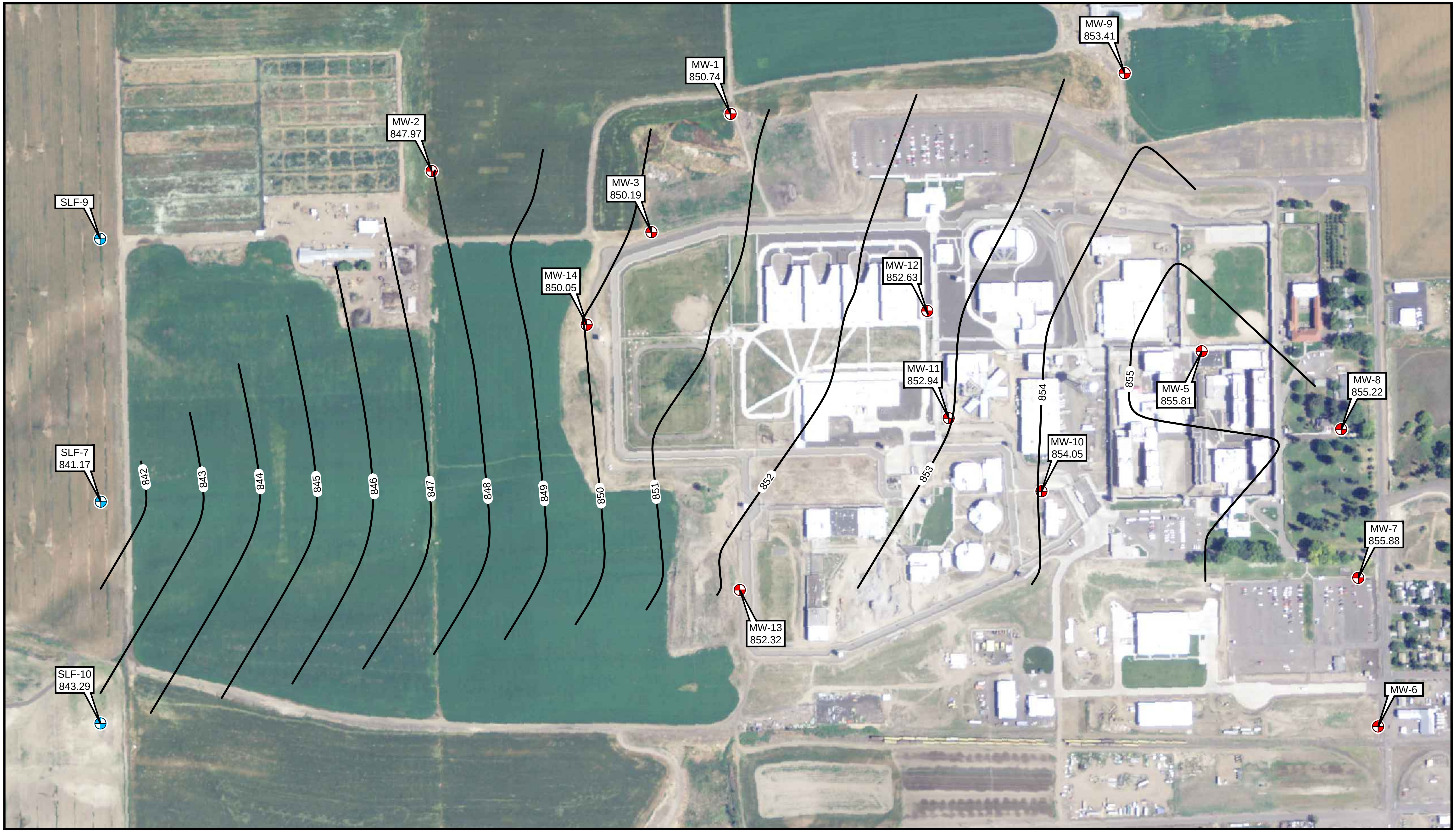
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

— Groundwater Contour

PHOTO SOURCE: 2011 NAIP

Figure 7
July 2010 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 400'

SCALE IN FEET

LEGEND

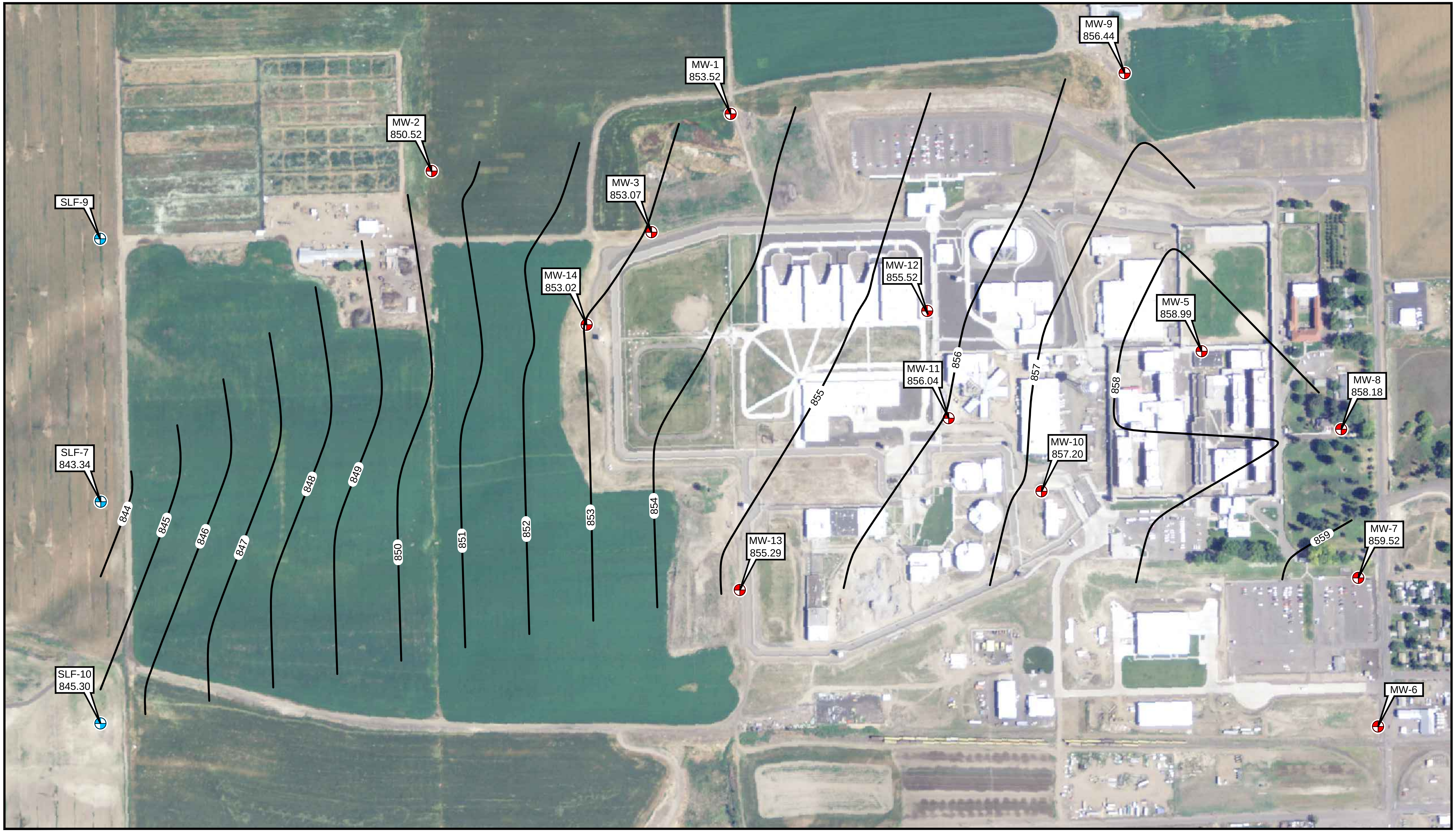
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

— Groundwater Contour

PHOTO SOURCE: 2011 NAIP

Figure 8
October 2010 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 400'

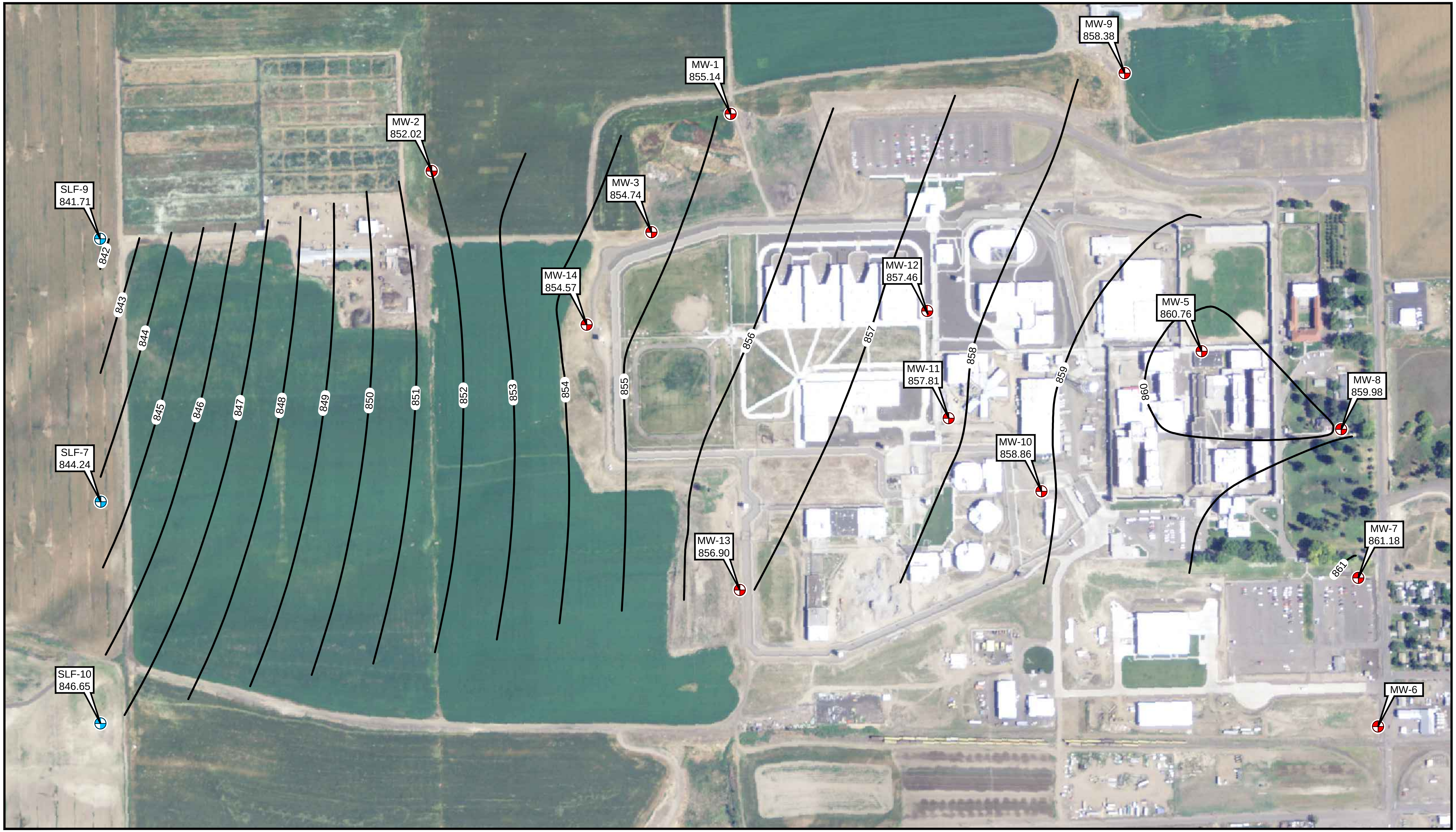
SCALE IN FEET

LEGEND

⊕ Sudbury Road Landfill Groundwater Monitoring Well	― Groundwater Contour
⊕ Washington State Penitentiary Groundwater Monitoring Well	

PHOTO SOURCE: 2011 NAIP

Figure 9
February 2011 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 400'
SCALE IN FEET

LEGEND

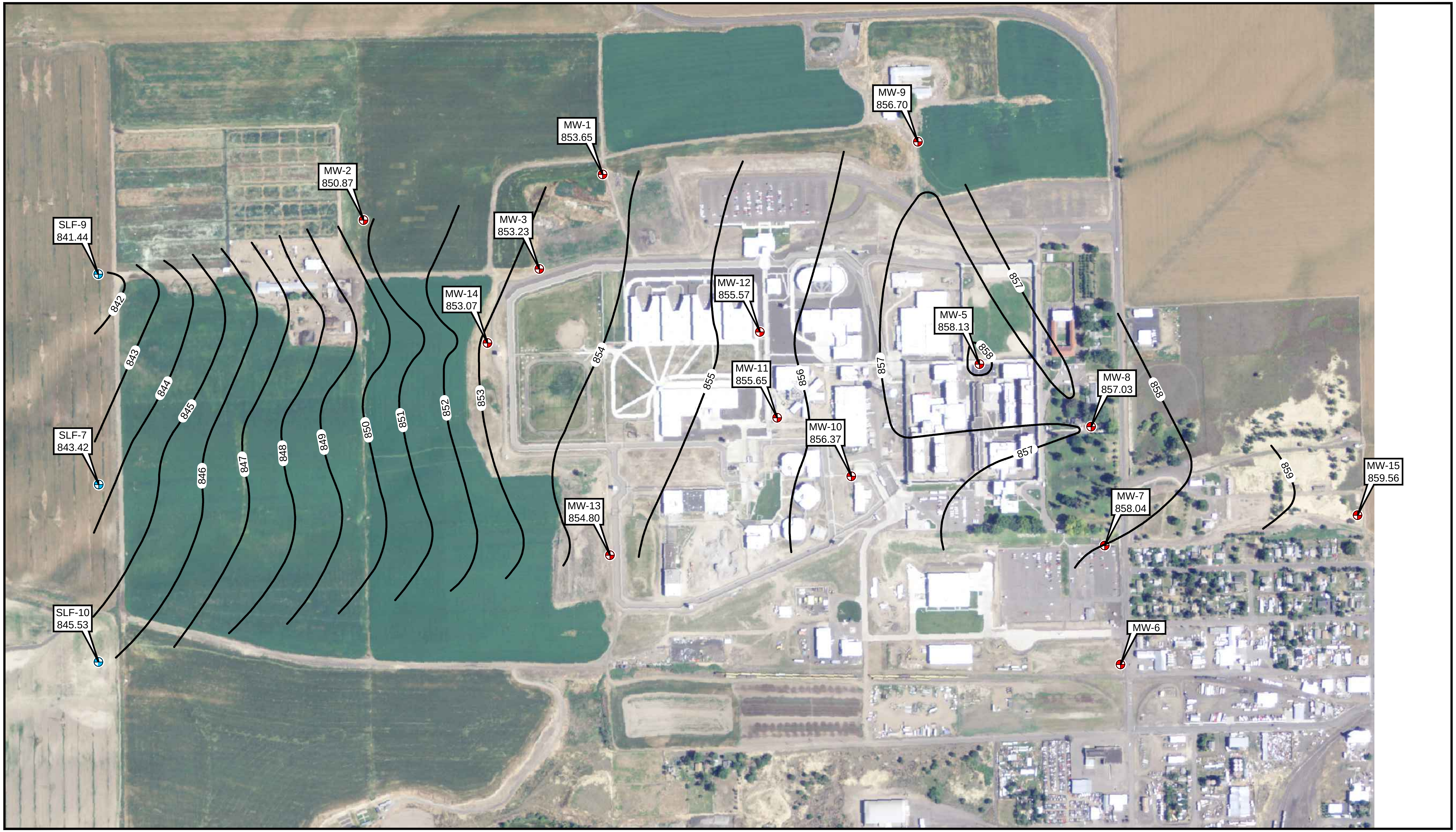
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

— Groundwater Contour

PHOTO SOURCE: 2011 NAIP

Figure 10
June 2011 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 500'

SCALE IN FEET

LEGEND

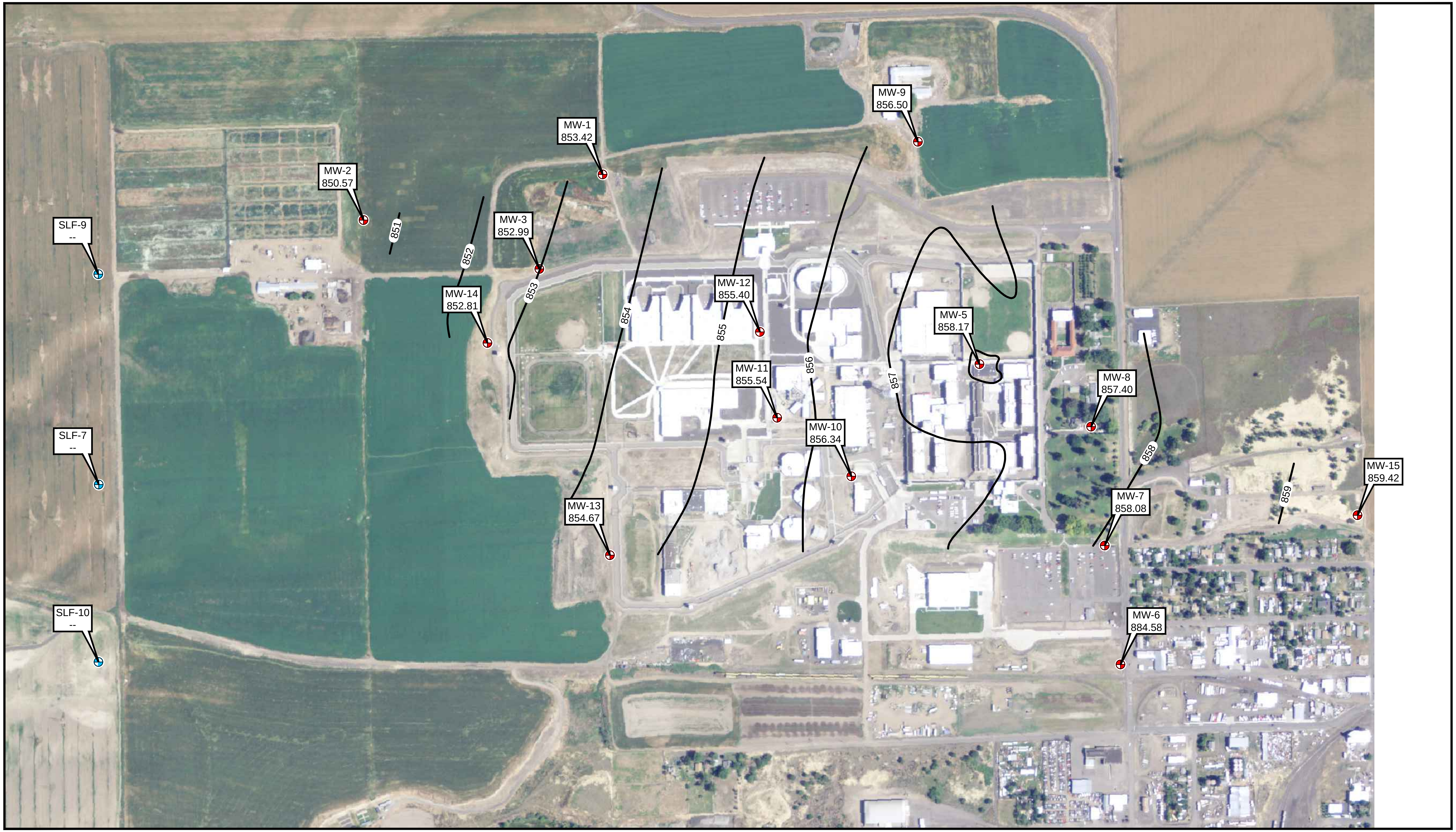
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

— Groundwater Contour

PHOTO SOURCE: 2011 NAIP

Figure 11
September 2011 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 10

N

0 500'

SCALE IN FEET

LEGEND

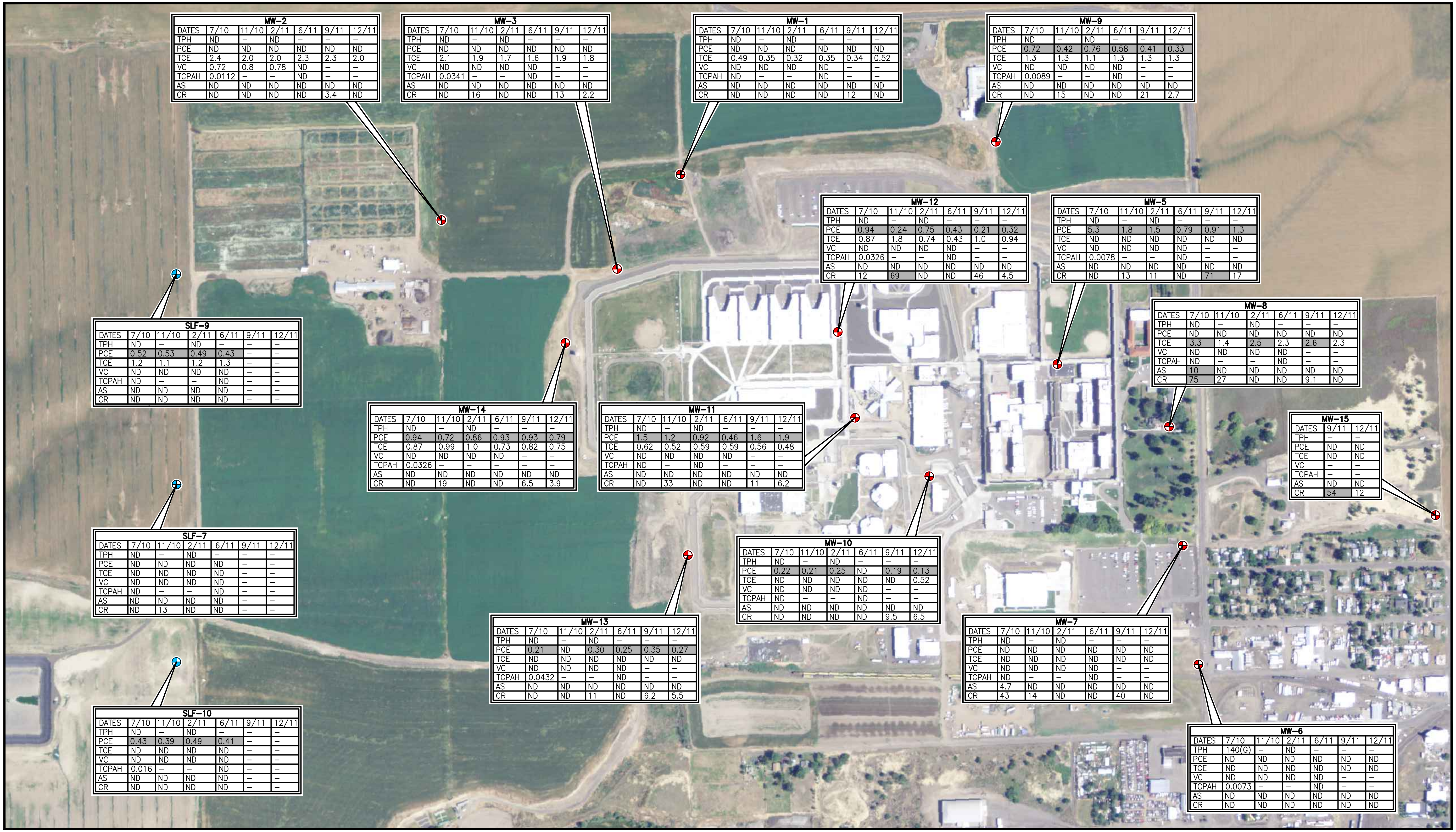
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

— Groundwater Contour

PHOTO SOURCE: 2011 NAIP

Figure 12
December 2011 Groundwater Surface
Washington State Penitentiary
Walla Walla, Washington



MW-2

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	2.4	2.0	2.0	2.3	2.3	2.0
VC	0.72	0.8	0.78	ND	–	–
TCPAH	0.0112	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	ND	ND	ND	3.4	ND

MW-3

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	2.1	1.9	1.7	1.6	1.9	1.8
VC	ND	ND	ND	ND	–	–
TCPAH	0.0341	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	16	ND	ND	13	2.2

MW-1

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	0.49	0.35	0.32	0.35	0.34	0.52
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	ND	ND	ND	12	ND

MW-9

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.72	0.42	0.76	0.58	0.41	0.33
TCE	1.3	1.3	1.1	1.3	1.3	1.3
VC	ND	ND	ND	ND	–	–
TCPAH	0.0089	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	15	ND	ND	21	2.7

MW-12

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.94	0.24	0.75	0.43	0.21	0.32
TCE	0.87	1.8	0.74	0.43	1.0	0.94
VC	ND	ND	ND	ND	–	–
TCPAH	0.0326	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	12	69	ND	ND	46	4.5

MW-5

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	5.3	1.8	1.5	0.79	0.91	1.3
TCE	ND	ND	ND	ND	ND	ND
VC	ND	ND	ND	ND	–	–
TCPAH	0.0078	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	13	11	ND	71	17

SLF-9

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.52	0.53	0.49	0.43	–	–
TCE	1.2	1.1	1.2	1.3	–	–
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	ND	ND	ND	ND	–	–
CR	ND	ND	ND	ND	–	–

MW-8

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	3.3	1.4	2.5	2.3	2.6	2.3
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	10	ND	ND	ND	ND	ND
CR	75	27	ND	ND	9.1	ND

MW-14

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.94	0.72	0.86	0.93	0.93	0.79
TCE	0.87	0.99	1.0	0.73	0.82	0.75
VC	ND	ND	ND	ND	–	–
TCPAH	0.0326	–	–	–	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	19	ND	ND	6.5	3.9

MW-11

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	1.5	1.2	0.92	0.46	1.6	1.9
TCE	0.62	0.52	0.59	0.59	0.56	0.48
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	ND	–	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	33	ND	ND	11	6.2

MW-15

DATES	9/11	12/11
TPH	–	–
PCE	ND	ND
TCE	ND	ND
VC	–	–
TCPAH	–	–
AS	ND	ND
CR	54	12

SLF-7

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	–	–
TCE	ND	ND	ND	ND	–	–
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	ND	ND	ND	ND	–	–
CR	ND	13	ND	ND	–	–

MW-10

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.22	0.21	0.25	ND	0.19	0.13
TCE	ND	ND	ND	ND	ND	0.52
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	ND	ND	ND	9.5	6.5

MW-13

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.21	ND	0.30	0.25	0.35	0.27
TCE	ND	ND	ND	ND	ND	ND
VC	ND	ND	ND	ND	–	–
TCPAH	0.0432	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	ND	11	ND	6.2	5.5

MW-7

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	ND	ND	ND	ND	ND	ND
VC	ND	ND	ND	ND	–	–
TCPAH	ND	–	–	ND	–	–
AS	4.7	ND	ND	ND	ND	ND
CR	43	14	ND	ND	40	ND

SLF-10

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	ND	–	ND	–	–	–
PCE	0.43	0.39	0.49	0.41	–	–
TCE	ND	ND	ND	ND	–	–
VC	ND	ND	ND	ND	–	–
TCPAH	0.016	–	–	ND	–	–
AS	ND	ND	ND	ND	–	–
CR	ND	ND	ND	ND	–	–

MW-6

DATES	7/10	11/10	2/11	6/11	9/11	12/11
TPH	140(G)	–	ND	–	–	–
PCE	ND	ND	ND	ND	ND	ND
TCE	ND	ND	ND	ND	ND	ND
VC	ND	ND	ND	ND	–	–
TCPAH	0.0073	–	–	ND	–	–
AS	ND	ND	ND	ND	ND	ND
CR	ND	ND	ND	ND	ND	ND

Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 12

LEGEND

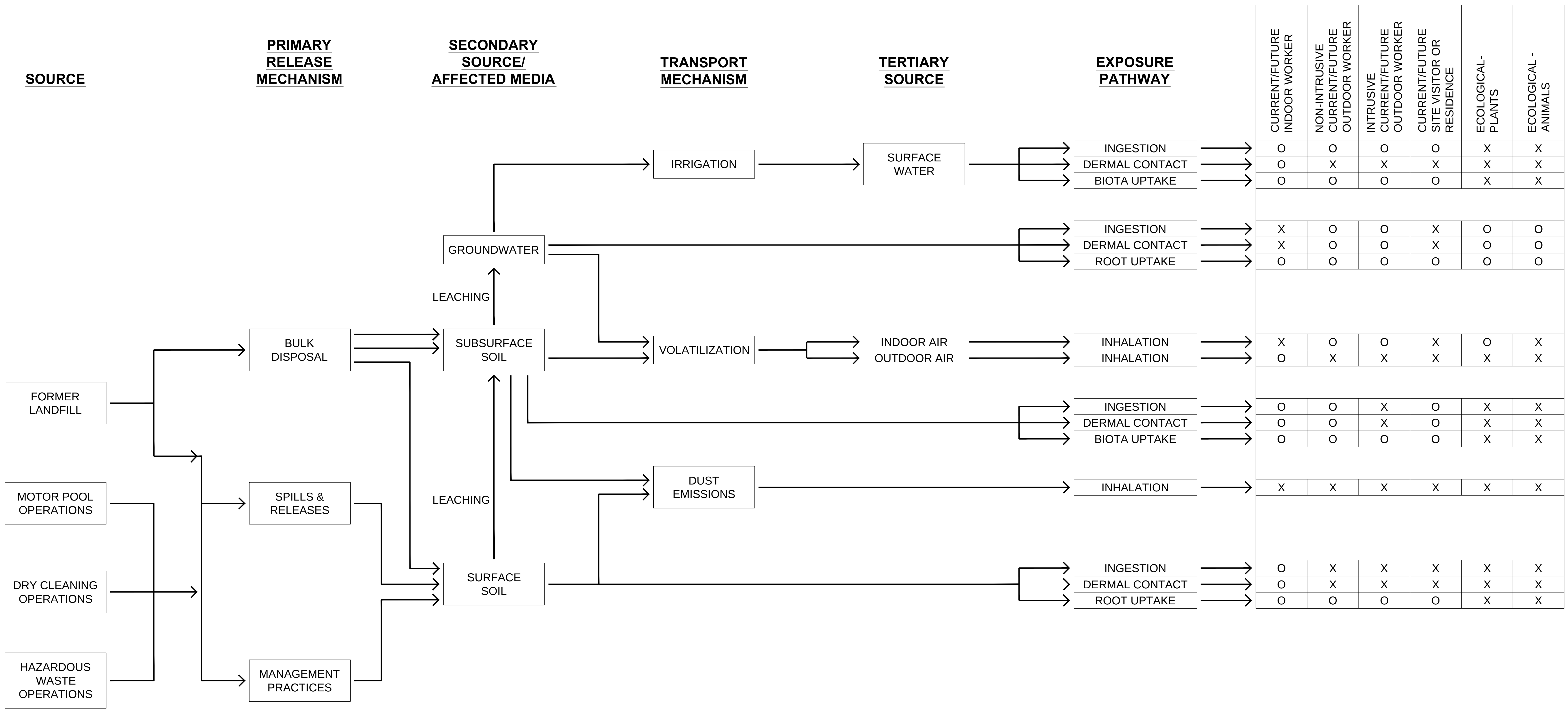
⊕ Sudbury Road Landfill Groundwater Monitoring Well

⊕ Washington State Penitentiary Groundwater Monitoring Well

TPH = Total Petroleum Hydrocarbons: (G)asoline; (D)iesel; (O)il
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride
TCPAH = Carcinogenic PAH by toxic equivalency factor method, per Method A guidance
AS = Arsenic
CR = Chromium
ND = Not detected above laboratory reporting limit

\- = Parameter not analyzed
▨ = Exceeds Screening Level

Figure 13
Groundwater Results
Washington State Penitentiary
Walla Walla, Washington



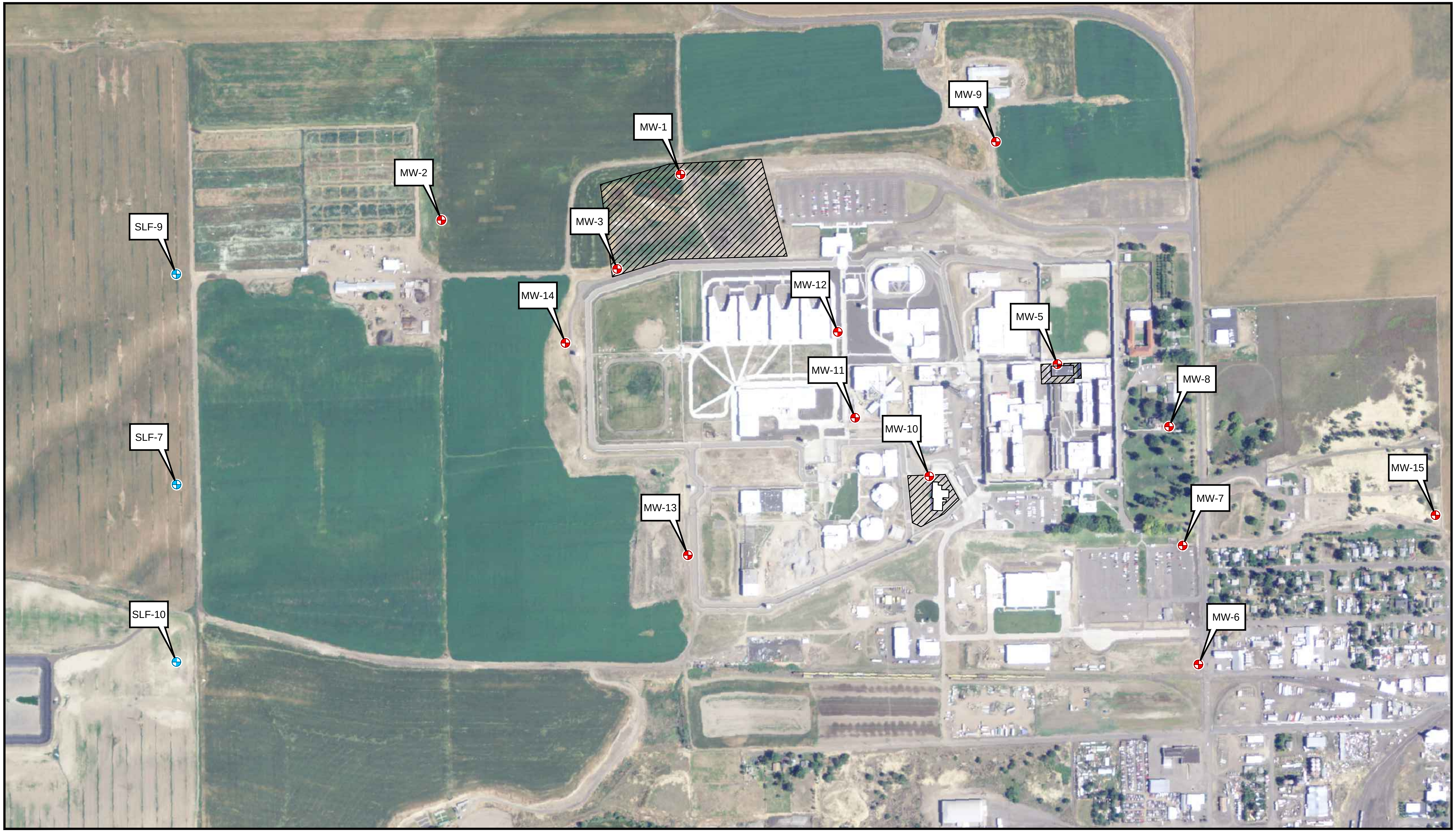
EXPOSURE PATHWAY	CURRENT/FUTURE INDOOR WORKER	NON-INTRUSIVE CURRENT/FUTURE OUTDOOR WORKER	INTRUSIVE CURRENT/FUTURE OUTDOOR WORKER	CURRENT/FUTURE SITE VISITOR OR RESIDENCE	ECOLOGICAL-PLANTS	ECOLOGICAL - ANIMALS
INGESTION	O	O	O	O	X	X
DERMAL CONTACT	O	X	X	X	X	X
BIOTA UPTAKE	O	O	O	O	X	X
INGESTION	X	O	O	X	O	O
DERMAL CONTACT	X	O	O	X	O	O
ROOT UPTAKE	O	O	O	O	O	O
INHALATION	X	O	O	X	O	X
INHALATION	O	X	X	X	X	X
INGESTION	O	O	X	O	X	X
DERMAL CONTACT	O	O	X	O	X	X
BIOTA UPTAKE	O	O	O	O	X	X
INHALATION	X	X	X	X	X	X
INGESTION	O	X	X	X	X	X
DERMAL CONTACT	O	X	X	X	X	X
ROOT UPTAKE	O	O	O	O	X	X

LEGEND

X = COMPLETE
O = INCOMPLETE

Parametrix DATE: November 15, 2012 FILE: SU2662004-FIG 13

Figure 14
Conceptual Site Model
Washington State Department of Corrections
WSP RI/FS



Parametrix DATE: Nov 20, 2012 FILE: Su2662004-Fig 14

N

0 400'

SCALE IN FEET

LEGEND

🔵 Sudbury Road Landfill Groundwater Monitoring Well

🔴 Washington State Penitentiary Groundwater Monitoring Well

TPH = Total Petroleum Hydrocarbons: (G)asoline; (D)iesel; (O)il
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride
TCPAH = Carcinogenic PAH by toxic equivalency factor method, per Method A guidance
AS = Arsenic
CR = Chromium
ND = Not detected above laboratory reporting limit

▨ Low Permeability Cap

Figure 15
Alternative 2
Washington State Penitentiary
Walla Walla, Washington

Tables

Table 1. Groundwater Analytical Data

ANALYTE	Units	Screening Levels				MW-1									MW-2								
		MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]	2/18/98	7/14/98	Sept/Oct 99	7/12/10	10/25/10	2/7/11	6/20/11	9/19/11	12/13/11	2/18/98	7/14/98	Sept/Oct 99	7/12/10	10/25/10	2/7/11	6/20/11	9/19/11	12/13/11
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
Gasoline Range Organics	µg/l	800/1000*	-	-	-	--	--	--	100 U	--	100 U	--	--	--	--	--	--	100 U	--	100 U	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	--	--	--	0.27 U	--	0.26 UJ	--	--	--	--	--	--	0.26 U	--	0.26 UJ	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	--	--	--	0.43 U	--	0.42 UJ	--	--	--	--	--	--	0.42 U	--	0.41 UJ	--	--	--
TOTAL METALS[2]																							
Arsenic	µg/l	5	0.058	10	-	--	--	--	3.3 U	3.3 U	--	--	5.0 U	5.0 U	--	--	--	3.3 U	3.3 U	--	--	5.0 U	5.0 U
Chromium	µg/l	50	-	100	-	--	--	--	11 U	11 U	--	--	12	2.0 U	--	--	--	11 U	11 U	--	--	3.4	2.0 U
Copper	µg/l	-	6,400	1,300	-	--	--	--	11 U	11 U	--	--	--	--	--	--	--	11 U	11 U	--	--	--	--
Lead	µg/l	15	-	15	-	--	--	--	--	1.1 U	--	--	2.0 U	2.0 U	--	--	--	--	1.1 U	--	--	2.0 U	2.0 U
Manganese	µg/l	-	2,200	-	50	--	--	--	11 U	11 U	--	--	--	--	--	--	--	11 U	11 U	--	--	--	--
DISSOLVED METALS[1]																							
Chromium	µg/l	50	-	100	-	1 U	1 U	1.50	10 U	10 U	10 U	10 U	--	--	1.3	1.6	1.50	10 U	10 U	10 U	10 U	--	--
Copper	µg/l	-	6,400	1,300	-	2.6	3	0.220	10 U	10 U	10 U	10 U	--	--	1 U	3.5	2.00 U	10 U	10 U	10 U	10 U	--	--
Lead	µg/l	15	-	15		1 U	1 U	1.00 U	--	1.0 U	1.0 U	1.0 U	--	--	1 U	1 U	1.00 U	--	1.0 U	1.0 U	1.0 U	--	--
Manganese	µg/l	-	2,200	-	50	105	10.0 U	10.0 U	10 U	10 U	11 U	10 U	--	--	68	10.0 U	10.0 U	10 U	10 U	11 U	10 U	--	--
Mercury	µg/l	2	-	2	-	0.5 U	0.25	0.20 U	0.50 U	0.50 U	0.50 U	0.50 U		0.20 U	0.5 U	0.2 U	0.20 U	--	--	--	--	--	0.20 U
Nickel	µg/l	-	-	100	-	3.6	1.7	2.00 U	--	--	--	--	--	--	2.3	3.3	2.00	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	2.6	3 U	2.00	--	--	--	--	--	--	1 U	1.1	1.00 U	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	5	5.9	7.70	--	--	--	--	--	--	5 U	7.2	5.60 U	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS[1]																							
Vinyl Chloride	µg/l	0.2	0.029	2	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Chloroform	µg/l	-	80	80	-	--	--	1 U	0.25	0.20	0.20 U	0.24	--	--	--	1.00**	1 U	0.72	0.8	0.78	0.89	--	--
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	1.73**	1.92	1.10	0.49	0.35	0.32	0.35	0.34	0.52	5.72	6.45	4.84	2.4	2.0	2.0	2.3	2.3	2.0
Toluene	µg/l	1000			-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	--	--	1 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	--	--	1 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U
sec-Butylbenzene	µg/l	-	-	-	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Naphthalene	µg/l	160	160	-	-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
1-Methylnaphthalene	µg/l	-	-	-	-	--	--	--	0.096 U	--	0.096 UJ	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Acenaphthene	µg/l	-	960	-	-	--	--	--	0.096 U	--	0.096 UJ	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Fluorene	µg/l	-	640	-	-	--	--	--	0.096 U	--	0.096 UJ	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Phenanthrene	µg/l	-	-	-	-	--	--	--	0.096 U	--	0.096 UJ	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.017	--	0.0096 UJ	--	--	--
Chrysene*	µg/l	-	12	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.023	--	0.0096 UJ	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.020	--	0.0096 UJ	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.014	--	0.0096 UJ	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.0096 U	--	0.0096 UJ	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	--	--	--	0.0072 U	--	0.0072 UJ	--	--	--	--	--	--	0.0112	--	0.0072 UJ	--	--	--
CONVENTIONALS																							
Calcuim	mg/l	-	-	-	-	--	--	--	95	99	150	130	--	--	--	--	--	67	66	71	71	--	--
Magnesium	mg/l	-	-	-	-	--	--	--	37	--	--	--	--	--	--	--	--	28	--	--	--	--	--
Sodium	mg/l	-	-	-	20	--	--	--	20	20	21	25	--	--	--	--	--	21	19	21	20	--	--
Total Dissolved Solids	mg/l	-	-	-	500	570	475	535	560 J	--	--	--	--	--	376	418	375	440 J	--	--	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	3 U	3 U	3.94	--	--	--	--		--	3 U	3 U	3.0 U	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	1.5	0.1 U	0.100 U	--	0.050 U	0.050 U	0.70	--	--	0.1 U	0.1 U	0.131	--	0.050 U	0.050 U	0.34	--	--
Nitrate	mg/l	-	-	10	-	18.3	15.0	16.2	15 J	15	20 J	22 J	--	--	13.6	13.9	12.2	15 J	14	16	15	--	--
Nitrite	mg/l	-	-	1	-	0.1 U	0.1 U	0.100 U	--	--	--	--		--	0.1 U	0.1 U	0.100 U	--	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	328	249	317	330 J	410	380	430	--	--	223	204	207	240 J	250	240	250	--	--
Sulfate	mg/l	-	-	-	250	60.3	38.0	41.3	48	44	54	72	--	--	21.4	21.1	22.0	24	22	23	23	--	--
Chloride	mg/l	-	-	-	250	51.6	35.3	35.3	--	--	--	--	--	--	27.6	25.1	19.7	--	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	10 U	10 U	10.0 U	20	--	--	--	--	--	10 U	10 U	10.0 U	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	328	249	317	--	--	--	--	--	--	223	204	207	--	--	--	--	--	--
FIELD PARAMETERS																							
pH	S.U.	-	-	-	-	7.80	6.10	7.10	6.57	6.58	6.61	6.80	6.51	--	7.80	6.60	7.50	6.95	6.95	7.02	7.26	6.64	--
Conductivity	µS/cm	-	-	-	-	1210	1190	200	892	1080	1280	1210	820.0	--	790	1040	430	685	828	842	900	625	--
Dissolved Oxygen	mg/l	-	-	-	-	NC	NC	NC	4.36	8.98	4.68	6.95	5.27	--	NC	NC	NC	7.40	8.77	8.36	10.03	7.64	--
Temperature	℃	-	-	-	-	14	17	13	18.55	17.70	15.77	19.29	21.17	--	13	15	16	16.49	18.2	15.94	18.79	18.69	--
Turbidity	NTU	-	-	-	-	NC	NC	NC	NC	49.8	0	227	32.8	--	NC	NC	NC	NC	6.5	0	51.7	90	--
Oxidation Reduction Potential	mV	-	-	-	-	NC	NC	NC	144	229	50	74	89	--	NC	NC	NC	126	192	41	53	86	--

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.

\- No comparative value established.

-- No analysis was completed for this parameter or parameter was non-detect.

* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.

** Parameter in initial sample not detected. Duplicate result presented.

[1] Only analytes with a minimum of one detection are listed.

[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.

[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
℃ Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.

NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID	MW-3									MW-4			MW-5						
					Date Sampled	2/18/98	7/14/98	Sept/Oct 99	7/13/10	10/25/10	2/7/11	6/20/11	9/19/11	12/13/11	2/1/98	7/1/98	Sept/Oct 99	Sept/Oct 99	7/16/10	10/27/10	2/9/11	6/22/11	9/20/11	12/14/11
		Screening Levels																						
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]																			
POLYCYCLIC AROMATIC HYDROCARBONS[1]																								
Gasoline Range Organics	µg/l	800/1000*	-	-	-	--	--	--	100 U	--	100 U	--	--	--	--	--	--	--	100 U	--	100 U	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	--	--	--	0.26 U	--	0.26 UJ	--	--	--	--	--	--	--	0.27 U	--	0.26 U	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	--	--	--	0.42 U	--	0.41 UJ	--	--	--	--	--	--	--	0.43 U	--	0.42 U	--	--	--
TOTAL METALS[2]																								
Arsenic	µg/l	5	0.058	10	-	--	--	--	3.3 U	3.3 U	--	--	5.0 U	5.0 U	--	--	--	--	3.3 U	3.3 U	--	--	5.0 U	5.0 U
Chromium	µg/l	50	-	100	-	--	--	--	11 U	16	--	--	13	2.2	--	--	--	--	11 U	13	--	--	71	17
Copper	µg/l	-	6,400	1,300	-	--	--	--	11 U	11 U	--	--	--	--	--	--	--	--	11 U	11 U	--	--	--	--
Lead	µg/l	15	-	15	-	--	--	--	--	1.1 U	--	--	2.0 U	2.0 U	--	--	--	--	--	1.1 U	--	--	2.0 U	2.0 U
Manganese	µg/l	-	2,200	-	50	--	--	--	27	40	--	--	--	--	--	--	--	--	32	29	--	--	--	--
DISSOLVED METALS[1]																								
Chromium	µg/l	50	-	100	-	1 U	1.3	1.50	10 U	10 U	10 U	10 U	--	--	1.3	1.5	2.00	2.10 J	10 U	10 U	11	10 U	--	--
Copper	µg/l	-	6,400	1,300	-	1 U	2.6	2.00 U	10 U	10 U	10 U	10 U	--	--	2.6	2.4	2.00	2.00 J	10 U	10 U	10 U	10 U	--	--
Lead	µg/l	15	-	15		1 U	1 U	1.00 U	--	1.0 U	1.0 U	1.0 U	--	--	1 U	1 U	1.00 U	1.00 J	--	1.0 U	1.0 U	1.0 U	--	--
Manganese	µg/l	-	2,200	-	50	127	10.0 U	10.0 U	10 U	10 U	11 U	10 U	--	--	1 U	10.0 U	21.0	31.0 J	10 U	10 U	11 U	10 U	--	--
Mercury	µg/l	2	-	2	-	0.5 U	0.2 U	0.20 U	--	--	--	--	--	0.20 U	0.5 U	0.2 U	0.20 U	0.20 J	--	--	--	--	--	0.20 U
Nickel	µg/l	-	-	100	-	2.1	3.4	2.00 U	--	--	--	--	--	--	2.3	1.7	3.40	6.30	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	1 U	1.4	1.10 U	--	--	--	--	--	--	1 U	1.4	1.00 U	1.00 J	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	6.3	5	5.40 U	--	--	--	--	--	--	6.3	5.7	42.9	5.00	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS[1]																								
Vinyl Chloride	µg/l	0.2	0.029	2	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Chloroform	µg/l	-	80	80	-	1.07	--	1 U	0.89	0.94	0.83	0.89	--	--	2.87	1.67	1 U	1 J	0.20	0.20 U	0.20 U	0.20 U	--	--
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	5.06	6.06	3.98	2.1	1.9	1.7	1.6	1.90	1.8	6.14	6.56	5.19	1 J	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U
Toluene	µg/l	1000			-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	--	--	1 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	--	--	1 U	1 J	5.3	1.8	1.5	0.79	0.91	1.30
sec-Butylbenzene	µg/l	-	-	-	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Naphthalene	µg/l	160	160	-	-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
POLYCYCLIC AROMATIC HYDROCARBONS[1]																								
1-Methylnaphthalene	µg/l	-	-	-	-	--	--	--	0.094 U	--	0.097 UJ	--	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Acenaphthene	µg/l	-	960	-	-	--	--	--	0.094 U	--	0.097 UJ	--	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Fluorene	µg/l	-	640	-	-	--	--	--	0.094 U	--	0.097 UJ	--	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Phenanthrene	µg/l	-	-	-	-	--	--	--	0.094 U	--	0.097 UJ	--	--	--	--	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	--	--	--	0.016	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.026	--	0.0097 UJ	--	--	--	--	--	--	--	0.010	--	0.0096 UJ	--	--	--
Chrysene*	µg/l	-	12	-	-	--	--	--	0.038	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	--	--	--	0.036	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	--	--	--	0.026	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	--	--	--	0.023	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	--	--	--	0.014	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.0094 U	--	0.0097 UJ	--	--	--	--	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	--	--	--	0.0341	--	0.0073 UJ	--	--	--	--	--	--	--	0.0078	--	0.0072 UJ	--	--	--
CONVENTIONALS																								
Calcuim	mg/l	-	-	-	-	--	--	--	73	67	82	64	--	--	--	--	--	--	15	27	19	16	--	--
Magnesium	mg/l	-	-	-	-	--	--	--	31	--	--	--	--	--	--	--	--	--	6.2	--	--	--	--	--
Sodium	mg/l	-	-	-	20	--	--	--	18	17	19	13	--	--	--	--	--	--	9.3	16	11	9.8	--	--
Total Dissolved Solids	mg/l	-	-	-	500	376	408	357	460 J	--	--	--	--	--	417	392	358	160	140	--	--	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	3 U	3 U	3.11	--	--	--	--	--	--	3 U	3 U	15.0	7.53	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	0.1 U	0.201	0.100 U	--	0.063	0.050 U	0.25	--	--	0.1 U	0.192	0.100 U	0.100 J	--	0.071	0.050 U	0.12	--	--
Nitrate	mg/l	-	-	10	-	0.1 U	14.8	12.1	19 J	16	22	24	--	--	0.1 U	13.1	10.7	0.467	1.3 J	1.4	1.9	1.3	--	--
Nitrite	mg/l	-	-	1	-	20.7	0.258	0.100 U	--	--	--	--	--	--	20	0.237	0.100 U	0.153	--	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	243	205	200	250 J	240	280	310	--	--	224	210	214	131	76	130	300	82	--	--
Sulfate	mg/l	-	-	-	250	14	20.6	22.4	23	22	23	24	--	--	15.4	18.8	19.2	1.33	5.0 U	14	6.8	5.0 U	--	--
Chloride	mg/l	-	-	-	250	27.9	26.1	15.8	--	--	--	--	--	--	30.9	20.2	14.3	1.87	--	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	10 U	10 U	10.0 U	--	--	--	--	--	--	10 U	10 U	10.0 U	10.0 J	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	243	205	200	--	--	--	--	--	--	224	210	214	131	--	--	--	--	--	--
FIELD PARAMETERS																								
pH	S.U.	-	-	-	-	7.60	6.10	7.40	6.80	6.90	6.82	6.85	6.72	--	7.60	6.70	7.60	8.20	6.95	7.15	6.98	7.58	7.19	--
Conductivity	µS/cm	-	-	-	-	830	1020	280	731	859	928	999	1030	--	810	930	370	70	173	380	269	515	138	--
Dissolved Oxygen	mg/l	-	-	-	-	NC	NC	NC	6.28	7.01	5.27	6.79	6.40	--	NC	NC	NC	NC	6.68	8.37	8.76	7.40	7.48	--
Temperature	°C	-	-	-	-	13	17	15	18.38	18.4	16.66	20.82	19.76	--	14	17	16	15	22.5	22.0	17.47	22.6	21.74	--
Turbidity	NTU	-	-	-	-	NC	NC	NC	--	99.1	56.5	55.4	35.0	--	NC	NC	NC	NC	NC	307	115.0	257.0	256	--
Oxidation Reduction Potential	mV	-	-	-	-	NC	NC	NC	105	158	25	68	67	--	NC	NC	NC	NC	111	152	57	63.0	92	--

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.
- No comparative value established.
-- No analysis was completed for this parameter or parameter was non-detect.
* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.
** Parameter in initial sample not detected. Duplicate result presented.
[1] Only analytes with a minimum of one detection are listed.
[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.
[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
°C Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID	MW-6						MW-7						MW-8					
					Date Sampled	7/16/10	10/26/10	2/8/11	6/21/11	9/19/11	12/13/11	7/29/10	10/26/10	2/8/11	6/21/11	9/19/11	12/13/11	7/29/10	10/28/10	2/8/11	6/21/11	9/19/11	12/13/11
		Screening Levels																					
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]																		
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
Gasoline Range Organics	µg/l	800/1000*	-	-	-	140	--	100 U	--	--	--	100 U	--	100 U	--	--	--	100 U	--	100 U	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	0.26 U	--	0.26 U	--	--	--	0.27 U	--	0.26 U	--	--	--	0.27 U	--	0.26 U	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	0.42 U	--	0.42 U	--	--	--	0.44 U	--	0.42 U	--	--	--	0.42 U	--	0.41 U	--	--	--
TOTAL METALS[2]																							
Arsenic	µg/l	5	0.058	10	-	3.3 U	3.3 U	--	--	5.0 U	5.0 U	4.7	3.3 U	--	--	5.0 U	5.0 U	10	3.3 U	--	--	5.0 U	5.0 U
Chromium	µg/l	50	-	100	-	11 U	11 U	--	--	2.0 U	2.0 U	43	14	--	--	40	2.0 U	75	27	--	--	9.1	2.0 U
Copper	µg/l	-	6,400	1,300	-	11 U	11 U	--	--	--	--	86	11 U	--	--	--	--	470	11 U	--	--	--	--
Lead	µg/l	15	-	15	-	--	1.1 U	--	--	2.0 U	2.0 U	--	1.1 U	--	--	2.0 U	2.0 U	--	1.1 U	--	--	2.0 U	2.0 U
Manganese	µg/l	-	2,200	-	50	1,800	2,400	--	--	--	--	3,100	22	--	--	--	--	35,000	460	--	--	--	--
DISSOLVED METALS[1]																							
Chromium	µg/l	50	-	100	-	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--
Copper	µg/l	-	6,400	1,300	-	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--
Lead	µg/l	15	-	15		--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--
Manganese	µg/l	-	2,200	-	50	1,800	2,400	1,400	420	--	--	64	10 U	11 U	10 U	--	--	10 U	23	11 U	10 U	--	--
Mercury	µg/l	2	-	2	-	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U
Nickel	µg/l	-	-	100	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS[1]																							
Vinyl Chloride	µg/l	0.2	0.029	2	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Chloroform	µg/l	-	80	80	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	2.2	1.9	2.4	2.6	--	--	1.6	1.3	1.5	1.7	--	--
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	3.3	1.4	2.5	2.3	2.6	2.3
Toluene	µg/l	1000			-	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.1	--	--
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U
sec-Butylbenzene	µg/l	-	-	-	-	0.89	0.43	0.20	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Naphthalene	µg/l	160	160	-	-	0.23	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
1-Methylnaphthalene	µg/l	-	-	-	-	0.26	--	0.096 UJ	--	--	--	0.11 U	--	0.096 UJ	--	--	--	0.11 U	--	0.095 UJ	--	--	--
Acenaphthene	µg/l	-	960	-	-	0.35	--	0.096 UJ	--	--	--	0.11 U	--	0.096 UJ	--	--	--	0.11 U	--	0.095 UJ	--	--	--
Fluorene	µg/l	-	640	-	-	1.1	--	0.096 UJ	--	--	--	0.11 U	--	0.096 UJ	--	--	--	0.11 U	--	0.095 UJ	--	--	--
Phenanthrene	µg/l	-	-	-	-	0.098	--	0.096 UJ	--	--	--	0.11 U	--	0.096 UJ	--	--	--	0.11 U	--	0.095 UJ	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Chrysene*	µg/l	-	12	-	-	0.0099	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	0.0096 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0096 UJ	--	--	--	0.011 U	--	0.0095 UJ	--	--	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	0.0073	--	0.0072 UJ	--	--	--	0.0008 U	--	0.0072 UJ	--	--	--	0.0008 U	--	0.0072 UJ	--	--	--
CONVENTIONALS																							
Calcuim	mg/l	-	-	-	-	26	29	28	24	--	--	46	42	47	60	--	--	59	63	62	59	--	--
Magnesium	mg/l	-	-	-	-	11	--	--	--	--	--	19	--	--	--	--	--	21	--	--	--	--	--
Sodium	mg/l	-	-	-	20	15	16	19	18	--	--	26	26	30	33	--	--	15	23	22	21	--	--
Total Dissolved Solids	mg/l	-	-	-	500	210	--	--	--	--	--	370	--	--	--	--	--	370	--	--	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	--	0.050 U	0.050 U	0.19	--	--	--	0.050 U	0.050 U	0.19	--	--	--	0.12	0.050 U	0.20	--	--
Nitrate	mg/l	-	-	10	-	0.15 J	0.61	1.5	2.0	--	--	10	9.1	12	18	--	--	7.8	7.8	7.7	7.2	--	--
Nitrite	mg/l	-	-	1	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	150	160	150	120	--	--	190	180	190	200	--	--	260	270	250	240	--	--
Sulfate	mg/l	-	-	-	250	6.5	7.7	15	13	--	--	38	30	34	47	--	--	20	29	21	23	--	--
Chloride	mg/l	-	-	-	250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS																							
pH	S.U.	-	-	-	-	5.99	6.60	6.35	6.49	5.91	--	6.88	6.87	6.83	6.90	6.49	--	7.15	7.09	7.13	7.28	6.88	--
Conductivity	µS/cm	-	-	-	-	298	413	394	900	317	--	566	640	669	999	507	--	554	762	693	999	494	--
Dissolved Oxygen	mg/l	-	-	-	-	0.14	0	0.28	0.47	0.87	--	6.26	7.70	818	7.16	7.61	--	7.82	10.28	11.43	9.52	9.65	--
Temperature	℃	-	-	-	-	16.03	15.4	15.92	17.34	19.60	--	17.5	19.9	16.04	21.47	20.41	--	18.81	16.0	17.17	20.15	19.32	--
Turbidity	NTU	-	-	-	-	NC	9.7	0	40.0	20.5	--	NC	34.6	42.8	78.2	146	--	NC	698	66.8	177.0	120	--
Oxidation Reduction Potential	mV	-	-	-	-	13	20	-1	32	6	--	200	202	46	64	75	--	210	262	49	123	84	--

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.

\- No comparative value established.

-- No analysis was completed for this parameter or parameter was non-detect.

* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.

** Parameter in initial sample not detected. Duplicate result presented.

[1] Only analytes with a minimum of one detection are listed.

[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.

[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
℃ Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID	MW-9						MW-10						MW-11					
					Date Sampled	7/13/10	10/25/10	2/8/11	6/20/11	9/19/11	12/13/11	7/14/10	10/27/10	2/9/11	6/22/11	9/20/11	12/14/11	7/14/10	10/27/10	2/9/11	6/22/11	9/20/11	12/14/11
		Screening Levels																					
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]																		
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
Gasoline Range Organics	µg/l	800/1000*	-	-	-	100 U	--	100 U	--	--	--	100 U	--	100 U	--	--	--	100 U	--	100 U	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	0.26 U	--	0.26 U	--	--	--	0.26 U	--	0.26 U	--	--	--	0.26 U	--	0.26 U	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	0.41 U	--	0.41 U	--	--	--	0.42 U	--	0.42 U	--	--	--	0.41 U	--	0.42 U	--	--	--
TOTAL METALS[2]																							
Arsenic	µg/l	5	0.058	10	-	3.3 U	3.3 U	--	--	5.0 U	5.0 U	3.3 U	3.3 U	--	--	5.0 U	5.0 U	3.3 U	3.3 U	--	--	5.0 U	5.0 U
Chromium	µg/l	50	-	100	-	11 U	15	--	--	21	2.7	11 U	11 U	--	--	9.5	6.5	11 U	33	--	--	11	6.2
Copper	µg/l	-	6,400	1,300	-	11 U	11 U	--	--	--	--	11 U	11 U	--	--	--	--	11 U	11 U	--	--	--	--
Lead	µg/l	15	-	15	-	--	1.1 U	--	--	2.0 U	2.0 U	--	1.1	--	--	2.0 U	2.0 U	--	1.1 U	--	--	2.0 U	2.3
Manganese	µg/l	-	2,200	-	50	21	64	--	--	--	--	39	130	--	--	--	--	65	56	--	--	--	--
DISSOLVED METALS[1]																							
Chromium	µg/l	50	-	100	-	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--
Copper	µg/l	-	6,400	1,300	-	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--
Lead	µg/l	15	-	15		--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--
Manganese	µg/l	-	2,200	-	50	11	21	11 U	10 U	--	--	10 U	10 U	11 U	10 U	--	--	10 U	10 U	11 U	10 U	--	--
Mercury	µg/l	2	-	2	-	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U
Nickel	µg/l	-	-	100	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS[1]																							
Vinyl Chloride	µg/l	0.2	0.029	2	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Chloroform	µg/l	-	80	80	-	0.59	0.78	0.63	0.79	--	--	1.4	1.5	1.0	1.0	--	--	0.81	0.89	1.1	0.95	--	--
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	1.3	1.3	1.1	1.3	1.3	1.3	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.52	0.62	0.52	0.59	0.59	0.56	0.48
Toluene	µg/l	1000			-	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	0.72	0.42	0.76	0.58	0.41	0.33	0.22	0.21	0.25	0.20 U	0.19	0.13	1.5	1.2	0.92	0.46	1.6	1.9
sec-Butylbenzene	µg/l	-	-	-	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
Naphthalene	µg/l	160	160	-	-	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--
POLYCYCLIC AROMATIC HYDROCARBONS[1]																							
1-Methylnaphthalene	µg/l	-	-	-	-	0.095 U	--	0.096 UJ	--	--	--	0.098 U	--	0.096 UJ	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Acenaphthene	µg/l	-	960	-	-	0.095 U	--	0.096 UJ	--	--	--	0.098 U	--	0.096 UJ	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Fluorene	µg/l	-	640	-	-	0.095 U	--	0.096 UJ	--	--	--	0.098 U	--	0.096 UJ	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Phenanthrene	µg/l	-	-	-	-	0.095 U	--	0.096 UJ	--	--	--	0.098 U	--	0.096 UJ	--	--	--	0.097 U	--	0.096 UJ	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	0.012	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Chrysene*	µg/l	-	12	-	-	0.015	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	0.014	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	0.0089	--	0.0072 UJ	--	--	--	0.0074 U	--	0.0072 UJ	--	--	--	0.0073 U	--	0.0072 UJ	--	--	--
CONVENTIONALS																							
Calcuim	mg/l	-	-	-	-	62	58	67	56	--	--	58	48	73	63	--	--	73	70	82	78	--	--
Magnesium	mg/l	-	-	-	-	25	--	--	--	--	--	23	--	--	--	--	--	29	--	--	--	--	--
Sodium	mg/l	-	-	-	20	15	15	18	15	--	--	41	36	49	48	--	--	58	54	61	72	--	--
Total Dissolved Solids	mg/l	-	-	-	500	400 J	--	--	--	--	--	470	--	--	--	--	--	580	--	--	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	--	0.050 U	0.050 U	0.30	--	--	--	0.050 U	0.050 U	0.13	--	--	--	0.084	0.050 U	0.14	--	--
Nitrate	mg/l	-	-	10	-	12 J	14	14	9.4	--	--	14 J	11	16	13	--	--	15 J	14	18	22 J	--	--
Nitrite	mg/l	-	-	1	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	200 J	200	200	180	--	--	250 J	220	290	280	--	--	340 J	360	250	350	--	--
Sulfate	mg/l	-	-	-	250	25	21	30	17	--	--	43	35	52	40	--	--	55	22	59	61	--	--
Chloride	mg/l	-	-	-	250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS																							
pH	S.U.	-	-	-	-	6.93	6.99	7.07	7.16	6.80	--	6.81	6.78	6.86	6.95	6.83	--	6.92	6.88	7.03	7.04	6.84	--
Conductivity	µS/cm	-	-	-	-	625	700	782	999	469	--	673	734	930	900	612	--	878	1000	980	970	1000	--
Dissolved Oxygen	mg/l	-	-	-	-	8.57	9.29	10.44	8.15	9.18	--	6.36	8.09	8.91	7.78	8.21	--	6.70	8.55	845	7.78	7.50	--
Temperature	℃	-	-	-	-	16.77	21.5	16.88	19.45	22.73	--	18.43	21.3	18.75	20.05	19.46	--	22.16	22.0	20.76	20.85	22.12	--
Turbidity	NTU	-	-	-	-	NC	230	38.4	251	160	--	NC	406	83.5	174.0	153	--	NC	70.3	32.5	69.6	100	--
Oxidation Reduction Potential	mV	-	-	-	-	122	165	40	56	61	--	128	219	41	75	92	--	125	152	47	75	63	--

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.
\- No comparative value established.
-- No analysis was completed for this parameter or parameter was non-detect.
* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.
** Parameter in initial sample not detected. Duplicate result presented.
[1] Only analytes with a minimum of one detection are listed.
[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.
[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
℃ Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID	MW-12						MW-13						MW-14						MW-15	
					Date Sampled	7/14/10	10/27/10	2/9/11	6/22/11	9/20/11	12/14/11	7/13/10	10/28/10	2/7/11	6/21/11	9/20/11	12/14/11	7/13/10	10/25/10	2/7/11	6/20/11	9/20/11	12/13/11	9/19/11	12/14/11
	Screening Levels																								
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs^3	WA Secondary MCLs^3																				
POLYCYCLIC AROMATIC HYDROCARBONS^1																									
Gasoline Range Organics	µg/l	800/1000*	-	-	-	100 U	--	100 U	--	--	--	100 U	--	100 U	--	--	--	100 U	--	100 U	--	--	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	0.25 U	--	0.26 U	--	--	--	0.26 U	--	0.26 UJ	--	--	--	0.26 U	--	0.26 UJ	--	--	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	0.40 U	--	0.41 U	--	--	--	0.41 U	--	0.41 UJ	--	--	--	0.41 U	--	0.41 UJ	--	--	--	--	--
TOTAL METALS^2																									
Arsenic	µg/l	5	0.058	10	-	3.3 U	3.3 U	--	--	5.0 U	5.0 U	3.3 U	3.3 U	--	--	5.0 U	5.0 U	3.3 U	3.3 U	--	--	5.0 U	5.0 U	5.0 U	5.0 U
Chromium	µg/l	50	-	100	-	12	69	--	--	46	4.5	11 U	11 U	--	--	6.2	5.5	11 U	19	--	--	6.5	3.9	54	12
Copper	µg/l	-	6,400	1,300	-	11 U	11 U	--	--	--	--	11 U	11 U	--	--	--	--	11 U	11 U	--	--	--	--	--	--
Lead	µg/l	15	-	15	-	--	1.1 U	--	--	3.2	2.0 U	--	1.1 U	--	--	2.0 U	2.3	--	1.1 U	--	--	2.0 U	2.0 U	3.8	3.4
Manganese	µg/l	-	2,200	-	50	210	58	--	--	--	--	37	44	--	--	--	--	29	51	--	--	--	--	--	--
DISSOLVED METALS^1																									
Chromium	µg/l	50	-	100	-	10 U	12	10 U	10 U	--	--	10 U	10 U	11	10 U	--	--	10 U	10 U	10 U	10 U	--	--	--	--
Copper	µg/l	-	6,400	1,300	-	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	10 U	10 U	10 U	10 U	--	--	--	--
Lead	µg/l	15	-	15		--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	--
Manganese	µg/l	-	2,200	-	50	10 U	12	11 U	10 U	--	--	10 U	17	11 U	10 U	--	--	10 U	10 U	11 U	10 U	--	--	--	--
Mercury	µg/l	2	-	2	-	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U	--	--	--	--	--	0.20 U	--	0.20 U
Nickel	µg/l	-	-	100	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS^1																									
Vinyl Chloride	µg/l	0.2	0.029	2	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--
Chloroform	µg/l	-	80	80	-	0.67	0.78	0.60	0.27	--	--	0.96	1.1	1.4	1.6	--	--	0.74	0.80	0.78	0.84	--	--	--	--
Trichloroethene (TCE) ^{4}	µg/l	5	2.4	5	-	1.7	1.5	0.74	0.43	1.0	0.94	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.87	0.99	1.0	0.73	0.82	0.75	0.10 U	0.10 U
Toluene	µg/l	1000			-	1.0 U	1.0 U	1.0 U	2.1	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--
Tetrachloroethene (PCE) ^{4}	µg/l	5	0.081	5	-	0.39	0.24	0.75	0.43	0.21	0.32	0.21	0.21 U	0.30	0.25	0.35	0.27	0.94	0.72	0.86	0.93	0.93	0.79	0.10 U	0.10 U
sec-Butylbenzene	µg/l	-	-	-	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--
Naphthalene	µg/l	160	160	-	-	0.20 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS^1																									
1-Methylnaphthalene	µg/l	-	-	-	-	0.095 U	--	0.096 UJ	--	--	--	0.095 U	--	0.098 UJ	--	--	--	0.094 U	--	0.095 UJ	--	--	--	--	--
Acenaphthene	µg/l	-	960	-	-	0.095 U	--	0.096 UJ	--	--	--	0.095 U	--	0.098 UJ	--	--	--	0.094 U	--	0.095 UJ	--	--	--	--	--
Fluorene	µg/l	-	640	-	-	0.095 U	--	0.096 UJ	--	--	--	0.095 U	--	0.098 UJ	--	--	--	0.094 U	--	0.095 UJ	--	--	--	--	--
Phenanthrene	µg/l	-	-	-	-	0.095 U	--	0.096 UJ	--	--	--	0.095 U	--	0.098 UJ	--	--	--	0.094 U	--	0.095 UJ	--	--	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.023	--	0.0098 UJ	--	--	--	0.020	--	0.0095 UJ	--	--	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.033	--	0.0098 UJ	--	--	--	0.029	--	0.0095 UJ	--	--	--	--	--
Chrysene*	µg/l	-	12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.059	--	0.0098 UJ	--	--	--	0.063	--	0.0095 UJ	--	--	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.052	--	0.0098 UJ	--	--	--	0.056	--	0.0095 UJ	--	--	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.027	--	0.0098 UJ	--	--	--	0.024	--	0.0095 UJ	--	--	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	0.0095 U	--	0.0096 UJ	--	--	--	0.029	--	0.0098 UJ	--	--	--	0.019	--	0.0095 UJ	--	--	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.019	--	0.0098 UJ	--	--	--	0.016	--	0.0095 UJ	--	--	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	0.0095 U	--	0.0096 UJ	--	--	--	0.0095 U	--	0.0098 UJ	--	--	--	0.0094 U	--	0.0095 UJ	--	--	--	--	--
Total cPAHs as Benzo(a)pyrene^2	µg/l	0.1	0.012	-	-	0.0072 U	--	0.0072 UJ	--	--	--	0.0432	--	0.0074 UJ	--	--	--	0.0326	--	0.0072 UJ	--	--	--	--	--
CONVENTIONALS																									
Calcuim	mg/l	-	-	-	-	65	62	80	110	--	--	81	80	55	54	--	--	76	72	79	92	--	--	--	--
Magnesium	mg/l	-	-	-	-	26	--	--	--	--	--	32	--	--	--	--	--	32	--	--	--	--	--	--	--
Sodium	mg/l	-	-	-	20	29	29	32	32	--	--	46	44	39	37	--	--	32	31	33	34	--	--	--	--
Total Dissolved Solids	mg/l	-	-	-	500	500	--	--	--	--	--	680 J	--	--	--	--	--	540 J	--	--	--	--	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	--	0.050 U	0.050 U	0.18	--	--	--	0.050 U	0.050 U	0.25	--	--	--	0.050 U	0.050 U	0.23	--	--	--	--
Nitrate	mg/l	-	-	10	-	14 J	14	46	46 J	--	--	36 J	34	18	16	--	--	22 J	18	20	22	--	--	--	--
Nitrite	mg/l	-	-	1	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	270 J	270	280	260	--	--	290 J	270	220	200	--	--	280 J	280	300	310	--	--	--	--
Sulfate	mg/l	-	-	-	250	35	27	34	24	--	--	63	48	34	36	--	--	39	36	49	53	--	--	--	--
Chloride	mg/l	-	-	-	250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
FIELD PARAMETERS																									
pH	S.U.	-	-	-	-	7.03	7.00	7.02	6.99	6.85	--	6.65	6.64	6.79	6.85	6.72	--	6.83	6.84	6.89	7.04	6.67	--	6.63	--
Conductivity	µS/cm	-	-	-	-	700	855	910	1240	621	--	973	1130	747	999	522	--	808	971	957	910	1030	--	596	--
Dissolved Oxygen	mg/l	-	-	-	-	7.25	7.93	7.63	5.80	7.58	--	6.41	6.46	6.44	5.81	6.86	--	6.98	8.54	8.43	10.70	7.95	--	7.51	--
Temperature	℃	-	-	-	-	19.39	19.1	17.96	20.61	18.52	--	16.92	18.2	17.02	20.27	20.62	--	20.73	19.2	16.06	17.48	18.30	--	20.91	--
Turbidity	NTU	-	-	-	-	NC	245	41.3	901	914	--	NC	224	398.0	259.0	140	--	NC	68.7	15.6	12.3	9.8	--	>1000	--
Oxidation Reduction Potential	mV	-	-	-	-	96	124	36	84	143	--	141	199	32	87	97	--	112	202	45	76	76	--	90	--

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.

\- No comparative value established.

-- No analysis was completed for this parameter or parameter was non-detect.

* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.

** Parameter in initial sample not detected. Duplicate result presented.

[1] Only analytes with a minimum of one detection are listed.

[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.

[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
℃ Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID	SLF-7								SLF-9										
					Date Sampled	Feb-98	7/14/98	Sept/Oct 99	1/31/02	7/15/10	11/4/10	2/10/11	6/23/11	3/30/93	4/13/93	6/14/93	8/31/93	9/1/93	12/7/93	8/30/94	9/28/94	11/8/94	12/16/94	2/18/98
		Screening Levels																						
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]																			
POLYCYCLIC AROMATIC HYDROCARBONS[1]																								
Gasoline Range Organics	µg/l	800/1000*	-	-	-	--	--	--	--	100 U	--	100 U	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Organics	µg/l	500	-	-	-	--	--	--	--	0.26 U	--	0.26 U	--	--	--	--	--	--	--	--	--	--	--	--
Lube Oil Range Organics	µg/l	500	-	-	-	--	--	--	--	0.42 U	--	0.42 U	--	--	--	--	--	--	--	--	--	--	--	--
TOTAL METALS[2]																								
Arsenic	µg/l	5	0.058	10	-	--	--	--	--	3.3 U	3.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	µg/l	50	-	100	-	--	--	--	--	11 U	13	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	µg/l	-	6,400	1,300	-	--	--	--	--	11 U	11 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	µg/l	15	-	15	-	--	--	--	--	--	1.1 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Manganese	µg/l	-	2,200	-	50	--	--	--	--	11 U	32	--	--	--	--	--	--	--	--	--	--	--	--	--
DISSOLVED METALS[1]																								
Chromium	µg/l	50	-	100	-	--	1.8	--	--	10 U	10 U	10 U	10 U	--	--	--	--	--	--	--	--	--	--	3.3
Copper	µg/l	-	6,400	1,300	-	--	3.1	--	--	10 U	10 U	10 U	10 U	--	--	--	--	--	--	--	--	--	--	2.4
Lead	µg/l	15	-	15		--	1 U	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--	1 U
Manganese	µg/l	-	2,200	-	50	--	--	--	--	10 U	10 U	11 U	10 U	--	--	--	--	--	--	--	--	--	--	1 U
Mercury	µg/l	2	-	2	-	--	0.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.5 U
Nickel	µg/l	-	-	100	-	--	3.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.3
Selenium	µg/l	-	80	50	-	--	1 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1 U
Zinc	µg/l	-	4,800	5,000	5,000	--	7.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	149
VOLATILE ORGANIC COMPOUNDS[1]																								
Vinyl Chloride	µg/l	0.2	0.029	2	-	--	--	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	--	--	--	--	--	--
Chloroform	µg/l	-	80	80	-	--	--	--	0.60	0.20 U	0.20 U	0.20 U	0.20 U	0.5 U	1.5	0.2 U	1.3	1.30	--	--	--	--	--	1.05
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	--	--	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	0.5 U	2.6	1.7	2.3	2.3	2.3	1.9	1.8	1.8	1.77	2.48
Toluene	µg/l	1000			-	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	--	1.26	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	3.6	4.1	2.3	3.1	3.1	3.4	2.7	2.7	2.6	2.42	1.84
sec-Butylbenzene	µg/l	-	-	-	-	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/l	160	160	-	-	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	--	--	--	--	0.20 U	0.20 U	0.20 U	0.2 U	--	--	--	0.6	--	--	--	--	--	--	--
POLYCYCLIC AROMATIC HYDROCARBONS[1]																								
1-Methylnaphthalene	µg/l	-	-	-	-	--	--	--	--	0.098 U	--	0.096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/l	-	960	-	-	--	--	--	--	0.098 U	--	0.096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/l	-	640	-	-	--	--	--	--	0.098 U	--	0.096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/l	-	-	-	-	--	--	--	--	0.098 U	--	0.096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene*	µg/l	-	12	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	--	--	--	--	0.0098 U	--	0.0096 UJ	--	--	--	--	--	--	--	--	--	--	--	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	--	--	--	--	0.0074 U	--	0.0072 UJ	--	--	--	--	--	--	--	--	--	--	--	--
CONVENTIONALS																			--	--	--	--	--	
Calcuim	mg/l	-	-	-	-	--	--	--	--	13	15	14	15	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/l	-	-	-	-	--	--	--	--	5.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium	mg/l	-	-	-	20	--	--	--	--	5.9	6.3	6.4	7.0	--	--	--	--	--	--	--	--	--	--	--
Total Dissolved Solids	mg/l	-	-	-	500	--	129.0	--	--	120	--	--	--	--	--	--	--	--	--	--	--	--	--	492
Total Organic Carbon	mg/l	-	-	-	-	--	3 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3 U
Ammonia	mg/l	-	-	-	-	--	0.1 U	--	--	--	0.073	0.050 U	0.15	--	--	--	--	--	--	--	--	--	--	0.222
Nitrate	mg/l	-	-	10	-	--	1.52	5.0	--	1.3 J	1.6 J	1.4	1.6	--	--	--	--	--	--	--	--	--	--	0.1 U
Nitrite	mg/l	-	-	1	-	--	0.1 U	0.2 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	35.2
Total Alkalinity	mg/l	-	-	-	-	--	61.0	--	--	66	74	74	80	--	--	--	--	--	--	--	--	--	--	289
Sulfate	mg/l	-	-	-	250	--	3.08	13.2	--	5.0 U	5.0 U	5.0 U	5.0 U	--	--	--	--	--	--	--	--	--	--	14.9
Chloride	mg/l	-	-	-	250	--	4.12	12.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	41.3
Carbonate Alkalinity	mg/l	-	-	-	-	--	10 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10 U
Bicarbonate Alkalinity	mg/l	-	-	-	-	--	61.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	289
FIELD PARAMETERS																								
pH	S.U.	-	-	-	-	NC	6.20	NC	NC	NC	6.70	7.56	7.57	--	--	--	--	--	--	--	--	--	--	7.80
Conductivity	µS/cm	-	-	-	-	NC	250	NC	NC	NC	198	191	52.1	--	--	--	--	--	--	--	--	--	--	1020
Dissolved Oxygen	mg/l	-	-	-	-	NC	NC	NC	NC	NC	6.6	7.56	5.83	--	--	--	--	--	--	--	--	--	--	NC
Temperature	°C	-	-	-	-	NC	15	NC	NC	NC	13.7	13.0	15.55	--	--	--	--	--	--	--	--	--	--	13
Turbidity	NTU	-	-	-	-	NC	NC	NC	NC	NC	50.9	129.0	37.3	--	--	--	--	--	--	--	--	--	--	NC
Oxidation Reduction Potential	mV	-	-	-	-	NC	NC	NC	NC	NC	217.0	64.0	66.0	--	--	--	--	--	--	--	--	--	--	NC

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.
- No comparative value established.
-- No analysis was completed for this parameter or parameter was non-detect.
* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.
** Parameter in initial sample not detected. Duplicate result presented.

[1] Only analytes with a minimum of one detection are listed.

[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.

[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
°C Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 1. Groundwater Analytical Data

ANALYTE					Well ID								SLF-10							
					Date Sampled	7/14/98	Sept/Oct 99	1/31/02	7/15/10	11/4/10	2/10/11	6/23/11	2/18/98	7/14/98	Sept/Oct 99	3/27/02	7/15/10	11/4/10	2/10/11	6/23/11
		Screening Levels																		
	Units	MTCA A Level	MTCA B Level	WA Primary MCLs[3]	WA Secondary MCLs[3]															
POLYCYCLIC AROMATIC HYDROCARBONS[1]																				
Gasoline Range Organics	µg/l	800/1000*	-	-	-	--	--	--	100 U	--	100 U	--	--	--	--	--	100 U	--	100 U	--
Diesel Range Organics	µg/l	500	-	-	-	--	--	--	0.26 U	--	0.26 U	--	--	--	--	--	0.26 U	--	0.26 U	--
Lube Oil Range Organics	µg/l	500	-	-	-	--	--	--	0.41 U	--	0.41 U	--	--	--	--	--	0.41 U	--	0.41 U	--
TOTAL METALS[2]																				
Arsenic	µg/l	5	0.058	10	-	--	--	--	3.3 U	3.3 U	--	--	--	--	--	--	3.3 U	3.3 U	--	--
Chromium	µg/l	50	-	100	-	--	--	--	11 U	11 U	--	--	--	--	--	--	11 U	11 U	--	--
Copper	µg/l	-	6,400	1,300	-	--	--	--	11 U	11 U	--	--	--	--	--	--	11 U	11 U	--	--
Lead	µg/l	15	-	15	-	--	--	--	--	6.6	--	--	--	--	--	--	--	1.1 U	--	--
Manganese	µg/l	-	2,200	-	50	--	--	--	11 U	12	--	--	--	--	--	--	11 U	11 U	--	--
DISSOLVED METALS[1]							--													
Chromium	µg/l	50	-	100	-	4	--	--	10 U	--	10 U	10 U	1	1	--	--	10 U	10 U	10 U	10 U
Copper	µg/l	-	6,400	1,300	-	3.6	--	--	18	--	10 U	10 U	2.2	3	--	--	10 U	10 U	10 U	10 U
Lead	µg/l	15	-	15		1.1	--	--	--	--	1.0 U	1.1	1 U	1 U	--	--	--	1.0 U	1.0 U	1.0 U
Manganese	µg/l	-	2,200	-	50	10.0 U	--	--	10 U	--	11 U	10 U	1 U	10.0 U	--	--	10 U	10 U	11 U	10 U
Mercury	µg/l	2	-	2	-	0.28	--	--	--	--	--	--	0.5 U	0.6	--	--	--	--	--	--
Nickel	µg/l	-	-	100	-	1.7	--	--	--	--	--	--	1 U	2	--	--	--	--	--	--
Selenium	µg/l	-	80	50	-	1.5	--	--	--	--	--	--	1 U	1 U	--	--	--	--	--	--
Zinc	µg/l	-	4,800	5,000	5,000	146	--	--	--	--	--	--	5 U	14.8	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS[1]																				
Vinyl Chloride	µg/l	0.2	0.029	2	-	--	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	80	80	-	--	--	1.2	0.78	0.63	0.72	0.72	2.04	1.49	--	1.7	1.4	1.1	1.5	1.2
Trichloroethene (TCE) [4]	µg/l	5	2.4	5	-	3.23	--	4.0	1.2	1.1	1.2	1.3	--	--	--	0.50 U	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000			-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE) [4]	µg/l	5	0.081	5	-	1.61	--	0.9	0.52	0.53	0.49	0.43	--	--	--	0.50 U	0.43	0.39	0.49	0.41
sec-Butylbenzene	µg/l	-	-	-	-	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	--	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	160	-	-	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U
1,1,1-Trichloroethane	µg/l	200	1,600	200	-	--	--	--	0.20 U	0.20 U	0.20 U	0.2 U			--		0.20 U	0.20 U	0.20 U	0.2 U
POLYCYCLIC AROMATIC HYDROCARBONS[1]																				
1-Methylnaphthalene	µg/l	-	-	-	-	--	--	--	0.097 U	--	0.096 UJ	--	--	--	--	--	0.13 U	--	0.096 UJ	--
Acenaphthene	µg/l	-	960	-	-	--	--	--	0.097 U	--	0.096 UJ	--	--	--	--	--	0.13 U	--	0.096 UJ	--
Fluorene	µg/l	-	640	-	-	--	--	--	0.097 U	--	0.096 UJ	--	--	--	--	--	0.13 U	--	0.096 UJ	--
Phenanthrene	µg/l	-	-	-	-	--	--	--	0.097 U	--	0.096 UJ	--	--	--	--	--	0.13 U	--	0.096 UJ	--
Benzo(g,h,i)perylene	µg/l	-	-	-	-	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--	--	--	0.020	--	0.0096 UJ	--
Benzo(a)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.012	--	0.0096 UJ	--	--	--	--	--	0.024	--	0.0096 UJ	--
Chrysene*	µg/l	-	12	-	-	--	--	--	0.012	--	0.0096 UJ	--	--	--	--	--	0.038	--	0.0096 UJ	--
Benzo(b)fluoranthene*	µg/l	-	0.12	-	-	--	--	--	0.012	--	0.0096 UJ	--	--	--	--	--	0.033	--	0.0096 UJ	--
Benzo(k)fluoranthene*	µg/l	-	1.2	-	-	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--	--	--	0.016	--	0.0096 UJ	--
Benzo(a)pyrene*	µg/l	0.1	0.012	0.0002	-	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--	--	--	0.013 U	--	0.0096 UJ	--
Indeno(1,2,3-cd)pyrene*	µg/l	-	0.12	-	-	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--	--	--	0.016	--	0.0096 UJ	--
Dibenzo(a,h)anthracene*	µg/l	-	0.12	-	-	--	--	--	0.0097 U	--	0.0096 UJ	--	--	--	--	--	0.013 U	--	0.0096 UJ	--
Total cPAHs as Benzo(a)pyrene[2]	µg/l	0.1	0.012	-	-	--	--	--	0.0656	--	0.0072 UJ	--	--	--	--	--	0.016	--	0.0072 UJ	--
CONVENTIONALS																				
Calcuim	mg/l	-	-	-	-	--	--	--	85	--	90	84	--	--	--	--	52	48	45	40
Magnesium	mg/l	-	-	-	-	--	--	--	34	--	--	--	--	--	--	--	21	--	--	--
Sodium	mg/l	-	-	-	20	--	--	--	34	--	35	35	--	--	--	--	19	16	17	16
Total Dissolved Solids	mg/l	-	-	-	500	503	--	--	580	--	--	--	298	367	--	--	370	--	--	--
Total Organic Carbon	mg/l	-	-	-	-	3 U	--	--	--	--	--	--	3 U	3 U	--	--	--	--	--	--
Ammonia	mg/l	-	-	-	-	0.1 U	--	--	--	0.10	0.050 U	0.14	0.1 U	0.1 U	--	--	--	0.080	0.050 U	0.13
Nitrate	mg/l	-	-	10	-	14.9	14.2	--	12 J	16 J	12	14	0.1 U	8.81	9.2	--	7.4 J	6.6 J	6.8 J	7.3
Nitrite	mg/l	-	-	1	-	0.1 U	0.2 U	--	--	--	--	--	23.8	0.1 U	0.2 U	--	--	--	--	--
Total Alkalinity	mg/l	-	-	-	-	268	--	--	310	330	320	310	145	161	--	--	170	160	150	140
Sulfate	mg/l	-	-	-	250	31.1	28.4	--	28	28	27	28	8.47	29.8	32.9	--	32	36	24	27
Chloride	mg/l	-	-	-	250	38.3	40.7	--	--	--	--	--	33.1	41.7	45.8	--	--	--	--	--
Carbonate Alkalinity	mg/l	-	-	-	-	10 U	--	--	--	--	--	--	10 U	10 U	--	--	--	--	--	--
Bicarbonate Alkalinity	mg/l	-	-	-	-	268	--	--	--	--	--	--	142	161	--	--	--	--	--	--
FIELD PARAMETERS																				
pH	S.U.	-	-	-	-	6.60	NC	NC	6.54	NC	7.02	6.91	8.30	6.40	NC	NC	NC	6.14	6.68	6.88
Conductivity	µS/cm	-	-	-	-	1200	NC	NC	903	NC	970	900	630	960	NC	NC	NC	573	528	900
Dissolved Oxygen	mg/l	-	-	-	-	NC	NC	NC	7.95	NC	10.15	8.76	NC	NC	NC	NC	NC	4.25	5.05	4.42
Temperature	℃	-	-	-	-	13	NC	NC	16.51	NC	13.40	14.85	13	13.5	NC	NC	NC	13.6	12.44	17.97
Turbidity	NTU	-	-	-	-	NC	NC	NC	NC	NC	0	182	NC	NC	NC	NC	NC	26.9	0	22.2
Oxidation Reduction Potential	mV	-	-	-	-	NC	NC	NC	231	NC	56	89	NC	NC	NC	NC	NC	195	98	98

Notes:

Values are screened against MCLs where they exist. If no MCL, Method B values are used. If no Method B, then Method A values are used.

* 800 µg/l if benzene present or 1,000 µg/l if benzene is not present.
- No comparative value established.
-- No analysis was completed for this parameter or parameter was non-detect.
* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.
** Parameter in initial sample not detected. Duplicate result presented.
[1] Only analytes with a minimum of one detection are listed.
[2] Total of individual cPAHs (indicated by *) multipled by benzo(a)pyrene toxcity equivalency half the practical quantitation limit was used for non-detect values.
[3] Primary and secondary MCLs for both WAC 173-200-040 and 246-290-310 are the same.

[4] Ecology modified TCE and PCE Method B cleanup levels in June 2012 to 4 ug/L and 5 ug/L, respectively. Preliminary cleanup levels presented in Table 13 show this change.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U = Analyte not detected above given practical quantitation limit.
J = recommended hold time, value is an
UJ = practical quantitation limit. Sample
℃ Degrees celcius.
mg/l = Milligrams per liter.
µS/m = Microsiemens per meter.
mV = Millivolts.
NTU = Nephelometric tubidity unit.
S.U. Standard units.
µg/l = micrograms per liter.

Table 2. Water Well Inventory

Qtr	Qtr	Section	T	R	ID #	Log ID	Type	Completion Date	Depth (ft)	Owner	Street Address
NE	NE	13	7N	35E	A	178366	Water	10/29/1991	83	City of Walla Walla	Walla Walla Landfill
SE	SW	13	7N	35E	B	164601	Water	10/21/1986	181	City of Walla Walla	--
	SE	13	7N	35E	C	294359	Water	5/20/1957	1,201	WSP	--
SE	SE	13	7N	35E	D1	437840	Resource Protection	3/30/2006	40	WSP	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NE	SE	13	7N	35E	D2	429601	Water	9/5/1968	1,618	WSP	--
N	SW	18	7N	36E	A	294228	Water	9/1/1956	1,004	Sate of Washington	--
SW	SW	18	7N	36E	B1	295759	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B2	295760	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B3	295761	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B4	295762	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B5	295763	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B6	295764	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B7	295765	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B8	295766	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B9	295767	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B10	295768	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B11	295769	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B12	295770	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B13	295771	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B14	295772	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B15	295773	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B16	295774	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B17	295775	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B18	295776	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B19	295777	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B20	295778	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B21	295779	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B22	295780	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B23	295781	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B24	295782	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B25	295783	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B26	295784	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B27	295785	Resource Protection	--	--	WSP	--
SW	SW	18	7N	36E	B28	295786	Resource Protection	--	--	WSP	--
NE	SW	18	7N	36E	C1	165489	Water	12/29/1970	272	WSP	--
SE	SW	18	7N	36E	C2	174174	Water	1/1/1912	640	WSP	--
SE	SW	18	7N	36E	C3	174175	Water	1/1/1911	525	WSP	--
SE	SW	18	7N	36E	C4	174176	Water	1/1/1911	525	WSP	--
NE	NE	24	7N	35E	A	164164	Water	10/24/1977	61	CARL GRASSI	Rt 2 Box 89
SW	NE	24	7N	35E	B	164386	Water	6/6/1980	140	CHAS ROBERTSON	--
SW	NE	24	7N	35E	B2	514046	Decommissioned	3/10/2004	52	WSDOT	SR12 MP334.8 APPROX 1/2 MILE NORTH
SW	NE	24	7N	35E	B3	166756	Water	6/15/1983	145	FRED BAHNEMAN	--
SW	NE	24	7N	35E	B4	168816	Water	3/13/1980	110	JO ANN SCHEIMAN	Rt 2 Box 172A
SW	NE	24	7N	35E	B5	378733	Resource Protection	3/10/2004	52	WSDOT	SR12 MP 334.8 APPROXIMATELY 1/2 MILE NORTH,WALLA WALLA 99362
NE	SE	24	7N	35E	C1	514060	Decommissioned	6/16/2005	29	WSDOT	SR12 VIC OF DELL STREET, WALLA WALLA
NE	SE	24	7N	35E	C2	514062	Decommissioned	6/16/2005	49	WSDOT	SR12 VIC OF PINE STREET, WALLA WALLA
NE	SE	24	7N	35E	C3	514063	Decommissioned	6/16/2005	49	WSDOT	SR12 VIC OF PINE STREET, WALLA WALLA
NE	SE	24	7N	35E	C4	514065	Decommissioned	6/14/2005	41	WSDOT	SR12 VIC OF DELL STREET, WALLA WALLA
NE	SE	24	7N	35E	C5	295739	Resource Protection	5/7/1998	--	VALLEY DIESEL	1491 Dell Ave
NE	SE	24	7N	35E	C6	295740	Resource Protection	5/6/1998	--	VALLEY DIESEL	1491 Dell Ave
NE	SE	24	7N	35E	C7	295741	Resource Protection	5/6/1998	--	VALLEY DIESEL	1491 Dell Ave
NE	SE	24	7N	35E	C8	416249	Resource Protection	8/16/2005	39	WSDOT	SR 12/PINE STREET/MYRA RD EXCH, WALLA WALLA 99362
NE	SE	24	7N	35E	C9	574617	Resource Protection	8/16/2005	--	WSDOT	SR12/PINE STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C10	574618	Resource Protection	8/16/2005	--	WSDOT	SR12/PINE STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C11	574619	Resource Protection	8/16/2005	--	WSDOT	SR12/PINE STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C12	574620	Resource Protection	8/16/2005	--	WSDOT	SR12/PINE STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C13	580233	Resource Protection	6/16/2005	29	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C14	580234	Resource Protection	6/16/2005	44	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C15	580235	Resource Protection	6/16/2005	--	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362

Table 2. Water Well Inventory

Qtr	Qtr	Section	T	R	ID #	Log ID	Type	Completion Date	Depth (ft)	Owner	Street Address
NE	SE	24	7N	35E	C16	580236	Resource Protection	6/16/2005	--	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C17	580237	Resource Protection	6/16/2005	--	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	C18	580238	Resource Protection	6/16/2005	40	WSDOT	SR 12 AT VIC. DELL STREET, WALLA WALLA 99362
NE	SE	24	7N	35E	D	514045	Decommissioned	8/16/2005	39	WSDOT	SR12 VIC OF PINE STREET, WALLA WALLA
SW	NW	24	7N	35E	E	175051	Water	4/25/1996	160	DONNA STEVENSON	2120 DELL AVENUE, WALLA WALLA 99362
SW	NW	24	7N	35E	E2	414758	Resource Protection	5/9/2005	17	WSDOT	SR 12 AND GOSE ROAD
SE	NW	24	7N	35E	F1	514072	Decommissioned	1/16/2008	34	WSDOT	SR12 VIC OF GOSE ROAD, WALLA WALLA
SE	NW	24	7N	35E	F2	514073	Decommissioned	1/16/2008	46	WSDOT	SR12 VIC OF GOSE ROAD, WALLA WALLA
SE	NW	24	7N	35E	F3	174996	Water	1/6/1994	153	JOHN DUNCAN	NKA/ROUTE 5/BOX 246, WALLA WALLA 99362
SE	NW	24	7N	35E	F4	253886	Water	6/16/2000	151	LEON EWING	2010 DELL AVE
SE	NW	24	7N	35E	F5	170379	Water	9/2/1997	141	MARK & SHERRY PEASE	2010 Dell Ave
SE	NW	24	7N	35E	F6	349382	Water	11/14/2002	158	STEVEN GILMORE SR	DELL AVE
SE	NW	24	7N	35E	F7	414756	Resource Protection	5/9/2005	37	WSDOT	SR 12 AND GOSE ROAD
SE	NW	24	7N	35E	F8	579465	Resource Protection	5/10/2005	--	WSDOT	SR 12/GOSE ROAD
SE	NW	24	7N	35E	F9	579466	Resource Protection	5/10/2005	--	WSDOT	SR 12/GOSE ROAD
NW	SW	24	7N	35E	G1	163126	Water	4/25/1979	186	ALVIN MC DOWELL	--
NW	SW	24	7N	35E	G2	430000	Water	12/9/1991	198	ANDREW PINZA	NKA/ROUTE 5/BOX 183, WALLA WALLA, 99362
NW	SW	24	7N	35E	G3	165875	Water	5/17/1994	106	DONN JOHNSON	NKA, WALLA WALLA 99362
NW	SW	24	7N	35E	G4	358480	Water	4/4/2003	150	ROBERT ESKILOSEN	2598 Dell Ave
NW	SW	24	7N	35E	G5	172584	Water	6/23/1993	170	RON MILKS	2175 DELL AVE, WALLA WALLA
NW	SW	24	7N	35E	G6	172657	Water	8/12/1954	572	ROSCOE GLUCK	--
NE	SW	24	7N	35E	H1	512886	Resource Protection	12/11/2007	25	WSDOT	NKA/DELL AVENUE & PINE STREET, WALLA WALLA
NE	SW	24	7N	35E	H2	429999	Water	7/26/1993	15	MARY LAMPERTI	NKA/ROUTE 5/BOX 182, WALLA WALLA, 99362
NE	SW	24	7N	35E	H3	171294	Water	9/12/1979	190	P. P & L SUB STATION	--
NE	SW	24	7N	35E	H4	171769	Water	7/18/1985	195	RALPH BRANDON	NKA/WALLA WALLA, 99362
NE	SW	24	7N	35E	H5	163755	Water	8/31/1995	33	ROBERT HYNEK	Dell Ave
NE	SW	24	7N	35E	H6	309466	Resource Protection	7/25/2001	20	TED REID	1491 Dell Ave
NE	SW	24	7N	35E	H7	309467	Resource Protection	7/25/2001	20	TED REID	1491 Dell Ave
NE	SW	24	7N	35E	H8	309468	Resource Protection	7/25/2001	20	TED REID	1491 Dell Ave
NW	SE	24	7N	35E	I1	514069	Decommissioned	1/16/2008	34	WSDOT	SR12 VIC OF DELL STREET, WALLA WALLA
NW	SE	24	7N	35E	I2	514070	Decommissioned	1/16/2008	40	WSDOT	SR12 VIC OF DELL STREET, WALLA WALLA
NW	SE	24	7N	35E	I3	191792	Water	8/24/1999	180	FRANK LOCATI	Rt 5 Box 236
NW	SE	24	7N	35E	I4	353432	Water	2/18/2003	140	RANK LOCATI	51 CORDEIRO LANE, WALLA WALLA, 99362
NW	SE	24	7N	35E	I5	483123	Resource Protection	2/21/2007	10	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I6	483124	Resource Protection	2/21/2007	13	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I7	483125	Resource Protection	2/21/2007	13	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I8	483126	Resource Protection	2/21/2007	10	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I9	483128	Resource Protection	2/21/2007	13	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I10	483129	Resource Protection	2/21/2007	10	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I11	483131	Resource Protection	2/22/2007	13	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I12	483132	Resource Protection	2/22/2007	13	WSDOT	HWY 12 AND PINE STREET
NW	SE	24	7N	35E	I13	514048	Decommissioned	1/16/2008	13	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I14	514050	Decommissioned	1/16/2008	10	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I15	514052	Decommissioned	1/16/2008	13	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I16	514054	Decommissioned	1/16/2008	10	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I17	514056	Decommissioned	1/16/2008	13	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I18	514058	Decommissioned	1/16/2008	13	WSDOT	VIC OF HWY 12 AT PINE STREET, WALLA WALLA
NW	SE	24	7N	35E	I19	580100	Resource Protection	6/15/2005	--	WSDOT	SR 12 VIC DELL STREET, WALLA WALLA 99362
NW	SE	24	7N	35E	I20	580101	Resource Protection	6/15/2005	--	WSDOT	SR 12 VIC DELL STREET, WALLA WALLA 99362
SW	NE	24	7N	35E	J	163456	Water	9/11/1979	150	BENIGNO MAURA	NKA/WALLA WALLA, 99362
NW	NW	19	7N	36E	A1	510522	Resource Protection	10/23/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A2	510523	Resource Protection	10/23/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A3	510525	Resource Protection	10/23/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A4	510527	Resource Protection	10/24/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A5	510529	Resource Protection	10/24/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A6	510531	Resource Protection	10/24/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A7	510533	Resource Protection	10/24/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A8	510535	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A9	510537	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362

Table 2. Water Well Inventory

Qtr	Qtr	Section	T	R	ID #	Log ID	Type	Completion Date	Depth (ft)	Owner	Street Address
NW	NW	19	7N	36E	A10	510539	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A11	510540	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A12	510541	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A13	510542	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A14	510544	Resource Protection	10/25/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A15	510546	Resource Protection	10/26/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NW	NW	19	7N	36E	A16	510548	Resource Protection	10/26/2007	25	DOC/Shannon and Wilson	1313 NORTH 13TH AVENUE, WALLA WALLA 99362
NE	NW	19	7N	36E	B1	174177	Water	7/17/1945	57	WSP	--
NE	NW	19	7N	36E	B2	174178	Water	7/18/1945	270	WSP	--
NW	NE	19	7N	36E	C1	189666	Resource Protection	3/16/1999	33	City of Walla Walla	812 REES AVE, WALLA WALLA
NW	NE	19	7N	36E	C2	189669	Resource Protection	3/16/1999	30	City of Walla Walla	812 REES AVE, WALLA WALLA
NW	NE	19	7N	36E	C3	189670	Resource Protection	3/16/1999	30	City of Walla Walla	812 REES AVE, WALLA WALLA
NW	NW	19	7N	36E	D1	430299	Resource Protection	6/22/1990	18	D&K FROZEN FOODS	1164 DELL AVENUE, WALLA WALLA, 99362
NW	NW	19	7N	36E	D2	430300	Resource Protection	6/28/1990	17	D&K FROZEN FOODS	1164 DELL AVENUE, WALLA WALLA, 99362
NW	NW	19	7N	36E	D3	430302	Water	4/29/1985	225	D&K FROZEN FOODS	1164 DELL AVENUE, WALLA WALLA, 99362
SW	NE	19	7N	36E	E	186105	Water	5/20/1988	--	UNOCAL STATIONS / W2 CO.	--
SW	NW	19	7N	36E	F1	499010	Water	9/27/2007	221	AMERICAN ROCK PROP	1430 DELL AVENUE, WALLA WALLA 99362
SW	SE	19	7N	36E	F2	430301	Water	3/21/1990	158	BLUE MOUNTAIN ASPHALT CO.	1360 DELL AVENUE, WALLA WALLA, 99362
SE	NW	19	7N	36E	G1	430298	Resource Protection	5/17/1991	13	D&K FROZEN FOODS	1164 DELL AVENUE, WALLA WALLA, 99362
SE	NW	19	7N	36E	G2	167105	Water	--	--	GENERAL FOODS CORP., BIRD'S EYE	--
SE	NW	19	7N	36E	G3	293716	Resource Protection	3/18/1946	1,123	GENERAL FOODS CORP./BIRDS EYE DIVISION	--
SW	NE	19	7N	36E	H	186049	Resource Protection	10/28/1990	--	UNION PACIFIC	N 9TH AVE AND N REES, WALLA WALLA
NE	SW	19	7N	36E	I1	430303	Water	12/15/1988	230	D&K FROZEN FOODS	1164 DELL AVENUE, WALLA WALLA, 99362
NE	SW	19	7N	36E	I2	172317	Water	8/1/1941	--	ROBERT LINCOLN	--
NE	SW	19	7N	36E	I3	382230	Resource Protection	5/11/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I3	382231	Resource Protection	5/11/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I3	382232	Resource Protection	5/11/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I6	382233	Resource Protection	5/11/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I7	382234	Resource Protection	5/12/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I8	382235	Resource Protection	5/12/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I9	382236	Resource Protection	5/12/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I10	382237	Resource Protection	5/12/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I11	382238	Resource Protection	5/12/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I12	382239	Resource Protection	5/13/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I13	382240	Resource Protection	5/13/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I14	382241	Resource Protection	5/13/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I15	382242	Resource Protection	5/13/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I16	382243	Resource Protection	5/13/2004	--	DOC	1313 N 13 AVE, WALLA WALLA
NE	SW	19	7N	36E	I17	295792	Resource Protection	--	18	Walla Walla	--
NE	SW	19	7N	36E	I18	295793	Resource Protection	--	18	Walla Walla	--
NE	SW	19	7N	36E	I19	295794	Resource Protection	--	18	Walla Walla	--
NE	SW	19	7N	36E	I20	295795	Resource Protection	--	23	Walla Walla	--
NE	SW	19	7N	36E	I21	295796	Resource Protection	--	23	Walla Walla	--
NE	SW	19	7N	36E	I22	295797	Resource Protection	--	23	Walla Walla	--
NE	SW	19	7N	36E	I23	297069	Water	--	--	WALLA WALLA CANNING CO. - PLANT WELL #1	--
NE	SW	19	7N	36E	I24	295798	Resource Protection	--	--	WALLA WALLA FARMERS CO - OP	--
NE	SW	19	7N	36E	I25	295799	Resource Protection	--	--	WALLA WALLA FARMERS CO - OP	--
NE	SW	19	7N	36E	I26	186333	Water	5/8/1987	22	WALLA WALLA FARMERS CO-OP	--
NW	SW	19	7N	36E	J1	315746	Resource Protection	8/13/2001	15	AGRIPAC FROZEN FOODS	1164 DELL AVE
NW	SW	19	7N	36E	J2	315757	Resource Protection	9/14/2001	25	AGRIPAC FROZEN FOODS	1164 DELL AVE, WALLA WALLA
NW	SW	19	7N	36E	J3	315758	Resource Protection	9/14/2001	25	AGRIPAC FROZEN FOODS	1164 DELL AVE, WALLA WALLA
NW	SW	19	7N	36E	J4	167486	Water	7/21/1954	64	H. J. PHINNEY	--
NW	SW	19	7N	36E	J5	171948	Water	9/1/1921	30	REMO GRASSIT	--
NW	SW	19	7N	36E	J6	380706	Resource Protection	3/29/2004	15	DOC	1313 N 13TH AVE, WALLA WALLA 99362
NW	SE	19	7N	36E	K	175049	Water	4/2/1996	115	WALT JOHNSON SR.	--
SW	NW	20	7N	36E	A	449040	Resource Protection	1/9/2006	8	JAMES HAROLD	10 EAST ROSE STREET, WALLA WALLA 99362
NW	NW	23	7N	35E	A	172478	Water	7/11/1977	204	RODGER ROWE	Rt 2 Box 127A
NW	NE	23	7N	35E	B1	164603	Resource Protection	12/7/1989	130	CITY OF WALLA WALLA	--
NW	NE	23	7N	35E	B2	172511	Water	6/6/1970	204	ROGER NIELSEN	--

Table 2. Water Well Inventory

Qtr	Qtr	Section	T	R	ID #	Log ID	Type	Completion Date	Depth (ft)	Owner	Street Address
	NW	23	7N	35E	C	169488	Water	8/5/1998	186	KEN PAPLINSKI	800 Rt 2
SW	NW	23	7N	35E	D1	164604	Resource Protection	9/18/1986	151	CITY OF WALLA WALLA	--
SW	NW	23	7N	35E	D2	178368	Water	9/25/1991	20	CITY OF WALLA WALLA	--
SW	NW	23	7N	35E	D3	514042	Decommissioned	1/16/2008	45	WSDOT	SR12 VIC OF SUDBURY ROAD
SW	NW	23	7N	35E	D4	414750	Resource Protection	5/19/2005	16	WSDOT	SR 12 AND SUDBURY ROAD
SE	NW	23	7N	35E	E1	514039	Decommissioned	1/16/2008	40	WSDOT	SR12 VIC OF GOSE ROAD
SE	NW	23	7N	35E	E2	514043	Decommissioned	1/16/2008	44	WSDOT	SR12 MP333.5 APPROX 1/4 MILE NORTH
SE	NW	23	7N	35E	E3	378729	Resource Protection	3/11/2004	44	WSDOT	SR12 MP 333.5 APPROXIMATELY 1/4 MILE NORTH,WALLA
SE	NW	23	7N	35E	E4	414752	Resource Protection	5/17/2005	16	WSDOT	SR 12 AND GOSE ROAD
SE	NW	23	7N	35E	E5	417283	Resource Protection	5/18/2005	40	WSDOT	SR 12/GOSE ROAD
SW	NE	23	7N	35E	F1	514040	Decommissioned	1/16/2008	69	WSDOT	SR12 VIC OF LAST CHANCE ROAD
SW	NE	23	7N	35E	F2	347030	Water	9/25/2002	576	HYDRO IRRIGATION DIST 9	HWY 12/GOSE STREET,WALLA WALLA 99362
SW	NE	23	7N	35E	F3	414754	Resource Protection	5/11/2005	22	WSDOT	SR 12 AND GOSE ROAD
SW	NE	23	7N	35E	F4	417273	Resource Protection	5/12/2005	69	WSDOT	SR 12/LAST CHANCE ROAD
SE	NE	23	7N	35E	G1	514037	Decommissioned	1/16/2008	39	WSDOT	SR12 APPROX 1/2 MILE NORTH OF MP334
SE	NE	23	7N	35E	G2	378732	Resource Protection	3/10/2004	39	WSDOT	SR12 MP 334 APPROXIMATELYT 1/2 MILE NORTH,WALLA WALLA 99362
SW	NE	23	7N	35E	H1	163152	Water	8/23/1952	53	ANDREA CASTOLDI	Rt 2 Box 541
SW	NE	23	7N	35E	H2	164726	Water	6/12/1949	36	CLIFFORD SANDERS	NKA/LOT 12, ROUTE 2 BOX 554-A, WALLA WALLA
SW	NE	23	7N	35E	H3	167818	Water	3/21/1956	53	HERBERT & REINARD LAND	NKA/LOT 4 BLK 9 OF BLALOCK ORCHARDS
SW	NE	23	7N	35E	H4	293843	Water	4/2/1960	160	JACK MC KINNON	NKA/LOT 2, BLK 3 OF BLALOCK ORCHARDS
SW	NE	23	7N	35E	H5	429992	Water	8/23/1952	53	STEVE BENZEL	Rt 2 Box 541
SW	NE	23	7N	35E	H6	173732	Water	6/12/1941	515	U. S. DEPT. OF INTERIOR, BONNEVILLE POWER ADMIN	--
NW	SW	23	7N	35E	I1	293409	Resource Protection	--	20	BENNEVILLE POWER ADMIN.	--
NW	SW	23	7N	35E	I2	293410	Resource Protection	--	20	BENNEVILLE POWER ADMIN.	--
NW	SW	23	7N	35E	I3	293411	Resource Protection	--	60	BENNEVILLE POWER ADMIN.	--
NW	SW	23	7N	35E	I4	293412	Resource Protection	--	60	BENNEVILLE POWER ADMIN.	--
NW	SW	23	7N	35E	I5	309261	Decommissioned	5/29/2001	18	BONNEVILLE POWER ADMIN	--
NW	SW	23	7N	35E	I6	309262	Decommissioned	5/29/2001	58	BONNEVILLE POWER ADMIN	--
NW	SW	23	7N	35E	I7	163861	Water	9/8/1976	--	BONNEVILLE POWER ADMINISTRATION	--
NW	SW	23	7N	35E	I8	429993	Resource Protection	1/18/1990	60	BONNEVILLE POWER ADMINISTRATION	NKA/WELL #5, ROUTE 5/BOX 126&HWY 12
NW	SW	23	7N	35E	I9	429994	Resource Protection	1/12/1990	20	BONNEVILLE POWER ADMINISTRATION	NKA/ROUTE 5/BOX 16&HWY 12
NW	SW	23	7N	35E	I10	429995	Resource Protection	1/9/1990	60	BONNEVILLE POWER ADMINISTRATION	NKA/WELL #1, ROUTE 5 BOX 126, WALLA WALLA
NW	SW	23	7N	35E	I11	429996	Resource Protection	1/12/1990	60	BONNEVILLE POWER ADMINISTRATION	NKA/WELL #2, ROUTE 5 BOX 126, WALLA WALLA
NW	SW	23	7N	35E	I12	429997	Resource Protection	1/10/1990	20	BONNEVILLE POWER ADMINISTRATION	NKA/WELL #3, ROUTE 5 BOX 126, WALLA WALLA
NW	SW	23	7N	35E	I13	429998	Resource Protection	1/12/1990	20	BONNEVILLE POWER ADMINISTRATION	NKA/WELL #4, ROUTE 5 BOX 126, WALLA WALLA
NW	SW	23	7N	35E	I14	172458	Water	2/19/1976	192	ROBIN M./SHARON R. SMITH	--
NE	SE	23	7N	35E	J	171755	Water	4/21/1947	350	B. W. BLAIR	NKA/WALLA WALLA, 99362

Notes:

-- Data Not Available

Table 3. Field Gas Measurements from Soil Gas Probes

Boring No.	Depth, ft bgs	PID (ppm)	O_2%	H_2S (ppm)	CO (ppm)	%LEL
Landfill						
P-1	4–6	0	19.5	0	4	0
	8–10	0	19.2	0	27	0
	12–14	0	19.9	0	3	0
	16–18	0	19.9	0	3	0
P-2	4–6	0	20	NA	2	NA
	8–10	0	16.2	0	29	0
	12–14	0	16.9	0	50	0
	16–18	0	18.4	NA	207	6
	20–22	0	17.4	0	14	3
P-3	4–6	0	18.2	0	4	0
	8–10	0	20.7	0	0	0
	12–14	0	14.2	0	7	0
	16–18	0.3	15.4	0	7	0
P-4	4–6	0	2.4	0	63	52
	8–10	0.7	2.8	0	36	>100
	12–14	0	1.2	0	75	94
	16–18	0	4.1	0	190	>100
	18–20	0	7.6	0	500	98
P-5	4–6	0	1.1	0	100	43
	8–10	0	0.8	0	5	40
	12–14	0	8.9	0	108	35
	16–18	0	17.8	0	60	20
P-6	4–6	0	12.9	0	113	20
	8–10	0.4	14.7	0	40	5
	12–14	0.9	13.8	0	50	10
	16–18	0	12.1	0	11	8
P-7	4–6	0.8	11.8	0	11	3
	8–10	1	8.6	0	4	3
	12–14	0.8	6.9	0	43	3
	16–18	1	5.4	0	51	3
P-8	4–6	0.1	16.2	0	12	3
	8–10	0	19.5	0	58	3
	12–14	0	16.5	0	65	5
	16–18	0	18	0	72	2

(Table Continues)

Table 3. Field Gas Measurements from Soil Gas Probes (Continued)

Boring No.	Depth, ft bgs	PID (ppm)	O_2%	H_2S (ppm)	CO (ppm)	%LEL
Landfill (continued)						
P-9	4–6	0	11.3	0	28	0
	8–10	0	11	0	229	12
	12–14	NA	9.6	0	256	8
	16–18	NA	11	0	209	12
P-10	4–6	6	15.1	0	45	0
	8–10	0	16.8	0	64	3
	12–14	0	18.2	0	24	0
	16–18	NA	12.2	0	150	6
P-11	4–6	NA	18.4	0	23	0
	8–10	NA	17.2	0	48	2
	12–14	NA	17.7	0	28	0
P-12	4–6	NA	20.2	0	14	0
	8–10	0	19.7	0	152	3
	12–14	0	17.5	0	34	0
	16–18	0	17.2	0	86	2
P-13	4–6	0	20.7	0	0	0
	8–10	0	16.7	0	45	0
	12–14	0	13.5	0	36	0
	16–18	0	15.2	0	109	2
P-14	4–6	0	19	0	25	0
	8–10	0	19.6	0	50	0
	12–14	NA	18.8	0	130	6
	16–18	NA	17.9	0	214	7
P-15	4–6	0	20.7	0	0	0
	8–10	0	13	0	67	0
	12–14	0	11.6	0	40	0
	16–18	0	14.1	0	26	0
AOC 2						
I-P1	4–6	0	20.5	NA	35	NA
	8–10	0	NA	NA	NA	NA
	12–14	0	NA	NA	NA	NA
AOC 5 (incorrect AOC (2) in sample IDs)						
I-P2	4–6	NA	16.8	NA	131	4
	8–10	NA	20	NA	98	0
	12–14	NA	19.5	NA	200	2

(Table Continues)

Table 3. Field Gas Measurements from Soil Gas Probes (Continued)

Boring No.	Depth, ft bgs	PID (ppm)	O_2%	H_2S (ppm)	CO (ppm)	%LEL
AOC 3						
MP-P1	4–6	0	20	0	24	0
	8–10	NA	19	0	100	4
	12–14	0	19.5	NA	68	NA
	16–18	0	NA	NA	NA	NA
AOC 6						
PH-P1	4–6	0	18	0	225	8
	8–10	0	17.5	0	20	7
	12–14	0	17.5	0	83	3
	16–18	0	18.5	0	75	2

Table 4. Groundwater Monitoring Data

			Date	7/12/2010		10/25/2010		2/7/2011		6/20/2011		9/19/2011		12/12/2011	
	Northing (USft)	Easting (USft)	Top of Casing Elevation (USft)	DTW (btoc)	Elevation (USft)	DTW (btoc)	Elevation (USft)	DTW (btoc)	Elevation (USft)	DTW (btoc)	Elevation (USft)	DTW (btoc)	Elevation (USft)	DTW (btoc)	Elevation (USft)
WSP Monitoring Wells															
MW-1	280824.371	2181490.37	913.14	60.75	852.39	62.4	850.74	59.62	853.52	58	855.14	59.49	853.65	59.72	853.42
MW-2	280575.923	2180188.99	893.01	43.17	849.84	45.04	847.97	42.49	850.52	40.99	852.02	42.14	850.87	42.44	850.57
MW-3	280310.23	2181145.54	923.82	72.06	851.76	73.63	850.19	70.75	853.07	69.08	854.74	70.59	853.23	70.83	852.99
MW-5	279792.103	2183540.86	938.06	82.41	855.65	82.25	855.81	79.07	858.99	77.3	860.76	79.93	858.13	79.89	858.17
MW-6	278159.132	2184308.72	911.05	24.19	886.86	24.76	886.29	23.57	887.48	23.04	888.01	25.56	885.49	26.47	884.58
MW-7	278805.856	2184222.73	913.21	58.04	855.17	57.33	855.88	53.69	859.52	52.03	861.18	55.17	858.04	55.13	858.08
MW-8	279452.553	2184148.45	944.76	92.8	851.96	89.54	855.22	86.58	858.18	84.78	859.98	87.73	857.03	87.36	857.40
MW-9	281001.894	2183205.74	937.51	82.49	855.02	84.1	853.41	81.07	856.44	79.13	858.38	80.81	856.70	81.01	856.50
MW-10	279182.69	2182843.83	928.46	75.86	852.60	74.41	854.05	71.26	857.20	69.6	858.86	72.09	856.37	72.12	856.34
MW-11	279500.998	2182440.01	923.74	70.72	853.02	70.8	852.94	67.7	856.04	65.93	857.81	68.09	855.65	68.2	855.54
MW-12	279967.379	2182346.33	924.18	70.62	853.56	71.55	852.63	68.66	855.52	66.72	857.46	68.61	855.57	68.78	855.40
MW-13	278753.212	2181530.41	906.92	54.31	852.61	54.6	852.32	51.63	855.29	50.02	856.90	52.12	854.80	52.25	854.67
MW-14	279907.515	2180863.82	919.36	67.8	851.56	69.31	850.05	66.34	853.02	64.79	854.57	66.29	853.07	66.55	852.81
MW-15*	278971.142	2185598.62	959.10	--	--	--	--	--	--	--	--	99.54	859.56	99.68	859.42
Sudbury Landfill Monitoring Wells															
SLF-7	UN	UN	884.89	--	--	43.72	841.17	41.55	843.34	40.65	844.24	41.47	843.42	--	--
SLF-9	UN	UN	901.44	--	--	--[1]	--[1]	--[1]	--[1]	59.73	841.71	60	841.44	--	--
SLF-10	UN	UN	869.81	--	--	26.52	843.29	24.51	845.30	23.16	846.65	24.28	845.53	--	--

Notes:

btoc = Below top of casing.

DTW = Depth-to-water.

UN = Coordinates unavailable.

USft = United States feet.

-- = Depth-to-water not collected.

* = Well installed in the third quarter of 2011.

[1] Water level meter probe diameter too wide to sound depth from access port at top of well, no water level collected.

Table 5. Potential Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR	Description	Applicability
Soils		
Model Toxics Control Act (WAC 173-340-740, -747)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for soil, including derivation of soil concentrations protective of groundwater.	MTCA cleanup levels are applicable to soil outside the area of refuse containment.
Groundwater		
EPA Underground Injection Control Regulations (40 CFR 144 and 146)	Regulates injections of underground sources of drinking water by specific classes of injection wells.	Relevant to use of any cleanup action technologies that involve injections into drinking water aquifer.
Safe Drinking Water Act, Primary Drinking Water Regulations (40 Code of Federal Regulations [CFR] 141)	These regulations protect the quality of public drinking water supplies through regulation of chemical parameters and constituent concentrations as maximum concentration limits (MCLs).	MCLs are potentially relevant and appropriate where groundwater is a potential source of drinking water.
Model Toxics Control Act (WAC 173-340-720)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for groundwater.	MTCA cleanup levels are applicable to groundwater. WAC 173-200-010(3)(c) states that clean up actions approved by the department (Ecology) under MTCA are not subject to the water quality standards for ground waters of the State of Washington contained within Chapter 173-200 WAC.
State Water Code and Water Rights (Chapters 173-150 & 154 WAC)	Establishes rights of well owners to have adequate water supplies and establishes permit program for groundwater withdrawal.	Applies to groundwater extraction.
Surface Water		
Clean Water Act Section 304 – Federal Ambient Water Quality (National Recommended Water Quality Criteria, November 2002) (EPA-822-R-02-047)	Provides chemical concentrations for acceptable ambient water quality.	Potentially relevant and appropriate to ambient surface water quality in and point-source discharges to surface water should cleanup activities cause a discharge to surface water.
Clean Water Act, National Pollutant Discharge Elimination System (40 CFR Part 122-125) and Washington State National Pollutant Discharge Elimination System Permit Program (Chapter 173-220 WAC).	The National Pollutant Discharge Elimination System (NPDES) program requires that permits be obtained for point-source discharges of pollutants to surface water. Under this regulation, a point-source discharge to a surface water body cannot cause an exceedance of water quality standards in the receiving water body outside the mixing zone.	Substantive regulatory requirements of the NPDES permit program are potentially applicable to the direct discharge of treated groundwater to a surface water body.
Clean Water Act's National Toxics Rule (NTR) (40 CFR 131.36)	Provides values that have to be met for point-source discharges to surface water.	Potentially applicable to point-source discharges to surface water and on-site stormwater ditches should cleanup activities cause discharge to surface water.
Stormwater Permit Program (40 CFR 122.26)	Best management practices (BMPs) must be used and appropriate monitoring performed to ensure that stormwater runoff does not cause an exceedance of water quality standards in a receiving surface water body.	Substantive requirements of the general stormwater permit program for stormwater discharges associated with construction activities disturbing over 1 acre are potentially applicable to cleanup actions at the Landfill.
Stormwater Management (Chapter 173-220 WAC)	Best management practices (BMPs) must be used and appropriate monitoring performed to ensure that stormwater runoff does not cause an exceedance of water quality standards in a receiving surface water body.	Substantive requirements of the general stormwater permit program for stormwater discharges associated with construction activities disturbing over 1 acre are potentially applicable to cleanup actions at the Landfill.
Washington State Water Quality Standards for Surface Waters (Chapter 173-201A WAC)	Washington State water quality standards protect freshwater aquatic life by specifying protection criteria by stretch of surface waters. Chapter 173-201A WAC provides limitations on other parameters such as turbidity, temperature, dissolved oxygen, and pH for protection of organisms. Tributaries of waters whose uses are designated salmon and trout spawning, core rearing and migration, or extraordinary primary contact recreation are protected at the same level as the waters themselves.	The substantive requirements of this regulation are potentially applicable for cleanup actions affecting surface water.
Model Toxics Control Act (WAC 173-340-730)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for surface water.	MTCA cleanup levels may be applicable if cleanup activities cause a discharge to surface water.
Air		
National Ambient Air Quality Standards (40 CFR 50.6, 50.12)	Provides acceptable ambient air quality levels for particulate matter and lead.	Applicable to earth-moving activities as well as to treatment processes that may include mixing or other processes that result in potential releases of particulates or lead.
National Emission Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR Part 261)	Establishes specific emissions levels allowed for toxic air pollutants.	Applicable to treatment alternatives that may emit toxic pollutants to the air.
Model Toxics Control Act (WAC 173-340-750)	MTCA regulates the investigation and cleanup of releases to the environment that may pose a threat to human health or the environment. Establishes cleanup levels for air.	MTCA cleanup levels may be applicable if cleanup activities cause a release to air.

(Table Continues)

Table 5. Potential Applicable or Relevant and Appropriate Requirements (ARARs) (Continued)

ARAR	Description	Applicability
Miscellaneous		
Endangered Species Act (50 CFR Parts 17, 402)	Section 7 of the Endangered Species Act (ESA) and 40 CFR Part 402 require that federal agencies consider the effects of their proposed actions on federal listed species. It requires consultation between the agency proposing the action and the U.S. Fish and Wildlife Service (USFWS) or National Oceanic and Atmospheric Administration (NOAA) Fisheries, as appropriate. Preparation of a biological assessment is conducted, addressing the potential effects to listed species in the area and methods to minimize those effects.	The ESA is potentially applicable to cleanup actions because federal threatened species could possibly use the project area. Therefore, they could potentially be affected by cleanup actions conducted at the site.
Native American Graves Protection and Repatriation Act (43 CFR Part 10)	Native American Graves Protection and Repatriation Act regulations protect Native American burials from desecration through the removal and trafficking of human remains and “cultural items,” including funerary and sacred objects.	This Act is potentially applicable to cleanup actions because it is possible that the disturbance of Native American materials could occur as a result of work in subsurface excavations at the site. Such materials are not known to be present at the site, but could be inadvertently uncovered during soil removal.
National Historic Preservation Act (36 CFR Parts 60, 63, and 800)	National Historic Preservation Act (NHPA) regulations require federal agencies to consider the possible effects on historic sites or structures of actions proposed for federal funding or approval. Historic sites or structures as defined in the regulations are those on or eligible for the National Register of Historic Places, generally at least 50 years old.	This Act is potentially applicable to subsurface work at site. No such sites are known to be present in the area.
State Environmental Policy Act (SEPA) (Chapter 197-11 WAC)	Requires a review of potential damage that occurs to the environment as a result of man’s activities.	SEPA checklist may be required prior to construction of a cleanup action system at the site.
Resource Conservation and Recovery Act (RCRA) – Identification and Listing of Hazardous Waste (40 CFR Part 261-265, 270, and 271)	Defines those solid wastes which are subject to regulation as hazardous wastes, and lists specific chemical and industry-source wastes.	Applicable to determining whether wastes are considered hazardous wastes under RCRA.
RCRA Land Disposal Restrictions (40 CFR 268)	Establishes standards for land disposal of RCRA hazardous waste. Requires treatment to diminish a waste’s toxicity and/or minimize contaminant migration.	Applicable if cleanup activities generate and include land disposal of waste that is characterized as hazardous.
RCRA Subtitle D Nonhazardous Waste Management Standards (40 CFR 257)	Develops standards for the management of non-hazardous wastes.	Applicable if cleanup activities generate and include the management of non-hazardous wastes.
Washington Hazardous Waste Management Act (Chapter 173-303 WAC)	Establishes standards for the generation, transport, treatment, storage, or disposal of designated dangerous waste in the state.	This regulation is potentially applicable to alternatives that would involve handling of contaminated media at the site. The area of contamination policy allows contaminated media to be consolidated within the same area of a site without triggering Resource Conservation and Recovery Act or Washington dangerous waste regulations.
Department of Transportation of Hazardous Wastes (49 CFR 105 – 180)	Establishes specific U.S. Department of Transportation rules and technical guidelines for the off-site transport of hazardous materials.	Applicable to cleanup activities that involve the off-site transportation of hazardous waste.
Washington Minimum Functional Standards for Solid Waste Handling (Chapter 173-304 WAC)	Defines requirements for solid waste management and disposal facilities. Establishes standards for handling and disposal of solid non-hazardous waste in Washington.	Applies to closure and post closure care of solid waste landfill that accepted waste prior to October 1991, including capping, installation of gas system, and environmental monitoring. The Washington State Department of Ecology has determined that Chapter 173-304 WAC is not an ARAR for the facility. However, future actions at the WSP landfill use this rule as a guideline for post closure care and maintenance.
Washington Solid Waste Handling Standards (Chapter 173-350 WAC)	Defines requirements for solid waste management and disposal facilities. Establishes standards for handling and disposal of solid non-hazardous waste in Washington.	These regulations are potentially applicable to solid nonhazardous wastes and are potentially relevant and appropriate to on-site cleanup actions governing contaminated media management.
Washington Water Well Construction Act Regulations (Chapter 173-160 WAC)	Provides requirements for water well construction.	These regulations are potentially applicable to the installation, operation, or closure of supply, monitoring and treatment wells at and around the site.
City of Walla Walla Municipal Code (Title 13 – Water and Sewers)	Local codes provide standards for water supply, sanitary sewer, and stormwater.	Applicable if cleanup activities require a water supply or discharges to the sanitary sewer. Also applicable if cleanup or construction activities discharge stormwater.
City of Walla Walla Municipal Code (Title 15 – Building and Construction)	Local codes provide standards for all building and construction activities, including building construction and grading.	Plans review and building permits may be required if cleanup activities necessitate the construction of buildings or structures.
City of Walla Walla Municipal Code (Title 21 – Environment)	Requires a review of potential damage that occurs to the environment as a result of man’s activities in accordance with State SEPA requirements.	SEPA checklist may be required prior to construction of a cleanup action system at the site.

Table 6. Soil Analytical Data

ANALYTE				Station ID	Tank #1-MSC				Tank #3-Hospital				Tank #4-MSC Industries				Tank #8 Unit 1				Tank #9 Unit 5				Tank #10 So	
				Sample ID	MSC-1NE	MSC-1SW	MSC-1B	MSC-1SP	WSP-3NE	WSP-3SW	WSP-3B	WSP-3SP	MSC-2NE	MSC-2NE	MSC-2B	MSC-2SP	WSP-4NE	WSP-4SW	WSP-4B	WSP-4SP	WSP-2NE	WSP-2SW	WSP-2B	WSP-2SP	WSP-1NE	WSP-1SW
				Depth (ft bgs)	4.5	4.5	9	0	4.5	4.5	9	0	4.5	4.5	9	0	5.5	5.5	9	0	4.5	4.5	9	0	4.5	4.5
				Location	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall
				Sample Type	Composite	Composite	Grab	Composite	Composite	Composite	Grab	Composite	Composite	Composite	Grab	Composite	Composite	Composite	Grab	Composite	Composite	Composite	Grab	Composite	Composite	Composite
				Date Sampled	2/27/96	2/27/96	2/27/96	2/27/1996	2/24/96	2/24/96	2/24/96	2/24/1996	2/28/96	2/28/96	2/28/96	2/28/1996	2/25/96	2/25/96	2/25/96	2/25/1996	2/24/96	2/24/96	2/24/96	2/24/1996	2/24/96	2/24/96
	Units	MTCA A Unrestricted	MTCA B Carcinogen	MTCA B Non-carcinogen																						
TOTAL PETROLEUM HYDROCARBONS																										
Gasoline Range Organics	mg/kg	30/100[4]	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Organics	mg/kg	2,000	-	-	--	--	--	210	--	--	--	--	--	--	--	96	32	28	--	47	--	--	--	59	--	--
Lube Oil Range Organics	mg/kg	2,000	-	-	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AROMATIC HYDROCARBONS																										
Benzene	mg/kg	0.03	18	320	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Toluene	mg/kg	7	-	6,400	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Ethylbenzene	mg/kg	600	-	8,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
m,p-Xylene	mg/kg	-	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
o-Xylene	mg/kg	-	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Total Xylenes	mg/kg	9	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
VOLATILE ORGANIC COMPOUNDS																										
Acetone	mg/kg	-	-	72,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Carbon disulfide	mg/kg	-	-	8,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2-Butanone (MEK)	mg/kg	-	-	48,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chloroform	mg/kg	-	-	800	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Trichloroethene (TCE)	mg/kg	0.03	21.7	40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Tetrachloroethene (PCE)[6/7]	mg/kg	0.05	**11**/476	480	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trimethylbenzene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
p-Isopropyltoluene (cumene)	mg/kg	8,000	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
POLYCYCLIC AROMATIC HYDROCARBONS[2]																										
Napththalene	mg/kg	5	-	1,600	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
2-Methylnaphthalene	mg/kg	-	-	320	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
1-Methylnaphthalene	mg/kg	-	35	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Acenaphthylene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Acenaphthene	mg/kg	-	-	4,800	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Fluorene	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Phenanthrene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Anthracene	mg/kg	-	-	24,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Fluoranthene	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Pyrene	mg/kg	-	-	2,400	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzo(g,h,i)perylene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzo(a)anthracene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chrysene*	mg/kg	-	140	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzo(b)fluoranthene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzo(k)fluoranthene*	mg/kg	-	14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzo(a)pyrene*	mg/kg	0.1	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Indeno(1,2,3-cd)pyrene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Dibenzo(a,h)anthracene*	mg/kg	-	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Total cPAHs as Benzo(a)pyrene[3]	mg/kg	0.1	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
TOTAL METALS[2]																										
Arsenic	mg/kg	20	0.67	24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Cadmium	mg/kg	2	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Chromium	mg/kg	2000	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Copper	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Lead	mg/kg	250	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Manganese	mg/kg	-	-	11,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT

Notes:

[2] Only analytes with a minimum of one detection are listed.

[3] Total of individual cPAHs (indicated by *), benzo(a)pyrene toxcity equivalency factor; half the practical quantitation limit was used for non-detect values.

[4] If benzene present - 30 mg/kg, if no benzene present - 100 mg/kg.

[5] Protection of soil injestion/protection of groundwater

[6] TCE and PCE concentrations in groundwater were originally screened to **bolded** levels. Changes to cleanup levels occurred following initial screening as described in Section 6.1. New cleanup levels are shown here and in Table 13.

[7] Screening level exceedances shown in this table reflect new screening levels established by Ecology in June 2012.

cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons.
U	Analyte not detected above given practical quantitation limit.
J	Sample analyzed past the recommended hold time, value is an estimate.
UJ	Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.
°C	Degrees celcius.
mg/l	Milligrams per liter.
µS/m	Microsiemens per meter.
mV	Millivolts.
-	No cleanup level established for this parameter
-- =	Result not detected. Reporting limit or method detection limit not listed in historic data.
NTU	Nephelometric tubidity unit.
S.U.	Standard units.
µg/l	micrograms per liter.
UN	Depth of sample collection unknown.
NT	Parameter was not tested.
UC	Source is unclear whether this parameter was analyzed.
^	Orginal sample was non-detect. Result presented is the duplicate result.
MEK	methyl ethyl keytone.

Table 6. Soil Analytical Data

ANALYTE				Station ID	uth Wing		Tank #11 IMU				Tank GF				Tank T_{13}			GP13				MW-7	MW-8	MW-9	MW-10
				Sample ID	WSP-1B	WSP-SP	IMU-1NE	IMU-1West	IMU-B	IMU-1SP	GF-1NE	GF-1SW	GF-1B	GF-1SP	S1-V2	S2-V2	S3	GP13	GP13	GP13	GP13	MW7-SB6	MW8-SB6	MW9-SB6	MW10-SB6
				Depth (ft bgs)	10	0	4.5	4.5	8	0	UN	UN	UN	UN	UN	UN	UN	0-3	3-6	6-9	9-12	6	6	6	6
				Location	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Sidewall	Sidewall	Bottom	Stockpile	Bottom	Sidewall	Sidewall	NA	NA	NA	NA	Subsurface	Subsurface	Subsurface	Subsurface
				Sample Type	Grab	Composite	Composite	Composite	Grab	Composite	Composite	Composite	Grab	Composite	Grab	Grab	Grab	NA	NA	NA	NA	Grab	Grab	Grab	Grab
				Date Sampled	2/24/96	2/24/1996	2/29/96	2/29/96	2/29/96	2/29/1996	2/27/96	2/27/96	2/27/96	2/27/1996	8/5/09	8/5/09	8/5/09	5/1/99	5/1/99	5/1/99	5/1/1999	5/4/10	5/4/10	5/3/10	5/12/10
	Units	MTCA A Unrestricted	MTCA B Carcinogen	MTCA B Non-carcinogen																					
TOTAL PETROLEUM HYDROCARBONS																									
Gasoline Range Organics	mg/kg	30/100[4]	-	-	--	--	--	--	--	--	--	--	--	--	7.22 U	6.44 U	6.72 U	--	--	--	--	7.7 U	7.3 U	7 U	140
Diesel Range Organics	mg/kg	2,000	-	-	--	--	--	--	640	280	--	--	--	--	12.2 U	319	11.7 U	--	--	--	--	33 U	29 U	29 U	29 U
Lube Oil Range Organics	mg/kg	2,000	-	-	--	--	--	--	--	--	--	--	--	--	30.6 U	28.6 U	29.3 U	--	--	--	--	65 U	58 U	59 U	58 U
AROMATIC HYDROCARBONS																									
Benzene	mg/kg	0.03	18	320	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.0217 U	0.0193 U	0.0202 U	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
Toluene	mg/kg	7	-	6,400	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.289 U	0.258 U	0.269 U	UC	UC	UC	UC	0.006 U	0.006 U	0.0074 U	0.007 U
Ethylbenzene	mg/kg	600	-	8,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.289 U	0.258 U	0.269 U	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
m,p-Xylene	mg/kg	-	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0024 U	0.0024 U	0.003 U	0.0028 U
o-Xylene	mg/kg	-	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
Total Xylenes	mg/kg	9	-	16,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.867 U	0.773 U	0.807 U	UC	UC	UC	UC	0.0036 U	0.0036 U	0.0045 U	0.0042 U
VOLATILE ORGANIC COMPOUNDS																									
Acetone	mg/kg	-	-	72,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.04	0.045	0.053	0.04
Carbon disulfide	mg/kg	-	-	8,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
2-Butanone (MEK)	mg/kg	-	-	48,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.006 U	0.006 U	0.0074 U	0.007 U
Chloroform	mg/kg	-	-	800	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
Trichloroethene (TCE)	mg/kg	0.03	21.7	40	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
Tetrachloroethene (PCE)[6/7]	mg/kg	0.05	**11**/476	480	--	--	--	--	--	--	--	--	--	--	--	--	--	2.40	0.94	1.4	0.68	0.0012 U	0.0012 U	0.0015 U	0.0014 U
1,2,4-Trimethylbenzene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
p-Isopropyltoluene (cumene)	mg/kg	8,000	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0012 U	0.0012 U	0.0015 U	0.0014 U
POLYCYCLIC AROMATIC HYDROCARBONS[2]																									
Napththalene	mg/kg	5	-	1,600	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
2-Methylnaphthalene	mg/kg	-	-	320	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
1-Methylnaphthalene	mg/kg	-	35	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Acenaphthylene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Acenaphthene	mg/kg	-	-	4,800	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Fluorene	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Phenanthrene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Anthracene	mg/kg	-	-	24,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Fluoranthene	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Pyrene	mg/kg	-	-	2,400	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Benzo(g,h,i)perylene	mg/kg	-	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Benzo(a)anthracene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Chrysene*	mg/kg	-	140	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Benzo(b)fluoranthene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Benzo(k)fluoranthene*	mg/kg	-	14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Benzo(a)pyrene*	mg/kg	0.1	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Indeno(1,2,3-cd)pyrene*	mg/kg	-	1.4	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Dibenzo(a,h)anthracene*	mg/kg	-	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0087 U	0.0077 U	0.0078 U	0.0078 U
Total cPAHs as Benzo(a)pyrene[3]	mg/kg	0.1	0.14	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	0.0066 U	0.0058 U	0.0059 U	0.0059 U
TOTAL METALS[2]																									
Arsenic	mg/kg	20	0.67	24	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	7.56	5.96	5.92	UC	UC	UC	UC	13 U	12 U	12 U	12 U
Cadmium	mg/kg	2	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.244 U	0.229 U	0.234 U	UC	UC	UC	UC	0.65 U	0.58 U	0.59 U	0.58 U
Chromium	mg/kg	2000	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	18.3	14	12.1	UC	UC	UC	UC	20	16	17	15
Copper	mg/kg	-	-	3,200	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	24	24	25	22
Lead	mg/kg	250	-	-	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	10.2	8.19	8.38	UC	UC	UC	UC	7.6	9.7	9.3	12
Manganese	mg/kg	-	-	11,000	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	UC	UC	UC	UC	500	540	540	590

Notes:

[2] Only analytes with a minimum of one detection are listed.

[3] Total of individal cPAHs (indicated by *), benzo(a)pyrene toxcity equivalency factor; half the practical quantitation limit was used for non-detect values.

[4] If benzene present - 30 mg/kg, if no benzene present - 100 mg/kg.

[5] Protection of soil injestion/protection of groundwater

[6] TCE and PCE concentrations in groundwater were originally screened to **bolded** levels. Changes to cleanup levels occurred following initial screening as described in Section 6.1. New cleanup levels are shown here and in Table 13.

[7] Screening level exceedances shown in this table reflect new screening levels established by Ecology in June 2012.

cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons.
U	Analyte not detected above given practical quantitation limit.
J	Sample analyzed past the recommended hold time, value is an estimate.
UJ	Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.
°C	Degrees celcius.
mg/l	Milligrams per liter.
µS/m	Microsiemens per meter.
mV	Millivolts.
-	No cleanup level established for this parameter
-- =	Result not detected. Reporting limit or method detection limit not listed in historic data.
NTU	Nephelometric tubidity unit.
S.U.	Standard units.
µg/l	micrograms per liter.
UN	Depth of sample collection unknown.
NT	Parameter was not tested.
UC	Source is unclear whether this parameter was analyzed.
^	Orginal sample was non-detect. Result presented is the duplicate result.
MEK	methyl ethyl keytone.

Table 6. Soil Analytical Data

ANALYTE				Station ID	MW-11	MW-12	MW-13	Former Dry Cleaner								Frmr Mtr Pool	Frmr Accmltn Area	Steam Plant
				Sample ID	MW11-SB6	MW12-SB7	MW13-SB6	02-01-SB-04 (I-P1)	02-01-SB-08 (I-P1)	02-02-SB-12 (I-P2)	02-02-SB-16 (I-P2)	02-02-SB-20 (I-P2)	02-09-SB-04 (I-P9)	02-09-SB-12 (I-P9)	02-06-SB-04 (I-P6)	03-01-SB-04 (MP-P1)	06-01-SB-04 (WH-P1)	07-01-SB-04 (PH-P1)
				Depth (ft bgs)	6	7	6	4	8	12	16	20	4	12	4	4	4	4
				Location	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface
				Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
				Date Sampled	5/7/10	5/10/10	5/6/10	5/27/10	5/27/10	5/27/10	5/27/10	5/27/10	5/28/10	5/28/10	5/28/10	5/27/10	5/27/10	5/28/10
	Units	MTCA A Unrestricted	MTCA B Carcinogen	MTCA B Non-carcinogen														
TOTAL PETROLEUM HYDROCARBONS																		
Gasoline Range Organics	mg/kg	30/100[4]	-	-	8 U	10 U	8 U	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT
Diesel Range Organics	mg/kg	2,000	-	-	30 U	33 U	30 U	NT	NT	28 U	30 U	NT	NT	NT	31 U	31 U	38	NT
Lube Oil Range Organics	mg/kg	2,000	-	-	59 U	65 U	60 U	NT	NT	56 U	60 U	NT	NT	NT	62 U	62 U	190	NT
AROMATIC HYDROCARBONS																		
Benzene	mg/kg	0.03	18	320	0.0016	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
Toluene	mg/kg	7	-	6,400	0.0068 U	0.0089 U	0.0077 U	NT	0.0066 U	0.0058 U	0.0055 U	0.0057 U	0.0061 U	0.0063 U	0.0073 U	0.0069 U	0.0061 U	NT
Ethylbenzene	mg/kg	600	-	8,000	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
m,p-Xylene	mg/kg	-	-	16,000	0.0027 U	0.0035 U	0.0031 U	NT	0.0026 U	0.0023 U	0.0022 U	0.0023 U	0.0024 U	0.0025 U	0.0029 U	0.0027 U	0.0025 U	NT
o-Xylene	mg/kg	-	-	16,000	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
Total Xylenes	mg/kg	9	-	16,000	0.0041 U	0.0053 U	0.0046 U	NT	0.0039 U	0.0035 U	0.0033 U	0.0034 U	0.0036 U	0.0038 U	0.0044 U	0.0041 U	0.0037 U	NT
VOLATILE ORGANIC COMPOUNDS																		
Acetone	mg/kg	-	-	72,000	0.042	0.047	0.055	NT	0.0033	0.035	0.021	0.035	0.073	0.077	0.055	0.059	0.059	NT
Carbon disulfide	mg/kg	-	-	8,000	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0015	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
2-Butanone (MEK)	mg/kg	-	-	48,000	0.0068 U	0.0089 U	0.008	NT	0.0066 U	0.0058 U	0.0055 U	0.0057 U	0.0085	0.0088	0.0073 U	0.0086	0.0071	NT
Chloroform	mg/kg	-	-	800	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
Trichloroethene (TCE)	mg/kg	0.03	21.7	40	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0014	0.0015 U	0.0014 U	0.0012 U	NT
Tetrachloroethene (PCE)[6/7]	mg/kg	0.05	**11**/476	480	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	1.6	12	0.0021	0.0025	0.024	NT
1,2,4-Trimethylbenzene	mg/kg	-	-	-	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
p-Isopropyltoluene (cumene)	mg/kg	8,000	-	-	0.0014 U	0.0018 U	0.0015 U	NT	0.0013 U	0.0012 U	0.0011 U	0.0011 U	0.0012 U	0.0013 U	0.0015 U	0.0014 U	0.0012 U	NT
POLYCYCLIC AROMATIC HYDROCARBONS[2]																		
Napththalene	mg/kg	5	-	1,600	0.0079 U	0.0087 U	0.015	NT	0.0013 U	0.0075 U	0.0080 U	0.0081 U	0.0012 U	0.0013 U	0.0015 U	0.0083 U	0.020	NT
2-Methylnaphthalene	mg/kg	-	-	320	0.0079 U	0.0087 U	0.027	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.066	NT
1-Methylnaphthalene	mg/kg	-	35	-	0.0079 U	0.0087 U	0.019	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.051	NT
Acenaphthylene	mg/kg	-	-	-	0.0079 U	0.0087 U	0.008 U	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.0076 U	NT
Acenaphthene	mg/kg	-	-	4,800	0.0079 U	0.0087 U	0.008 U	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.0076 U	NT
Fluorene	mg/kg	-	-	3,200	0.0079 U	0.0087 U	0.008 U	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.0076 U	NT
Phenanthrene	mg/kg	-	-	-	0.0079 U	0.0087 U	0.022	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.073	NT
Anthracene	mg/kg	-	-	24,000	0.0079 U	0.0087 U	0.008 U	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.012	NT
Fluoranthene	mg/kg	-	-	3,200	0.0079 U	0.0087 U	0.0086	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.081	NT
Pyrene	mg/kg	-	-	2,400	0.0079 U	0.0087 U	0.0088	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.086	NT
Benzo(g,h,i)perylene	mg/kg	-	-	-	0.0079 U	0.0087 U	0.008 U	NT	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.034	NT
Benzo(a)anthracene*	mg/kg	-	1.4	-	0.0079 U	0.0087 U	0.008 U	0.030	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.042	NT
Chrysene*	mg/kg	-	140	-	0.0079 U	0.0087 U	0.008 U	0.041	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.061	NT
Benzo(b)fluoranthene*	mg/kg	-	1.4	-	0.0079 U	0.0087 U	0.008 U	0.042	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.039	NT
Benzo(k)fluoranthene*	mg/kg	-	14	-	0.0079 U	0.0087 U	0.008 U	0.035	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.044	NT
Benzo(a)pyrene*	mg/kg	0.1	0.14	-	0.0079 U	0.0087 U	0.008 U	0.044	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.044	NT
Indeno(1,2,3-cd)pyrene*	mg/kg	-	1.4	-	0.0079 U	0.0087 U	0.008 U	0.034	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.027	NT
Dibenzo(a,h)anthracene*	mg/kg	-	0.14	-	0.0079 U	0.0087 U	0.008 U	0.011	NT	0.0075 U	0.0080 U	0.0081 U	NT	NT	NT	0.0083 U	0.011	NT
Total cPAHs as Benzo(a)pyrene[3]	mg/kg	0.1	0.14	-	0.0060 U	0.0066 U	0.006 U	0.060	NT	0.0057 U	0.0060 U	0.0061 U	NT	NT	NT	0.0063 U	0.061	NT
TOTAL METALS[2]																		
Arsenic	mg/kg	20	0.67	24	12 U	13 U	12 U	NT	NT	NT	NT	NT	NT	NT	NT	NT	11 U	12 U
Cadmium	mg/kg	2	-	-	0.59 U	0.65 U	0.60 U	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.57 U	0.59 U
Chromium	mg/kg	2000	-	-	16	18	19	NT	NT	NT	NT	NT	NT	NT	NT	NT	12	13
Copper	mg/kg	-	-	3,200	25	25	29	NT	NT	NT	NT	NT	NT	NT	NT	NT	24	25
Lead	mg/kg	250	-	-	9.6	11	13	NT	NT	NT	NT	NT	NT	NT	NT	NT	18	24
Manganese	mg/kg	-	-	11,000	680	620	720	NT	NT	NT	NT	NT	NT	NT	NT	NT	450	520

Notes:

[2] Only analytes with a minimum of one detection are listed.

[3] Total of individual cPAHs (indicated by *), benzo(a)pyrene toxcity equivalency factor; half the practical quantitation limit was used for non-detect values.

[4] If benzene present - 30 mg/kg, if no benzene present - 100 mg/kg.

[5] Protection of soil injestion/protection of groundwater

[6] TCE and PCE concentrations in groundwater were originally screened to **bolded** levels. Changes to cleanup levels occurred following initial screening as described in Section 6.1. New cleanup levels are shown here and in Table 13.

[7] Screening level exceedances shown in this table reflect new screening levels established by Ecology in June 2012.

cPAHs Carcinogenic Polycyclic Aromatic Hydrocarbons.
U Analyte not detected above given practical quantitation limit.
J Sample analyzed past the recommended hold time, value is an estimate.
UJ Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.
°C Degrees celcius.
mg/l Milligrams per liter.
µS/m Microsiemens per meter.
mV Millivolts.
- No cleanup level established for this parameter
-- = Result not detected. Reporting limit or method detection limit not listed in historic data.
NTU Nephelometric tubidity unit.
S.U. Standard units.
µg/l micrograms per liter.
UN Depth of sample collection unknown.
NT Parameter was not tested.
UC Source is unclear whether this parameter was analyzed.
^ Orginal sample was non-detect. Result presented is the duplicate result.
MEK methyl ethyl keytone.

Table 6. Soil Analytical Data

ANALYTE				Station ID	Landfill									
				Sample ID	01-01-TP-08 (TP-1)	01-03-TP-07 (TP-3)	01-04-TP-4 (TP-4)	01-05-TP-07 (TP-5)	01-06-TP-08 (TP-6)	01-08-TP-10 (TP-8)	01-09-TP-10 (TP-9)	01-10-TP-15 (TP-10)	01-12-TP-16 (TP-12)	01-16-TP-12 (TP-16)
				Depth (ft bgs)	8	7	4	7	8	10	10	15	16	12
				Location	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface	Subsurface
				Sample Type	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab	Grab
				Date Sampled	5/24/10	5/24/10	5/24/10	5/24/10	5/24/10	5/24/10	5/24/10	5/24/10	5/24/10	5/25/10
	Units	MTCA A Unrestricted	MTCA B Carcinogen	MTCA B Non-carcinogen										
TOTAL PETROLEUM HYDROCARBONS														
Gasoline Range Organics	mg/kg	30/100[4]	-	-	NT	18	NT	7.4 U	NT	NT	NT	6.5 U	NT	11^
Diesel Range Organics	mg/kg	2,000	-	-	NT	43	NT	30 U	NT	31 U	NT	29 U	NT	30 U
Lube Oil Range Organics	mg/kg	2,000	-	-	NT	680	NT	60 U	NT	61 U	NT	57 U	NT	60 U
AROMATIC HYDROCARBONS														
Benzene	mg/kg	0.03	18	320	0.0022 U	0.0022 U	0.0065 U	0.0015	0.089	0.082	0.0014 U	0.0020 U	0.0015 U	0.20 U
Toluene	mg/kg	7	-	6,400	0.011 U	0.032 U	0.032 U	0.0061 U	0.042	0.018	0.0069 U	0.0098 U	0.0073 U	0.078 U
Ethylbenzene	mg/kg	600	-	8,000	0.0067 U	0.0065 U	0.0065 U	0.0012 U	0.0041	0.0034	0.0014 U	0.0020 U	0.0015 U	0.078 U
m,p-Xylene	mg/kg	-	-	16,000	0.013 U	0.013 U	0.013 U	0.0024 U	0.012	0.0034 U	0.0028 U	0.0039 U	0.0029 U	0.078 U
o-Xylene	mg/kg	-	-	16,000	0.0067 U	0.0065 U	0.0065 U	0.0012 U	0.0050	0.0017 U	0.0014 U	0.0020 U	0.0015 U	0.078 U
Total Xylenes	mg/kg	9	-	16,000	0.0197 U	0.0195 U	0.0195 U	0.0036 U	0.0170	0.0051 U	0.0042 U	0.0059 U	0.0044 U	0.156 U
VOLATILE ORGANIC COMPOUNDS														
Acetone	mg/kg	-	-	72,000	0.072	0.19	0.032 U	0.093	0.0080 U	0.0084 U	0.081	0.15	0.088	NT
Carbon disulfide	mg/kg	-	-	8,000	0.0022 U	0.0022 U	0.0065 U	0.0012 U	0.0094	0.0018	0.0014 U	0.0020 U	0.0015 U	NT
2-Butanone (MEK)	mg/kg	-	-	48,000	0.011 U	0.013	0.032 U	0.0094	0.0080 U	0.0084 U	0.011	0.016	0.015	NT
Chloroform	mg/kg	-	-	800	0.0022 U	0.0022 U	0.0065 U	0.0013	0.0016 U	0.0017 U	0.0014 U	0.0095	0.0015 U	NT
Trichloroethene (TCE)	mg/kg	0.03	21.7	40	0.0022 U	0.0065 U	0.0065 U	0.0012 U	0.0016 U	0.0017 U	0.0014 U	0.0020 U	0.0015 U	NT
Tetrachloroethene (PCE)[6/7]	mg/kg	0.05	**11**/476	480	0.0067 U	0.052	0.0065 U	0.0012 U	0.0016 U	0.0017 U	0.0014 U	0.013	0.0015 U	NT
1,2,4-Trimethylbenzene	mg/kg	-	-	-	0.0022 U	0.0065 U	0.0065 U	0.0012 U	0.0031	0.0017 U	0.0014 U	0.0020 U	0.0015 U	NT
p-Isopropyltoluene (cumene)	mg/kg	8,000	-	-	0.0022 U	0.0065 U	0.0065 U	0.0012 U	0.0016 U	0.0017 U	0.0044	0.0020 U	0.0015 U	NT
POLYCYCLIC AROMATIC HYDROCARBONS[2]														
Napththalene	mg/kg	5	-	1,600	0.0022 U	0.012	0.0065 U	0.0083	0.012	0.0081 U	0.0014 U	0.0076 U	0.0015 U	0.0083
2-Methylnaphthalene	mg/kg	-	-	320	NT	0.030	NT	0.012	NT	0.0081 U	NT	0.014	NT	0.014
1-Methylnaphthalene	mg/kg	-	35	-	NT	0.036	NT	0.011	NT	0.0081 U	NT	0.012	NT	0.011
Acenaphthylene	mg/kg	-	-	-	NT	0.0095	NT	0.0080 U	NT	0.0081 U	NT	0.011	NT	0.0081 U
Acenaphthene	mg/kg	-	-	4,800	NT	0.0086 U	NT	0.0080 U	NT	0.0081 U	NT	0.0076 U	NT	0.0081 U
Fluorene	mg/kg	-	-	3,200	NT	0.0086 U	NT	0.0080 U	NT	0.0081 U	NT	0.0076 U	NT	0.0081 U
Phenanthrene	mg/kg	-	-	-	NT	0.056	NT	0.0190	NT	0.0081 U	NT	0.056	NT	0.079
Anthracene	mg/kg	-	-	24,000	NT	0.014	NT	0.0080 U	NT	0.0081 U	NT	0.017	NT	0.014
Fluoranthene	mg/kg	-	-	3,200	NT	0.10	NT	0.017	NT	0.0081 U	NT	0.11	NT	0.11
Pyrene	mg/kg	-	-	2,400	NT	0.090	NT	0.016	NT	0.0081 U	NT	0.12	NT	0.11
Benzo(g,h,i)perylene	mg/kg	-	-	-	NT	0.033	NT	0.0170	NT	0.0081 U	NT	0.067	NT	0.037
Benzo(a)anthracene*	mg/kg	-	1.4	-	NT	0.037	NT	0.0081	NT	0.0081 U	NT	0.059	NT	0.050
Chrysene*	mg/kg	-	140	-	NT	0.065	NT	0.014	NT	0.0081 U	NT	0.075	NT	0.062
Benzo(b)fluoranthene*	mg/kg	-	1.4	-	NT	0.40	NT	0.016	NT	0.0081 U	NT	0.072	NT	0.041
Benzo(k)fluoranthene*	mg/kg	-	14	-	NT	0.035	NT	0.011	NT	0.0081 U	NT	0.067	NT	0.043
Benzo(a)pyrene*	mg/kg	0.1	0.14	-	NT	0.037	NT	0.013	NT	0.0081 U	NT	0.082	NT	0.059
Indeno(1,2,3-cd)pyrene*	mg/kg	-	1.4	-	NT	0.024	NT	0.014	NT	0.0081 U	NT	0.054	NT	0.032
Dibenzo(a,h)anthracene*	mg/kg	-	0.14	-	NT	0.0091	NT	0.0080 U	NT	0.0081 U	NT	0.021	NT	0.012
Total cPAHs as Benzo(a)pyrene[3]	mg/kg	0.1	0.14	-	NT	0.0882	NT	0.0189	NT	0.0061 U	NT	0.110	NT	0.077
TOTAL METALS[2]														
Arsenic	mg/kg	20	0.67	24	NT	13 U	NT	12 U	NT	15	NT	11 U	NT	12 U
Cadmium	mg/kg	2	-	-	NT	0.65 U	NT	0.60 U	NT	2.0	NT	0.57 U	NT	0.60 U
Chromium	mg/kg	2000	-	-	NT	13	NT	14	NT	54	NT	16	NT	16
Copper	mg/kg	-	-	3,200	NT	26	NT	26	NT	720	NT	25	NT	41
Lead	mg/kg	250	-	-	NT	41	NT	38	NT	940	NT	52	NT	240
Manganese	mg/kg	-	-	11,000	NT	210	NT	480	NT	910	NT	530	NT	390

Notes:

[2] Only analytes with a minimum of one detection are listed.

[3] Total of individl cPAHs (indicated by *), benzo(a)pyrene toxcity equivalency factor; half the practical quantitation limit was used for non-detect values.

[4] If benzene present - 30 mg/kg, if no benzene present - 100 mg/kg.

[5] Protection of soil injestion/protection of groundwater

[6] TCE and PCE concentrations in groundwater were originally screened to **bolded** levels. Changes to cleanup levels occurred following initial screening as described in Section 6.1. New cleanup levels are shown here and in Table 13.

[7] Screening level exceedances shown in this table reflect new screening levels established by Ecology in June 2012.

cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons.
U	Analyte not detected above given practical quantitation limit.
J	Sample analyzed past the recommended hold time, value is an estimate.
UJ	Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.
°C	Degrees celcius.
mg/l	Milligrams per liter.
µS/m	Microsiemens per meter.
mV	Millivolts.
-	No cleanup level established for this parameter
-- =	Result not detected. Reporting limit or method detection limit not listed in historic data.
NTU	Nephelometric tubidity unit.
S.U.	Standard units.
µg/l	micrograms per liter.
UN	Depth of sample collection unknown.
NT	Parameter was not tested.
UC	Source is unclear whether this parameter was analyzed.
^	Orginal sample was non-detect. Result presented is the duplicate result.
MEK	methyl ethyl keytone.

Table 7. Surface Water Analytical Data

								Surface Station ID	S-1		S-2		S-3		S-1, S-2, S-3^
								Date Sampled	Feb-98	Jul-98	Feb-98	Jul-98	Feb-98	Jul-98	1995
ANALYTE	Units	MTCA B Carcinogen Level	MTCA B Non-carcinogen Level	WA Surface (Fresh) Water Quality Standards** for Human Health	WA Surface (Fresh) Water Quality Standards* for Aquatic Life		Clean Water Act Surface (Fresh) Water Standards** for Aquatic Life								
					Acute	Chronic	Acute	Chronic							
DISSOLVED METALS^2															
Arsenic	µg/l	0.098	18	0.018	360	190	340	150	0.0023	NA	0.0013	NA	0.0046	NA	NP
Antimony	µg/l	-	1,300	5.6	-	-	-	-	0.001 U	NA	0.001	NA	0.001 U	NA	NP
Cadmium	µg/l	-	41	-	0.82	0.37	2	0.25	0.0015	NA	0.001 U	NA	0.001 U	NA	NP
Chromium	µg/l	-	-	-	-	-	-	-	0.001	NA	0.0011	NA	0.0022	NA	NP
Copper	µg/l	-	2,900	-	4.6	3.5	13	9	0.0052	NA	0.0023	NA	0.0034	NA	NP
Iron	µg/l	-	-	300	-	-	-	100	1.25	NA	0.474	NA	1.71	NA	NP
Lead	µg/l	-	-	-	14	0.54	65	2.5	0.0016	NA	0.001 U	NA	0.0015	NA	NP
Manganese	µg/l	-	-	50	-	-	-	-	0.257	NA	0.278	NA	0.735	NA	NP
Nickel	µg/l	-	1,100	610	440	49	470	52	0.0056	NA	0.0038	NA	0.0095	NA	NP
Zinc	µg/l	-	-	7,400	35	32	120	120	0.0141	NA	0.0062	NA	0.009	NA	NP
VOLATILE ORGANIC COMPOUNDS															
Chloroform	µg/l	-	6,900	5.7	-	-	-	-	--	NA	1.86	NA	--	NA	NP
Trichloroethene (TCE)	µg/l	6.7	71	2.5	-	-	-	-	--	NA	--	NA	--	NA	NP
Toluene	µg/l		-	1,300	-	-	-	-	2.36	NA	5.31	NA	23.0	NA	2.2
Tetrachloroethene (PCE)	µg/l	2.4	0.49	0.69	-	-	-	-	--	NA	--	NA	--	NA	NP
CONVENTIONALS						-		-							
Total Dissolved Solids	mg/l	-	-	-	-	-	-	-	300	NA	358	NA	903	NA	NP
Total Organic Carbon	mg/l	-	-	-	-	-		-	164	NA	79.2	NA	224	NA	NP
Ammonia	mg/l	-	-	-	-	-	-	-	10.1	NA	8.7	NA	26.4	NA	NP
Nitrate	mg/l	-	-	1	-	-	-	-	0.115	NA	0.1 U	NA	0.1 U	NA	NP
Nitrite	mg/l	-	-	-	-	-	-	-	7.62	NA	7.2	NA	5.24	NA	NP
Total Alkalinity	mg/l	-	-	-	-	-	-	-	184	NA	174	NA	438	NA	NP
Chloride	mg/l	-	-	-	860	230	860	230	23.9	NA	20.9	NA	62.1	NA	NP
Bicarbonate Alkalinity	mg/l	-	-	-	-	-	-	-	184	NA	174	NA	438	NA	NP

Notes:

-	No cleanup level established for this parameter
--	Result below detection limit.
NA	Not analyzed.
NP	Not presented.
U	Result below given practical quanititation limit.
*	WAC 173-201A-240, Table 240(3).
**	Clean Water Act 304
^	Maximum concentration for these locations is presented only. Location specific result was not presented in data table.

Table 8. Soil Gas Analytical Data

AOC	Landfill																	Dry Cleaners				
Sample Location	GP3				GP13				GP13				P-4					I-P2				
Sample Depth (ft bgs)	32-34				15-16				32-34				16					14				
Date Sampled	5/1/1999				5/1/1999				5/1/1999				5/28/2010					5/28/2010				
Analyte[1]	Units		Units		Units		Units		Units		Units		Units		Units			Units		Units		
Methane	NA		NA		NA		NA		NA		NA		ppm	14,268	mg/m^3	9,640		ppm	5.34	mg/m^3	3.61	
Methane	NA		NA		NA		NA		NA		NA		% by Volume	1.43%				% by Volume	0.00%			
Dichlorofluoromethane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	3.1	ug/m^3	15.81		ppbv	ND	ug/m^3	ND	
Chloromethane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	14.99	ug/m^3	31.96		ppbv	0.93	ug/m^3	1.99	J
1,1-Dichloroethene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	1.31	ug/m^3	5.38	J	ppbv	ND	ug/m^3	ND	
1,1-Dichloroethane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	2.61	ug/m^3	4.71	J	ppbv	ND	ug/m^3	ND	
1,1,1-Trichloroethane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	1.41	ug/m^3	7.93	J	ppbv	ND	ug/m^3	ND	
trans-1,3-Dichloropropene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND		ppbv	1.51	ug/m^3	7.1	J
Benzene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	33.68	ug/m^3	111.09		ppbv	8.66	ug/m^3	28.56	
Toluene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	27.78	ug/m^3	108.05		ppbv	50.38	ug/m^3	195.96	
Ethylbenzene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	4.17	ug/m^3	18.72	J	ppbv	2.54	ug/m^3	11.37	
m,p-Xylenes	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	8.81	ug/m^3	39.52	J	ppbv	7.09	ug/m^3	31.78	
o-Xylene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	24.31	J	ppbv	2.89	ug/m^3	12.98	
Carbon Tetrachloride	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND		ppbv	0.61	ug/m^3	3.97	J
4-Ethyltoluene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	3.63	ug/m^3	18.42		ppbv	1.79	ug/m^3	9.1	
1,3,5-Trimethylbenzene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	2.36	ug/m^3	11.97	J	ppbv	1.15	ug/m^3	5.83	J
1,2,4-Trimethylbenzene	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	3.18	ug/m^3	16.09	J	ppbv	1.62	ug/m^3	8.21	J
Acetone	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	355	ug/m^3	871		ppbv	671	ug/m^3	1645	
2-Butanone	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	53	ug/m^3	161		ppbv	64	ug/m^3	194	J
Cyclohexane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	6	ug/m^3	22	J	ppbv	ND	ug/m^3	ND	
Hexane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	22	ug/m^3	79		ppbv	ND	ug/m^3	ND	
n-Heptane	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	20	ug/m^3	85		ppbv	ND	ug/m^3	ND	
Tetrachloroethene	ppbv	ND	ug/m^3	ND	ppbv	1,200	ug/m^3	8,404	ppbv	590	ug/m^3	4,132	ppbv	ND	ug/m^3	ND		ppbv	ND	ug/m^3	ND	
Methylene chloride	ppbv	370	ug/m^3	1,327	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND		ppbv	ND	ug/m^3	ND	
Vinyl chloride	ppbv	1,600	ug/m^3	4,223	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND	ppbv	ND	ug/m^3	ND		ppbv	ND	ug/m^3	ND	

Notes:

[1] Detections reported only.

ppm = parts per million

ppbv = parts per billion by volume

ug/m^3 = micrograms per cubic meter = ppbv*FW/23.68 calculated assuming conditions at 60 F and 1 atm.

mg/m^3 = miilligrams per cubic meter

ft bgs =feet below ground surface.

ND = not detected

NA = not analyzed

J = flag for a result between the MDL and the RL (or lower quantitation limit, LQL)

Table 9. Groundwater Analytical Results for Volatile Organic Compounds at the Washington State Penitentiary Site

ANALYTE	Well ID		MW-1				MW-2				MW-3				MW-5			
	Date Sampled		7/12/10	10/25/10	2/7/11	6/20/11	7/12/10	10/25/10	2/7/11	6/20/11	7/13/10	10/25/10	2/7/11	6/20/11	7/16/10	10/27/10	2/9/11	6/22/11
	Units	Cleanup Level[1]																
VOLATILE ORGANIC COMPOUNDS[2]																		
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	0.25	0.20	0.20 U	0.24	0.72	0.8	0.78	0.89	0.89	0.94	0.83	0.89	0.20	0.20 U	0.20 U	0.20 U
Trichloroethene (TCE)	µg/l	4 [3]	0.49	0.35	0.32	0.35	2.4	2.0	2.0	2.3	2.1	1.9	1.7	1.6	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	0.81	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.3	1.8	1.5	0.79
sec-Butylbenzene	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

ANALYTE	Well ID		MW-7				MW-8				MW-9				MW-10			
	Date Sampled		7/29/10	10/26/10	2/8/11	6/21/11	7/29/10	10/28/10	2/8/11	6/21/11	7/13/10	10/25/10	2/8/11	6/20/11	7/14/10	10/27/10	2/9/11	6/22/11
	Units	Cleanup Level[1]																
VOLATILE ORGANIC COMPOUNDS[2]																		
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	2.2	1.9	2.4	2.6	1.6	1.3	1.5	1.7	0.59	0.78	0.63	0.79	1.4	1.5	1.0	1.0
Trichloroethene (TCE)	µg/l	4 [3]	0.20 U	0.20 U	0.20 U	0.20 U	3.3	1.4	2.5	2.3	1.3	1.3	1.1	1.3	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	5 [3]	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.72	0.42	0.76	0.58	0.22	0.21	0.25	0.20 U
sec-Butylbenzene	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

ANALYTE	Well ID		MW-12				MW-13				MW-14				SLF-7			
	Date Sampled		7/14/10	10/27/10	2/9/11	6/22/11	7/13/10	10/28/10	2/7/11	6/21/11	7/13/10	10/25/10	2/7/11	6/20/11	7/15/10	11/4/10	2/10/11	6/23/11
	Units	Cleanup Level[1]																
VOLATILE ORGANIC COMPOUNDS[2]																		
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	0.67	0.78	0.60	0.27	0.96	1.1	1.4	1.6	0.74	0.80	0.78	0.84	0.20 U	0.20 U	0.20 U	0.20 U
Trichloroethene (TCE)	µg/l	4 [3]	1.7	1.5	0.74	0.43	0.20 U	0.20 U	0.20 U	0.20 U	0.87	0.99	1.0	0.73	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	2.1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	5 [3]	0.39	0.24	0.75	0.43	0.21	0.21 U	0.30	0.25	0.94	0.72	0.86	0.93	0.20 U	0.20 U	0.20 U	0.20 U
sec-Butylbenzene	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	0.20 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

- No comparative MTCA A value established.

-- No analysis was completed for this parameter.

* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.

[1] MTCA Method A Groundwater Cleanup Level.

[2] Only analytes with a minimum of one detection are listed.

[3] Cleanup level based on "Summary of Revised Groundwater and Air Cleanup Levels" - June 2012 (Perchloroethylene and Trichloroethylene); provided by Washington State Department of Ecology.

cPAHs Carginogenic Polycyclic Aromatic Hydrocarbons.

U = Analyte not detected above given practical quantitation limit.

J = Sample analyzed past the recommended hold time, value is an estimate.

UJ = Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.

mg/l = Milligrams per liter.

µg/l = micrograms per liter.

▨ Exceeds MTCA Method A Groundwater Cleanup Level

Table 9. Groundwater Analytical Results for Volatile Organic Compounds at the Washington State Penitentiary Site

ANALYTE	Well ID		MW-6			
	Date Sampled		7/16/10	10/26/10	2/8/11	6/21/11
	Units	Cleanup Level[1]				
VOLATILE ORGANIC COMPOUNDS[2]						
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U
Trichloroethene (TCE)	µg/l	4 [3]	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	0.81	0.20 U	0.20 U	0.20 U	0.20 U
sec-Butylbenzene	µg/l	-	0.89	0.43	0.20	0.20 U
Naphthalene	µg/l	160	0.23	1.0 U	1.0 U	1.0 U

ANALYTE	Well ID		MW-11			
	Date Sampled		7/14/10	10/27/10	2/9/11	6/22/11
	Units	Cleanup Level[1]				
VOLATILE ORGANIC COMPOUNDS[2]						
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	0.81	0.89	1.1	0.95
Trichloroethene (TCE)	µg/l	4 [3]	0.62	0.52	0.59	0.59
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	5 [3]	1.5	1.2	0.92	0.46
sec-Butylbenzene	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	1.0 U	1.0 U	1.0 U	1.0 U

ANALYTE	Well ID		SLF-9				SLF-10			
	Date Sampled		7/15/10	11/4/10	2/10/11	6/23/11	7/15/10	11/4/10	2/10/11	6/23/11
	Units	Cleanup Level[1]								
VOLATILE ORGANIC COMPOUNDS[2]										
Vinyl Chloride	µg/l	0.2	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Chloroform	µg/l	-	0.78	0.63	0.72	0.72	1.4	1.1	1.5	1.2
Trichloroethene (TCE)	µg/l	4 [3]	1.2	1.1	1.2	1.3	0.20 U	0.20 U	0.20 U	0.20 U
Toluene	µg/l	1000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene (PCE)	µg/l	5 [3]	0.52	0.53	0.49	0.43	0.43	0.39	0.49	0.41
sec-Butylbenzene	µg/l	-	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Naphthalene	µg/l	160	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

Notes:

- No comparative MTCA A value established.

-- No analysis was completed for this parameter.

* cPAHs used to calculate Total cPAHs as Benzo(a)pyrene.

[1] MTCA Method A Groundwater Cleanup Level.

[2] Only analytes with a minimum of one detection are listed.

[3] Cleanup level based on "Summary of Revised Groundwater and Air Cleanup Levels" - June 2012 (Perchloroethylene and Trichloroethylene); provided by Washington State Department of Ecology.

cPAHs Carginogenic Polycyclic Aromatic Hydrocarbons.

U = Analyte not detected above given practical quantitation limit.

J = Sample analyzed past the recommended hold time, value is an estimate.

UJ = Analyte not detected above given practical quantitation limit. Sample analyzed past the recommended hold time, value is an estimate.

mg/l = Milligrams per liter.

µg/l = micrograms per liter.

▨ Exceeds MTCA Method A Groundwater Cleanup Level

Table 10. Statistical Analysis of Groundwater Data at the Washington State Penitentiary Site

Constituent	**95% UCL Calculations All Groundwater Data**									**Groundwater Screening Level[1]**	**Max or RME Exceeds Screening Level?**
	N	**Detects**	**Min**	**Max**	**Mean**	**Distribution**	**95% UCL**	**RME**	**Basis**		
	#	#	(µg/l)	(µg/l)	(µg/l)		(µg/l)	(µg/l)		(µg/l)	
Vinyl Chloride	64	0	0.2 U	0.2 U	--	N/A	--	**0.1**	1/2 Det. Limit	0.35	No
Chloroform	64	52	0.2 U	2.6	0.84	normal	0.968	**0.968**	95% UCL	1.2	**Yes**
Trichloroethene (TCE)	64	37	0.2 U	3.3	0.78	non-parametric	1.34	**1.34**	95% UCL	0.42	**Yes**
Toluene	64	1	1.0 U	2.1	--	N/A	--	**2.1**	Max (>50% NDs)	15000	No
Tetrachloroethene (PCE)	64	34	0.2 U	5.3	0.46	non-parametric	0.61	**0.61**	95% UCL	1	**Yes**
sec-Butylbenzene	64	4	0.2 U	0.89	--	N/A	--	**0.89**	Max (>50% NDs)	N/A	--
Naphthalene	64	2	0.2 U	0.23	--	N/A	--	**0.23**	Max (>50% NDs)	170	No

Notes:

[1] Groundwater screening levels were obtained from the Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology 2009). The groundwater screening level is the concentration in the groundwater expected to not result in exceedance of the air cleanup level in an overlying structure under most circumstances. GW SL = [Indoor Air Cleanup Level]/[Hcc*ϒ *1000], where ϒ = 1.0E-3.

N = Number of samples collected.

Min = minimum concentration detected.

Max = maximum concentration detected.

UCL = upper confidence limit.

RME = reasonable maximum exposure.

ND = non-detect.

N/A = not available.

U = not detected above the method detection limit.

µg/l = micrograms per liter

Table 11. Johnson and Ettinger Groundwater Model Results

Constituent	**MTCA Method B Indoor Air Cleanup Level**	**Johnson & Ettinger Groundwater Screening Model**		**Exceeds MTCA Method B?**	**Johnson & Ettinger Groundwater Advanced Model**				**Johnson & Ettinger Groundwater Advanced Model**			
		Residential Exposure			**Residential Exposure**				**Occupational Exposure**			
		Predicted Indoor Air Concentration			Predicted Indoor Air Concentration		Predicted Indoor Air Concentration		Predicted Indoor Air Concentration		Predicted Indoor Air Concentration	
		Using Max GW Conc.	Using GW RME		Using Max. GW Conc. & Small Building (9,500 ft^2)	Using Max. GW Conc. & Large Building (18,500 ft^2)	Using GW RME & Small Building (9,500 ft^2)	Using GW RME & Large Building (18,500 ft^2)	Using Max. GW Conc. & Small Building (7,200 ft^2)	Using GW RME & Small Building (7,200 ft^2)	Using Max. GW Conc. & Large Building (97,160 ft^2)	Using GW RME & Large Building (97,160 ft^2)
	μg/m^3	μg/m^3	μg/m^3		μg/m^3	μg/m^3	μg/m^3	μg/m^3	μg/m^3	μg/m^3	μg/m^3	μg/m^3
Vinyl Chloride	0.28	0.042	0.021	No	-	-	-	-	-	-	-	-
Chloroform	0.11	0.058	0.022	No	-	-	-	-	-	-	-	-
Trichloroethene (TCE)	0.1	0.14	0.059	Yes	0.1	0.043	0.077	0.03	0.092	0.037	0.024	0.0096
Toluene	2300	0.062	0.062	No	-	-	-	-	-	-	-	-
Tetrachloroethene (PCE)	0.4	0.35	0.04	No	-	-	-	-	-	-	-	-
sec-Butylbenzene	N/A	8.3E-06	8.3E-06	No	-	-	-	-	-	-	-	-
Naphthalene	1.4	0.00025	0.00025	No	-	-	-	-	-	-	-	-

Notes:

MTCA = Model Toxics Control Act

μg/m^3 = micrograms per cubic meter

ft^2 = square feet

Conc. = concentration

Table 12. Johnson & Ettinger Screening and Advanced Groundwater Model Input Parameters

Parameter	Units	Site-Specific Value	Default (USEPA 2004)
Groundwater Concentration	µg/L	Chemical specific	--
Groundwater temperature	C°		10
Depth below grade (basement)	cm	Used for residential	200
Depth below grade (slab on grade)	cm	Used for occupational	15
Soil type (Stratum A)	--	Silt (0 to 40 feet bgs)	--
Soil type (Stratum B)	--	Sand (40 to > 75 feet bgs)	--
Soil dry bulk density (Stratum A)	g/cm^3		1.35
Soil total porosity (Stratum A)	unitless		0.489
Soil water-filled porosity (Stratum A)	cm^3/cm^3		0.167
Soil dry bulk density (Stratum B)	g/cm^3		1.66
Soil total porosity (Stratum B)	unitless		0.375
Soil water-filled porosity (Stratum B)	cm^3/cm^3		0.054
Depth below grade to water table	ft (cm)	75 (2286)	--
Floor thickness	cm		10
Building pressure differential	$g/cm\text{-}s^2$		40
Seam crack width	cm		0.1
Indoor air exchange rate	1/hour		0.25
Averaging time for carcinogens (res.)	years		70
Averaging time for non-carcinogens (res.)	years		30
Exposure duration (res.)	years		30
Exposure frequency (res.)	days		350
Averaging time for carcinogens (occ.)	years		70
Averaging time for non-carcinogens (occ.)	years		30
Exposure duration (occ.)	years		20
Exposure frequency (occ.)	days		219
Building L/W/H			
Small Res. Building (D-80; 9,500 ft^2 on 1 floor)	ft (cm)	95 (2985) x 100 (3048) x 10 (305)	--
Large Res. Building (D-70; 18,500 ft^2 on 1 floor)	ft (cm)	100 (3048) x 185 (5639) x 10 (305)	--
Small Occ. Building (F-20; 7,200 ft^2)	ft (cm)	72 (2194) x 100 (3048) x 10 (305)	--
Large Occ. Building (C-30; 97,160 ft^2)	ft (cm)	311 (9,500) x 311 (9,500) x 10 (305)	--

Notes:

µg/L	micrograms per liter
C°	degress Celsius
cm	centimeters
g/cm^3	grams per cubic centimeters
cm^3/cm^3	cubic centimeter per cubic centimeter
$g/cm\text{-}s^2$	grams per centimeter seconds squared
ft^2	square feet
res.	residential
occ.	occupational
bgs	below ground surface

Table 13. Preliminary Cleanup Levels

Soil			
	CAS #	Units	Method B Soil
Benzo(a)pyrene	50-32-8	mg/kg	**0.14**
Gasoline Range Organics$^{\#}$	---	mg/kg	**100**
Lead	7439-92-1	mg/kg	**250**
Tetrachloroethene (PCE)	127-18-4	mg/kg	**476.2**

Groundwater											
			MTCA B Groundwater		Goundwater ARARs			Downward-adjusted ARARs			
Chemical	CAS #	Units	Non-Cancer SFV	Cancer SFV	Federal Primary MCL	Federal MCL Goal	State Primary MCL	Adjusted Minimum MCL	Hazard Quotient	Excess Cancer Risk	Preliminary Cleanup Level
Benzo(a)pyrene	50-32-8	µg/L	*NR*	0.012	0.2	0	0.2	0.12	---	1.00E-05	**0.12**
Manganese, dissolved	7439-96-5	µg/L	2,200	*NR*	*NR*	*NR*	*NR*	*NR*	*No MCL available.*		**2,200**
Tetrachloroethene (PCE) [1]	127-18-4	µg/L	48	20.833	5	0	5	5	0.1000	2.40E-07	**5**
Trichloroethene (TCE) [1]	79-01-6	µg/L	4	0.95	5	0	5	4	1.0000	4.20E-06	**4**

[1] MTCA Method B values are from "Summary of Revised Groundwater and Air Cleanup Levels" - June 2012 (Perchloroethylene and Trichloroethylene), provided by Department of Ecology.

ARAR = Applicable or Relevant and Appropriate Requirement.

Downward-adjusted ARARs (WAC 173-340-705 (2)):

Hazard Quotient = Hazard quotient for Adjusted Minimum MCL based on applicable MTCA B Groundwater non-cancer SFV. If HQ > 1 for the MCL, then the MCL was adjusted

Excess Cancer RIsk = Cancer risk for Adjusted Minimum MCL based on applicable MTCA B Groundwater cancer SFV. If greater than 1x10^{5} for the MCL, then MCL was

🟧 MCL downward-adjusted so that Hazard Quotient≤ 1 and Excess Cancer Risk ≤ 1x10^{-5}.

Standard = Downward-adjusted ARAR or, if no ARARs, minimum of MTCA B groundwater cancer and non-cancer SFVs.

MCL = Maximum Contaminant Level.

N/A = Not available (COC not included in CLARC Database).

N/S = No standard (no SFVs or MCLs available for COC to calculate Standard).

NR = Not Researched (CLARC Database).

RND = Researched - No Data (CLARC Database).

SFV = Standard Formula Value (CLARC Database).

= soil contains no benzene and the total of ethylbenzene, toluene and xylene are less than 1% of the gasoline mixture.

Table 14. Screening of Technologies and Process Options

Medium	Cleanup Action Category	Cleanup Technology1	Process Options	Technical Feasibility/ Effectiveness	Implementability	Cost	Retained/Rejected2
Soil	Land Use Controls	Land Use/ Institutional Controls	Not Applicable	This control is effective because it restricts the use/access to soil. It does not directly address contamination removal or treatment.	This is an acceptable method for preventing human contact with hazardous media. It can be difficult to implement due to potential public resistance, and the necessary cooperation of multiple agencies and local governments.	Low	Retained
	In Situ Biological Treatment	Natural Attenuation	Monitored Natural Attenuation—Natural subsurface processes such as dilution, volatilization, biodegradation, and other physical and/or chemical processes are allowed to reduce contaminant concentrations.	This is an effective method to reduce VOC and inorganics contamination; however, it requires evaluation of contaminant degradation rates to determine if it is appropriate for a site.	This is an accepted technology that has been implemented at numerous sites. It is easy to implement because little to no action is required. A long-term groundwater monitoring system would be required to verify the effectiveness of this technology. Institutional controls may be required, and the site may not be available for re-use until contaminant levels are reduced. This approach has low O&M requirements.	Low	Retained
		Enhanced Biodegradation	Indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants found in soil and/or ground water, converting them to innocuous end products. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials.	This is an effective method to reduce VOC contamination; however, it requires evaluation of contaminant degradation rates to determine if it is appropriate for a site. Experimental results for inorganics available; however, full-scale examples are limited. Due to the existence of commingled chlorinated and un-chlorinated VOCs, nutrient characteristics are typically mutually exclusive.	This is an accepted technology that has been implemented at numerous sites. A long-term groundwater monitoring system would be required to verify the effectiveness of this technology. Institutional controls may be required, and the site may not be available for re-use until contaminant levels are reduced. Depths of contaminants at the site are limiting for the technology and microorganism contact with nutrients is difficult to obtain. This approach has medium O&M requirements due to repeated dosings of nutrients.	Medium	Rejected due to feasibility and implementability issues.
		Bioventing	Bioventing wells – Shallow wells are installed in soil to provide oxygen to existing soil microorganisms. Bioventing uses low air flow rates to provide only enough oxygen to sustain microbial activity. Oxygen is most commonly supplied through direct air injection into residual contamination in soil.	This is an effective method to reduce VOC contamination; however, it requires evaluation of contaminant degradation rates to determine if it is appropriate for a site. Experimental results for inorganics available; however, full-scale examples are limited. Due to the existence of commingled chlorinated and un-chlorinated VOCs, chlorinated VOC remediation in aerobic environments is largely ineffectual.	This is an accepted technology that has been implemented at numerous sites. A long-term groundwater monitoring system would be required to verify the effectiveness of this technology. Site may not be available for re-use until contaminant levels are reduced. Microorganisms typically require supplemental nutrients in order to degrade VOCs to cleanup levels. This approach has medium O&M requirements due to repeated dosings of nutrients and the long term nature of implementation.	Medium	Rejected due to feasibility and implementability issues.
		Phytoremediation	Phytoremediation -- Process that uses plants to remove, transfer, stabilize, and destroy contaminants in soil and sediment. The mechanisms of phytoremediation include enhanced rhizosphere biodegradation, phyto-extraction (also called phyto-accumulation), phyto-degradation, and phyto-stabilization.	This is an effective method to reduce inorganic contamination in shallow surface soil. Contaminants are either bioaccumulated in biomass or converted to less toxic byproducts via various biological activities. Remediation of VOCs is experimental and not well documented. Plants require large volumes of water for survival and are typically dormant during colder times of the year.	This is an accepted technology that has been implemented at numerous sites. Biomass requires harvesting and disposal in accordance with solid waste regulations.	Low	Rejected due to feasibility and implementability issues.

Table 14. Screening of Technologies and Process Options

Medium	Cleanup Action Category	Cleanup Technology1	Process Options	Technical Feasibility/ Effectiveness	Implementability	Cost	Retained/Rejected2
	In Situ Physical/ Chemical Treatment	Chemical Oxidation Electrokinetic Separation Fracturing Soil Flushing Soil Vapor Extraction Solidification/ Stabilization Thermal Treatment	Physical/chemical treatment -- Uses the physical properties of the contaminants or the contaminated medium to destroy (i.e., chemically convert), separate, or contain the contamination. Treatment residuals from separation techniques will require treatment or disposal, which will add to the total project costs and may require permits. Extraction fluids from soil flushing will increase the mobility of the contaminants, so provisions must be made for subsurface recovery.	Each of these technologies could be feasible and effective at specific areas of the facility (i.e., WSP Landfill, Former Motor Pool, Former Dry Cleaner); however, none of the technologies are applicable to all areas where soil contamination levels are above cleanup levels.	Each of these technologies have limited implementability for the specific contaminants, lithology, and access restrictions associated with working at the WSP. Due to the range of depths, type of soils where contamination occurs (e.g., silts), nature of the contaminants above cleanup levels, and relative disperse nature of the contamination, in situ physical/ chemical treatment technologies are not readily implementable at the site.	High. The cost to implement any of these technologies over a limited area and independent of the other contaminated soil areas would be extremely high in relation to the removal of the limited target contaminants and concentrations.	In Situ Physical/ Chemical Treatment technologies rejected due to feasibility and implementability issues and cost.
	Ex Situ Treatment	Biopiles Composting Landfarming Slurry Phase Biological Treatment Chemical Extraction Chemical Reduction/Oxidation Dehalogenation Separation Soil Washing Solidification/ Stabilization Hot Gas Decontamination Incineration Pyrolysis Thermal Desorption	Ex Situ Treatment -- Uses biological, physical/ chemical, or thermal processes to lower contaminant concentrations or potential exposures. Bioremediation techniques are destruction or transformation techniques directed toward stimulating the microorganisms to grow and use the contaminants as a food and energy source by creating a favorable environment for the microorganisms. Generally, this means providing some combination of oxygen, nutrients, and moisture, and controlling the temperature and pH. Physical/chemical treatment uses the physical properties of the contaminants or the contaminated medium to destroy (i.e., chemically convert), separate, or immobilize the contamination. Thermal processes use heat to increase the volatility (separation); burn, decompose, or detonate (destruction); or melt (immobilization) the contaminants.	Each of these technologies could be feasible and effective at areas of the facility outside the WSP Landfill (i.e., Former Motor Pool, Former Dry Cleaner); however, none of the technologies are applicable to all areas where soil contamination levels are above cleanup levels. The low levels of contaminants within the soil and the disperse nature of the contamination would lead to substantial dilution and large volumes of excavated material requiring large volumes of nutrients to degrade the relatively small amount of contamination. Also, assuming some contamination exists in areas inaccessible by excavation methods (e.g., beneath structures), residual contamination would need to be left in place and either in situ or containment technologies would be necessary.	Each of these technologies have limited implementability for the specific contaminants, lithology, and access restrictions associated with working at the WSP. Due to the range of depths, type of soils where contamination occurs (e.g., silts), nature of the contaminants above cleanup levels, and relative disperse nature of the contamination, ex situ treatment technologies are not readily implementable at the site.	High. The cost to implement any of these technologies over a limited area and independent of the other contaminated soil areas would be extremely high in relation to the removal of the limited target contaminants and concentrations. The low levels of contaminants within the soil and the disperse nature of the contamination would lead to substantial dilution and large volumes of excavated material requiring large volumes of nutrients to degrade the relatively small amount of contamination.	Ex Situ Treatment technologies rejected due to feasibility and implementability issues and cost.

Table 14. Screening of Technologies and Process Options

Medium	Cleanup Action Category	Cleanup Technology1	Process Options	Technical Feasibility/ Effectiveness	Implementability	Cost	Retained/Rejected2
	Containment	Low Permeability Cap	Low Permeability Cap – Uses low permeability material (e.g., bentonite amended soil, geomembrane, asphalt) on the surface above contamination to minimize the surface infiltration of precipitation and exposure to the contaminants.	This is an effective technology for minimizing vertical contaminant migration. Cap materials vary in permeability. It provides containment only, it does no treat groundwater or provide source removal.	This is a common, well-established, and accepted technology.	Medium	Retained
		Soil Caps	Covering with permeable to low permeable soil to establish barrier between receptor populations and waste. Creating positive drainage to reduce ponding and infiltration. Planting native vegetation to enhance evapotranspitration. Use of low permeability soil further enhances effectiveness.	Technically feasible. Effectiveness varies depending on thickness of soil, slope, and climatic conditions. Does not remove source material and does not treat groundwater.	Commonly used approach for abandoned landfills. Regulatory standard in Washington for landfills that stopped receiving waste prior to October 1992	Low to medium depending on soil permeability, thickness and areal coverage.	Retained
		Excavation and Offsite Disposal	Soil contamination above cleanup levels would be excavated and shipped offsite for disposal at a permitted landfill.	Based on the known limits of refuse and assuming a refuse layer thickness between 6 and 12 feet, the WSP Landfill is estimated to contain 40,000 to 80,000 cubic yards of refuse. Soil contamination in other areas of the facility occurs at depths as deep as 12 feet with an unknown areal extent.	This is a common, well-established, and acceptable technology.	Very High. The cost is disproportionate to the potential benefits, especially for the WSP Landfill. The waste within the WSP Landfill does not appear to generate large amounts of leachate or landfill gas.	Rejected due to feasibility and implementability issues and cost. However, specific areas could be excavated and disposed offsite in conjunction with future construction.

1 Cleanup technologies, descriptions, and applicability to the Site were primarily based on information from the Federal Remediation Technologies Roundtable website at www.frtr.gov, the CPEO website at http://www.cpeo.org/tree.html, and various related documents.

2 The retained technologies shown in Table 1 result from qualitatively evaluating the potential technologies based on screening information prepared by EPA, CPEO, and other organizations for sites across the United States, using the screening criteria listed above, and are ultimately based on the experiences gained at similar sites and professional knowledge and judgment.

Table 15. Remedial Alternatives Estimated Costs

	Remedial Alternatives	
Criteria	**1. Land Use Controls**	**2. Low Permeability Cap with Land Use Controls**
Construction Costs	$389,078	$1,826,853
Operation and Maintenance Costs	$54,655	$73,941
Total Costs:	**$443,733**	**$1,900,794**

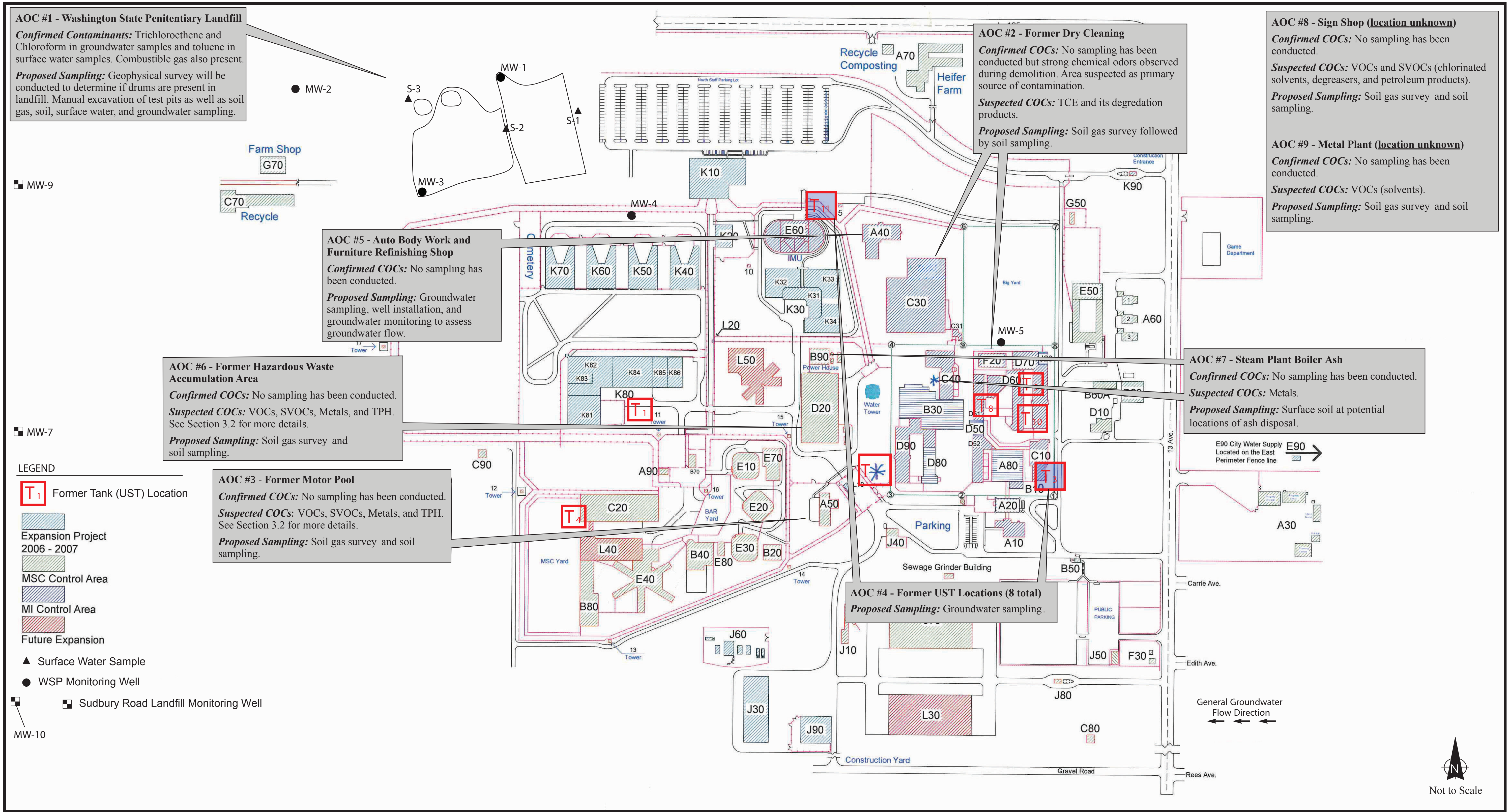
Table 16. Alternative Analysis Scoring Matrix

	Alternative		
	1	**2**	**3**
Threshold Criteria			
Protection of HH & Env.	1	3	1
Cleanup Standards Compliance	1	2	1
Compliance with ARARs	1	2	1
Compliance monitoring	3	3	0
Threshold Criteria Subtotal	*6*	*10*	*3*
Permanent Solutions Criteria			
Protectiveness	1	2	--
Reduction of toxicity, mobility, volume	1	3	--
Cost	4	3	--
Long-term effectiveness	2	3	--
Short term risks	4	3	--
Implementability	4	3	--
Public concerns	4	3	--
Permanent Solutions Criteria Subtotal	*20*	*20*	*0*
Reasonable Restoration Time Frame Criteria			
Potential Risk posed by site	1	3	--
Practability of shorter restoration time frame	1	2	--
Current/Future use of site	2	2	--
Alternative water supply	0	0	--
Institutional controls reliability	2	3	--
Monitor migration of hazardous substances	2	2	--
Toxicity of hazardous substances	2	3	--
Reasonable Restoration Time Frame Criteria Subtotal	*10*	*15*	*0*
Additional Performance Criteria			
Institutional controls and financial assurances	3	2	--
Release and Migration	1	2	--
Dilution and Dispersion	0	0	--
Remediation levels	0	0	--
Additional Performance Criteria Subtotal	*4*	*4*	*0*
Total Alternative Score	**40**	**49**	**3**

-- = Not evaluated as alternative does not meet all Threshold Criteria.

Appendix A

Areas of Concern (AOCs)
Identified in the RI Work Plan



AOC #1 - Washington State Penitentiary Landfill

Confirmed Contaminants: Trichloroethene and Chloroform in groundwater samples and toluene in surface water samples. Combustible gas also present.

Proposed Sampling: Geophysical survey will be conducted to determine if drums are present in landfill. Manual excavation of test pits as well as soil gas, soil, surface water, and groundwater sampling.

AOC #2 - Former Dry Cleaning

Confirmed COCs: No sampling has been conducted but strong chemical odors observed during demolition. Area suspected as primary source of contamination.

Suspected COCs: TCE and its degredation products.

Proposed Sampling: Soil gas survey followed by soil sampling.

AOC #8 - Sign Shop (location unknown)

Confirmed COCs: No sampling has been conducted.

Suspected COCs: VOCs and SVOCs (chlorinated solvents, degreasers, and petroleum products).

Proposed Sampling: Soil gas survey and soil sampling.

AOC #9 - Metal Plant (location unknown)

Confirmed COCs: No sampling has been conducted.

Suspected COCs: VOCs (solvents).

Proposed Sampling: Soil gas survey and soil sampling.

AOC #5 - Auto Body Work and Furniture Refinishing Shop

Confirmed COCs: No sampling has been conducted.

Proposed Sampling: Groundwater sampling, well installation, and groundwater monitoring to assess groundwater flow.

AOC #6 - Former Hazardous Waste Accumulation Area

Confirmed COCs: No sampling has been conducted.

Suspected COCs: VOCs, SVOCs, Metals, and TPH. See Section 3.2 for more details.

Proposed Sampling: Soil gas survey and soil sampling.

AOC #7 - Steam Plant Boiler Ash

Confirmed COCs: No sampling has been conducted.

Suspected COCs: Metals.

Proposed Sampling: Surface soil at potential locations of ash disposal.

AOC #3 - Former Motor Pool

Confirmed COCs: No sampling has been conducted.

Suspected COCs: VOCs, SVOCs, Metals, and TPH. See Section 3.2 for more details.

Proposed Sampling: Soil gas survey and soil sampling.

AOC #4 - Former UST Locations (8 total)

Proposed Sampling: Groundwater sampling.

ecology and environment, inc.
Seattle, Washington

Source: Washington State Department of Corrections, 2009.

WASHINGTON STATE PENITENTIARY
Walla Walla, Washington

Figure 7
PRELIMINARY SITE CONCEPTUAL MODEL MAP

Date:	Drawn by:	
7/14/09	AES	10:002330WD2703\fig 7

Updated 02/25/2010 by **Parametrix**, Inc.

Appendix B

Landfill Geophysical Survey Results

GEOPHYSICAL INVESTIGATION REPORT

WASHINGTON STATE PENITENTIARY LANDFILL
WALLA WALLA, WASHINGTON

FOR

PARAMETRIX, INC.
SUMNER, WASHINGTON

JULY 2011

PHILIP H. DUOOS
GEOPHYSICAL CONSULTANT

Philip H. Duoos **Geophysical Consultant**

July 1, 2010 Our Ref: 905

Mr. Michael Warfel
Parametrix, Inc.
1231 Fryar Avenue
P.O. Box 460
Sumner, WA 98390

REPORT: Geophysical Investigation
Washington State Penitentiary Landfill
Walla Walla, Washington
Parametrix PN 215-2662-004

Dear Mr. Warfel:

This letter report summarizes the results of the geophysical investigation that I performed at the Washington State Penitentiary Landfill between May 19 – 21, 2010. The primary purpose of the investigation was to delineate the lateral extent of landfill materials using magnetometry methods. Limited electromagnetic (EM-31) surveying was done around portions of the suspected perimeter of the landfill materials. An attempt was made to determine the depth of burial of the landfill material using ground penetrating radar (GPR) methods. The GPR data was very limited in depth penetration at the site because of the fine-grained silt and loess in the near-surface. The magnetic survey provided good results on the lateral extent of possible buried landfill material as well as locating concentrations of buried metal. Preliminary results of the survey were provided to you and Mr. Vance Atkins (HWA GeoSciences Inc.) shortly after the field work was performed to help in locating test pits.

The magnetic survey was performed along transects spaced 20 feet apart which provided reasonable definition of landfill boundaries and large concentrations of buried ferrous material. Both total field and vertical gradient data were recorded along each transect at station intervals ranging from 4 to 7 feet. An EG&G Geometrics G-858 Cesium Magnetometer was used to measure and record the data, and a Trimble AG114 Global Positioning System was used to obtain station locations to sub-meter accuracy in most cases. A brief description of the geophysical methods is attached (Appendix A).

INTERPRETATION RESULTS

The interpretation results of the magnetic data are shown on Figure 1. The interpreted results utilized both the total field and vertical gradient magnetic data. The edges of the landfill in some areas were also based on the limited EM-31 survey results which helped in interpreting the magnetic data. The results are also shown on the Total Magnetic Field Data Map (Figure 2) and the Vertical Gradient Data Map (Figure 3).

The total magnetic field data is a measure of the earth's natural magnetic field which is affected by ferrous objects such as drums, storage tanks, rebar, metal debris, etc. Cultural features such as fences, vehicles, and manhole covers can also affect the data. The earth's field changes naturally throughout the day as well, but these changes were not large enough to affect the interpretation of the data.

The vertical gradient data is the difference in the earth's magnetic field measured between the two magnetometer sensors. The top sensor is approximately 6 feet above the ground surface, and the lower sensor is about 3 feet above the ground. The data recorded at the top sensor was used to create the total field data contours because it is farther from the ground and less susceptible to small amounts of scattered ferrous material. The vertical gradient data is influenced to a greater degree by shallow metal and smaller amounts of metal.

The gradient data may also detect disturbances in the native soils due to trenching and grading activities. These activities disturb the original remnant magnetic orientation of the soil particles when they were deposited. Natural changes in the soils due to different materials (zones of gravels or cobbles) or natural erosion may also be the source of these minor disturbances in the gradient data. The gradient data is less affected by cultural interferences such as fences and vehicles, and is also not affected by the naturally occurring changes in the earth's total field throughout the day.

The anomalous magnetic data were classified into three types of anomalous zones: based on the magnitude of the magnetic anomaly.

High Anomalous Zone: Indicates large concentrations of buried metal.

Moderate Anomalous Zone: Indicates moderate concentrations of buried metal.

Low Anomalous Zone (extent of landfill): Indicates low concentrations of buried metal and/or disturbed soils and is interpreted to be the extent of the main landfill area.

The anomalous zone classifications were based primarily on the magnitude of the magnetic anomalies. The magnitude of the anomaly depends on the depth of the material and the mass of the buried ferrous material. The spacing of 20-feet between transect lines will also play a part in the magnitude of small, discrete anomalies. A relatively large single object (such as an appliance or monitoring well) may not cause much of an anomaly if it was located midway between two transects, but would create a large anomaly if directly beneath a transect line. The 20-foot line spacing was designed to delineate the edge of the major landfill material and to characterize large zones of buried metal. Small, scattered amounts of buried metal may not have been detected.

Anomalies associated with visible features such as monitoring wells, culverts, fences and other cultural features are not interpreted as indicating buried metal. Some small anomalies related to large amounts of surface metal are also not shown. However, in most cases the extent of visible surface metal was smaller than the anomalous zones, indicating that additional buried metal is present in proximity to the visible surface metal (often observed protruding from the ground surface).

A subtle change in the electromagnetic (EM-31) data was observed along a linear trend in the northern portion of the site (Figure 1). This linear feature may indicate a buried utility or perhaps a former trench or gulley that has been filled in with fill material. This linear feature heads in the general direction of a manhole in the distance to the east of the chain link fence.

GEOPHYSICAL METHODOLOGY

Magnetic data were obtained using a EG&G Geometrics 858 Cesium Magnetometer. Both total field data (nanoTeslas) and vertical gradient data (nanoTeslas/meter) were digitally recorded at 1 to 1.5 second intervals while walking along each transect. This provided a spacing of about 4 to 6 feet between stations. Transects were spaced 20 feet apart and oriented in a general north-south direction.

Global positioning data were measured using a Trimble AG 114 GPS system at 1-second intervals. The data were differentially corrected and typically provided sub-meter accuracy. The GPS coordinates are referenced to UTM Metric, WGS-84, 1984.

Limited electromagnetic surveying was performed using a Geonics Limited EM-31 Terrain Conductivity Meter. The EM-31 instrument was monitored in real-time while walking short transects (about 40 feet long) that intersected the suspected edge of the landfill. This limited scanning was performed at numerous locations along the northern edge of the landfill, and in the southeast corner of the landfill.

Blue flagging was placed at the interpreted edges of the landfill material based on the field interpretation of the EM-31 data. These blue flags were later located during the magnetometer survey with the GPS system. The EM-31 results were useful in interpreting the magnetic data, especially along the northern boundary of the landfill which is less distinct than the southern edge.

Numerous survey lines were scanned with a GSSI SIR-3000 Digital ground penetrating radar (GPR) system using a 200 MHz antenna. The GPR data did not provide consistent information regarding either the lateral or vertical extent of buried landfill material. The presence of the fine-grained silt and loess in the near surface limited the depth of penetration of the GPR to a foot or two in areas with loess at the surface. In barren areas of the site (generally ash landfill at the surface) the GPR was able to penetrate a bit better, but still only to depths of 4 to 5 feet.

SURVEY CONTROL

Reference baselines were established at the site using 300-foot tape measures and PVC pin flags and wood lathe. Reference baselines oriented east-west were marked with alternating yellow pin flags and pink pin flags at 20-foot intervals. The pin flags were labeled with their local coordinate location (e.g.: 100E, 200N) and were left in the ground as a reference for future explorations.

The magnetic survey was performed while walking along transects oriented north-south. Tall, brightly marked range poles were placed at each reference baseline along the transect being surveyed so a straight line was maintained. The baselines were spaced 100 to 200 feet apart depending on visibility so that at least one, and often several, range poles were visible along each transect.

The reference baselines were established with the help of Vance Atkins (HWA GeoSciences Inc.). Many of the reference flags were surveyed using the GPS system to provide accurate locations of the baselines. The locations of roads, fences and other features were also surveyed using the GPS system.

CONCLUSIONS

The use of the magnetic method provided a rapid and non-intrusive means of investigating the areas of concern for possible buried ferrous material (such as buried drums, reinforced concrete debris, metal debris and other landfill materials). However, because of the numerous variables involved in all geophysical investigations, there is a possibility that some subsurface features may not have been detected, including possible landfill materials. As with any geophysical investigation, only direct observations using test pits or other means can ultimately characterize the anomalies and other subsurface conditions.

The numerous test pits that were completed at the site shortly after the geophysical investigation was performed generally agree with the interpreted results. Test pit TP-1 was located to the north of the interpreted landfill in the vicinity of the linear trend observed in the EM-31 data. Although it did encounter some brick and concrete construction debris, no large amounts of metal were noted in the test pit log, and no utility was observed. Test pit TP-2 was located within the Low Anomalous Zone, and did detect some trace amounts of metal in a fairly thin 5-foot layer. Most of the test pits in the High Anomalous Zones encountered large amounts of metal, in several cases over 10 to 15 feet thick.

Please do not hesitate to contact me if you have any questions or comments regarding this information, or if you require further assistance. I appreciated the opportunity to work with you on this interesting project.

Sincerely,

Philip H. Duoos
Geophysical Consultant

Attachments

State of Washington
561
Licensed Geologist
Philip H. Duoos

DESCRIPTION OF TECHNIQUES

EG&G 858 CESIUM MAGNETOMETER/GRADIOMETER

The EG&G 858 magnetometer/gradiometer is a rapid, effective and non-destructive instrument used to locate buried ferrous material (drums, pipes, mineral deposits, archaeological objects, etc.). The gradiometer consists of two sensors and a digital recording unit carried in a harness by one operator. Data are recorded and later downloaded to a computer.

Two types of measurements are recorded during a gradiometer survey: the total field and vertical gradient. The total field measurement is affected by regional changes in the magnetic field and anomalies caused by buried ferrous material. The vertical gradient data are more affected by near-surface sources and provides better resolution of shallow buried objects.

Several factors can limit the effectiveness of the magnetometry method including the proximity of cultural interferences (such as buildings, fences and reinforced concrete), and the size, depth and magnetic susceptibility of the target.

ELECTROMAGNETICS (EM-31)

The EM-31 measures subsurface conductance using the principles of electromagnetic induction to depths of about 18 feet, and can detect large amounts of metal at greater depths. The EM-31 is portable, rapid and non-destructive. It has a fixed boom containing the transmitter and receiver coils so that handling and data gathering is easily achieved by one operator.

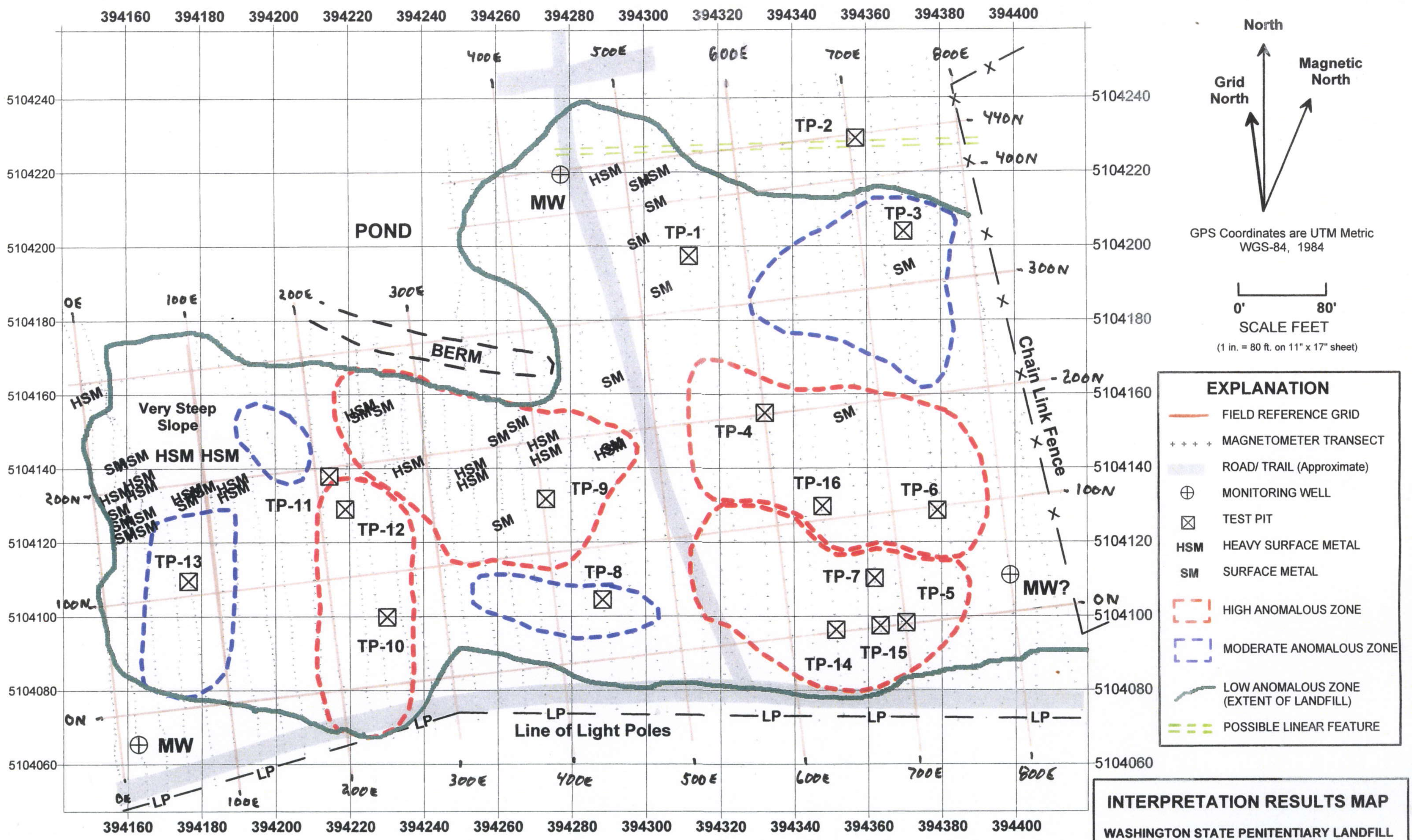
Factors which may increase subsurface conductivities include higher moisture content, greater amounts of finer materials, increased clay and/or silt content, soil contamination and/or ground water contamination. The presence of buried metal can also affect the conductivity data. The detectability of metal objects (buried pipes, drums, etc.) can be enhanced by measuring the change in the magnitude of the primary field (inphase component) of the induced magnetic field.

Several factors can limit the effectiveness of the EM method including the proximity of cultural interferences (such as buildings, fences and reinforced concrete) the presence of highly conductive materials (such as clays and water), and the size, depth and conductivity contrast of the target.

GROUND PENETRATING RADAR

Some of the uses of GPR include locating buried tanks and drums, delineating boundaries of landfills and trenches, and defining voids and geologic stratigraphy. Although other techniques can also provide this information, GPR is less affected by cultural interferences such as overhead powerlines, buildings, and fences. GPR can also provide higher resolution of the target in many cases. A variety of antennas can be used depending on subsurface conditions and the objective of the survey. Resolution of shallow objects requires higher frequencies, while lower frequencies work better for deeper investigations.

Several factors can affect the effectiveness of the GPR method including reinforced concrete at the surface, the presence of highly conductive materials (such as clays and water), the size, depth, and physical property of the target and; in stratigraphic investigations, the conductivity contrast between stratigraphic units. The presence of numerous buried objects may mask objects and/or stratigraphy below.



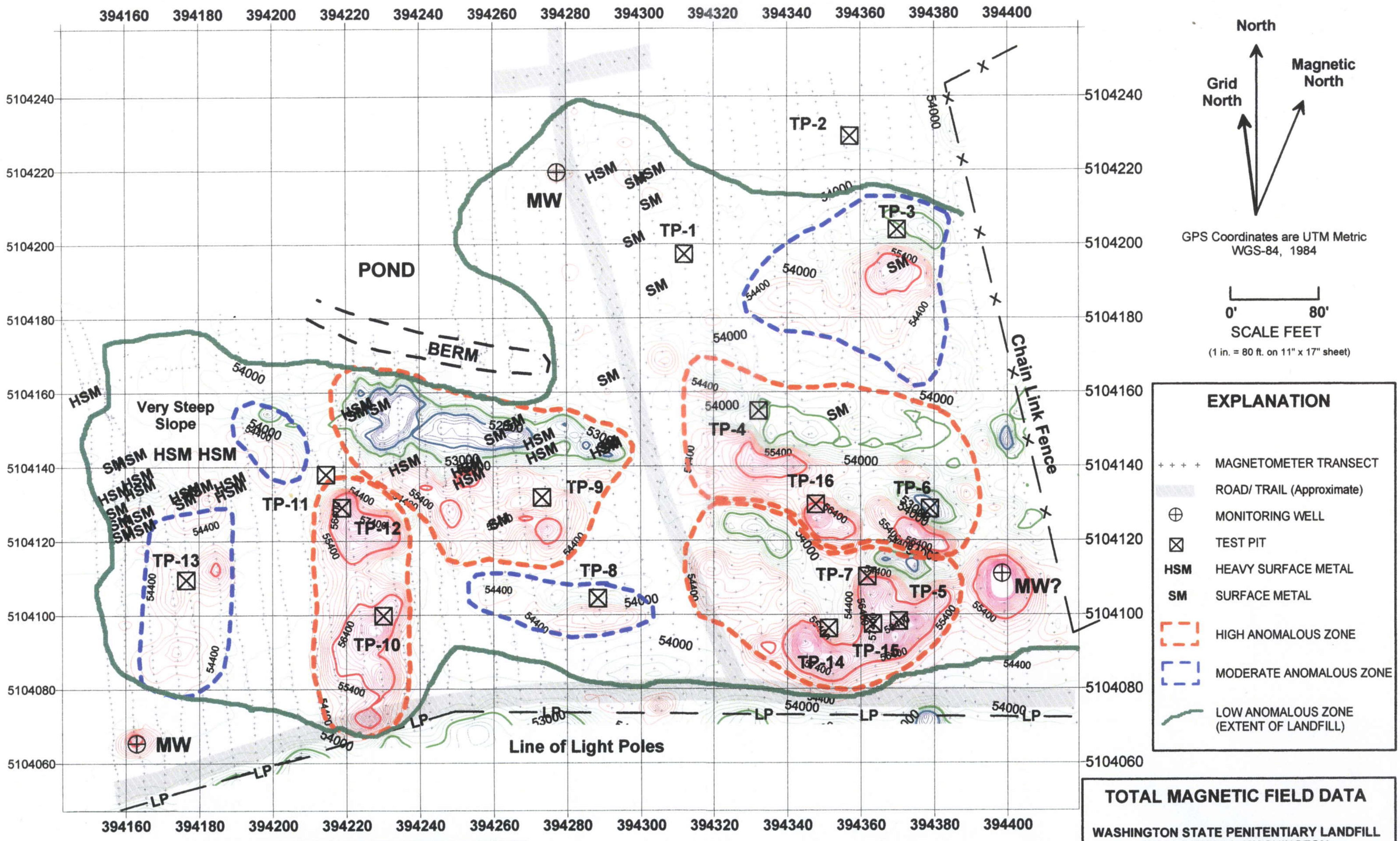
INTERPRETATION RESULTS MAP

WASHINGTON STATE PENITENTIARY LANDFILL
WALLA WALLA, WASHINGTON

Philip H. Duoos, Geophysical Consultant
for Parametrix, Inc.

July 2011, Project No. 905

Figure 1



TOTAL MAGNETIC FIELD DATA

Blue to Green Range: 51,000 to 54,200 nT
Contour Interval: 200 nT

Red to Magenta Range: 54,400 to 60,000 nT
Contour Interval: 200 nT

TOTAL MAGNETIC FIELD DATA

WASHINGTON STATE PENITENTIARY LANDFILL
WALLA WALLA, WASHINGTON

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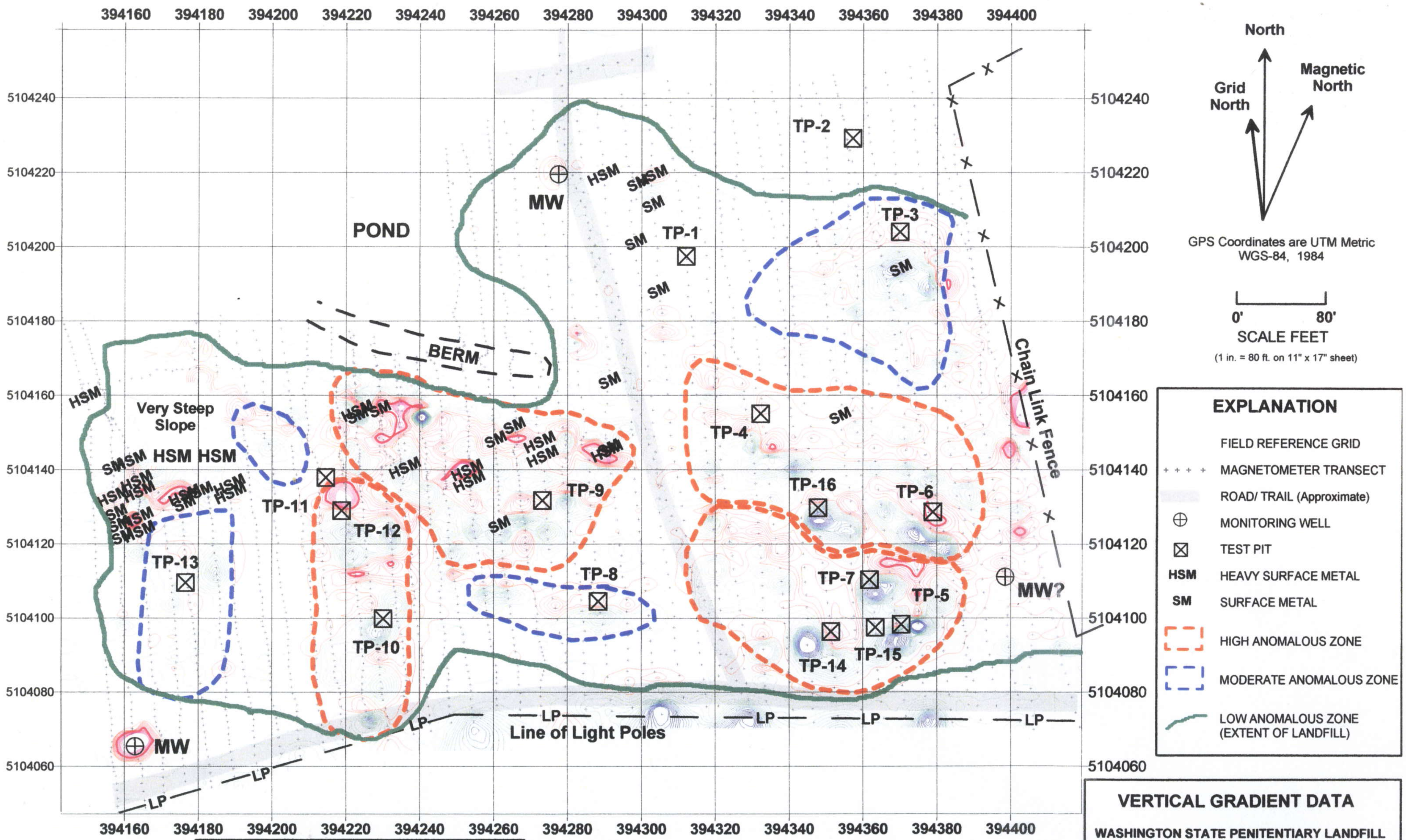
Figure 2



VERTICAL GRADIENT DATA

Blue to Green Range: -1,000 to 0 nT
Contour Interval: 100 nT

Red to Magenta Range: 100 to 1600 nT
Contour Interval: 100 nT

VERTICAL GRADIENT DATA

WASHINGTON STATE PENITENTIARY LANDFILL
WALLA WALLA, WASHINGTON

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July 2011, Project No. 905

Figure 3

Appendix C

Landfill Test Pit Geologic Logs

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils More than 50% Retained on No. 200 Sieve Size	Gravel and Gravelly Soils More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils 50% or More of Coarse Fraction Passing No. 4 Sieve	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
		Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils 50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

☒	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
I	Shelby Tube
▣	3-1/4" OD Split Spoon with Brass Rings
○	Small Bag Sample
▚	Large Bag (Bulk) Sample
▯	Core Run
⧄	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

▽	Groundwater Level (measured at time of drilling)
▼	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

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Walla Walla, Washington

LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

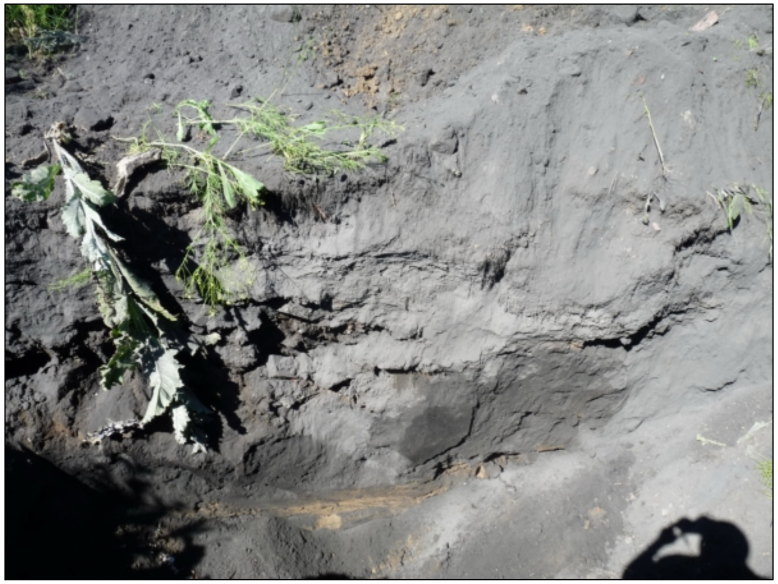
PROJECT NO.: 2009-138-22 FIGURE: C-1

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 350N/550E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Dark gray silty TOPSOIL with grass and root materials, dry.				
3 6		SM	Medium dense dark gray silty SAND with construction debris (brick, concrete), dry. **[LANDFILL]** Grading moist				
9		ML	Medium stiff brownish-yellow SILT, moist. **[LOESS]**		WSP-01-01-TP-08		
12 15			Test pit completed to 10 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				

TEST PIT PHOTO



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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LOG OF TEST PIT
TP-01

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PROJECT NO.: 2009-138-22 FIGURE: C-2

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 450N/700E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0		ML	Medium stiff yellow-brown SILT with construction debris, dry.				
3			Dark gray SILT and ASH with brick, trace metal debris, dry. **[BURN FILL]**				
		ML	Medium stiff brownish-yellow SILT, moist. **[LOESS]**				
6			Test pit completed to 6 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
9							
12							
15							

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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LOG OF TEST PIT
TP-02

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PROJECT NO.: 2009-138-22 FIGURE: C-3

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 350N/740E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Dark gray SILT and ASH, dry. **[BURN FILL]**				
		SM	Dark gray silty SAND with metal debris (pipe, wire), dry. **[LANDFILL]**				
3			Concrete, some small (1-gallon) containers, empty, crushed.				
			Plastic sheeting				
6							
					WSP-01-03-TP-07		
9		ML	Medium stiff brownish-yellow SILT, moist. **[LOESS]**				
			Test pit completed to 10 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
12							
15							

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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LOG OF TEST PIT
TP-03

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PROJECT NO.: 2009-138-22 FIGURE: C-4

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 200N/600E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Light gray silty TOPSOIL with grass and root materials, dry.				
3			Light gray grading dark gray SILT and ASH fill with brick, construction debris, dry. **[LANDFILL]**				
			Large concrete debris with steel (rebar and beams).		WSP-01-04-TP-04		
		ML	Medium stiff dark yellow-brown SILT, trace gravel, moist. **[LOESS]**				
6			Test pit completed to 6 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
9							
12							
15							

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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LOG OF TEST PIT
TP-04

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PROJECT NO.: 2009-138-22 FIGURE: C-5

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 350N/550E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0	▥	ML	Light yellow-brown SILT with grass, root material.				
	⋯	SM	Light gray-brown silty fill with metallic debris (sheet metal), concrete, and bricks. **[LANDFILL]** Two 55-gallon drums, damaged, no tops.		WSP-01-05-TP-07		
	▥	ML	Loose yellow-red SILT, trace debris, moist. Sloughing. **[LOESS]**				

Depth scale (feet): 0, 3, 6, 9, 12, 15

Test pit completed to 10 feet bgs.
Ground water not encountered.
Test pit backfilled with excavated material.

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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Remedial Investigation/Feasibility Study
Walla Walla, Washington

LOG OF TEST PIT
TP-05

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PROJECT NO.: 2009-138-22 FIGURE: C-6

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 0N/700E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
	▩		Loose yellow-gray silty FILL with ash/burned material, dry.				
	◬		Light gray brick and ASH **(BURN FILL)**				
3 6	▩		Fill with metallic debris, decayed brick, construction debris, cans, glassware. **[LANDFILL]**				
9	▥	ML	Loose yellow-red SILT, decreasing debris, moist. Sloughing. **[LOESS]**		WSP-01-06-TP-08		
12	▥	ML	Medium stiff dark yellow-brown SILT. **[LOESS]**				

Test pit completed to 12 feet bgs.
Ground water not encountered.
Test pit backfilled with excavated material.

15

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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Remedial Investigation/Feasibility Study
Walla Walla, Washington

LOG OF TEST PIT
TP-06

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PROJECT NO.: 2009-138-22 FIGURE: C-7

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 40N/680E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0		ML	Dark brown to gray SILT and ASH, dry.				
			Yellow-gray ASH/clinker, dry.				
		ML	Gray SILT with ash, dry.				
3							
6			Test pit completed to 6 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
9							
12							
15							

TEST PIT PHOTO

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Walla Walla, Washington

LOG OF TEST PIT
TP-07

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PROJECT NO.: 2009-138-22 FIGURE: C-8

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 50N/440E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0	▥	ML	Yellowish-gray silty FILL with ash, dry.				
3	▩		Gray-brown silty BURN FILL with ash and debris, dry. Debris consists of metal, decayed brick, glass. **[LANDFILL]** Crushed 30-gallon drum				
6	▩		Decreasing metallic debris. Fill with burned material, significant glass debris.				
9	▩						
			Test pit completed to 10 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.		WSP-01-08-TP-10		
12							
15							

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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Walla Walla, Washington

LOG OF TEST PIT
TP-08

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PROJECT NO.: 2009-138-22 FIGURE: C-9

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 150N/400E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Light yellow-brown silty TOPSOIL				
			Dark gray BURN FILL/ASH				
3			Fill with construcution debris (metal fencing, concrete, crushed drum, PVC piping, plastic sheets.) **[LANDFILL]**				
6			Wood debris				
			Some sloughing.				
9							
12		ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**		WSP-01-09-TP-12		
			Test pit completed to 12 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
15							

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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PROJECT NO.: 2009-138-22 FIGURE: C-10

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 60N/250E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0	▥	ML	Light yellow-brown SILT with trace debris (brick)				
3	▥						
	▩		Fill with metallic and construction debris (Fencing, large concrete debris). **[LANDFILL]**				
6	▩						
9	▩						
12	▩						
15	▩						

TEST PIT PHOTO

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PROJECT NO.: 2009-138-22 FIGURE: C-11

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 60N/250E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
15		ML	Medium stiff yellow-brown SILT, trace caliche, moist. **[LOESS]**		WSP-01-10-TP-15		
			Test pit completed to 16 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
18							
21							
24							
27							
30							

TEST PIT PHOTO

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LOG OF TEST PIT
TP-10

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PROJECT NO.: 2009-138-22 FIGURE: C-12

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 190N/210E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0	∴		Silty loam TOPSOIL, with root material.				
	‖	ML	Medium stiff yellow-brown SILT, dry. **(FILL)**				
3	▩		Wedge of construction debris (plastic, piping, wire). **[LANDFILL]**				
6 9	‖	ML	Medium stiff dark yellow-brown SILT, dry grading moist. **[LOESS]**				

Test pit completed to 10 feet bgs.
Ground water not encountered.
Test pit backfilled with excavated material.

12

15

TEST PIT PHOTO

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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PROJECT NO.: 2009-138-22 FIGURE: C-13

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 160N/220E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0	▥	ML	Yellow-brown SILT with debris (brick fragments, plastic, wire).				
	▨		Wedge of burned fill with brick, plastic. **[LANDFILL]**				
3	▨						
	▨		Silty FILL with sheet metal, brick, tile. **[LANDFILL]**				
6	▨						
9	▨						
12	▨						
15							

TEST PIT PHOTO

No Photo Available

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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PROJECT NO.: 2009-138-22 FIGURE: C-14

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 160N/220E
DATE COMPLETED: 5/24/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
15	▥	ML	Medium stiff yellow SILT, moist.				
			Test pit completed to 16 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.		WSP-01-12-TP-16		
18							
21							
24							
27							
30							

TEST PIT PHOTO

No Photo Available

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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PROJECT NO.: 2009-138-22 FIGURE: C-15

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 120N/80E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Silty loam TOPSOIL, with brush and root material.				
3	▨		FILL with ash and debris (Concrete, metal conduit, cable, brick, fabric), dry. **[LANDFILL]**				
6							
9							
12							
15							

TEST PIT PHOTO

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TP-13

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PROJECT NO.: 2009-138-22 FIGURE: C-16

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 120N/80E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
15	▩						
	▥	ML	Yellow-brown SILT (LOESS)				
18			Test pit completed to 18 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
21							
24							
27							
30							

TEST PIT PHOTO

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PROJECT NO.: 2009-138-22 FIGURE: C-17

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 0N/640E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Silty loam TOPSOIL, with brush and root material.				
			FILL with gray ash and debris (scrap metal, brick, cans, bottles), dry. **[LANDFILL]**				
3							
6							
9							
12							
15							

TEST PIT PHOTO

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PROJECT NO.: 2009-138-22 FIGURE: C-18

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 0N/640E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
15	▨				WSP-01-14-TP-18		
18			Test pit completed to 18 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
21							
24							
27							
30							

TEST PIT PHOTO

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LOG OF TEST PIT
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PROJECT NO.: 2009-138-22 FIGURE: C-19

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 0N/680E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Silty loam TOPSOIL, with brush and root material.				
3			Layered gray ASH. **[LANDFILL]**				
6			Fill with brick, glass bottles, metal fencing, sheet metal. **[LANDFILL]** Metal drum fragments.				
9		ML	Medium stiff yellow-gray SILT, dry. **[LOESS]**				
			Test pit completed to 9 feet bgs. Ground water not encountered. Test pit backfilled with excavated material.				
12							
15							

TEST PIT PHOTO

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LOG OF TEST PIT
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PROJECT NO.: 2009-138-22 FIGURE: C-20

EXCAVATION COMPANY: MASCO
EXCAVATING EQUIPMENT: Caterpillar 320C Excavator
SURFACE ELEVATION: ± Feet

LOCATION: Former CDL, 120N/640E
DATE COMPLETED: 5/25/10
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS.	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	MOISTURE CONTENT(%)	OTHER TESTS
0			Light brown silty TOPSOIL with dark gray/black ash layer.				
3		ML	Light brown SILT fill with dark gray/black ash layers. Ash layer				
6 9			Fill with brick fragments, metal pipe and banding, flatware. Metal drum fragments. **[LANDFILL]** Soil-filled drum.				
12		ML	Light yellow-brown SILT, moist. **[LOESS]**		WSP-01-16-TP-12		

Test pit completed to 12 feet bgs.
Ground water not encountered.
Test pit backfilled with excavated material.

15

TEST PIT PHOTO

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LOG OF TEST PIT
TP-16

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PROJECT NO.: 2009-138-22 FIGURE: C-21

Appendix D

Soil Probe Boring Geologic Logs

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils More than 50% Retained on No. 200 Sieve Size	Gravel and Gravelly Soils More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils 50% or More of Coarse Fraction Passing No. 4 Sieve	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
		Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils 50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

☒	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
Ɪ	Shelby Tube
▣	3-1/4" OD Split Spoon with Brass Rings
○	Small Bag Sample
▚	Large Bag (Bulk) Sample
▯	Core Run
◪	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

▽	Groundwater Level (measured at time of drilling)
▼	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

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LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 2009-138-22 FIGURE: D-1

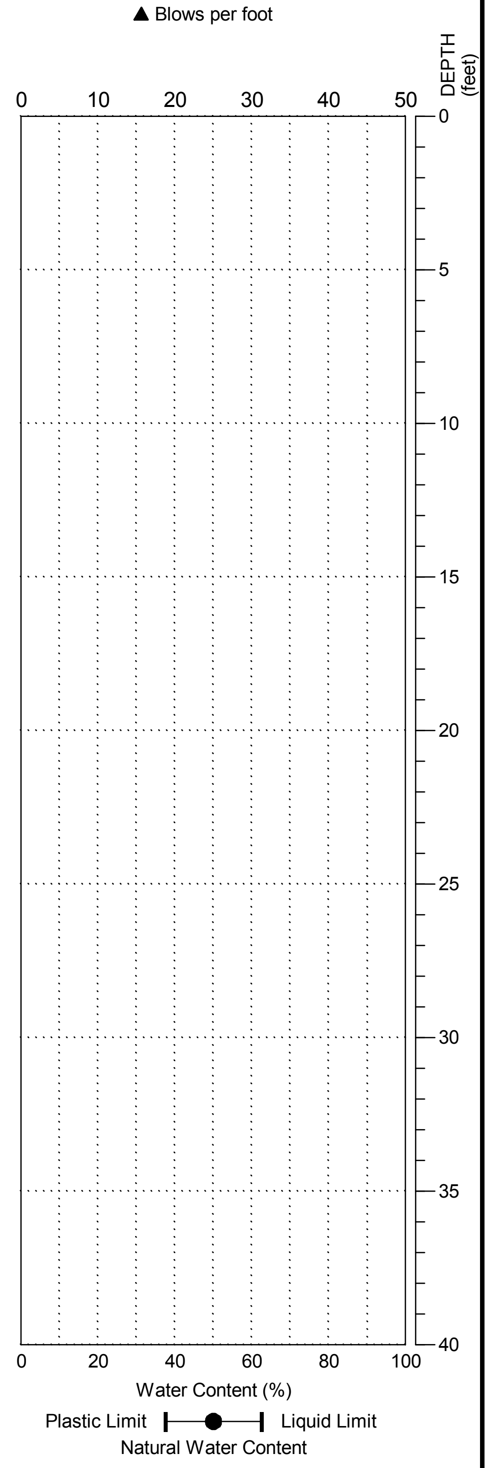
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: West side of Industries/Laundry (C30)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0	GM	Medium dense dark brown silty GRAVEL, moist. **[FILL]**				
1	ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**				
2.4			02-01-SB-04		10.6	
5.5		Medium stiff yellow-brown SILT, occasional coarse sand grains, moist.				
6.4			02-01-SB-08		68	
10.4			02-01-SB-12		6	
12.5		As above, stiff.				
14.4			02-01-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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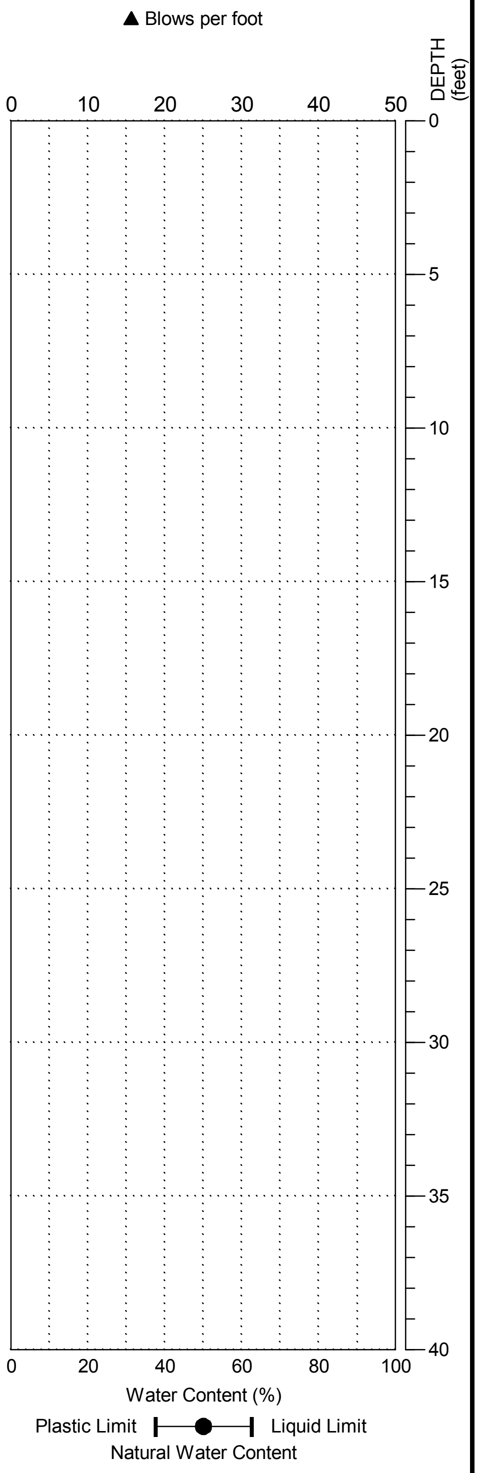
PROJECT NO.: 2009-138-22 FIGURE: D-2

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: North side of former auto shop (A40)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0	▨	SM	Medium dense dark gray sandy SILT with gravel, moist. **[FILL]**	■				
		ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**	■	02-02-SB-04		10	
5				■	02-02-SB-08		3	
10				■	02-02-SB-12		60	
			As above, stiff.	■				
15				■	02-02-SB-16		160	
				■	02-02-SB-20		70	
20			Boring completed to 20 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
25								
30								
35								
40								



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PROJECT NO.: 2009-138-22 FIGURE: D-3

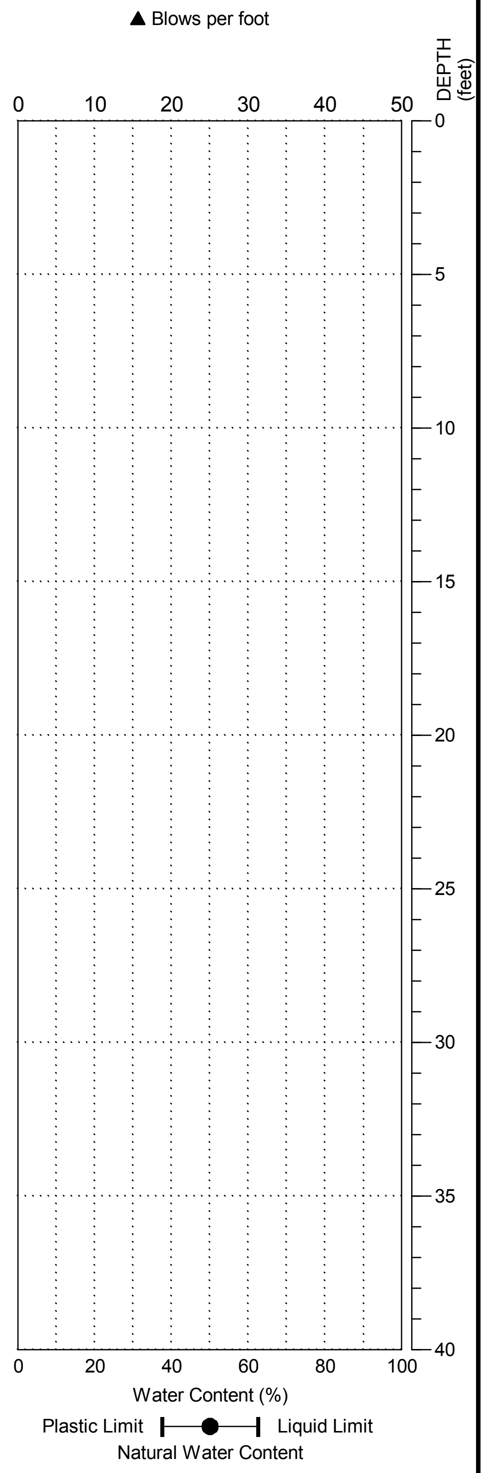
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: South side of former auto shop (A40)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0		GM	Medium dense dark gray silty angular GRAVEL, moist. **[FILL]**	■				
		ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**	■	02-03-SB-04			
5				■				
			As above, stiff.	■	02-03-SB-08			
			Stiff yellow-brown SILT, trace clay, moist.	■				
10				■	02-03-SB-12			
15				■	02-03-SB-16			

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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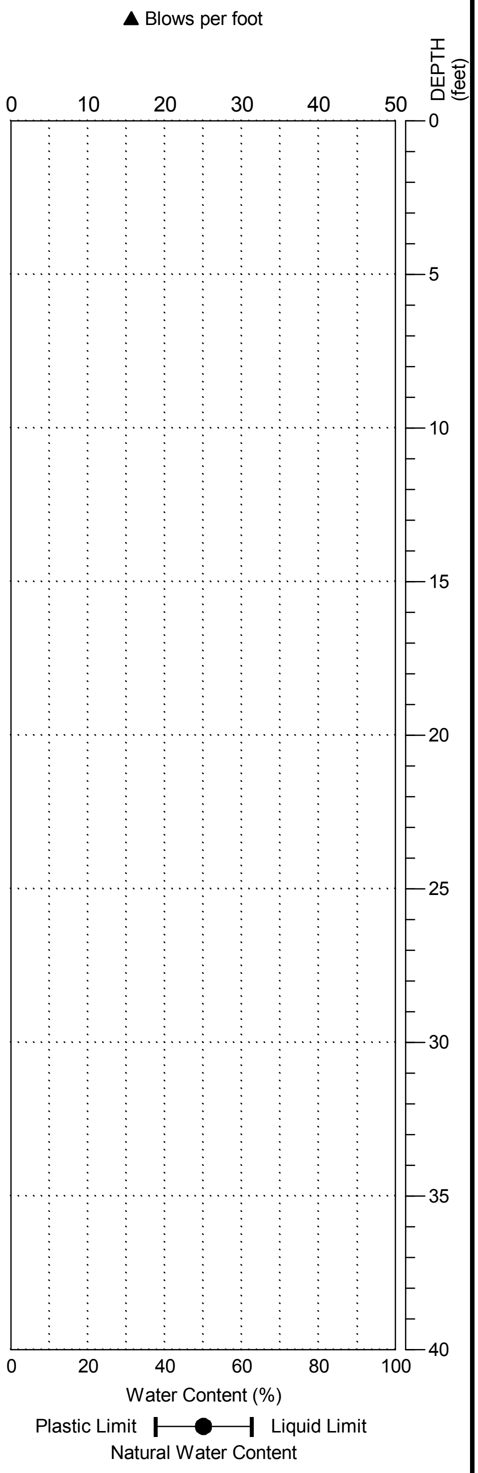
PROJECT NO.: 2009-138-22 FIGURE: D-4

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Northwest corner of Industries/Laundry (C30)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0		GM	Medium dense dark gray silty angular GRAVEL, moist. **[FILL]**					
		ML	Medium stiff dark brown SILT, dry. **[LOESS]**		02-04-SB-04		0	
5			Grading stiff yellow-brown SILT, moist.		02-04-SB-08		0	
10			As above, trace clay.		02-04-SB-12		0	
15					02-04-SB-16		0	
			As above, light yellow-brown.					
					02-04-SB-20		0	
20			Boring completed to 20 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
25								
30								
35								
40								



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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PROJECT NO.: 2009-138-22 FIGURE: D-5

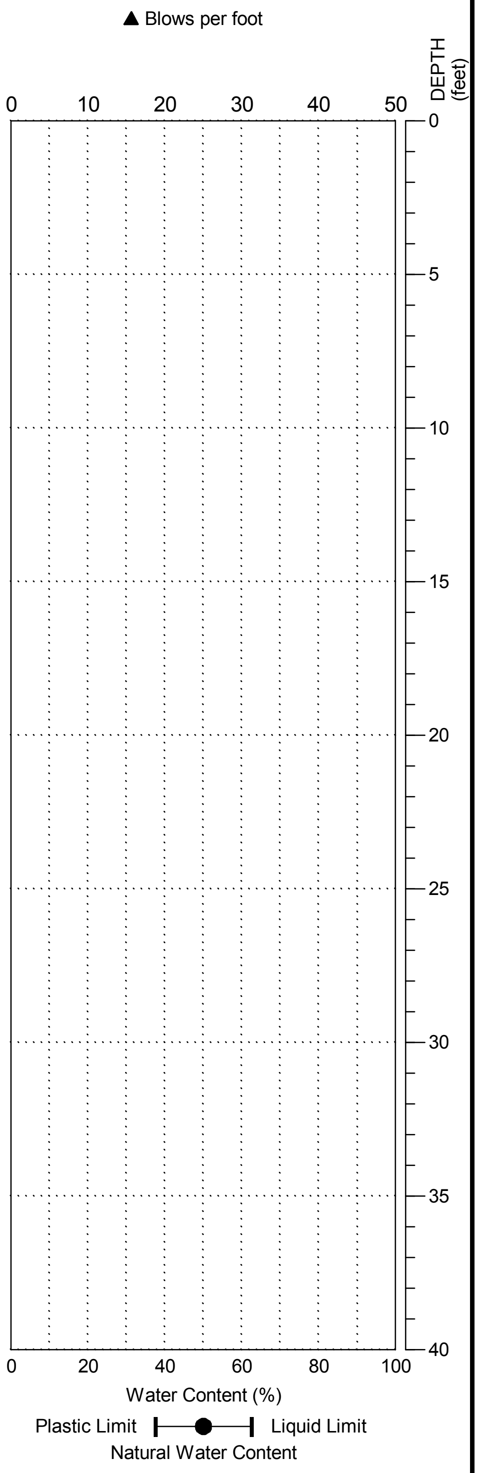
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Southeast side of Industries/Laundry (C30)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/28/2010
DATE COMPLETED: 5/28/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0		GM	Dark gray gravelly SILT, moist. **[FILL]**					
		ML	Medium stiff dark yellow-brown SILT, moist. **[LOESS]**					
					02-05-SB-04		0	
			As above, occasional coarse sand grains.					
5					02-05-SB-08		0	
			Grading stiff.					
10					02-05-SB-12		0	
			Stiff grading hard yellow-brown SILT, moist.					
15					02-05-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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PROJECT NO.: 2009-138-22 FIGURE: D-6

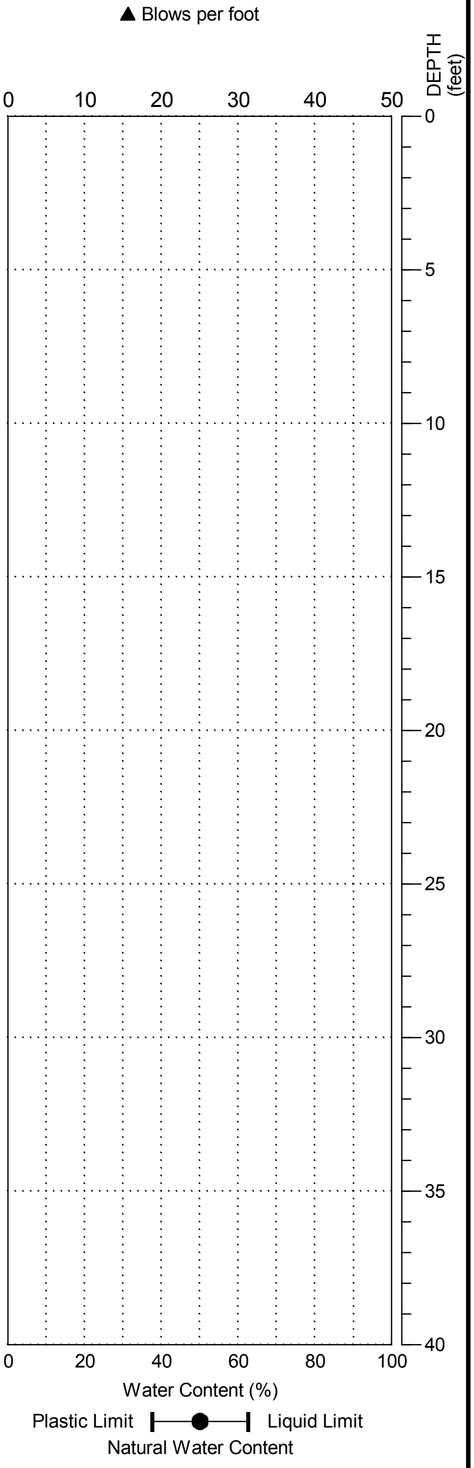
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Northeast side of Industries/Laundry (C30)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/28/2010
DATE COMPLETED: 5/28/2010
LOGGED BY: V. Atkins

USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
GM	Dark brown SILT and GRAVEL, moist. **[FILL]**				
	Dark yellow-brown SILT with gravel and concrete debris, moist. **[FILL]**	02-06-SB-04		0	
ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**				
		02-06-SB-08		0	
	Stiff yellow-brown SILT, trace coarse sand, moist.				
		02-06-SB-12		0	
		02-06-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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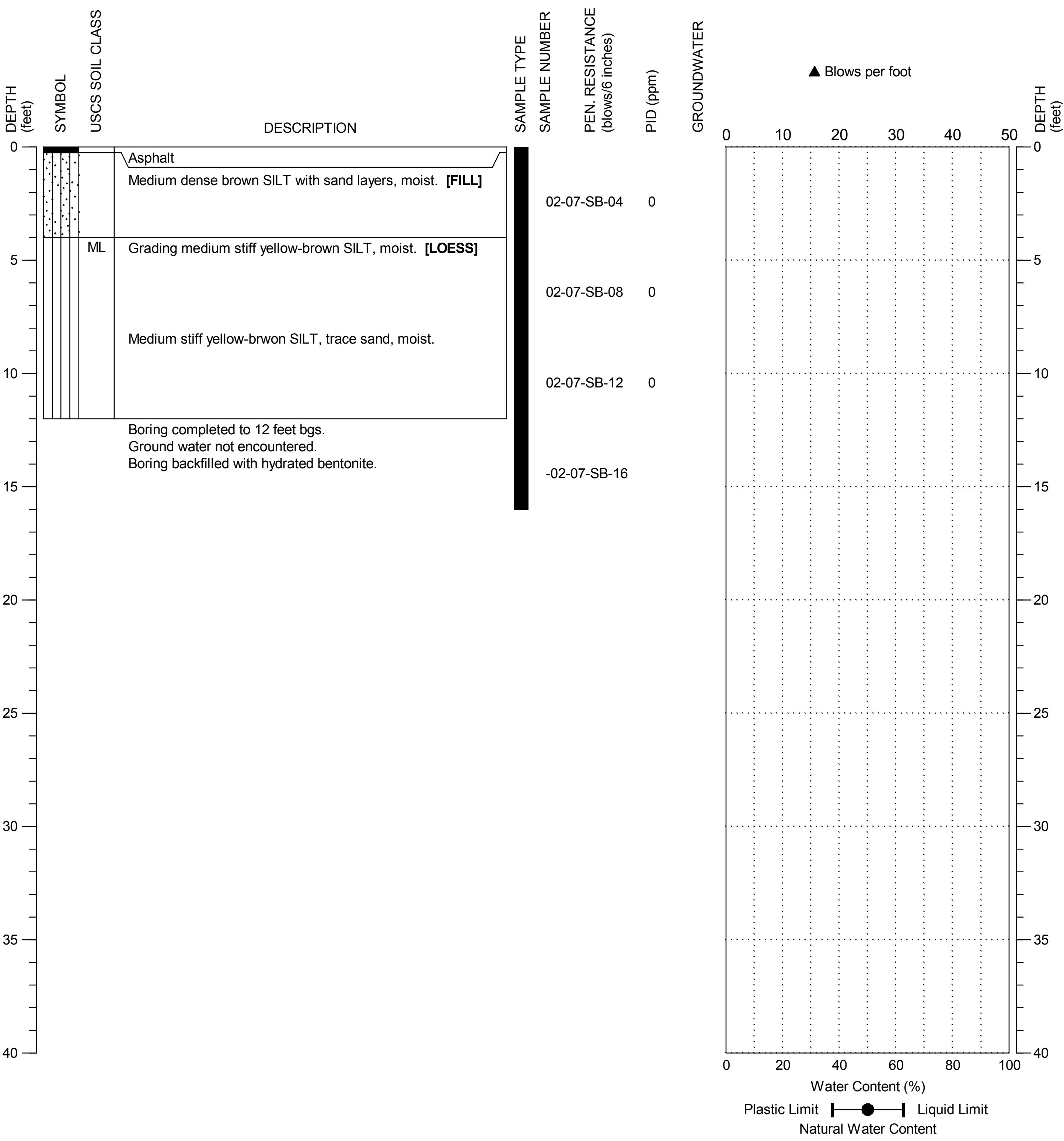
PROJECT NO.: 2009-138-22 FIGURE: D-7

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: North side of Crafts/former dry cleaner (F20)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/28/2010
DATE COMPLETED: 5/28/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Asphalt					
			Medium dense brown SILT with sand layers, moist. **[FILL]**		02-07-SB-04		0	
		ML	Grading medium stiff yellow-brown SILT, moist. **[LOESS]**		02-07-SB-08		0	
			Medium stiff yellow-brwon SILT, trace sand, moist.		02-07-SB-12		0	
			Boring completed to 12 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.		-02-07-SB-16			



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PROJECT NO.: 2009-138-22 FIGURE: D-8

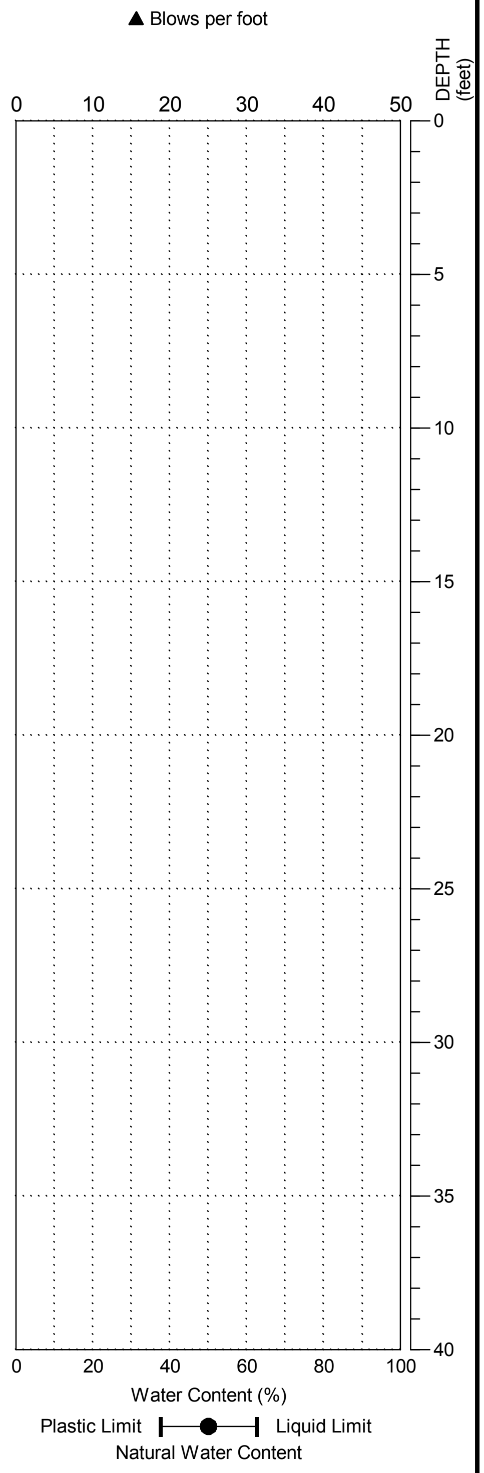
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: West side of Crafts/former dry cleaner (F20)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/28/2010
DATE COMPLETED: 5/28/2010
LOGGED BY: V. Atkins

USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PID (ppm)
	Asphalt		
GM	Medium stiff brown SILT and GRAVEL, moist. **[FILL]**	02-07-SB-04	0
GP	Pea gravel, dry. **[FILL]**		
ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**	02-07-SB-08	0
	No recovery.		
	Boring sloughing.		
	Hard yellow-brown SILT, moist.	02-07-SB-14	0

Boring completed to 14 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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PROJECT NO.: 2009-138-22 FIGURE: D-9

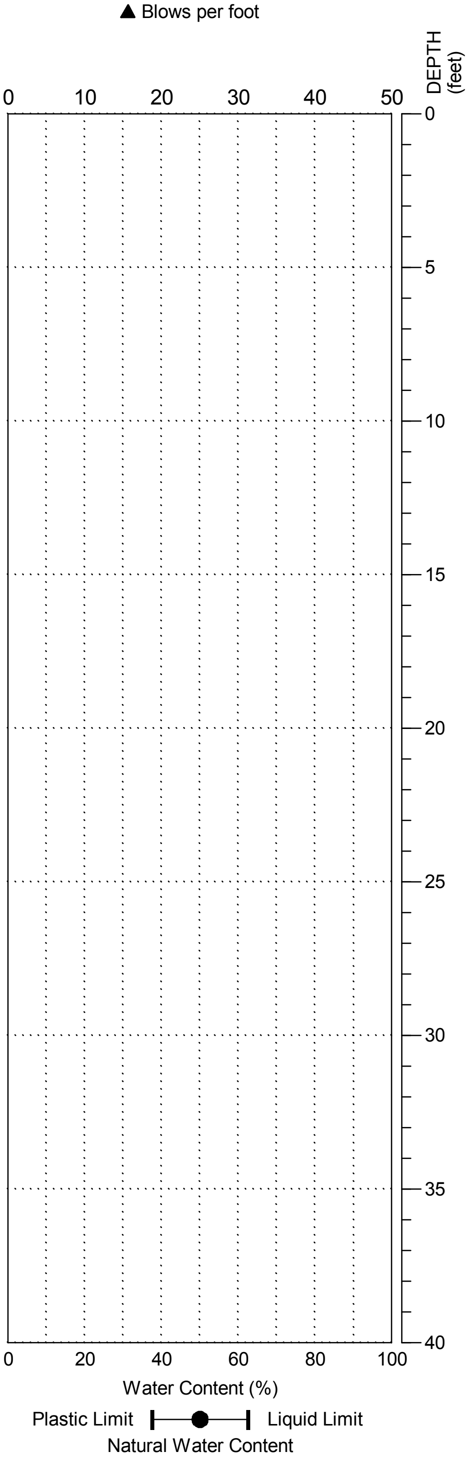
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: South side of Crafts/former dry cleaner (F20)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/28/2010
DATE COMPLETED: 5/28/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Asphalt					
			Medium stiff brown to yellow-brown SILT with gravel and brick debris, moist. **[FILL]**		02-09-SB-04		0	
5			As above, no debris.		02-09-SB-08		0	
		ML	Medium stiff dark yellow-brown SILT, trace angular gravel.					
10					02-09-SB-12		40	
		ML	Stiff yellow-brown SILT, trace sand grains, moist. **[LOESS]**					
15					02-09-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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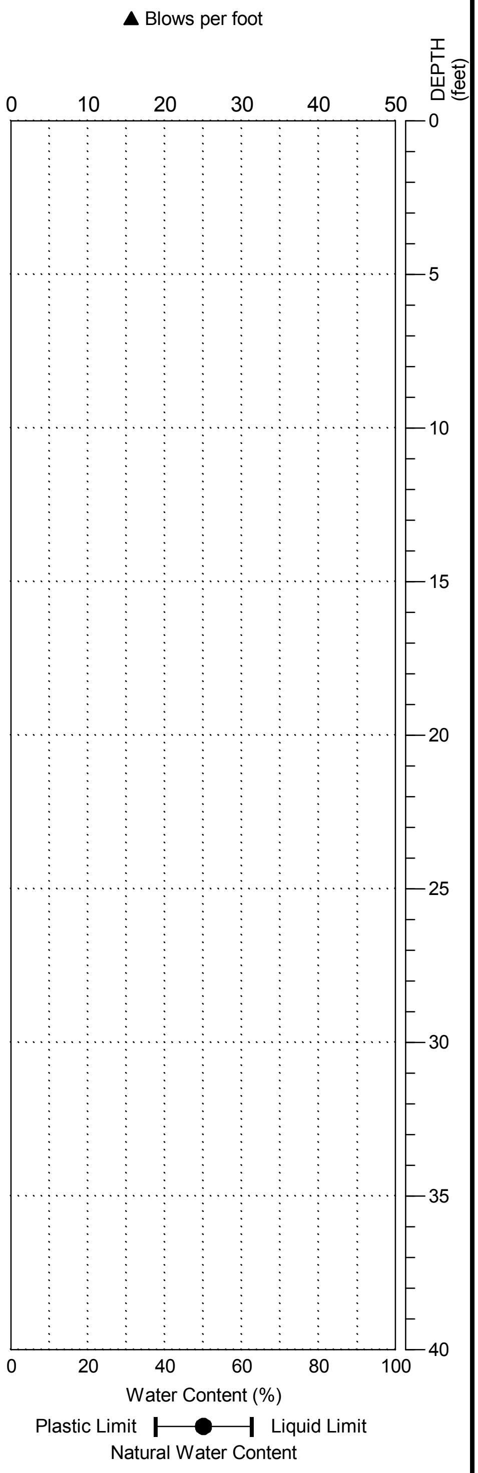
PROJECT NO.: 2009-138-22 FIGURE: D-10

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: West side of Capital Project shop (former motor pool)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			ASPHALT	■				
		GP	Gray angular GRAVEL. **[FILL]**	■				
		ML	Brown SILT with dark gray sand layers **[FILL]**	■	03-01-SB-04			
			Medium still yellow-brown SILT, occasional coarse sand grains, moist. **[LOESS]**	■				
5				■	03-01-SB-08			
10			As above, trace clay.	■	03-01-SB-12			
			Boring completed to 12 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
15								
20								
25								
30								
35								
40								



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PROJECT NO.: 2009-138-22 FIGURE: D-11

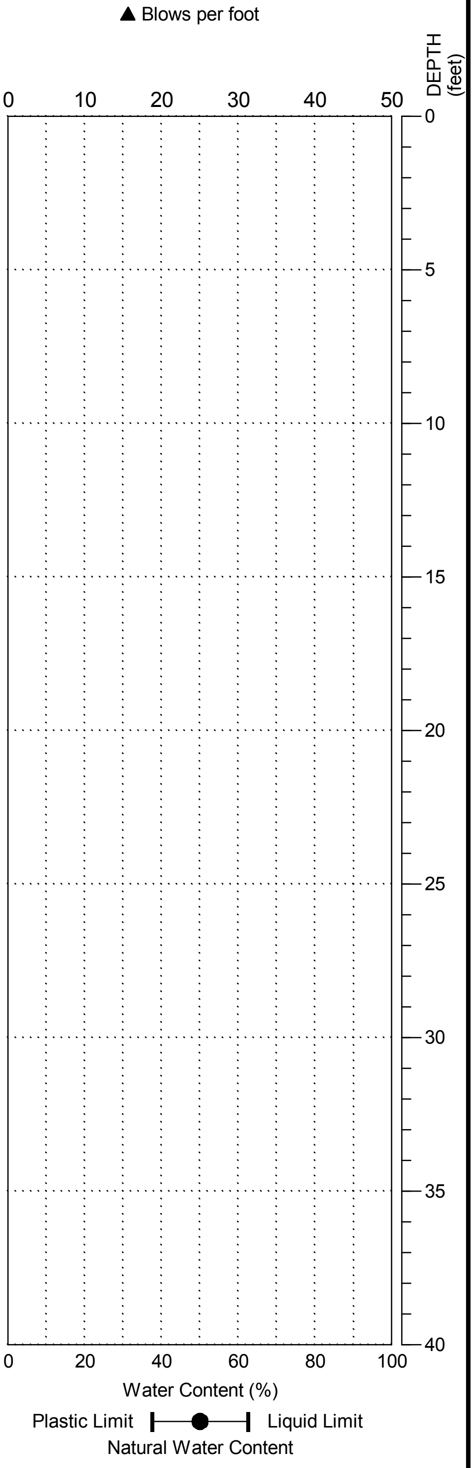
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: East side of Capital Project shop (former motor pool)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Asphalt					
			Medium stiff red-brown SILT with sand and gravel. **[FILL]**					
		ML	Medium still yellow-brown SILT, moist. **[LOESS]**		-03-02-SB-04		0	
5					03-02-SB-08		0	
			As above, stiff.					
10					03-02-SB-12		0	
15					03-02-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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PROJECT NO.: 2009-138-22 FIGURE: D-12

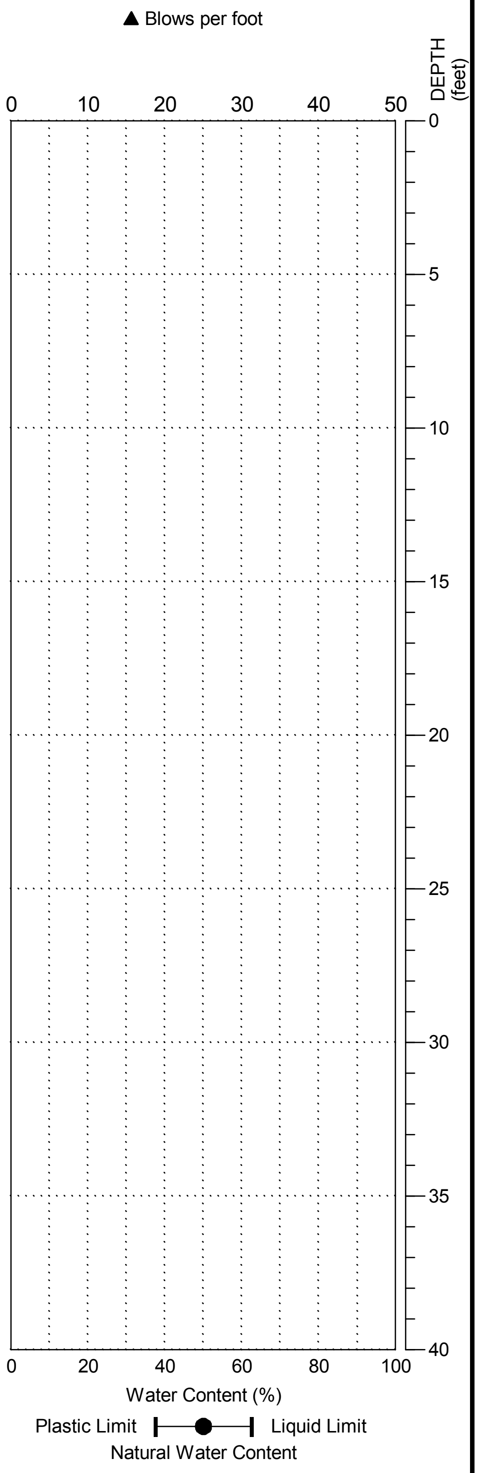
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: West side of boiler house

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0		GP	Angular GRAVEL. **[FILL]**					
		SM	Dark brown silty SAND with brick debris, gravel, moist. **[FILL]**		07-01-SB-04		0	
			Dark gray to black burn fill/ash layer					
5		ML	Medium stiff yellow-brown SILT, dry to moist. **[LOESS]**					
					07-01-SB-08		0	
			Stiff dark yellow-brown SILT, moist.					
10					07-01-SB-12		0	
			As above, occasional coarse sand grains.					
15					07-01-SB-16		0	

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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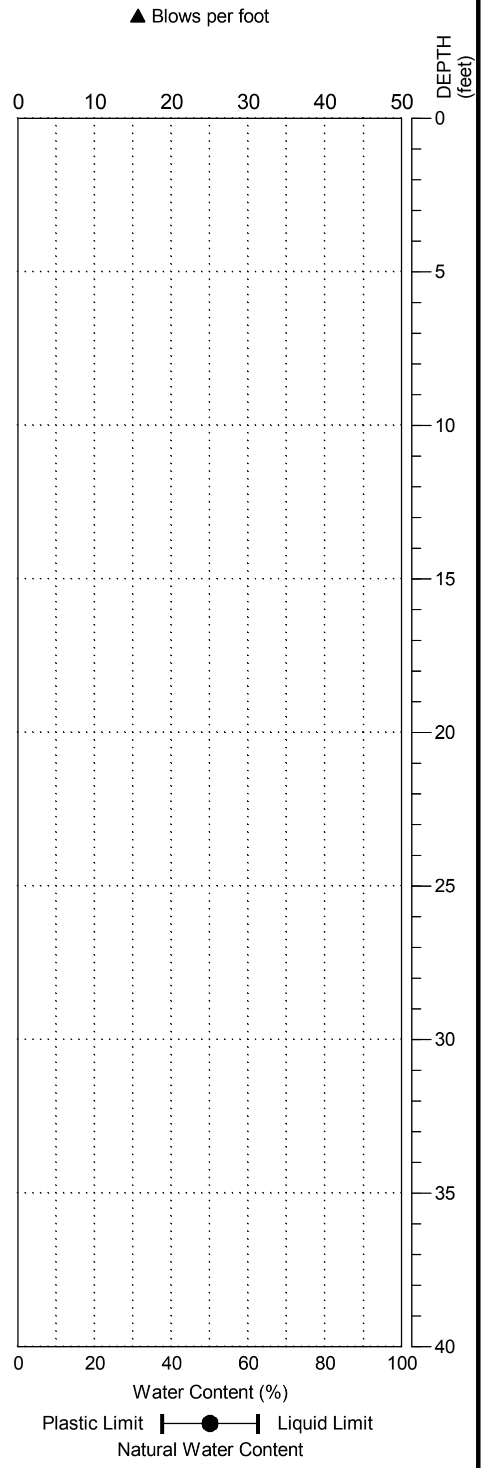
PROJECT NO.: 2009-138-22 FIGURE: D-13

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: East side of warehouse, former hazardous materials storage.

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/27/2010
DATE COMPLETED: 5/27/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0	⁙	SM	Medium dense dark gray silty SAND with gravel and debris, dry. **[FILL]**	■				
				■	06-01-SB-04		0	
	▥	ML	Medium stiff yellow-brown SILT, occasional sand grains, moist. **[LOESS]**	■				
5	▥			■	06-01-SB-08		0	
	▥		As above, occasional gravel grains.	■				
10	▥			■	06-01-SB-12		0	
15	▥			■	06-01-SB-16		0	
			Boring completed to 16 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
20								
25								
30								
35								
40								



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PROJECT NO.: 2009-138-22 FIGURE: D-14

Appendix E

Soil Gas Probe Boring Geologic Logs

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils More than 50% Retained on No. 200 Sieve Size	Gravel and Gravelly Soils More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils 50% or More of Coarse Fraction Passing No. 4 Sieve	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
		Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils 50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

SAMPLE TYPE SYMBOLS

⊠	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
I	Shelby Tube
▣	3-1/4" OD Split Spoon with Brass Rings
○	Small Bag Sample
▚	Large Bag (Bulk) Sample
▮	Core Run
⧄	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

▽	Groundwater Level (measured at time of drilling)
▼	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

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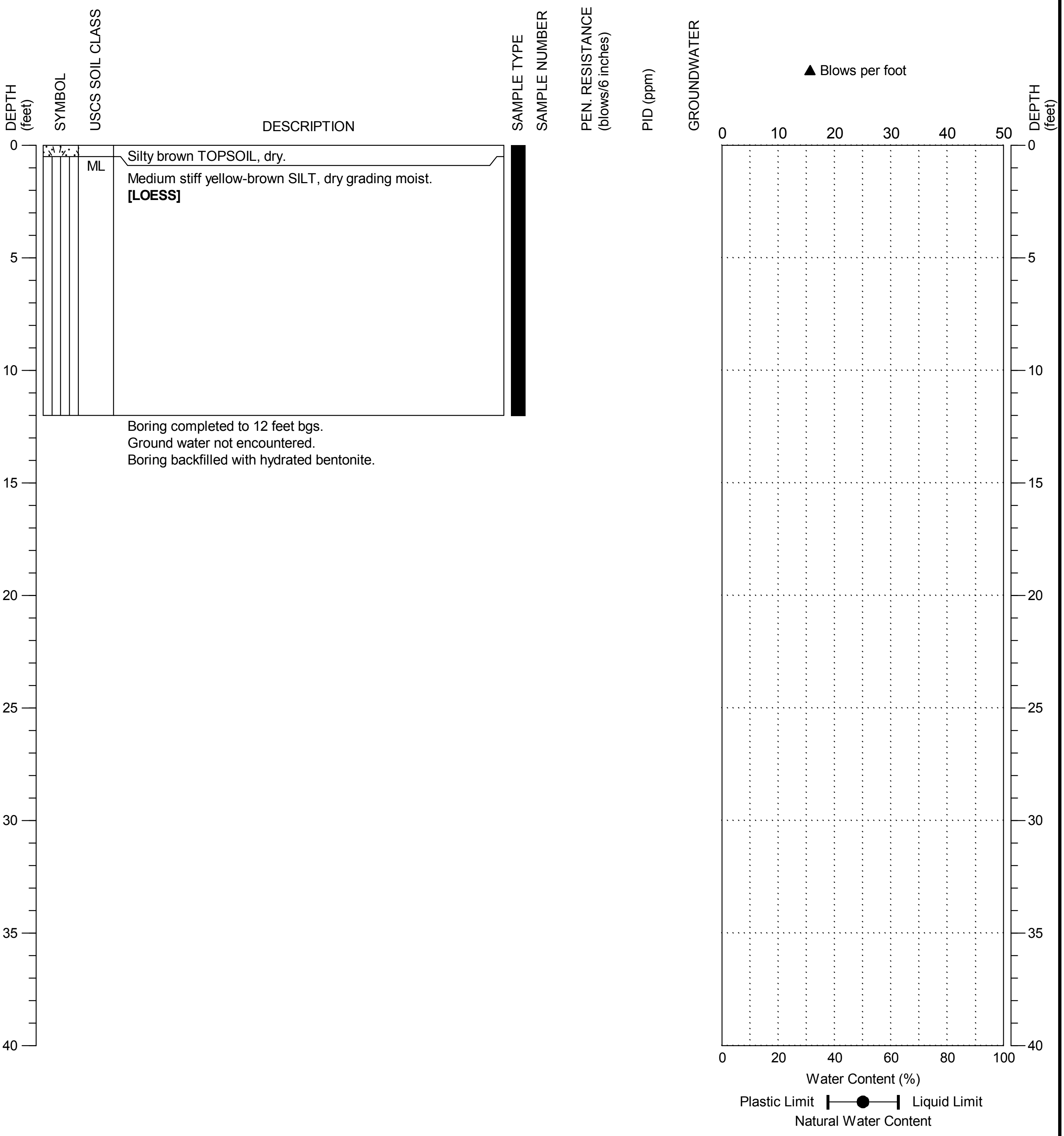
LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 2009-138-22 FIGURE: E-1

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 50N/500E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins



Silty brown TOPSOIL, dry.

Medium stiff yellow-brown SILT, dry grading moist.
[LOESS]

Boring completed to 12 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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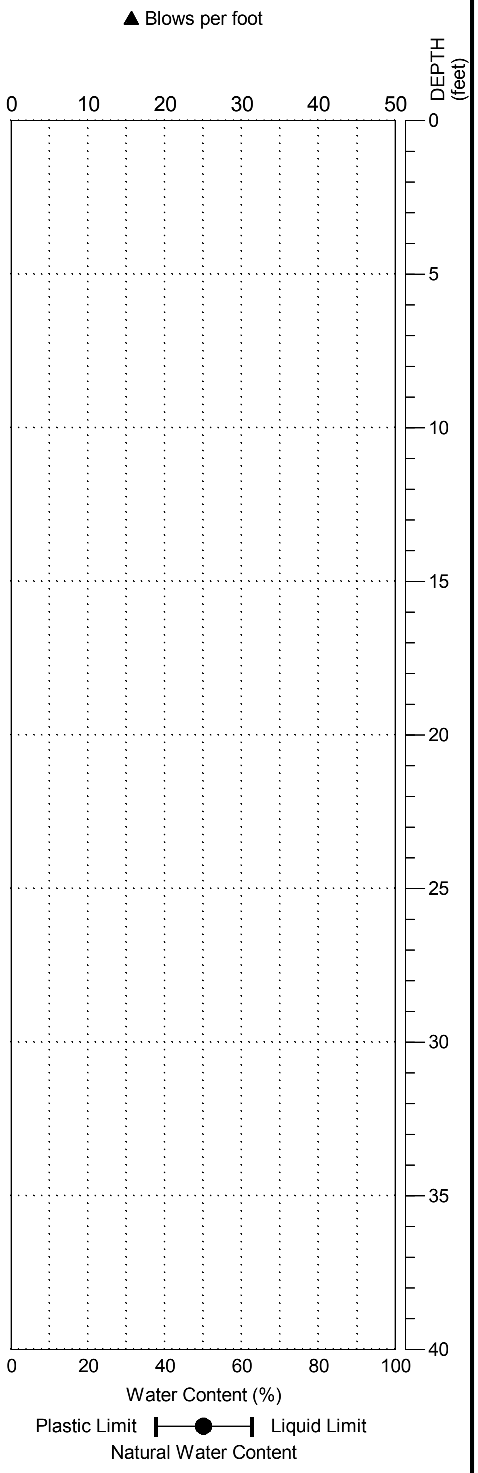
PROJECT NO.: 2009-138-22 FIGURE: E-2

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 150N/500E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Yellow-brown silty TOPSOIL, dry.	■				
		ML	Medium dense dark gray silty ash with brick debris, dry. **[BURN FILL]**					
			Medium stiff yellow-brown SILT, moist. **[LOESS]**					
5								
			Grading stiff, light yellow-brown.					
10								
			Boring completed to 12 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
15								
20								
25								
30								
35								
40								



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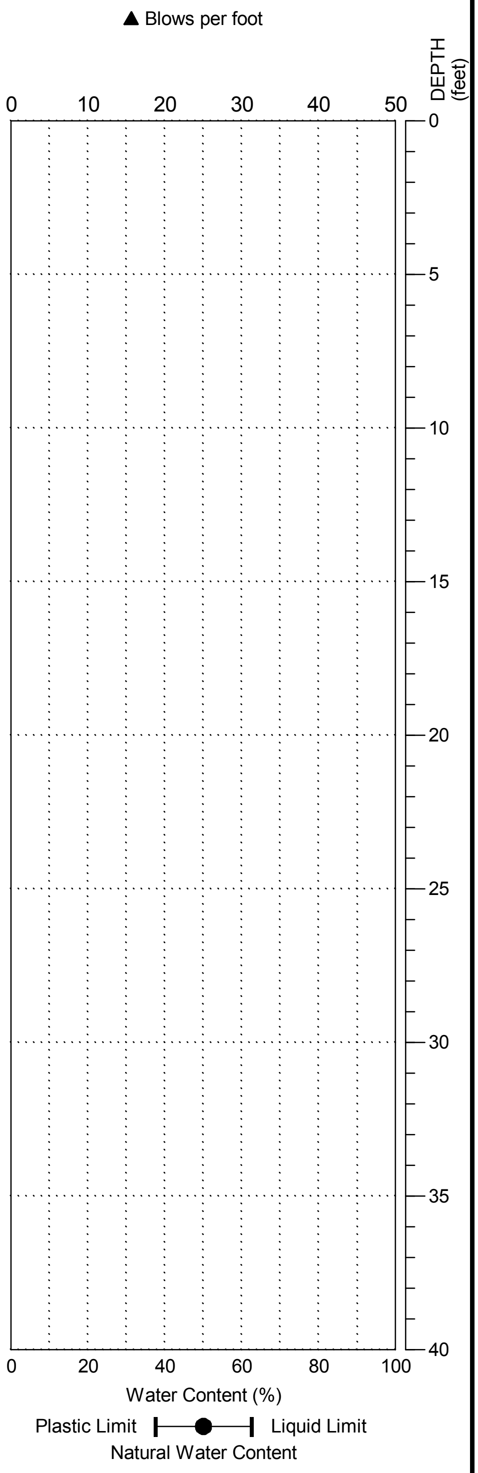
PROJECT NO.: 2009-138-22 FIGURE: E-3

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 400N/500E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			No soil boring completed for stratigraphic purposes.					



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PROJECT NO.: 2009-138-22 FIGURE: E-4

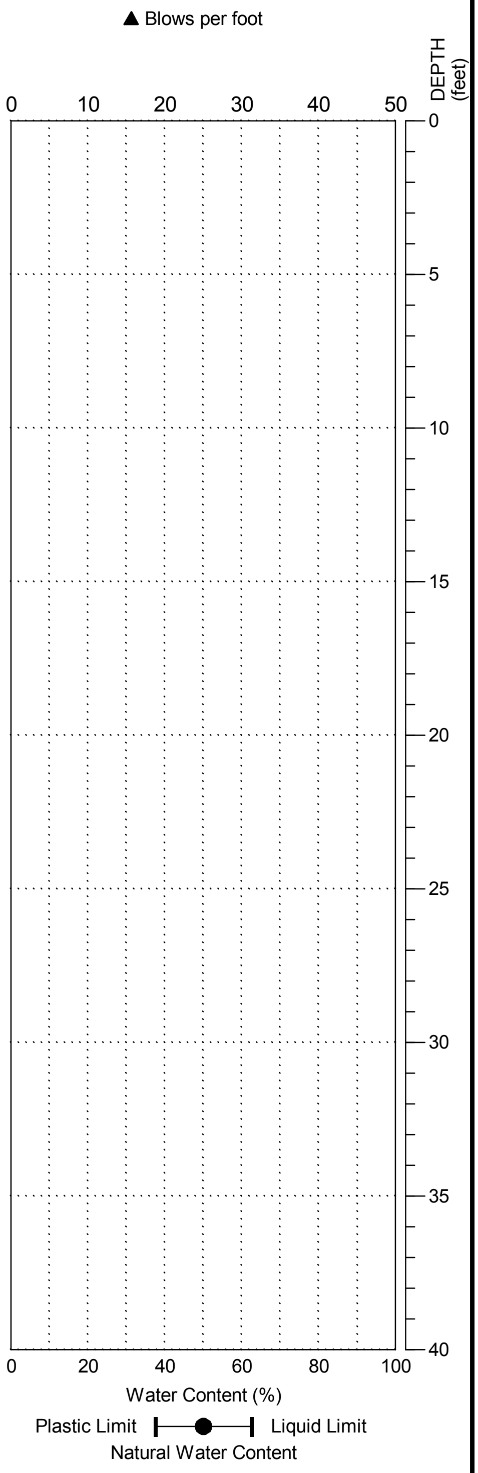
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 0N/620E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0–20			No soil boring completed for stratigraphic purposes. See Test Pit TP-14 log for reference.					

Depth scale (feet): 0, 5, 10, 15, 20, 25, 30, 35, 40



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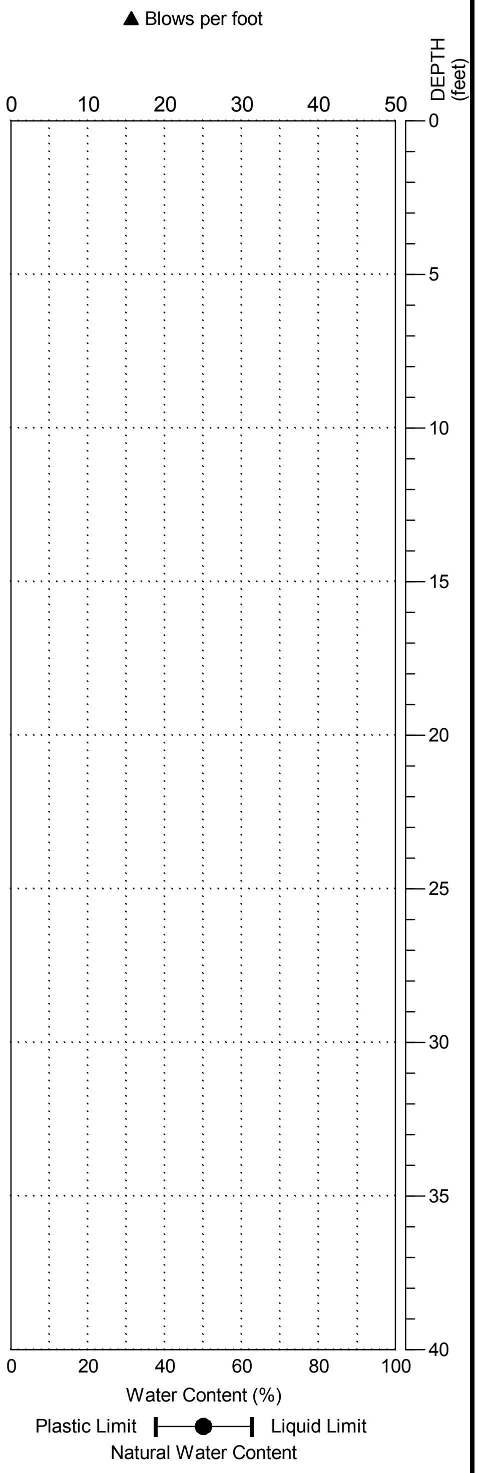
PROJECT NO.: 2009-138-22 FIGURE: E-5

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 120N/620E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			No soil boring completed for stratigraphic purposes. See Test Pit TP-16 log for reference.					
5								
10								
15								
20								
25								
30								
35								
40								



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PROJECT NO.: 2009-138-22 FIGURE: E-6

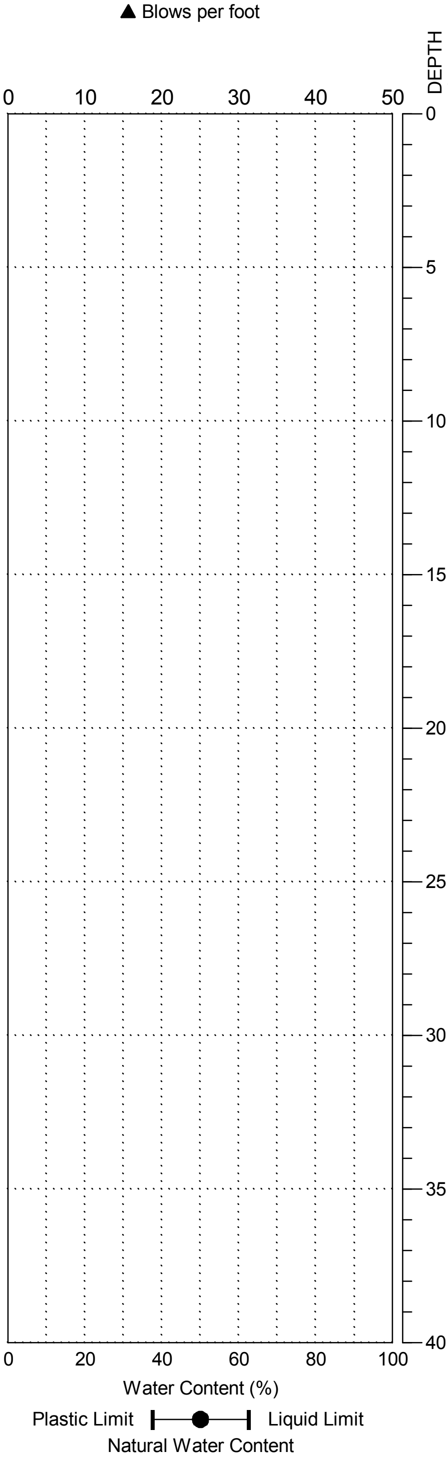
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 230N/620E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Dark gray TOPSOIL/ASH, dry.					
		ML	Medium stiff yellow-brown SILT with brick debris, dry **[FILL]**					
			Dark gray to black ASH and DEBRIS, dry . **[BURN FILL]** As above, with brick.					
		ML	Medium stiff gray SILT with brick debris, dry to moist.					
		ML	Medium stiff yellow-brown SILT, slight red-orange mottling, moist. **[LOESS]** Grading dark yellow-brown.					

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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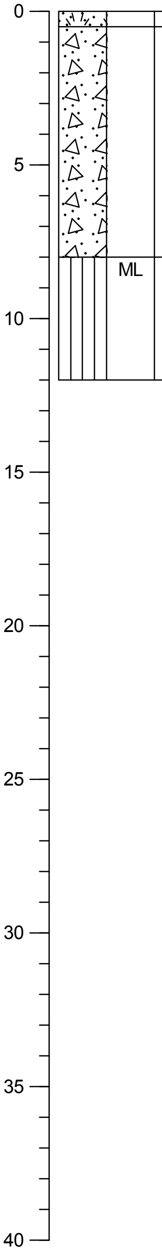
PROJECT NO.: 2009-138-22 FIGURE: E-7

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 140N/760E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet) | SYMBOL | USCS SOIL CLASS | DESCRIPTION | SAMPLE TYPE | SAMPLE NUMBER | PEN. RESISTANCE (blows/6 inches) | PID (ppm) | GROUNDWATER | DEPTH (feet)



Dark gray TOPSOIL/ASH, dry.

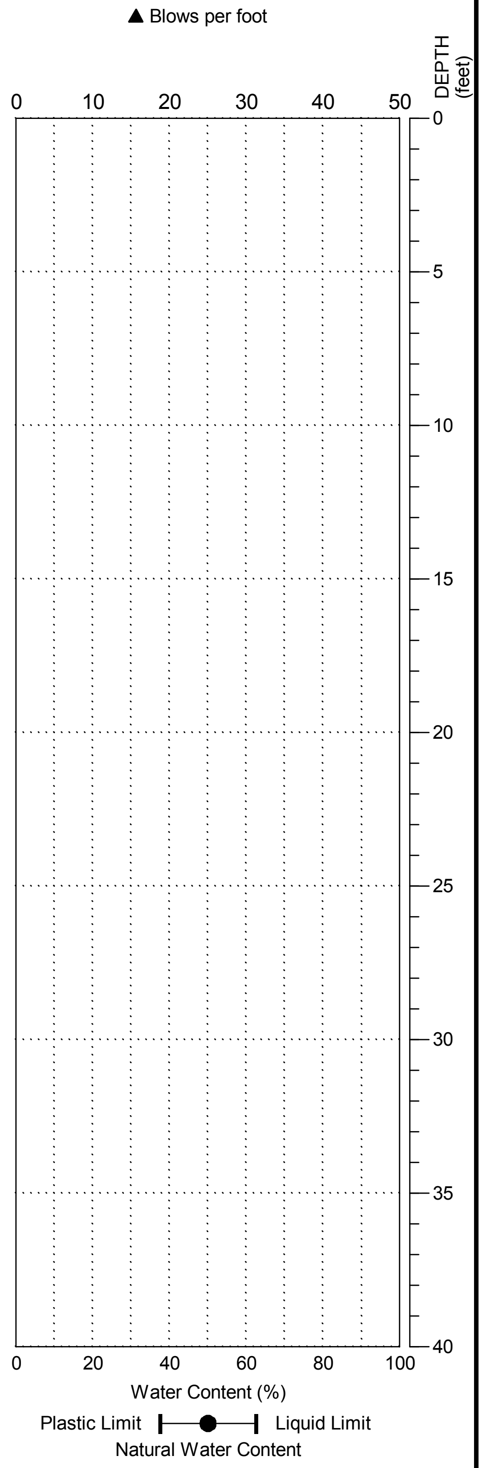
Medium dense dark gray to black silty ASH and DEBRIS (brick), dry . **[BURN FILL]**

As above, with concrete debris, dry.

Medium stiff yellow-brown SILT, dry. **[LOESS]**

Dark yellow-brown SILT with red-brown mottling, moist.

Boring completed to 12 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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PAGE: 1 of 1

PROJECT NO.: 2009-138-22 FIGURE: E-8

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 50N/100E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

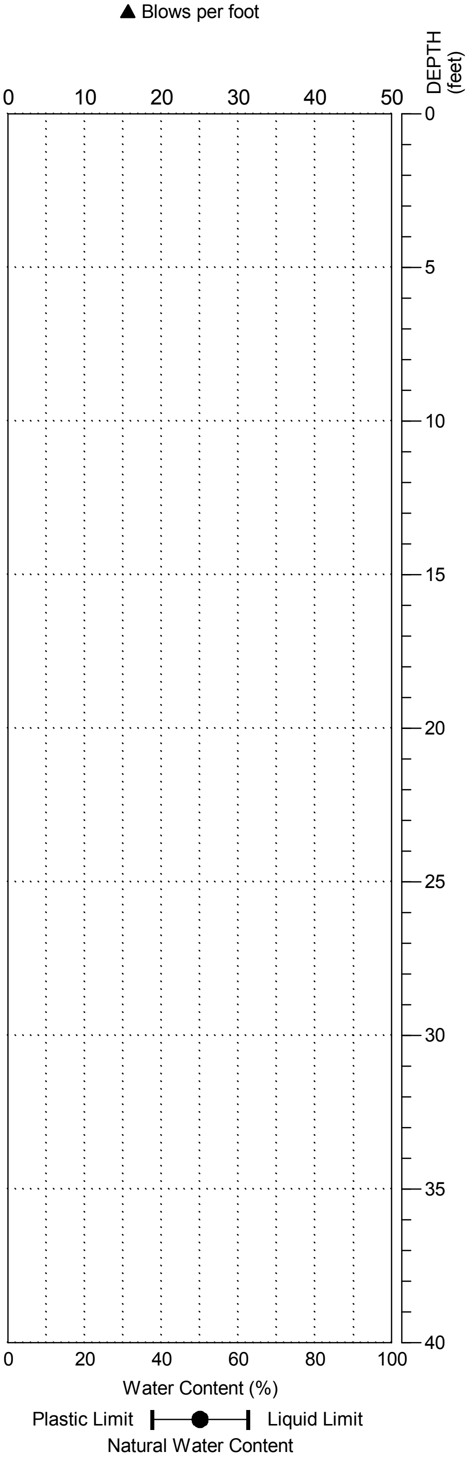
DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

USCS SOIL CLASS	DESCRIPTION
	Medium stiff yellow-brown SILT/TOPSOIL with root material, dry.
ML	Medium stiff dark yellow-brown SILT with gravel, debris (brick), some ash/burn fill.
ML	Stiff yellow-brown SILT, dry grading moist. **[LOESS]** Grading light yellow-brown SILT, trace caliche, occasional coarse sand grains. Stiff yellow-brown SILT, occasional coarse sand grains, moist.

Boring completed to 12 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.

DEPTH (feet): 0, 5, 10, 15, 20, 25, 30, 35, 40

SAMPLE TYPE, SAMPLE NUMBER, PEN. RESISTANCE (blows/6 inches), PID (ppm), GROUNDWATER



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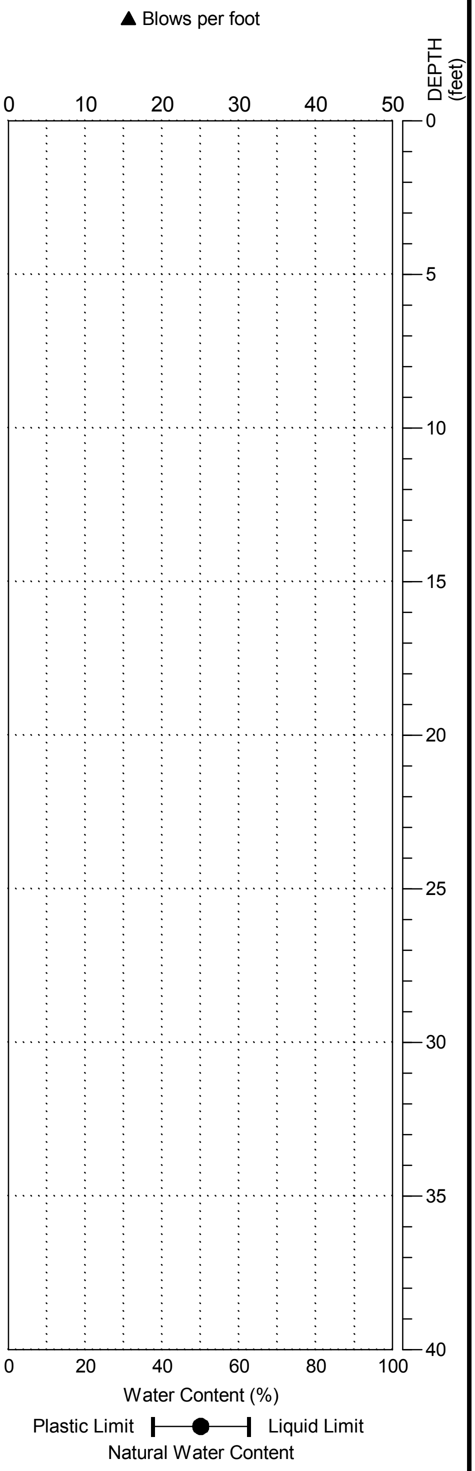
PROJECT NO.: 2009-138-22 FIGURE: E-9

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 140N/100E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/25/2010
DATE COMPLETED: 5/25/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			No soil boring completed for stratigraphic purposes. See Test Pit TP-13 log for reference.					
5								
10								
15								
20								
25								
30								
35								
40								



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PROJECT NO.: 2009-138-22 FIGURE: E-10

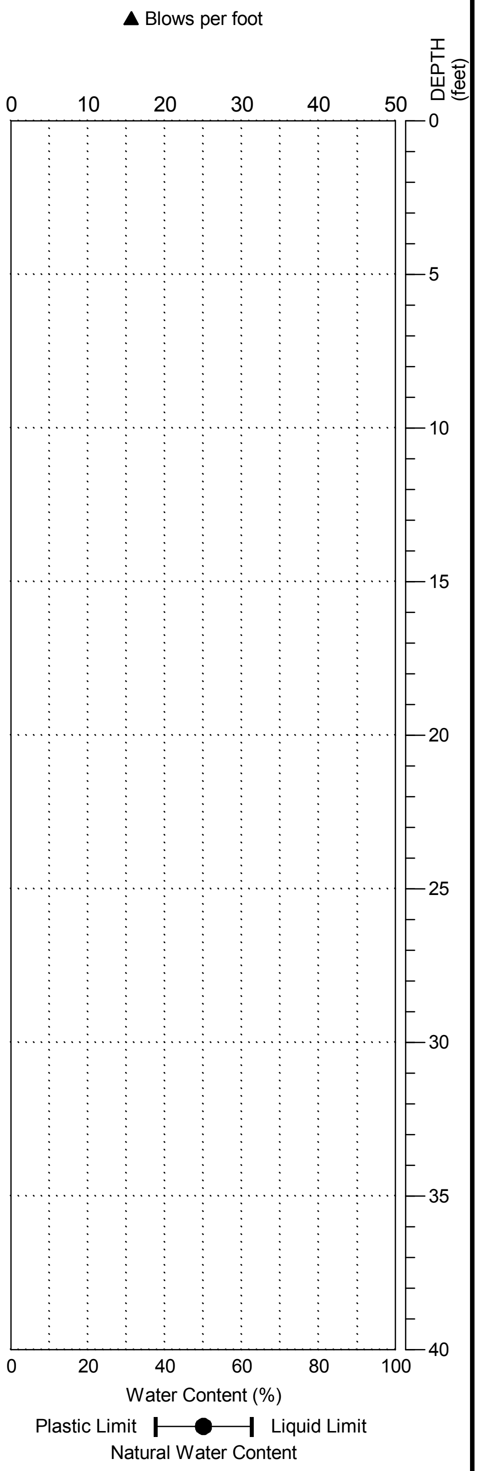
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 140N/200E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Yellow-brown SILT/TOPSOIL with root material, dry.					
		ML	Medium stiff yellow-brown SILT with construction debris (rock, brick) grading dark yellow-brown with woody debris.					
5		ML	Medium stiff light yellow-brown SILT, dry. **[LOESS]**					
			Grading stiff.					
10								

Boring completed to 12 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.



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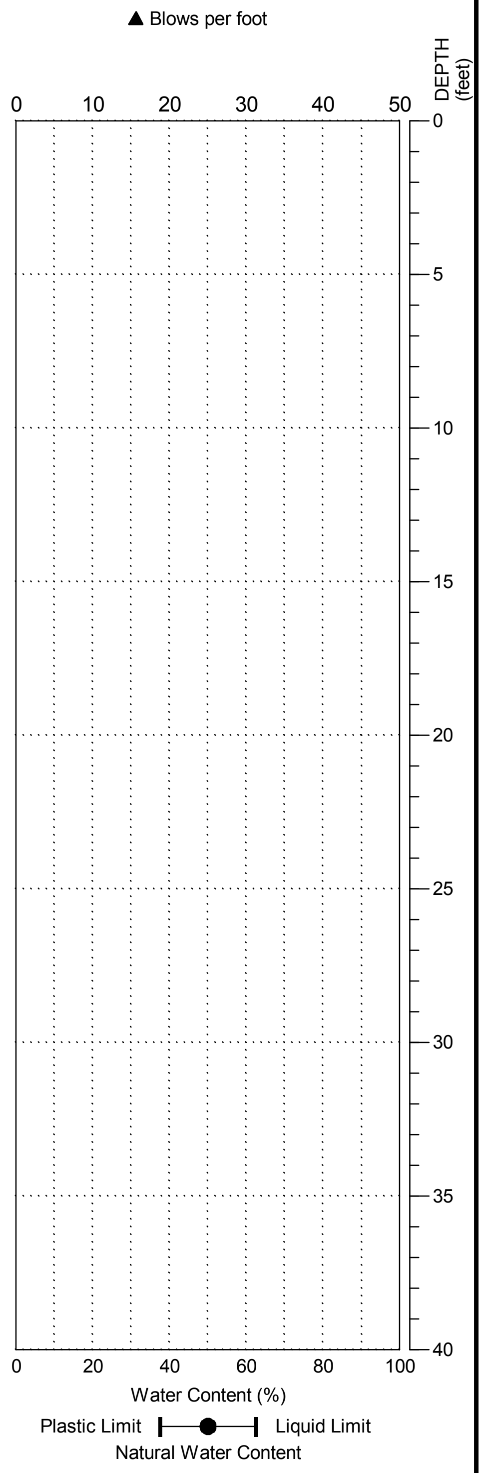
PROJECT NO.: 2009-138-22 FIGURE: E-11

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 40N/200E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			No soil boring completed for stratigraphic purposes. See Test Pit TP-10 log for reference.					
5								
10								
15								
20								
25								
30								
35								
40								



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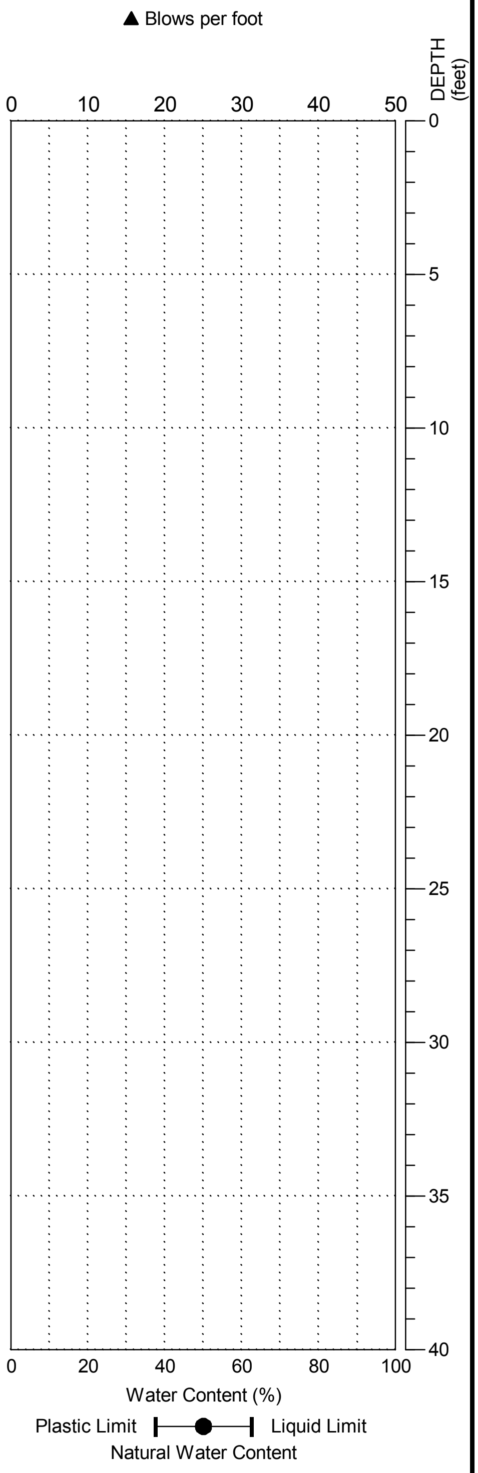
PROJECT NO.: 2009-138-22 FIGURE: E-12

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 50N/350E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Brown silty TOPSOIL with roots, dry.					
		ML	Medium stiff light yellow-brown SILT with debris (brick, concrete), dry.					
		ML	Medium dense yellow-brown SILT, dry to moist. **[LOESS]**					
5			As above, occasional coarse sand grains, trace caliche.					
10			Grading light yellow-brown.					
			Boring completed to 12 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					



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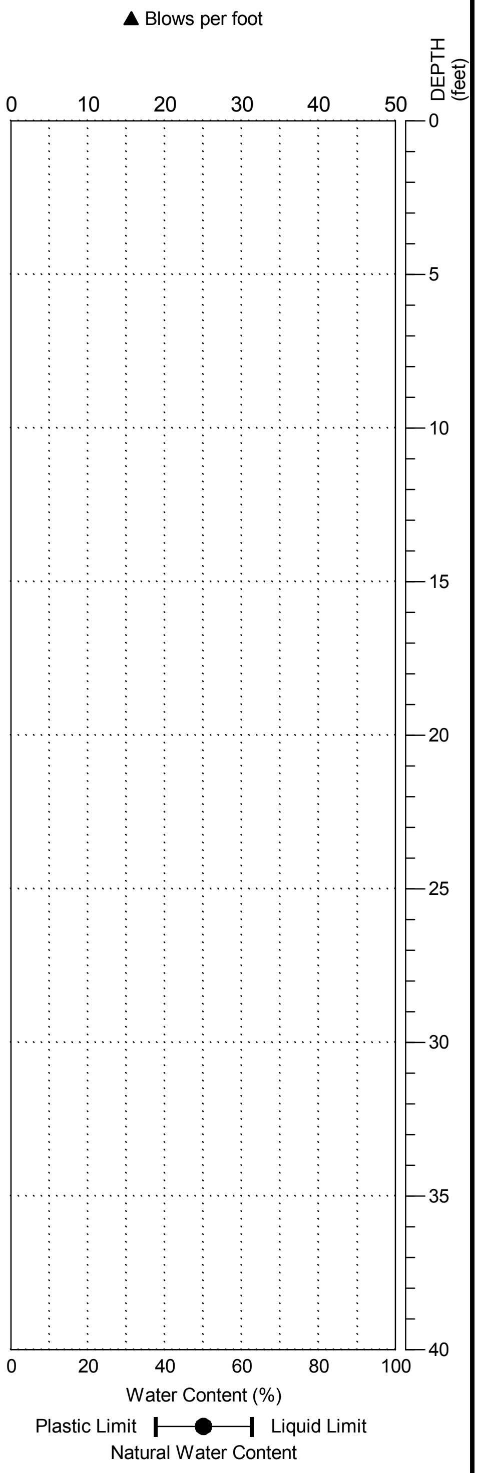
PROJECT NO.: 2009-138-22 FIGURE: E-13

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 140N/350E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			No soil boring completed for stratigraphic purposes.					
5								
10								
15								
20								
25								
30								
35								
40								



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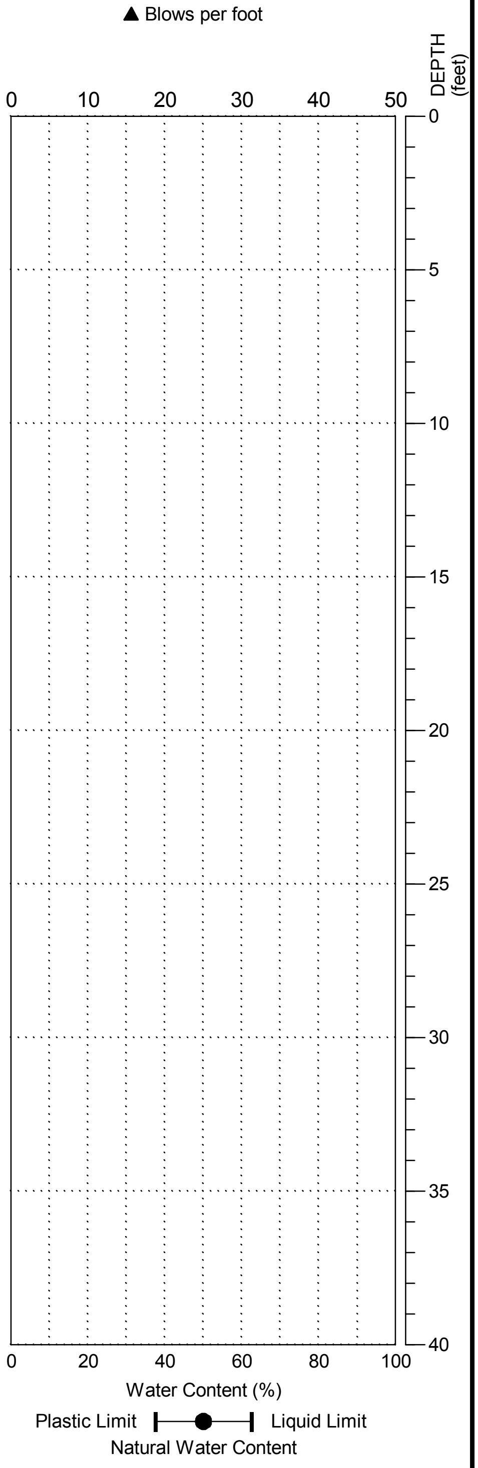
PROJECT NO.: 2009-138-22 FIGURE: E-14

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, -25N/770E

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	GROUNDWATER
0			Dark yellow-brown silty TOPSOIL, dry.					
		ML	Medium stiff yellow-brown grading light yellow-brown SILT, dry to moist. **[LOESS]**					
5			As above, occasional coarse sand grains.					
			Grading stiff.					
10								
			Boring completed to 12 feet bgs. Ground water not encountered. Boring backfilled with hydrated bentonite.					
15								
20								
25								
30								
35								
40								



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Walla Walla, Washington

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PROJECT NO.: 2009-138-22 FIGURE: E-15

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: GeoProbe
SAMPLING METHOD: 48" Macrocore w/ HDPE liner
LOCATION: Former CDL, 100N/770E

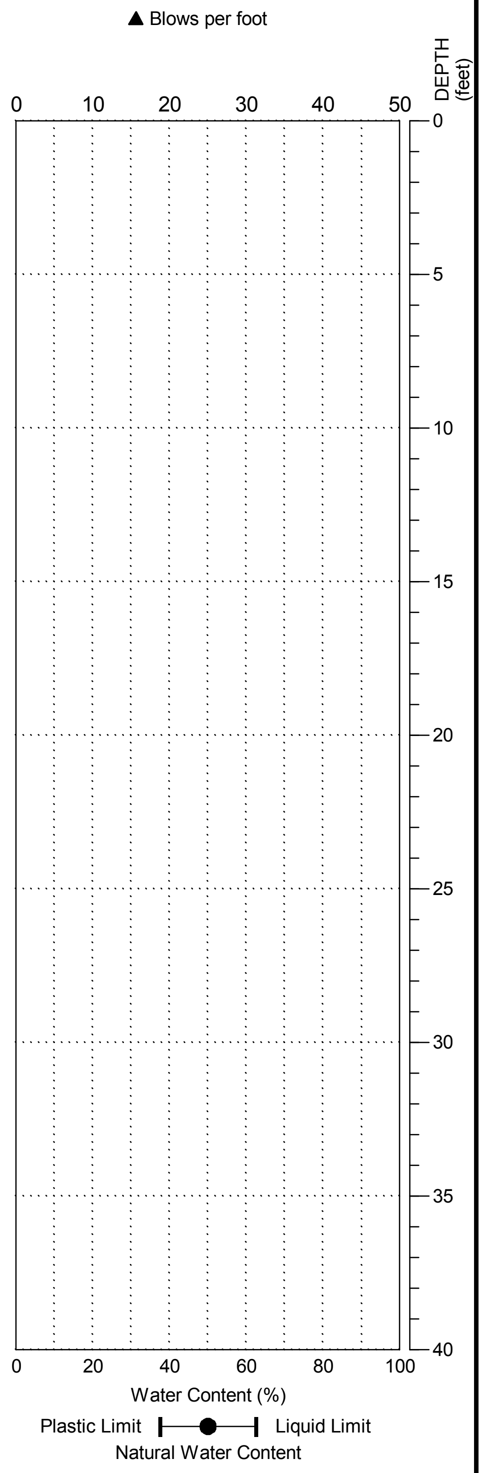
SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/26/2010
DATE COMPLETED: 5/26/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION
0		Dark gray ASH/TOPSOIL, dry. **[FILL]**
		Medium dense dark gray to black ASH/BURN FILL with concrete and brick debris, dry.
5	ML	Medium stiff brown SILT, dry.
		Medium dense dark gray to black ASH/BURN FILL with concrete and brick debris, dry.
	ML	Medium stiff yellow-brown SILT, occasional medium to coarse sand grains, moist. **[LOESS]** Grading light yellow-brown.
15		

Boring completed to 16 feet bgs.
Ground water not encountered.
Boring backfilled with hydrated bentonite.

SAMPLE TYPE | SAMPLE NUMBER | PEN. RESISTANCE (blows/6 inches) | PID (ppm) | GROUNDWATER



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PROJECT NO.: 2009-138-22 FIGURE: E-16

Appendix F

RI Monitoring Well Geologic Logs and Construction Diagrams

RELATIVE DENSITY OR CONSISTENCY VERSUS SPT N-VALUE

COHESIONLESS SOILS			COHESIVE SOILS		
Density	N (blows/ft)	Approximate Relative Density(%)	Consistency	N (blows/ft)	Approximate Undrained Shear Strength (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

TEST SYMBOLS

%F	Percent Fines
AL	Atterberg Limits: PL = Plastic Limit LL = Liquid Limit
CBR	California Bearing Ratio
CN	Consolidation
DD	Dry Density (pcf)
DS	Direct Shear
GS	Grain Size Distribution
K	Permeability
MD	Moisture/Density Relationship (Proctor)
MR	Resilient Modulus
PID	Photoionization Device Reading
PP	Pocket Penetrometer Approx. Compressive Strength (tsf)
SG	Specific Gravity
TC	Triaxial Compression
TV	Torvane Approx. Shear Strength (tsf)
UC	Unconfined Compression

USCS SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP DESCRIPTIONS	
Coarse Grained Soils More than 50% Retained on No. 200 Sieve Size	Gravel and Gravelly Soils More than 50% of Coarse Fraction Retained on No. 4 Sieve	Clean Gravel (little or no fines)	GW	Well-graded GRAVEL
			GP	Poorly-graded GRAVEL
		Gravel with Fines (appreciable amount of fines)	GM	Silty GRAVEL
			GC	Clayey GRAVEL
	Sand and Sandy Soils 50% or More of Coarse Fraction Passing No. 4 Sieve	Clean Sand (little or no fines)	SW	Well-graded SAND
			SP	Poorly-graded SAND
		Sand with Fines (appreciable amount of fines)	SM	Silty SAND
			SC	Clayey SAND
Fine Grained Soils 50% or More Passing No. 200 Sieve Size	Silt and Clay	Liquid Limit Less than 50%	ML	SILT
			CL	Lean CLAY
			OL	Organic SILT/Organic CLAY
	Silt and Clay	Liquid Limit 50% or More	MH	Elastic SILT
			CH	Fat CLAY
			OH	Organic SILT/Organic CLAY
Highly Organic Soils			PT	PEAT

SAMPLE TYPE SYMBOLS

☒	2.0" OD Split Spoon (SPT) (140 lb. hammer with 30 in. drop)
I	Shelby Tube
▣	3-1/4" OD Split Spoon with Brass Rings
○	Small Bag Sample
▚	Large Bag (Bulk) Sample
▮	Core Run
▱	Non-standard Penetration Test (3.0" OD split spoon)

GROUNDWATER SYMBOLS

▽	Groundwater Level (measured at time of drilling)
▼	Groundwater Level (measured in well or open hole after water level stabilized)

COMPONENT DEFINITIONS

COMPONENT	SIZE RANGE
Boulders	Larger than 12 in
Cobbles	3 in to 12 in
Gravel	3 in to No 4 (4.5mm)
Coarse gravel	3 in to 3/4 in
Fine gravel	3/4 in to No 4 (4.5mm)
Sand	No. 4 (4.5 mm) to No. 200 (0.074 mm)
Coarse sand	No. 4 (4.5 mm) to No. 10 (2.0 mm)
Medium sand	No. 10 (2.0 mm) to No. 40 (0.42 mm)
Fine sand	No. 40 (0.42 mm) to No. 200 (0.074 mm)
Silt and Clay	Smaller than No. 200 (0.074mm)

COMPONENT PROPORTIONS

PROPORTION RANGE	DESCRIPTIVE TERMS
< 5%	Clean
5 - 12%	Slightly (Clayey, Silty, Sandy)
12 - 30%	Clayey, Silty, Sandy, Gravelly
30 - 50%	Very (Clayey, Silty, Sandy, Gravelly)
Components are arranged in order of increasing quantities.	

NOTES: Soil classifications presented on exploration logs are based on visual and laboratory observation. Soil descriptions are presented in the following general order:

Density/consistency, color, modifier (if any) GROUP NAME, additions to group name (if any), moisture content. Proportion, gradation, and angularity of constituents, additional comments. (GEOLOGIC INTERPRETATION)

Please refer to the discussion in the report text as well as the exploration logs for a more complete description of subsurface conditions.

MOISTURE CONTENT

DRY	Absence of moisture, dusty, dry to the touch.
MOIST	Damp but no visible water.
WET	Visible free water, usually soil is below water table.

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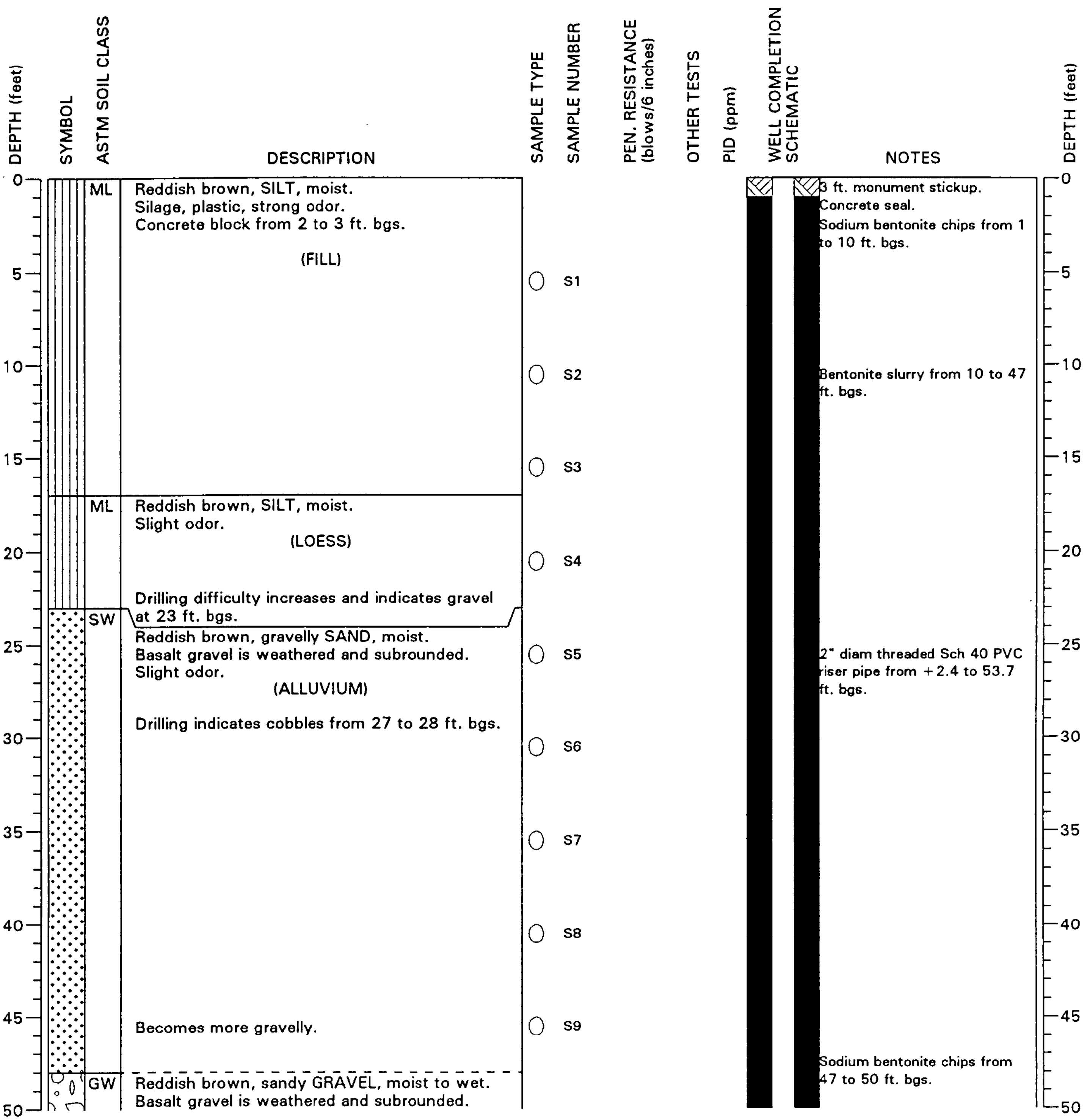
LEGEND OF TERMS AND SYMBOLS USED ON EXPLORATION LOGS

PROJECT NO.: 2009-138-22 FIGURE: F-1

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 899 ± Feet

LOCATION: Between East and West LF Cells.
DATE COMPLETED: 2/17/98
LOGGED BY: NRH



SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES
	ML	Reddish brown, SILT, moist. Silage, plastic, strong odor. Concrete block from 2 to 3 ft. bgs. (FILL)	○ ○ ○	S1 S2 S3					3 ft. monument stickup. Concrete seal. Sodium bentonite chips from 1 to 10 ft. bgs. Bentonite slurry from 10 to 47 ft. bgs.
	ML	Reddish brown, SILT, moist. Slight odor. (LOESS) Drilling difficulty increases and indicates gravel at 23 ft. bgs.	○	S4					
	SW	Reddish brown, gravelly SAND, moist. Basalt gravel is weathered and subrounded. Slight odor. (ALLUVIUM) Drilling indicates cobbles from 27 to 28 ft. bgs. Becomes more gravelly.	○ ○ ○ ○ ○	S5 S6 S7 S8 S9					2" diam threaded Sch 40 PVC riser pipe from +2.4 to 53.7 ft. bgs. Sodium bentonite chips from 47 to 50 ft. bgs.
	GW	Reddish brown, sandy GRAVEL, moist to wet. Basalt gravel is weathered and subrounded.							

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HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 1

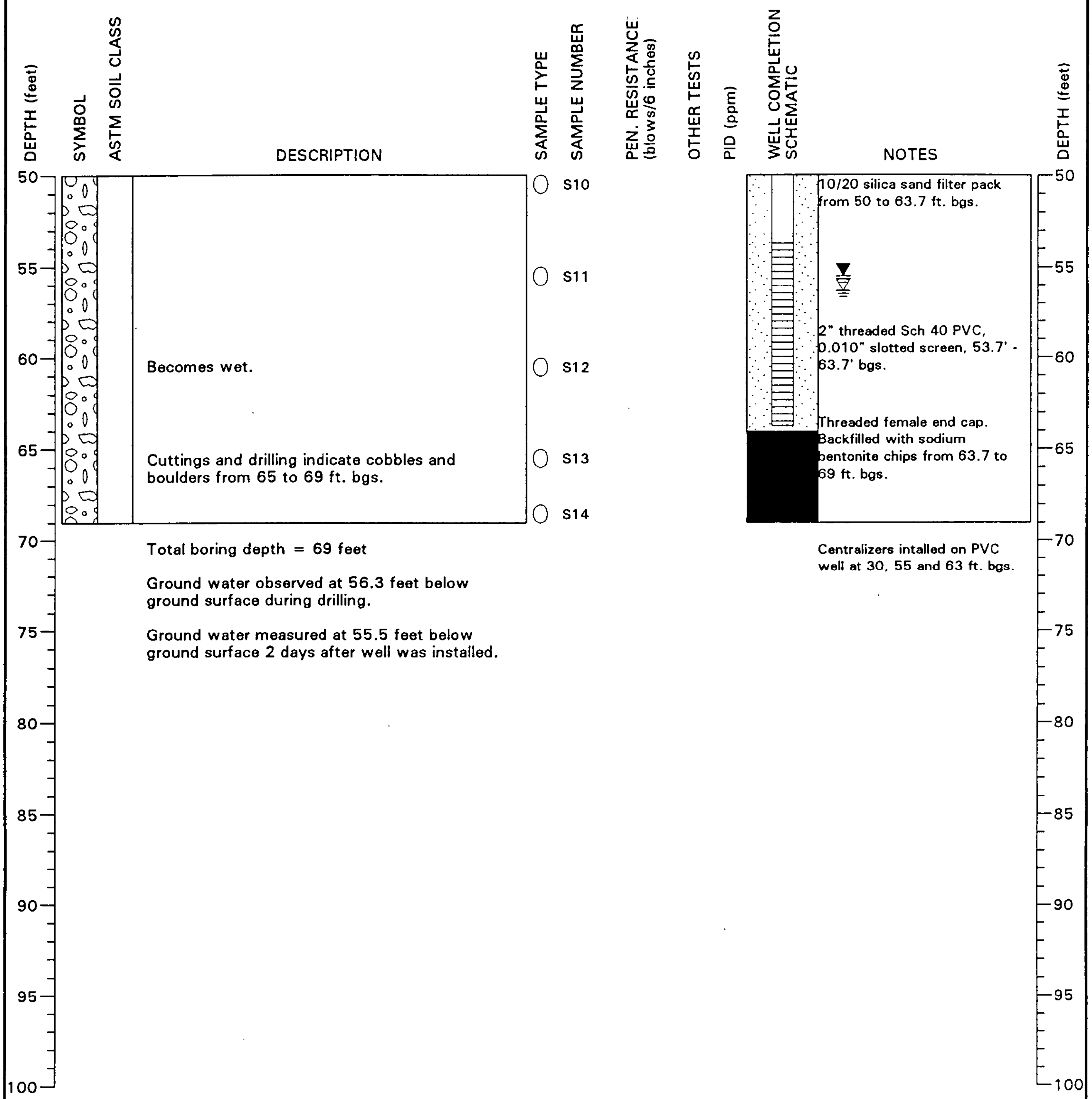
PAGE: 1 of 2

PROJECT NO.: 97124

FIGURE: A-2

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 899 ± Feet

LOCATION: Between East and West LF Cells.
DATE COMPLETED: 2/17/98
LOGGED BY: NRH



Becomes wet.

Cuttings and drilling indicate cobbles and boulders from 65 to 69 ft. bgs.

Total boring depth = 69 feet

Ground water observed at 56.3 feet below ground surface during drilling.

Ground water measured at 55.5 feet below ground surface 2 days after well was installed.

10/20 silica sand filter pack from 50 to 63.7 ft. bgs.

2" threaded Sch 40 PVC, 0.010" slotted screen, 53.7' - 63.7' bgs.

Threaded female end cap. Backfilled with sodium bentonite chips from 63.7 to 69 ft. bgs.

Centralizers intalled on PVC well at 30, 55 and 63 ft. bgs.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 1

PAGE: 2 of 2

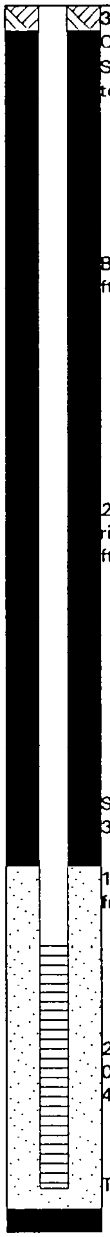
PROJECT NO.: 97124 FIGURE: A-2

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 879 ± Feet

LOCATION: Approx. 500 ft N of Hog Farm.
DATE COMPLETED: 2/12/98
LOGGED BY: NRH

DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
0	ML	Tan, SILT, slightly moist. (LOESS)						3 ft. monument stickup. Concrete seal. Sodium bentonite chips from 1 to 10 ft. bgs.
5			○	S1				
10			○	S2				Bentonite slurry from 10 to 32 ft. bgs.
15		Becomes light brownish gray.	○	S3				
20		Brownish gray, clayey SILT, moist.	○	S4				2" diam threaded Sch 40 PVC riser pipe from +2.0 to 38.2 ft. bgs.
		Drilling difficulty increases and indicates gravel at 24 ft. bgs.						
25	SW	Dark reddish brown, trace gravelly SAND, moist. Basalt gravel is weathered and subrounded. (ALLUVIUM)	○	S5				
30		Grades to reddish brown, gravelly SAND.	○	S6				Sodium bentonite chips from 32 to 35 ft. bgs.
		Drilling indicates cobbles from 34 to 35 ft. bgs.						
35			○	S7				10/20 silica sand filter pack from 35 to 49 ft. bgs. ▼
40		Grades to trace gravelly SAND.	○	S8				2" threaded Sch 40 PVC, 0.010" slotted screen, 38.2' - 48.2' bgs.
45		Becomes wet.	○	S9				∇ Threaded female end cap.
50								

WELL COMPLETION SCHEMATIC



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 2

PAGE: 1 of 2

PROJECT NO.: 97124 FIGURE: A-3

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 879 ± Feet

LOCATION: Approx. 500 ft N of Hog Farm.
DATE COMPLETED: 2/12/98
LOGGED BY: NRH

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
50		GW	Reddish brown, sandy GRAVEL, slightly wet. Basalt gravel is weathered and subrounded. Cuttings and drilling indicate cobbles and boulders.	○	S10					Backfilled with sodium bentonite chips from 49 to 63 ft. bgs.	50
55			Reddish brown, clayey silty GRAVEL, slightly wet.	○	S11						55
60			Cuttings and drilling indicate cobbles and boulders from 60 to 63 ft. bgs.	○	S12						60
65			Total boring depth = 63 feet Ground water observed at 46 feet below ground surface during drilling.							Centralizers intalled on PVC well at 18, 39 and 47 ft. bgs.	65
70			Ground water measured at 38.8 feet below ground surface 7 days after well was installed.								70
75											75
80											80
85											85
90											90
95											95
100											100

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 2

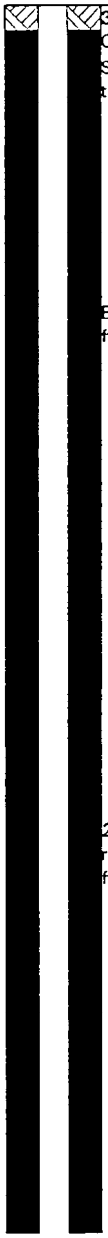
PAGE: 2 of 2

PROJECT NO.: 97124 FIGURE: A-3

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 910 ± Feet

LOCATION: SW corner of West LF Cell.
DATE COMPLETED: 2/13/98
LOGGED BY: NRH

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
0		ML	Brown, SILT, moist. (LOESS)							3 ft. monument stickup. Concrete seal. Sodium bentonite chips from 1 to 12 ft. bgs.	0
5				○	S1						5
10				○	S2						10
										Bentonite slurry from 12 to 59 ft. bgs.	
15			Becomes tannish brown.	○	S3						15
20				○	S4						20
25				○	S5						25
30				○	S6						30
										2" diam threaded Sch 40 PVC riser pipe from +2.2 to 66.6 ft. bgs.	
35				○	S7						35
40				○	S8						40
			Drilling difficulty increases and indicates gravel at 44 ft. bgs.								
45		ML	Brown, gravelly sandy SILT, moist. Basalt gravel is weathered and subrounded. (ALLUVIUM)	○	S9						45
50											50



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HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 3

PAGE: 1 of 2

PROJECT NO.: 97124 FIGURE: A-4

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 910 ± Feet

LOCATION: SW corner of West LF Cell.
DATE COMPLETED: 2/13/98
LOGGED BY: NRH

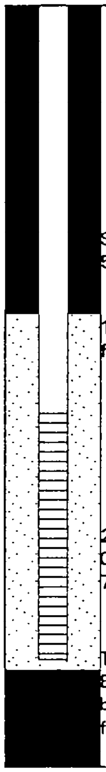
DEPTH (feet)	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)
50	SW	Dark reddish brown, gravelly SAND, moist. Basalt gravel is weathered and subrounded.	○	S10			
55			○	S11			
60			○	S12			
65			○	S13			
		SAND layer from 67 to 68 feet bgs.					
70	GW	Dark reddish brown, sandy GRAVEL, moist. Basalt gravel is weathered and subrounded.	○	S14			
	SW	Dark reddish brown, gravelly SAND, moist.					
75		Becomes wet.	○	S15			
	GW	Gray, GRAVEL, wet					
80			○	S16			

Total boring depth = 81 feet

Ground water observed at 67 feet below ground surface during drilling.

Ground water measured at 66.9 feet below ground surface 6 days after well was installed.

WELL COMPLETION SCHEMATIC



NOTES

Sodium bentonite chips from 59 to 62.5 ft. bgs.

10/20 silica sand filter pack from 62.5 to 77 ft. bgs.

2" threaded Sch 40 PVC, 0.010" slotted screen, 66.6' - 76.6' bgs.

Threaded female end cap. Backfilled with sodium bentonite chips from 77 to 81 ft. bgs.

Centralizers intalled on PVC well at 30, 66 and 75 ft. bgs.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 3

PAGE: 2 of 2

PROJECT NO.: 97124 FIGURE: A-4

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 915 ± Feet

LOCATION: SE of East Landfill Cell.
DATE COMPLETED: 2/11/98
LOGGED BY: NRH

DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
0		ML	Dark brown, Clayey SILT, moist.							3 ft. monument stickup. Concrete seal.	0
			(LOESS)							Sodium bentonite chips from 1 to 10 ft. bgs.	
5				○	S1						5
10			Light tannish brown, SILT, moist.	○	S2					Bentonite slurry from 10 to 61 ft. bgs.	10
15				○	S3						15
			Drilling difficulty increases.								
20			Trace gravel from 20 to 23 ft. bgs.	○	S4						20
			Light tannish brown, SILT, moist.								
25				○	S5						25
30			Becomes light brown.	○	S6						30
35				○	S7					2" diam threaded Sch 40 PVC riser pipe from +2.2 to 70.4 ft. bgs.	35
40		ML	Brown, trace gravelly SILT, moist.	○	S8						40
			(ALLUVIUM)								
		GW	Reddish brown, sandy GRAVEL, slightly moist. Basalt gravel is weathered and subrounded.								
45				○	S9						45
50											50

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HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 4

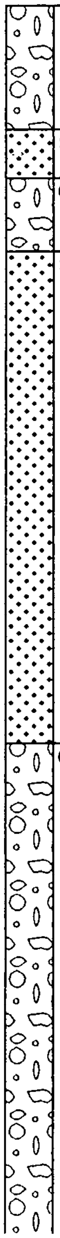
PAGE: 1 of 3

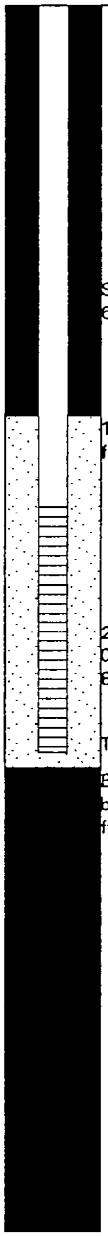
PROJECT NO.: 97124

FIGURE: A-5

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 915 ± Feet

LOCATION: SE of East Landfill Cell.
DATE COMPLETED: 2/11/98
LOGGED BY: NRH





DEPTH (feet)	SYMBOL	ASTM SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
50			Becomes slightly silty.	○	S10						50
55		SW	Reddish brown, gravelly silty SAND, moist.	○	S11						55
			Grades to fine to coarse grained SAND.	○	S12						
		GW	Gray, GRAVEL, moist. Basalt gravel is weathered and subrounded. Drilling difficulty increases.								
60		SW	Reddish brown, gravelly SAND, slightly moist.	○	S13						60
										Sodium bentonite chips from 61 to 66.7 ft. bgs.	
65				○	S14						65
										10/20 silica sand filter pack from 66.7 to 81 ft. bgs.	
70				○	S15					▼	70
75				○	S16					2" threaded Sch 40 PVC, 0.010" slotted screen, 70.4' - 80.4' bgs.	75
80		GW	Gray, trace fine sandy GRAVEL, wet. Basalt gravel is weathered and subrounded. Cuttings and drilling indicate cobbles and boulders from 82 to 101 ft. bgs.	○	S17					Threaded female end cap. Backfilled with sodium bentonite chips from 81 to 101 ft. bgs.	80
85				○	S18						85
90			Drilling difficulty increases.	○	S19						90
95				○	S20						95
100											100

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

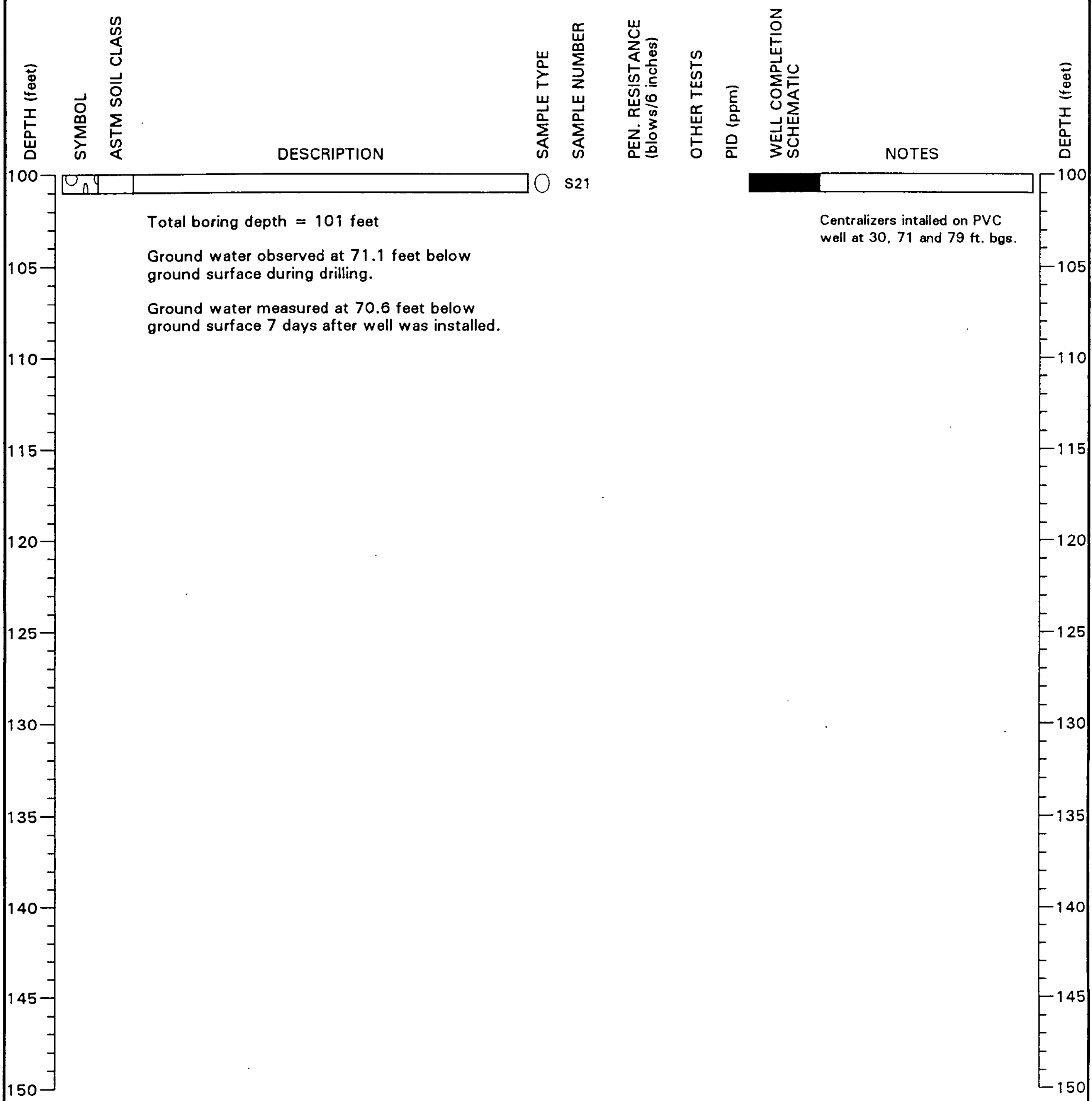
WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING
WELL: MW- 4

PROJECT NO.: 97124 FIGURE: A-5

DRILLING COMPANY: Tacoma Pump & Drill
DRILLING METHOD: Foremost Drills-DR24, Air Rotary
SURFACE ELEVATION: 915 ± Feet

LOCATION: SE of East Landfill Cell.
DATE COMPLETED: 2/11/98
LOGGED BY: NRH



Total boring depth = 101 feet

Ground water observed at 71.1 feet below ground surface during drilling.

Ground water measured at 70.6 feet below ground surface 7 days after well was installed.

Centralizers intalled on PVC well at 30, 71 and 79 ft. bgs.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

WASHINGTON STATE PEN. LANDFILL EVAL.
WALLA WALLA, WASHINGTON

MONITORING WELL: MW- 4

PAGE: 3 of 3

PROJECT NO.: 97124

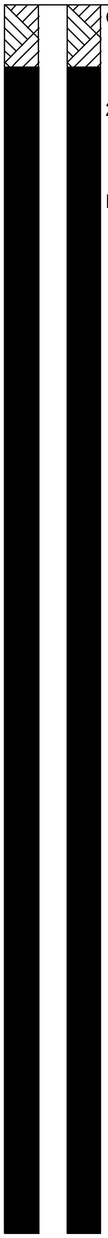
FIGURE: A-5

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Air Rotary
SAMPLING METHOD: SPT Sampler, 140# hammer
LOCATION: North of former laundry

SURFACE ELEVATION: 938.06 ± feet
CASING ELEVATION ± feet

DATE STARTED: 10/9/1999
DATE COMPLETED: 10/9/1999
LOGGED BY: NRH

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
0		ML	Stiff light brown SILT, dry grading moist, non-plastic.							Cement surface Seal	0
										2-inch Sch. 40 PVC casing	
5				☒	5	7/12/16		0.5			5
										Hydrated bentonite chips	
10				☒	10	9/9/6		1.0			10
15				☒	15	8/13/17		1.0			15
20			Stiff light brown slightly clayey SILT, moist, non-plastic.	☒	20	10/14/21		1.4			20
25			As above, with caliche, dry.	☒	25	11/20/18		1.5			25
30			Stiff brown slightly clayey SILT, trace caliche, moist, non-plastic.	☒	30	9/12/14		2			30
35		GM	Very dense brown to gray silty weathered basaltic GRAVEL, moist.	☒	35	37/50-5"		0.4			35
40											40



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HWA GEOSCIENCES INC.

Washington State Penitentiary
Phase II Soil and Ground Water Investigation
Walla Walla, Washington

MONITORING WELL:
MW-5

PAGE: 1 of 3

PROJECT NO.: 97124

FIGURE: F-2

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Air Rotary
SAMPLING METHOD: SPT Sampler, 140# hammer
LOCATION: North of former laundry

SURFACE ELEVATION: 938.06 ± feet
CASING ELEVATION ± feet

DATE STARTED: 10/9/1999
DATE COMPLETED: 10/9/1999
LOGGED BY: NRH

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
40			☒	40	12/14/27		0.6	
45	GP	Very dense basaltic GRAVEL, moist.	☒	45	75-5"		--	
50	GM	Very dense tan silty basaltic GRAVEL, dry.	☒	50	100-5"		0.5	
55								
60		Very dense tan silty sandy basaltic GRAVEL, fine to medium sand, moist.	☒	60	100-5.5"		0.2	
65								
70			☒	70	100-5"		0.2	
75								
80								

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Phase II Soil and Ground Water Investigation
Walla Walla, Washington

MONITORING WELL:
MW-5

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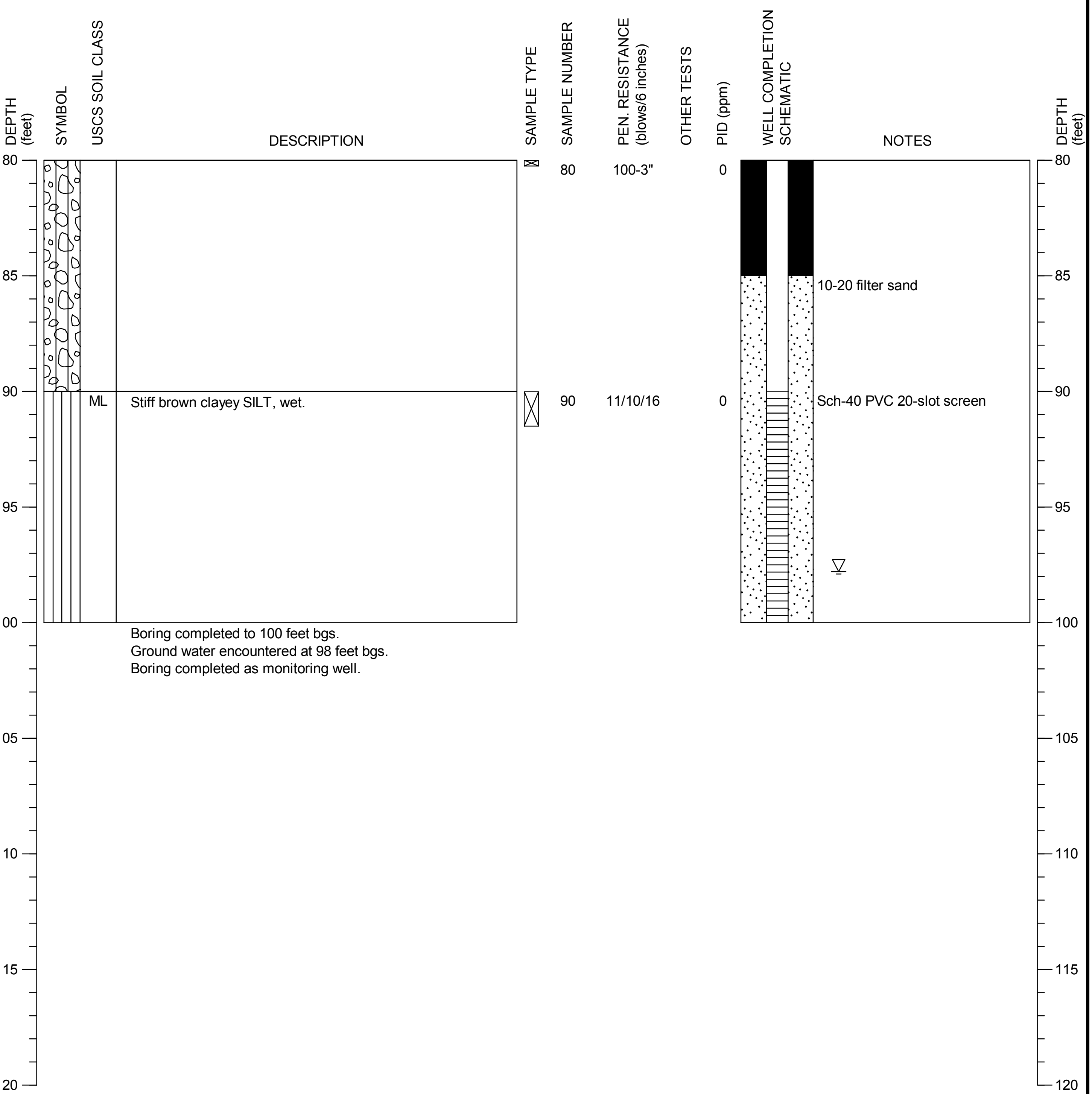
PROJECT NO.: 97124

FIGURE: F-2

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Air Rotary
SAMPLING METHOD: SPT Sampler, 140# hammer
LOCATION: North of former laundry

SURFACE ELEVATION: 938.06 ± feet
CASING ELEVATION ± feet

DATE STARTED: 10/9/1999
DATE COMPLETED: 10/9/1999
LOGGED BY: NRH



DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
80			☒	80	100-3"		0	
85								10-20 filter sand
90	ML	Stiff brown clayey SILT, wet.	☒	90	11/10/16		0	Sch-40 PVC 20-slot screen

Boring completed to 100 feet bgs.
Ground water encountered at 98 feet bgs.
Boring completed as monitoring well.

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HWA GEOSCIENCES INC.

Washington State Penitentiary
Phase II Soil and Ground Water Investigation
Walla Walla, Washington

MONITORING WELL:
MW-5

PAGE: 3 of 3

PROJECT NO.: 97124

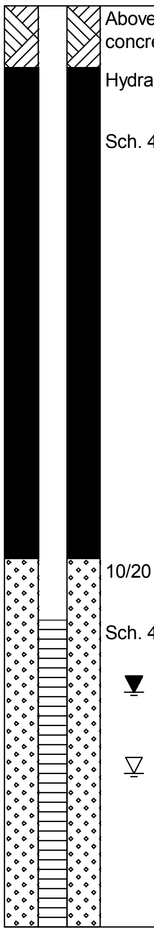
FIGURE: F-2

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, southeast property, RR tracks

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/5/2010
DATE COMPLETED: 5/5/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
0		Brown SILT and SAND with cobbles and construction debris (Brick, asphalt). **[FILL]** Hand dig to 3.5 feet						Above-ground monument and concrete surface seal Hydrated bentonite backfill
3.5	GM	Very dense dark brown GRAVEL with silt, moist.						Sch. 40 PVC casing
5			▣	6	27/50-2"		0	
10		No recovery	⊡	11	50-3"		0	
15		Very dense coarse dark gray GRAVEL with red-brown silt and sand, moist.	⊡	16	50-4"		0	10/20 filter sand
20		Very dense dark gray silty GRAVEL. Hydrocarbon odor. Dark gray silty GRAVEL and SAND, moist. Collect grab sample for analysis.	▣	21	14/50-4"		0	Sch. 40 PVC 10-slot screen
25		Very dense gray GRAVEL with silt, wet. Hydrocarbon odor and sheen.	⊡	26	50-5"		5	
30		Boring completed to 30 feet bgs. Ground water encountered at 25 feet bgs. Completed as monitoring well.	⊠		50-3"		5	



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HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-06

PAGE: 1 of 1

PROJECT NO.: 2009-138-22 FIGURE: F-3

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, east property, visitor parking lot

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/4/2010
DATE COMPLETED: 5/4/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES	DEPTH (feet)
0		ASPHALT and base-coarse angular gravel						Flush mount monument and concrete surface seal	0
	ML	Stiff yellow-brown SILT, trace clay, moist. **[LOESS]**						Hydrated bentonite backfill	
								Sch. 40 PVC casing	
5			■	6	5/7/8		0.1		5
	GP	Very dense dark gray coarse basaltic GRAVEL with sand, trace silt, dry.							
10			■	11	31/50-3"		4.4		10
15		Very dense dark grad basaltic GRAVEL, dry.	▪	16	50-5"		5.1		15
20		Cobble in sampler.	▪	21	50-3"				20
25		No recovery.	▪	26	50-4"				25
30									30
35	GM	Very dense coarse silty GRAVEL, dark gray with red-brown silt, moist.	▪		50-4"				35
40									40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-07

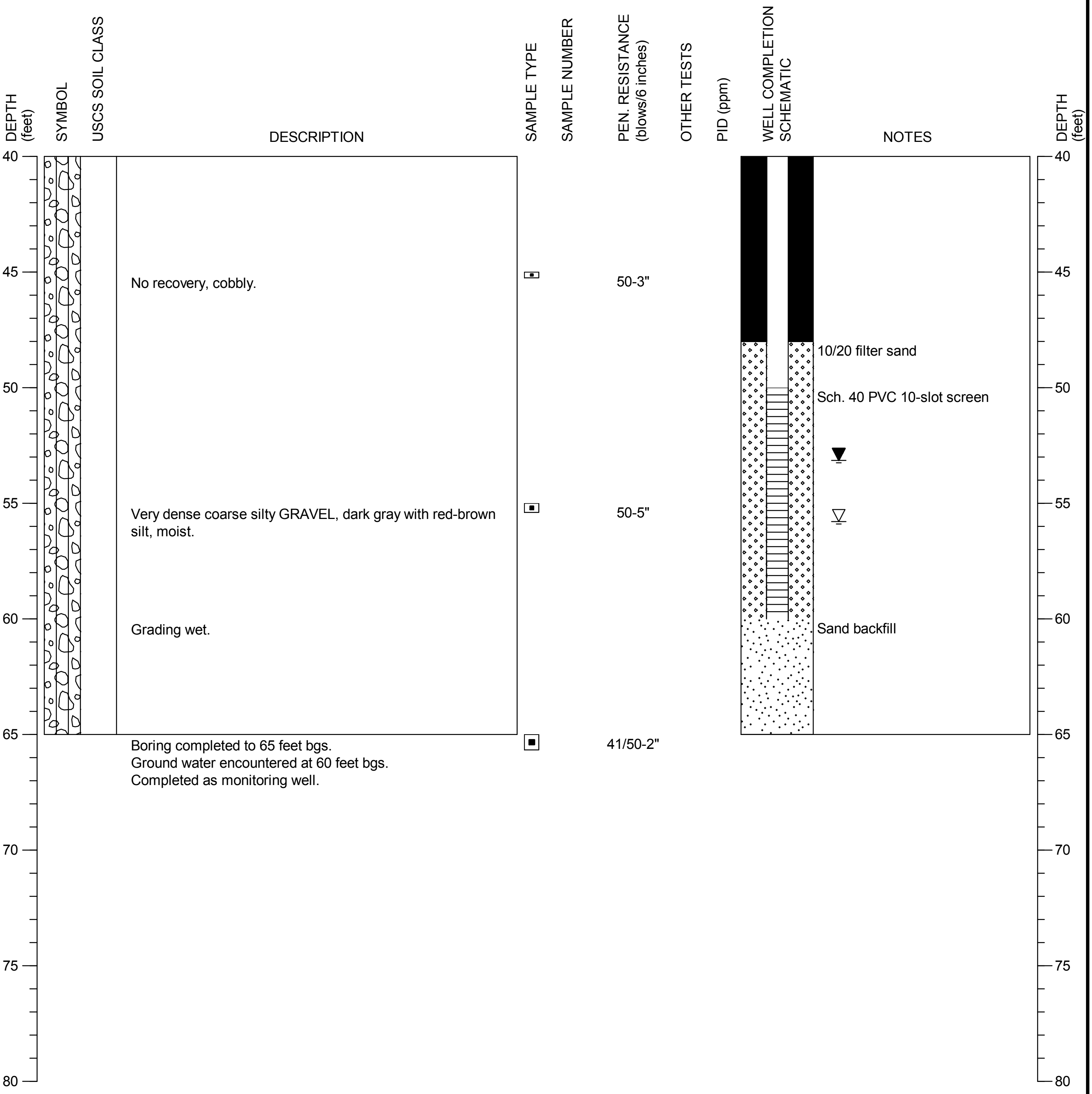
PAGE: 1 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-4

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, east property, visitor parking lot

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/4/2010
DATE COMPLETED: 5/4/2010
LOGGED BY: V. Atkins



DEPTH (feet)	DESCRIPTION	SAMPLE TYPE	PEN. RESISTANCE (blows/6 inches)	NOTES
40				
45	No recovery, cobbly.	▣	50-3"	
				10/20 filter sand
50				Sch. 40 PVC 10-slot screen
55	Very dense coarse silty GRAVEL, dark gray with red-brown silt, moist.	▣	50-5"	
60	Grading wet.			Sand backfill
65	Boring completed to 65 feet bgs. Ground water encountered at 60 feet bgs. Completed as monitoring well.	▣	41/50-2"	

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-07

PAGE: 2 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-4

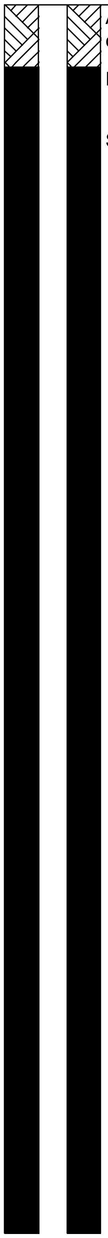
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, east property, Superintendent's residence

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/4/2010
DATE COMPLETED: 5/4/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES	DEPTH (feet)
0		Grass/TOPSOIL						Above-ground monument and concrete surface seal	0
	ML	Stiff brownish yellow SILT with fine sand and root material, dry to moist. **[LOESS]**						Hydrated bentonite backfill	
								Sch. 40 PVC casing	
5			■	6	6/6/6		0.5		5
10		Very stiff brownish yellow SILT, occasional coarse sand grains, moist.	■	11	6/15/19		1.1		10
15		Hard brown SILT, trace orange mottling, moist.	■	16	12/33/35		2.5		15
20			■	21	16/30/34		1.1		20
25		Hard yellow-brown SILT, trace caliche, moist.	■	26	11/31/50-5"		2.3		25
30									30
35									35
	GP	Very dense rounded/subrounded coarse dark gray basaltic GRAVEL with sand, trace red gravel, moist.							
40									40

WELL COMPLETION SCHEMATIC



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HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-08

PAGE: 1 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-5

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, east property, Superintendent's residence

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/4/2010
DATE COMPLETED: 5/4/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
40				▣		12/30/50-4"					40
45			Grading cobbly.								45
50											50
55			No recovery, cobbly.	▣		50-4"					55
60											60
65			No recovery, cobbly.	▣		50-1"					65
70		GM	Dark gray coarse GRAVEL with occasional brownish red GRAVEL and silt. moist								70
75			Very dense subrounded coarse dark gray GRAVEL with silt, moist.	▣		50-3"					75
80											80

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

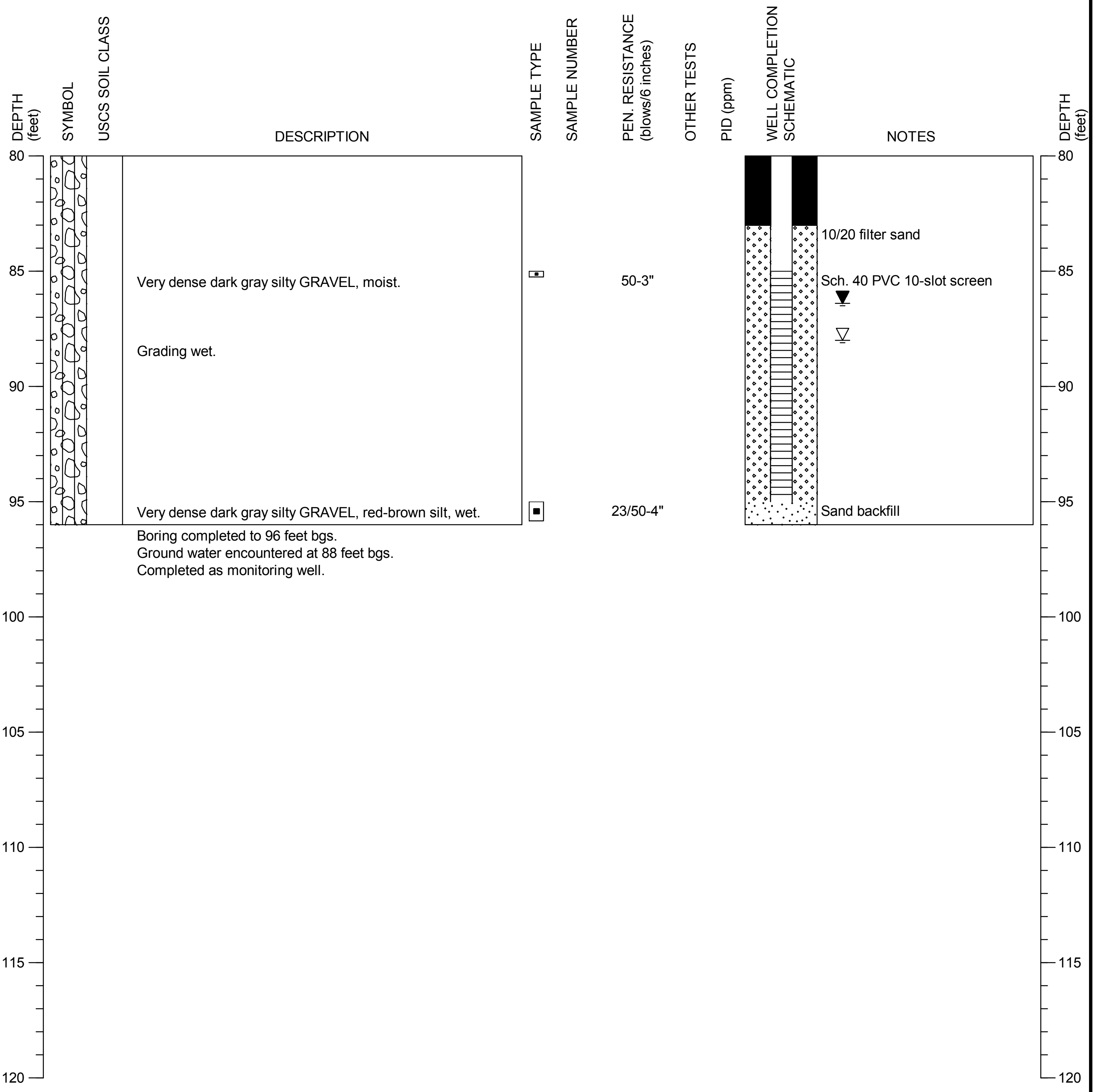
MONITORING WELL:
MW-08

PROJECT NO.: 2009-138-22 FIGURE: F-5

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, east property, Superintendent's residence

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/4/2010
DATE COMPLETED: 5/4/2010
LOGGED BY: V. Atkins



DESCRIPTION	PEN. RESISTANCE (blows/6 inches)	NOTES
		10/20 filter sand
Very dense dark gray silty GRAVEL, moist.	50-3"	Sch. 40 PVC 10-slot screen
Grading wet.		
Very dense dark gray silty GRAVEL, red-brown silt, wet.	23/50-4"	Sand backfill

Boring completed to 96 feet bgs.
Ground water encountered at 88 feet bgs.
Completed as monitoring well.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-08

PROJECT NO.: 2009-138-22 FIGURE: F-5

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, northeast property, or dairy farm

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/3/2010
DATE COMPLETED: 5/3/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES	DEPTH (feet)
0		Silty TOPSOIL						Above-ground monument and concrete surface seal	0
	ML	Medium stiff dark yellow-brown SILT with fine sand, trace caliche, dry to moist. **[LOESS]**						Hydrated bentonite backfill Sch. 40 PVC casing	
5			■	6	6/5/4		4.8		5
10		Hard yellow-brown SILT with fine sand, trace clay, moist.	■	11	12/19/34		1.8		10
15		Hard yellow-brown SILT, trace fine and coarse sand, trace caliche, moist.	■	16	9/14/23		2.1		15
20		Hard yellow brown SILT with calche and clasts, dry.	■	21	7/31/33		3.3		20
25		Hard dark yellow- brown SILT, moist.	■	25	8/17/16		2.1		25
		Grading SILT with gravel. Gravel to 1/2', dark gray, basaltic. Moist.							
30									30
	GP	Increasing rig chatter. Red-brown basaltic GRAVEL and SAND.							
35									35
		Cobbly/boulder.							
40									40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

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Walla Walla, Washington

MONITORING WELL:
MW-09

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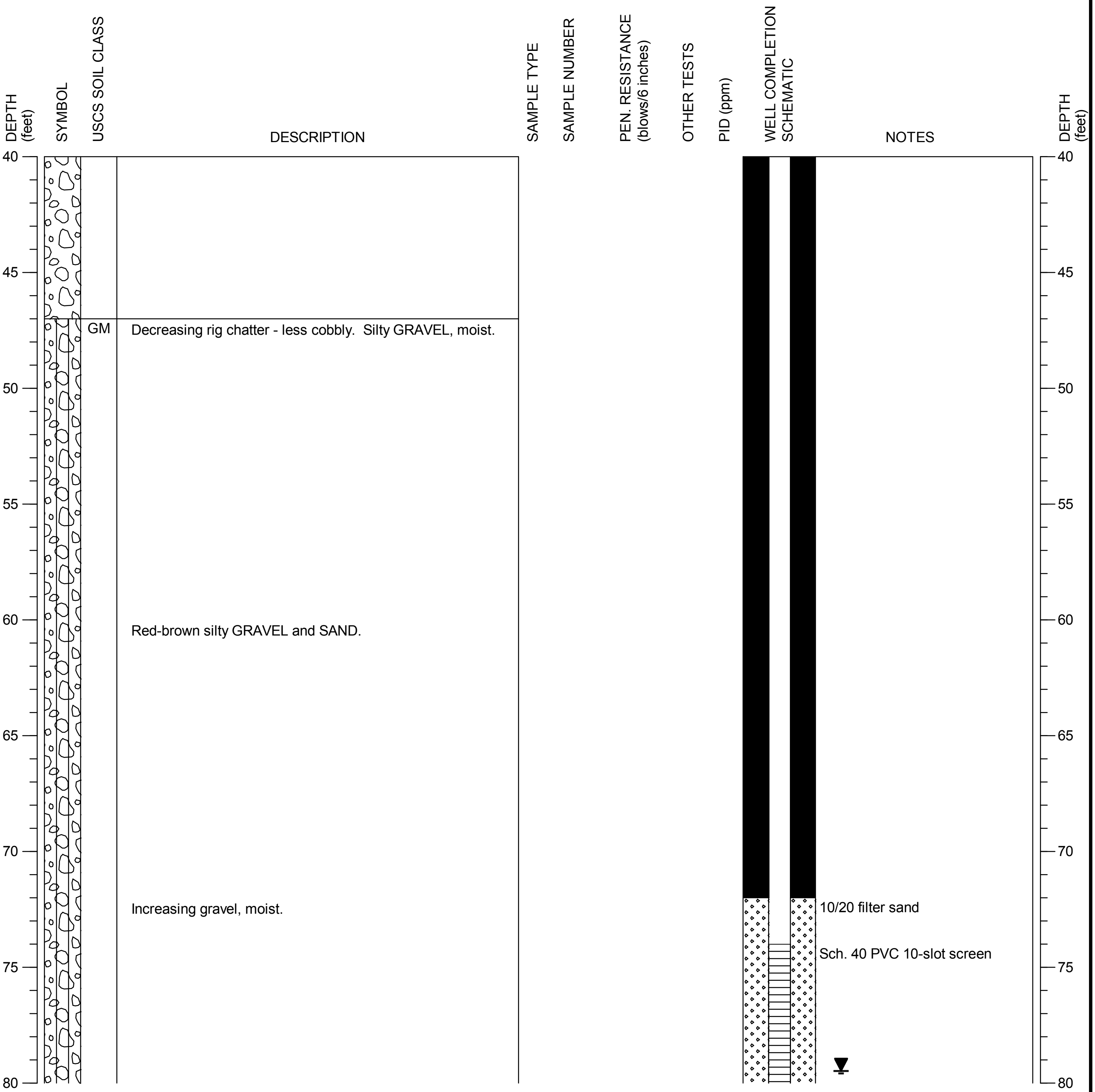
PROJECT NO.: 2009-138-22 FIGURE: F-6

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, northeast property, or dairy farm

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/3/2010
DATE COMPLETED: 5/3/2010
LOGGED BY: V. Atkins



USCS SOIL CLASS	DESCRIPTION	NOTES
GM	Decreasing rig chatter - less cobbly. Silty GRAVEL, moist.	
	Red-brown silty GRAVEL and SAND.	
	Increasing gravel, moist.	10/20 filter sand
		Sch. 40 PVC 10-slot screen
		▼

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

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MONITORING WELL:
MW-09

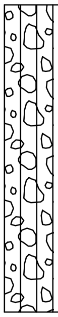
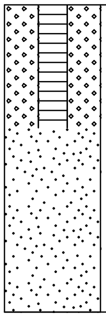
PAGE: 2 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-6

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Upgradient Well, northeast property, or dairy farm

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/3/2010
DATE COMPLETED: 5/3/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES
80			Red-brown silty SAND and GRAVEL, moist grading wet.							Sand backfill
90			Very dense red-brown silty GRAVEL, subrounded, coarse, wet. Boring completed to 90 feet bgs. Ground water encountered at 80 feet bgs. Completed as monitoring well.	▣		32/50-2"				

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MONITORING WELL:
MW-09

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PROJECT NO.: 2009-138-22 FIGURE: F-6

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: South interior well, north of Capital Projects (Bldg A50)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/12/2010
DATE COMPLETED: 5/12/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
0			Yellow-brown SILT with gravel, cobbles, and brick. **[FILL]** Hand dig to 3.5 feet bgs.							Flush mount monument and concrete surface seal Hydrated bentonite backfill	0
		ML	Hard yellow-brown SILT, trace caliche, dry. **[LOESS]**							Sch. 40 PVC casing	
5			Hard light yellow-brown SILT, trace caliche, dry.	■	6	16/23/32		2			5
10			Hard light yellow-brown SILT, trace caliche, occasional clasts, moist.	■	11	10/18/37		0.5			10
15				■	16	13/23/28		1			15
20				■	21	19/23/25		1.2			20
25			Hard yellow-brown SILT, caliche stringers, trace clasts, moist.	■	36	16/18/29		0			25
30											30
35			Dark yellow-brown SILT with caliche seams, moist.	■		13/31/50-2"		0.4			35
		GM	Grading gravelly SILT at 36 feet. Gravel coarse dark gray vesicular basalt.								
40											40

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HWA GEOSCIENCES INC.

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MONITORING WELL:
MW-10

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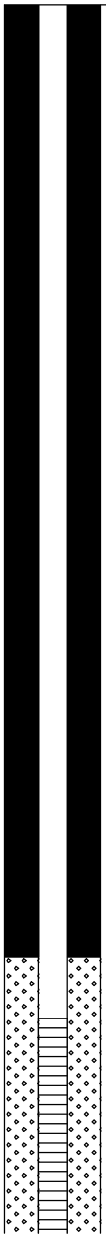
PROJECT NO.: 2009-138-22 FIGURE: F-7

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: South interior well, north of Capital Projects (Bldg A50)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/12/2010
DATE COMPLETED: 5/12/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
40											40
45			No recovery, very dense. Cuttings coarse dark gray basaltic GRAVEL, moist.	▣		50-4"					45
50											50
55			No recovery, very dense. Cuttings coarse dark gray basaltic GRAVEL with red-brown SILT, cobbly, moist.	▣		50-3"					55
60											60
65			Very dense coarse dark gray basaltic GRAVEL with red-brown SILT, trace red oxidation, moist.	▣		50-4"					65
70										10/20 filter sand	70
										Sch. 40 PVC 10-slot screen	
75			Very dense coarse dark gray basaltic silty GRAVEL, trace red oxidation, moist. grading wet	▣		46/50-5"				∇	75
80											80



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
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MONITORING WELL:
MW-10

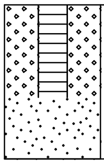
PAGE: 2 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-7

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: South interior well, north of Capital Projects (Bldg A50)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/12/2010
DATE COMPLETED: 5/12/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
80											80
			Silty layers.							Sand backfill	
85			Boring completed to 85 feet bgs. Ground water encountered at 76 feet bgs. Completed as monitoring well.								85
90											90
95											95
100											100
105											105
110											110
115											115
120											120

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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MONITORING WELL:
MW-10

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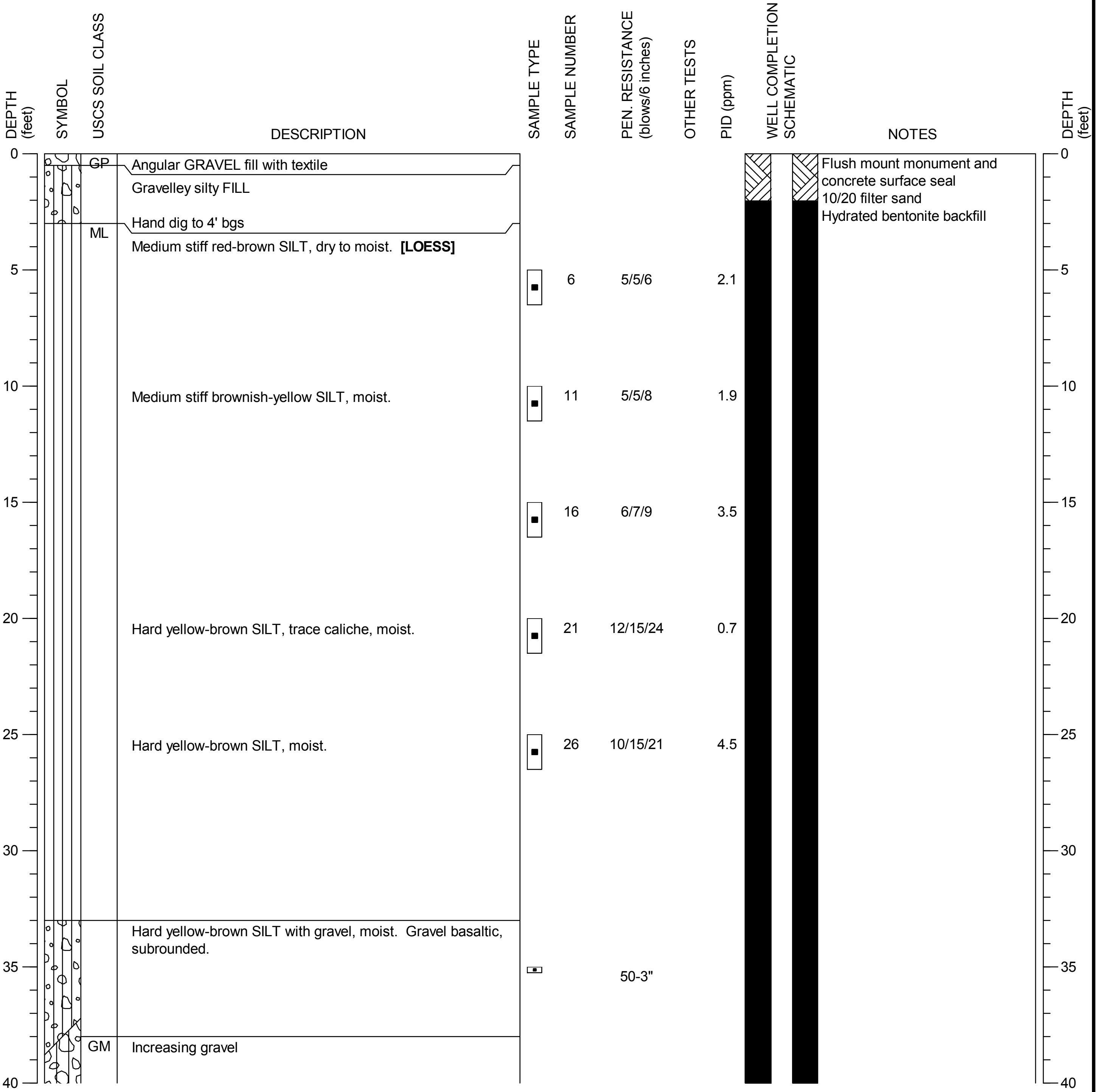
PROJECT NO.: 2009-138-22 FIGURE: F-7

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Central interior well, south of Health Care Facility (Bldg L50)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/7/2010
DATE COMPLETED: 5/7/2010
LOGGED BY: V. Atkins



DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
0	GP	Angular GRAVEL fill with textile					Flush mount monument and concrete surface seal
		Gravelley silty FILL					10/20 filter sand
		Hand dig to 4' bgs					Hydrated bentonite backfill
	ML	Medium stiff red-brown SILT, dry to moist. **[LOESS]**					
5			6	5/5/6		2.1	
10		Medium stiff brownish-yellow SILT, moist.	11	5/5/8		1.9	
15			16	6/7/9		3.5	
20		Hard yellow-brown SILT, trace caliche, moist.	21	12/15/24		0.7	
25		Hard yellow-brown SILT, moist.	26	10/15/21		4.5	
30							
35		Hard yellow-brown SILT with gravel, moist. Gravel basaltic, subrounded.		50-3"			
	GM	Increasing gravel					
40							

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

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Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-11

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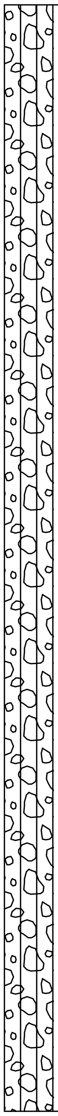
PROJECT NO.: 2009-138-22 FIGURE: F-8

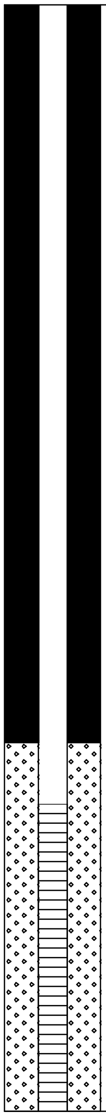
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Central interior well, south of Health Care Facility (Bldg L50)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/7/2010
DATE COMPLETED: 5/7/2010
LOGGED BY: V. Atkins



DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
40											40
45			Very dense silty coarse GRAVEL, to 2", basaltic, gray with reddish brown silt, moist.	▣		50-3"					45
50											50
			Break casing - pull back, replace, and reinstall.								
55			No recovery, cobbly.	▣		50-3"					55
60											60
										Sch. 40 PVC casing	
65			Very dense red-brown silty coarse basaltic GRAVEL, subrounded, moist.	▣		50-3"					65
										Sch. 40 PVC 10-slot screen	
										∇	
			Grading wet.								
70											70
75			Very dense dark gray basaltic GRAVEL with red-brown SILT, wet. Basalt slightly vesicular.	▣		50-5"					75
			Boring completed to 76 feet bgs. Ground water encountered at 69 feet bgs. Completed as monitoring well.								
80											80



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HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
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MONITORING WELL:
MW-11

PAGE: 2 of 2

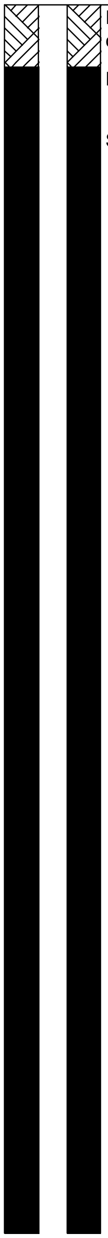
PROJECT NO.: 2009-138-22 FIGURE: F-8

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: North interior well, east of MMU (Bldg K40)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/10/2010
DATE COMPLETED: 5/11/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
0	GP ML	Gray angular gravel fill Yellow-brown SILT, dry. Hand dig to 6 feet bgs.						Flush mount monument nad concrete surface seal Hydrated bentonite backfill Sch. 40 PVC casing
5		Stiff light yellow-brown SILT, trace caliche, dry.	■	7	6/8/14		0	
10		As above, hard.	■	11	7/10/17		0	
15		Hard brownish yellow SILT, trace caliche, trace clasts, dry to moist.	■	16	13/17/25		0	
20			■	21	14/20/23		0	
25			■	26	21/23/20		0	
30								
35	GM	Grading gravelly Very dense coarse dark gray basaltic GRAVEL, with brown SILT, moist.	■		21/50-2"			
40								



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HWA GEOSCIENCES INC.

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Remedial Investigation/Feasibility Study
Walla Walla, Washington

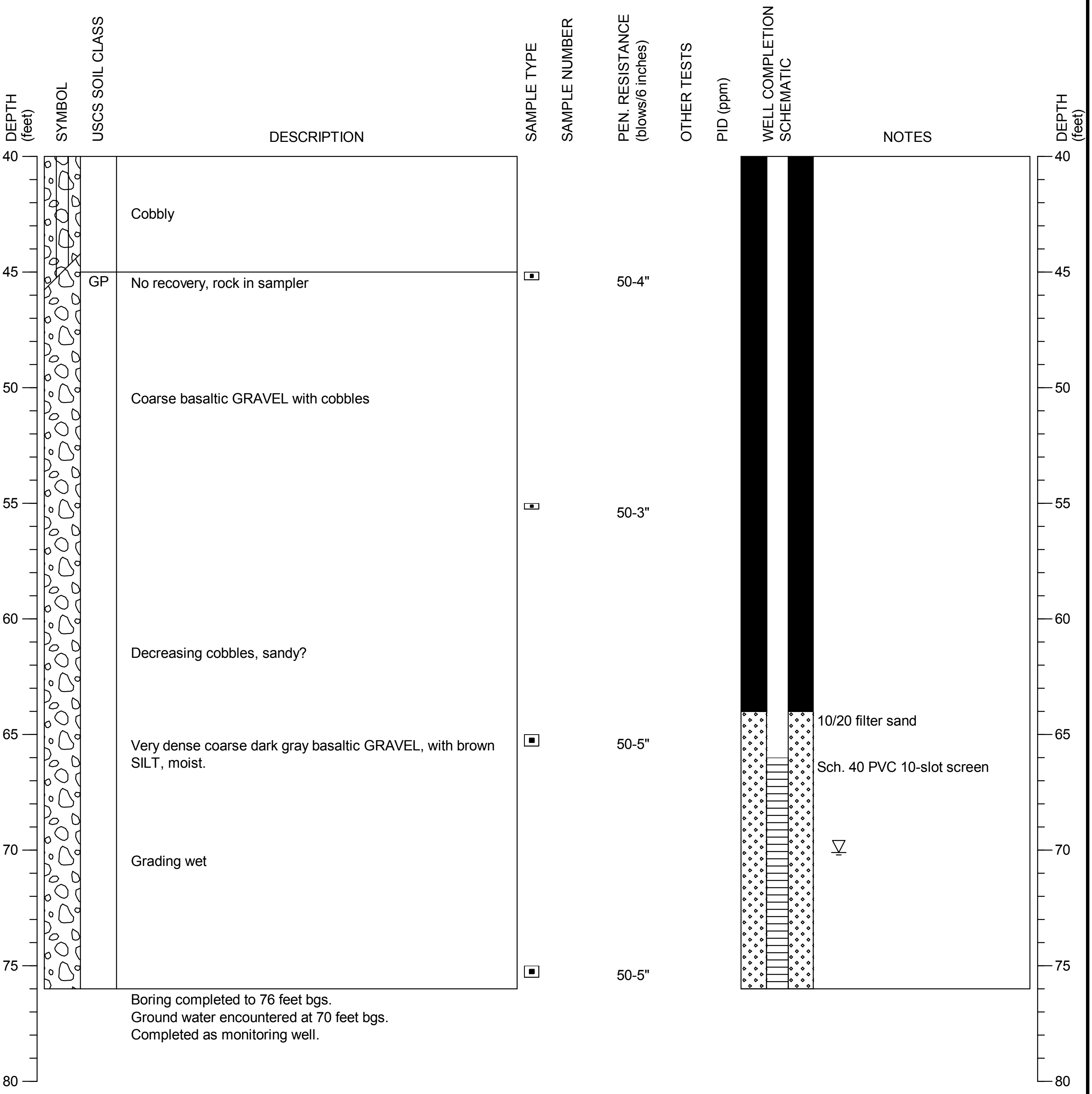
MONITORING WELL:
MW-12

PROJECT NO.: 2009-138-22 FIGURE: F-9

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: North interior well, east of MMU (Bldg K40)

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/10/2010
DATE COMPLETED: 5/11/2010
LOGGED BY: V. Atkins



DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	PEN. RESISTANCE (blows/6 inches)	NOTES
40		Cobbly			
45	GP	No recovery, rock in sampler	▣	50-4"	
50		Coarse basaltic GRAVEL with cobbles			
55			▣	50-3"	
60		Decreasing cobbles, sandy?			
					10/20 filter sand
65		Very dense coarse dark gray basaltic GRAVEL, with brown SILT, moist.	▣	50-5"	Sch. 40 PVC 10-slot screen
70		Grading wet			∇
75			▣	50-5"	

Boring completed to 76 feet bgs.
Ground water encountered at 70 feet bgs.
Completed as monitoring well.

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

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MONITORING WELL:
MW-12

PAGE: 2 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-9

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Southeast downgradient, south of 12 Tower

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/6/2010
DATE COMPLETED: 5/6/2010
LOGGED BY: V. Atkins

DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES	DEPTH (feet)
0		Silty TOPSOIL, dry.						Above-ground monument and concrete surface seal	0
		Medium stiff dark red-brown SILT, with brick fragments, moist. **[FILL]**							
								Hydrated bentonite backfill	
								Sch. 40 PVC casing	
5			▣	6	6/8/5		1.1		5
	ML	Medium stiff yellow-brown SILT, moist. **[LOESS]**							
10			▣	11	4/5/8		1.5		10
15		Medium stiff yellow-brown SILT, trace caliche, moist.	▣	16	4/5/6		1.6		15
20		Stiff dark yellow-brown SILT, trace caliche, moist.	▣	21	8/14/13		1.1		20
25			▣	26	8/13/13		1.2		25
	GM	Grading gravelly							
30									30
		Boulder							
35		Very dense dark brown silty basaltic GRAVEL, moist. Gravel rounded.	▣		32/50-1"				35
40									40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-13

PAGE: 1 of 2

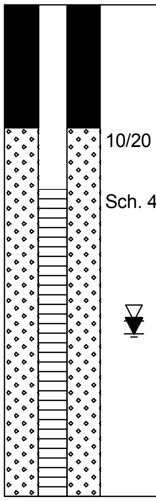
PROJECT NO.: 2009-138-22 FIGURE: F-10

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Southeast downgradient, south of 12 Tower

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/6/2010
DATE COMPLETED: 5/6/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
40											40
										10/20 filter sand	
45			Very dense dark gray and red silty basaltic GRAVEL, moist. Gravel subrounded.	▣		50-3"					45
										Sch. 40 PVC 10-slot screen	
50			Grading wet.							▽	50
55			Very dense dark gray coarse basaltic GRAVEL, vesicular.	▣		50-5"					55
			Boring completed to 56 feet bgs. Ground water encountered at 50 feet bgs. Completed as monitoring well.								
60											60
65											65
70											70
75											75
80											80



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Walla Walla, Washington

MONITORING WELL:
MW-13

PAGE: 2 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-10

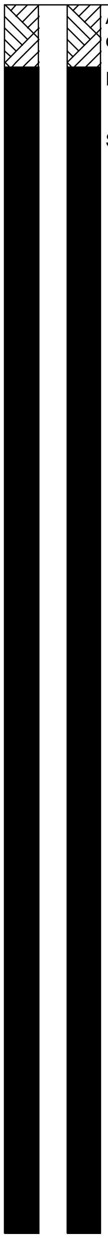
DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Northeast downgradient, west of 17 Tower

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/5/2010
DATE COMPLETED: 5/5/2010
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES	DEPTH (feet)
0			Silty TOPSOIL, dry.						Above-ground monument and concrete surface seal	0
		ML	Stiff yellow-brown SILT, trace root materials, dry. **[LOESS]**						Hydrated bentonite backfill Sch. 40 PVC casing	
5				■	6	7/4/5		0		5
10			As above, decreasing roots.	■	11	6/5/5		0		10
15			Hard yellow-brown SILT with fine sand, trace mottling, moist.	■	16	14/23/40		0		15
20			Hard yellow-brown SILT, trace coarse sand, moist.	■	21	20/36/41		0		20
25			Hard yellow-brown SILT, trace caliche, moist.	■	26	12/24/43		0		25
30			Hard yellow-brown SILT, moist.							30
35			Hard dark yellow-brown SILT, caliche seams, moist.	■		14/21/23		0		35
40										40

WELL COMPLETION SCHEMATIC



NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-14

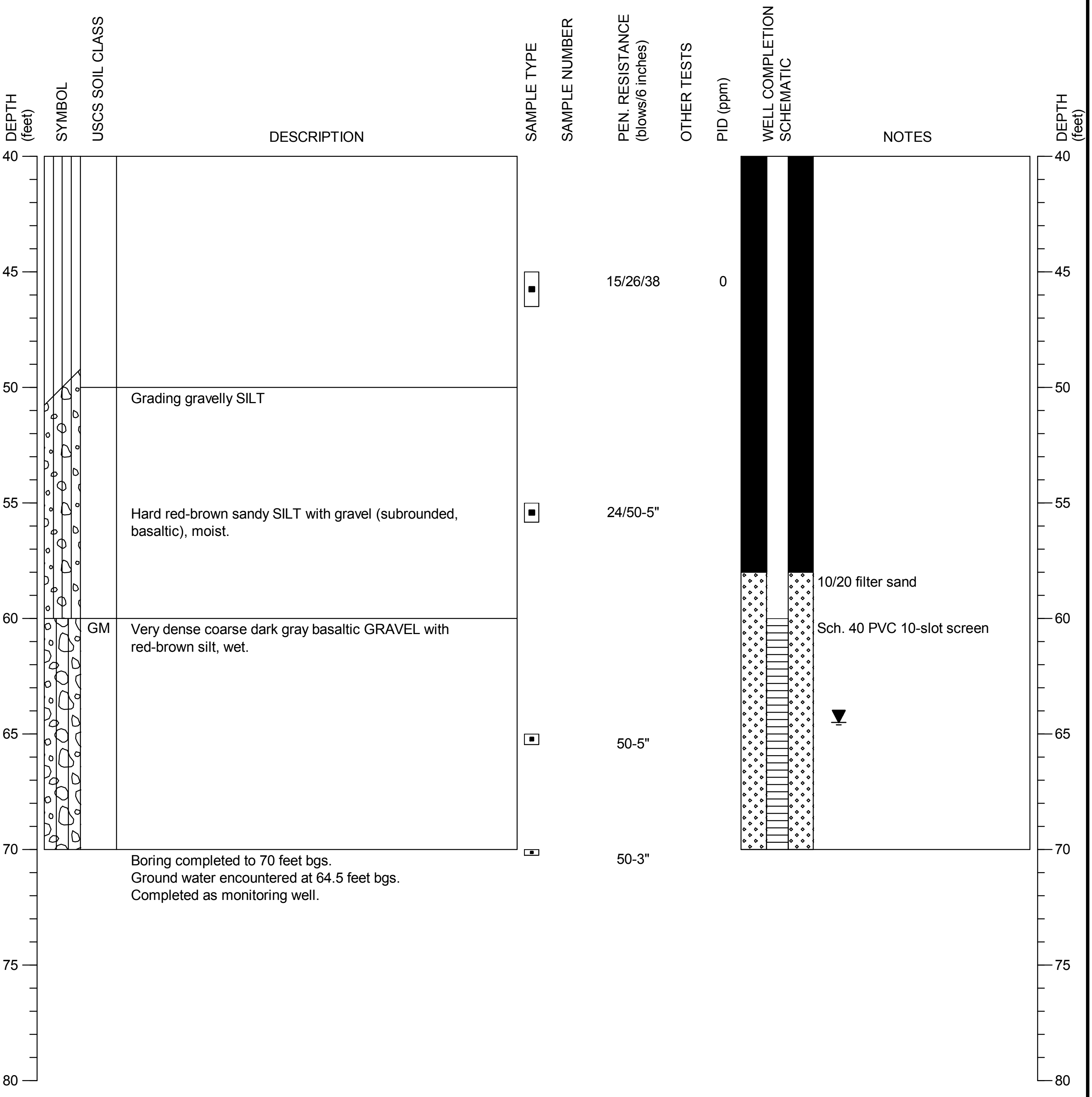
PAGE: 1 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-11

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Northeast downgradient, west of 17 Tower

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 5/5/2010
DATE COMPLETED: 5/5/2010
LOGGED BY: V. Atkins



DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	PEN. RESISTANCE (blows/6 inches)	PID (ppm)	NOTES
45			■	15/26/38	0	
50		Grading gravelly SILT				
55		Hard red-brown sandy SILT with gravel (subrounded, basaltic), moist.	■	24/50-5"		
58						10/20 filter sand
60	GM	Very dense coarse dark gray basaltic GRAVEL with red-brown silt, wet.				Sch. 40 PVC 10-slot screen
64.5						▼
65			■	50-5"		
70		Boring completed to 70 feet bgs. Ground water encountered at 64.5 feet bgs. Completed as monitoring well.	■	50-3"		

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-14

PAGE: 2 of 2

PROJECT NO.: 2009-138-22 FIGURE: F-11

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Southeast corner of game farm, east of main facility

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 9/7/2011
DATE COMPLETED: 9/8/2011
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
0		ML	Stiff brown SILT with very fine sand [LOESS], caliche seams, dry.							Stickup monument, TOC approx 2.5' above ground Cement surface Seal	0
										2-inch Sch. 40 PVC casing	
5				▣	6	10/13/21		0.2			5
10			Very stiff brown SILT, decreasing caliche	▣	11	6/9/22		0.4		Hydrated bentonite chips	10
15			Very stiff brown SILT, occasional fine to medium SAND seams, dry to moist.	▣	16	10/23/28		0.3			15
20			Hard yellow-brown SILT, dry to moist.	▣	21	15/32/36		0			20
25				▣	26	15/30/38		0.2			25
30											30
		GP	Hard brown SILT grading very dense gray to dark gray subangular basaltic GRAVEL to 3", vesicular, dry.								
35				▣	36	18/50-5"		0.2			35
40											40

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-15

PAGE: 1 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-12

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Southeast corner of game farm, east of main facility

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 9/7/2011
DATE COMPLETED: 9/8/2011
LOGGED BY: V. Atkins

DEPTH (feet)	SYMBOL	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	WELL COMPLETION SCHEMATIC	NOTES	DEPTH (feet)
40											40
45			No recovery, coarse basaltic gravel and cobbles.	⊡	45	50-3"		--			45
			Hard drilling, rig chatter.								
50											50
55											55
60											60
			Silty/sandy layers, easier drilling, moist to wet, slight perched ground water.								
		GP	Dense, coarse basaltic GRAVEL with sand, dry to moist.								
65											65
70											70
75											75
80											80

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

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Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-15

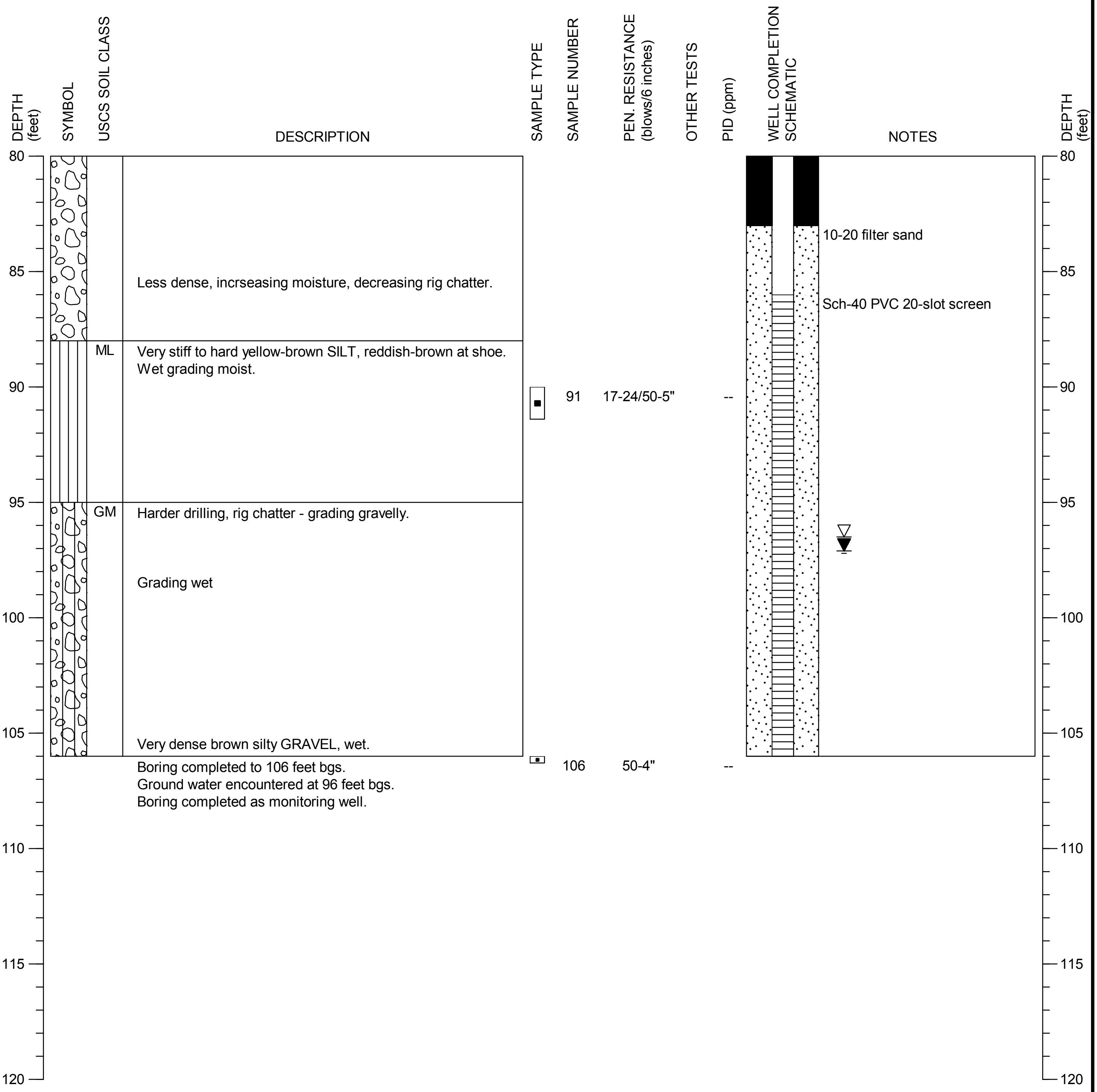
PAGE: 2 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-12

DRILLING COMPANY: Environmental West Explorations, Inc.
DRILLING METHOD: Schramm T300 Air Rotary
SAMPLING METHOD: D&M Sampler, 140# hammer
LOCATION: Southeast corner of game farm, east of main facility

SURFACE ELEVATION: ± feet
CASING ELEVATION ± feet

DATE STARTED: 9/7/2011
DATE COMPLETED: 9/8/2011
LOGGED BY: V. Atkins



DEPTH (feet)	USCS SOIL CLASS	DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	PEN. RESISTANCE (blows/6 inches)	OTHER TESTS	PID (ppm)	NOTES
83								10-20 filter sand
85		Less dense, incrseasing moisture, decreasing rig chatter.						
86								Sch-40 PVC 20-slot screen
88	ML	Very stiff to hard yellow-brown SILT, reddish-brown at shoe. Wet grading moist.						
90			■	91	17-24/50-5"		--	
95	GM	Harder drilling, rig chatter - grading gravelly.						
96								▽ ▼
98		Grading wet						
105		Very dense brown silty GRAVEL, wet.						
106		Boring completed to 106 feet bgs. Ground water encountered at 96 feet bgs. Boring completed as monitoring well.	■	106	50-4"		--	

NOTE: This log of subsurface conditions applies only at the specified location and on the date indicated and therefore may not necessarily be indicative of other times and/or locations.

HWA GEOSCIENCES INC.

Washington State Penitentiary
Remedial Investigation/Feasibility Study
Walla Walla, Washington

MONITORING WELL:
MW-15

PAGE: 3 of 3

PROJECT NO.: 2009-138-22 FIGURE: F-12

Appendix G

Groundwater Monitoring Field Data Records

PARAMETRIX Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-1
Sample #: WSP-MW-01-GW-071210

Project Number: 215-2662-004
Date: 7/12/10
Project Name: WSP RI/FS
Location: Walla Walla Pen.
Project Address:
Sampled By: R.Simmons, P. Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" ✓ 4" ______ 6" ______ Other ______

Depth to Water (feet): 60.75
Purge ~~Volume~~ Flow Measurement Method: 1L grad. cyl & stopwatch
Depth of Well (feet): 65.76
Date Purged: 7/12/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to): 1140 - 1201
Date/Time Sampled: 7/12/10, 1200

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): low flow
Actual Purge Volume ~~(gallons):~~ ~ 6L

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
1145	-	6.49	884	4.86	17.50	-	168
1149	60.75	6.51	894	4.57	18.16	-	150
1153	-	6.53	891	4.55	18.36	-	149
1157	60.74	6.52	891	4.37	18.35	-	149
1201	-	6.57	892	4.36	18.55	-	144

Purge Equipment: Hlab, new tubing, Portable Redi-Flo pump
Sampling Equipment: ~~new~~ purge tubing, Redi-Flo pump

Laboratory: OnSite
Date Sent to Lab: 7/15/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: -
Shipment Method: sampler (PP)
Split With (names[s]/organization): -

Well Integrity: OK, cut off old lock, replaced w/ new WSP lock
Remarks: decon'd pump in Alkanox/DI then rinsed in DI
Signature: Ronald A. Sim

Decon'd pump before before setting @ 63'
Pulled old bailer and rotted poly line from inside casing
Flow rate (purge/sample) 380 ml/min

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-2

Sample #: WSP-MW-02-GW-071210

Project Number: 215-2662-004
Date: 7/12/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R Simmons, P. Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet): 43.17
Purge ~~Volume~~ Flow Measurement Method: 1L grad cyl & stopwatch
Depth of Well (feet): 49.90
Date Purged: 7/12/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to): 1440-1508
Date/Time Sampled: 7/12/10, 1500

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow
Actual Purge Volume ~~(gallons)~~: ~8 L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
1444	-	6.96	682	7.02	18.27	-	132
1448	43.15	6.96	447	4.88	21.03	-	132
1456 ~~1455~~	-	~~7~~6.96	685	7.29	~~26.20~~ 18.03	-	139
~~1459~~							
~~1500~~							
1502		6.94	687	7.22	17.05		130
1506		6.95	686	7.52	16.47		127
1508		6.95	685	7.40	16.49		126

flow interupted. re-established flow at 1502

Purge Equipment: Hlab, new tubing, portable Redi-Flo
Sampling Equipment: ~~new~~ purge tubing & Redi Flo

Laboratory: On Site Environ.
Date Sent to Lab: 7/15/10
Chain-of-Custody [✓ yes]/no):
Field QC Sample Number: -
Shipment Method: sampler (PP)
Split With (names[s]/organization): -

Well Integrity: OK, removed old teflon bailer & rotted poly line from inside casing.
Remarks: Flow rate 430 ml/min
Signature: Ronald A. Sim

Extra volume collected at MW-2 for MS/MSD.
Collected full sample set for MS/MSD.
Decon'd pump in Alconox & DI water
Set portable pump @ about 47'

PARAMETRIX

Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-9

WSP-MW-09-GW-071310 ← Sample #: ~~MW-9~~ RS

Project Number: 215-2662-004
Date: 7/13/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R Simmons, P, Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 82.49
Purge Volume Measurement Method: 1L grad cyl & stopwatch
Depth of Well (feet): NM
Date Purged: 7/13/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to: 0951 - 1017
Date/Time Sampled: 7/13/10, 09 15

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow Actual Purge Volume (~~gallons~~): 10½ L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb. vis ~~SAL %~~	REDOX (mv)
0953	-	6.93	644	8.36	16.93	very	139
0957	82.55	6.91	626	8.45	17.02	mod	123
1003	-	6.91	627	8.34	20.78	slight	126
1005	82.52	6.93	637	7.79	21.07	↓	127
1009	-	6.90	629	8.51	20.93	↓	128
1013	82.69	6.92	625	8.60	17.01	clear	129
1017		6.93	625	8.51	16.77	↓	122

Purge Equipment: Port Redi-Flo, Hlab; new tubing
Sampling Equipment: Redi Flo & ~~new~~ purge tubing

Laboratory: On Site Environ
Date Sent to Lab: 7/15/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: -
Shipment Method: sampler (PP)
Split With (names[s]/organization): -

Well Integrity: OK. Placed pump @ 3' above bottom.
Remarks: High initial turbidity flow rate = 440 ml/min
Signature: Ronald A. Si

Decon'd this pump before placing in well.

PARAMETRIX

Form 02-EN-101/Rev. 10/0:

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-3

Sample #: WSP-MW-03-

Project Number: 215-2662-004

Date: 7/13/10

Project Name: WSP RI/FS

Location:

Project Address:

Sampled By: R.Simmons, P. Pearson

Client Name: WSP

Purged By: RS, PP

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet): 72.06

Purge ~~Volume~~ Flow Measurement Method: 1L grad. cyl & stopwatch

Depth of Well (feet): ~~75.41~~ 78.60

Date Purged: 7/13/10

Reference Point (surveyor's notch, etc.): ~~top~~ PVC casing

Purge Time (from/to): 0857-0916

Date/Time Sampled: 7/13/10, 0930

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow

Actual Purge Volume ~~(gallons)~~: ~ 9 L.

conv initial 72.74

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
0859	-	6.76	729	6.90	14.78	-	173
0903	72.77'	6.77	729	6.47	16.49	-	150
0907	7	6.79	731	6.32	18.22	-	121
0911	72.80	6.79	732	6.30	18.42	-	110
0915	72.79	6.80	731	6.28	18.38	-	105

72.74

Purge Equipment: Hlab, Portable Redi-Flo pump New tubing

Sampling Equipment: Redi-Flo & purge tubing

Laboratory: On-Site

Date Sent to Lab: 7/15/10

Chain-of-Custody [✓ yes]/no):

Field QC Sample Number: -

Shipment Method: sampler (PP)

Split With (names[s]/organization): -

Well Integrity: OK, Decon'd pump before placing at 75'

Remarks: Flow rate = 460 ml/min

Signature: Ronald A. Sim

PARAMETRIX Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-14

WSP-MW-14-GW-071310 Sample #: ~~MW-14~~ RS

Project Number: 215-2662-004
Date: 7/13/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R. Simmons, P. Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" X 4" ______ 6" ______ Other ______

Depth to Water (feet): 72.87
Purge Volume Measurement Method: 1L grad. cyl & stopwatch
Depth of Well (feet): 67.80
Date Purged: 7/13/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to: 1104 - 1126
Date/Time Sampled: 7/13/10, 1130

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow
Actual Purge Volume (~~gallons~~): ~ 7 L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb vis ~~SAL~~ %	REDOX (mv)
1106	-	6.93	811	7.99	16.38	high	182
1110	67.77	6.85	805	7.22	16.85	mod	180
1114	-	6.85	806	7.26	18.93	mod	162
1118	67.80	6.85	808	7.13	19.00	clear	152
1122	-	6.85	804	6.87	20.80	↓	129
1126	-	6.83	808	6.98	20.76	↓	112

Purge Equipment: Port Redi-Flo, Hlab & new tubing
Sampling Equipment: Port Redi-Flo & ~~new~~ Purge tubing RS

Laboratory: On Site Enviro
Date Sent to Lab: 7/15/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: -
Shipment Method: Sampler (PP)
Split With (names[s]/organization): -

Well Integrity: OK, pump set @ 65'
Remarks: flow = 330 ml/m
Signature: Ronald A. Si

Decon'd pump before placing in well

PARAMETRIX Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-13

Sample #: ~~MW-13~~ RS WSP-MW-13-GW-071310

Project Number: 215-2662-004

Date: 7/13/10

Project Name: WSP RI/FS

Location:

Project Address:

Sampled By: R. Simmons; P. Pearson

Client Name: WSP

Purged By: RS, PP

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet): 54.31

Purge Volume Measurement Method: 1L grad. cyl & stopwatch

Depth of Well (feet): 58.16

Date Purged: 7/13/10

Reference Point (surveyor's notch, etc.): top PVC casing

Purge Time (from/to): 1213 - 1244

Date/Time Sampled: 7/13/10, 1230

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow

Actual Purge Volume (~~gallons~~): ~ 10½ L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb. vis ~~SAL %~~	REDOX (mv)
1215	-	6.69	1175	6.39	19.79	high	176
1219	-	6.67	1137	5.99	19.92	high	132
1223	54.40	6.68	1109	5.75	20.11	mod	119
1228 → ~~1229~~	-	6.67	1079	6.12	20.75	mod	107
~~1232~~							
1234	54.41	6.65	1014	6.29	17.09	clearish	132
1238	-	6.65	989	6.23	16.79	↓	138
124~~2~~4		6.65	973	6.41	16.92	mod	141

flow interupted

Purge Equipment: Port Redi-Flo, Hlab &, new tubing

Sampling Equipment: Redi-Flo & new tubing

Laboratory: On Site Enviro

Date Sent to Lab: 7/15/10

Chain-of-Custody ([✓ yes]/no):

Field QC Sample Number: -

Shipment Method: sampler (PP)

Split With (names[s]/organization): -

Well Integrity: OK

Remarks: Flow = 360 ml/min, pump set at 56'

Signature: Ronald A. Sim

Decon'd pump before placing in well.

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-10
Sample #: WSP-MW-10-GW-071410

Project Number: 215-2662-004
Date: 7/14/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R Simmons, P. Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 75.86
Purge Volume Measurement Method: 1L grad. cyl, stop watch
Depth of Well (feet): 82.60
Date Purged: 7/14/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to: 0850 - 0912
Date/Time Sampled: 7/14/10,

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): low flow
Actual Purge Volume (~~gallons~~): 10½ L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb vis. ~~SAL %~~	REDOX (mv)
0852	–	6.57	673	7.07	16.44	mod.	202
0856	–	6.66	670	6.59	17.61	mod.	179
0900	75.81	6.57	671	6.33	18.46	clear	175
0904	-	6.73	673	6.56	18.49	↓	161
0908		6.79	673	6.38	19.14	↓	134
0912		6.81	673	6.36	18.43	↓	128

Purge Equipment: Port Redi-Flo, Hlab, new tubing
Sampling Equipment: Redi-Flo, ~~new~~ purge tubing RS

Laboratory: On Site Enviro
Date Sent to Lab: 7/15/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: –
Shipment Method: Sampler (PP)
Split With (names[s]/organization): –

Well Integrity: OK.
Remarks: Flow rate ≈ 480 ml/min, placed pump @ 78'
Signature: Ronald A. S

Decon'd pump before placing in well

PARAMETRIX Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-11
Sample #: WSP-MW-11-GW-071410

Project Number: 215-2662-004
Date: 7/14/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R. Simmons, P. Pearson
Client Name: WSP
Purged By: RS, PP

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 70.72
Purge Volume Measurement Method: 1L grad. cyl & stopwatch
Depth of Well (feet): 75.33
Date Purged: 7/14/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to): 0956-1015
Date/Time Sampled: 7/14/10, 1020

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)(\#\ \text{Casing volumes})$
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): low flow Actual Purge Volume (~~gallons~~): ~8 L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
0959	-	6.91	883	7.33	19.62	high	141
1003	-	6.90	874	7.00	20.38	mod.	150
1007	70.80	6.92	~~150~~ 877	6.~~90~~78	21.78	light	147
1011	-	6.92	877	6.76	22.15	clear	136
1015	70.79	6.92	878	6.70	22.16	↓	125

Purge Equipment: Port Redi Flo, Hlab, new tubing
Sampling Equipment: Redi·Flo, ~~new~~ purge tubing RS

Laboratory: On Site Enviro.
Date Sent to Lab: 7/15/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: -
Shipment Method: sampler (PP)
Split With (names[s]/organization): -

Well Integrity: OK
Remarks: Pump set @ 73', Flow = 425 ml/min
Signature: Ronald A. Si

Decon'd pump before placing in well.

PARAMETRIX

Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-12

Sample #: WSP-MW-12-GW-071410

Project Number: 215-2662-004

Project Name: WSP RI/FS

Project Address:

Client Name: WSP

Date: 7/14/10

Location:

Sampled By: R. Simmons, P. Pearson

Purged By: RS, PP

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 70.62

Depth of Well (feet): 75.33

Reference Point (surveyor's notch, etc.): top PVC casing

Date/Time Sampled: 7/14/10, 1200

Purge Volume Measurement Method: 1L grad. cyl & stopwatch

Date Purged: 7/14/10

Purge Time (from/to): 1127 - 1205

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): low flow Actual Purge Volume ~~(gallons)~~: 7 L.

TIME (2400 hr)	WATER LEVEL (feet)	10% pH (units)	~~3%~~ COND (mS/cm)	DO (mg/L)	TEMP °C	turb vis ~~SAL %~~	REDOX (mv)
1130	–	7.21	743	6.48	22.76	high	139
* 1153 ~~1134~~ RS	–	7.02	720	6.70	18.82	mod.	136
1158 ~~1138~~ RS	70.73	7.01	695	7.13	19.14	low	126
1202 ~~1142~~ RS	–	7.02	692	6.94	18.84	clear	122
1205 ~~1146~~ RS	70.71	7.03	700	7.25	19.39	low	96
~~1209~~							

Purge Equipment: Port Redi-Flo, Hlab & new tubing

Sampling Equipment: Redi Flo & ~~new~~ purge tubing RS

Laboratory: On Site Enviro

Chain-of-Custody ([✓ yes]/no):

Shipment Method: sampler (PP)

Date Sent to Lab: 7/15/10

Field QC Sample Number: –

Split With (names[s]/organization): –

Well Integrity: OK * pump control problem caused 23 min delay

Remarks: Pump placed @ 72', Flow = 440 ml/min

Signature: Ronald A. Sim

Decon'd pump before placing in well.

Groundwater Sampling Field Data Sheet No. 2

Well #: WSP-02-05-GW
Sample #: MW-5

Project Number: 215-2662-004
Date: 7/16/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R. Simmons
Client Name: WSP
Purged By: RS

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 82.41
Purge ~~Volume~~ Flow Measurement Method: 1L grad. cyl & stopwatch
Depth of Well (feet): 99.87
Date Purged: 7/16/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to: 0917 - 0939
Date/Time Sampled: 7/16/10, 0945

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): low flow
Actual Purge Volume (~~gallons~~): ~7½ L.

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb vis ~~SAL %~~	REDOX (mv)
0919	-	7.43	189	7.67	20.19	mod	51
0923	85.97	7.27	179	7.10	18.20	↓	63
0927	86.31	7.02	174	6.92	19.85	slight	85
0931	-	7.13	172	6.84	21.10	↓	87
0935	86.31	6.95	172	6.76	21.86	↓	104
0939		6.95	173	6.68	22.52	↓	111

Purge Equipment: Port. Redi Flow, Hlab & new tubing
Sampling Equipment: Redi-Flo & ~~new~~ purge tubing RS

Laboratory: On Site Enviro
Date Sent to Lab: 7/17/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: -
Shipment Method: sampler (RS)
Split With (names[s]/organization): -

Well Integrity: OK
Remarks: pump placed @ 96', Flow = 370 ml/min
Signature: Ronald A. Sim

Decon'd pump before placing in this well.

Groundwater Sampling Field Data Sheet No. 2

Well #: WSP-XX-06-GW
Sample #: MW-6

Project Number: 215-2662-004
Date: 7/16/10
Project Name: WSP RI/FS
Location:
Project Address:
Sampled By: R. Simmons
Client Name: WSP
Purged By: RS

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet): 24.19
Purge ~~Volume~~ flow Measurement Method: 1L grad cyl & stopwatch
Depth of Well (feet): 32.93
Date Purged: 7/16/10
Reference Point (surveyor's notch, etc.): top PVC casing
Purge Time (from/to: 1151 - 1210
Date/Time Sampled: 7/16/10, 1215

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): low flow
Actual Purge Volume (~~gallons~~): ~7 L

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	turb vis ~~SAL %~~	REDOX (mv)
1153	–	6.48	298	0.75	15.87	high	-35
1157	24.33	6.09	299	0.26	15.94	~~no~~ slight	2
1201	24.33	6.07	299	0.20	16.14	clear	3
1205	–	6.00	299	0.15	16.00	↓	10
1210~~9~~ RS	24.33	5.99	298	0.14	16.03	↓	13

Purge Equipment: Port Redi-Flo, new tubing & Hlab
Sampling Equipment: Port. Redi-Flo, purge tubing

Laboratory: On-Site Enviro
Date Sent to Lab: 7/17/10
Chain-of-Custody ([✓ yes]/no):
Field QC Sample Number: –
Shipment Method: sampler (RS)
Split With (names[s]/organization): –

Well Integrity: OK, no sign of floating product
Remarks: Pump decon'd before placing at 30' | Flow = 380 ml/min.
Signature: Ronald A. S

Decon'd pump before placing in this well

PARAMETRIX Form 02-EN-101/Rev. 10/02

Groundwater Sampling Field Data Sheet No. 2

Well #: MW-7
Sample #: MW-7 *

Project Number:	215-2662-004	**Date:**	7/29/10
Project Name:	WSP RI/FS	**Location:**	
Project Address:		**Sampled By:**	Ron Simmons
Client Name:	WSP	**Purged By:**	same

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet):	* 58.04	**Purge Volume Measurement Method:**	5 g. bucket
Depth of Well (feet):	59.96	**Date Purged:**	7/29/10
Reference Point (surveyor's notch, etc.):	top PVC casing	**Purge Time (from/to:**	1015 - 1055
Date/Time Sampled:	7/29/10, 1055		

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons): –   Actual Purge Volume (gallons): ~ 5 g.

initial 58.04'

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
1015	58.03	Checked recharge by measuring DTW between bailings. Recharge looks good. Bailed 5 g. then sampled w/ Teflon bailer. Measured field parameters at completion of bailing before sampling					
1020	58.03						
1034	58.03	6.88	566	6.26	17.50	–	200

Purge Equipment: PE bailer **Sampling Equipment:** Teflon bailer

Laboratory:	On Site Enviro	**Date Sent to Lab:**	7/30/10
Chain-of-Custody ([✓ yes]/no):		**Field QC Sample Number:**	–
Shipment Method:	Sampler (RS)	**Split With (names[s]/organization):**	–

Well Integrity: OK

Remarks: * DTW was at 57.98' on 7/16/10. Too shallow to sample w/ Redi-Flo pump. Purged and sampled w/ bailers

Signature: Ronald A. Sim

* should have been labeled WSP-XX-07-GW

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Groundwater Sampling Field Data Sheet No. 2

Well #: MW-8
Sample #: MW-8 *

Project Number: 215-2662-004
Project Name: WSP RI/FS
Project Address:
Client Name: WSP
Date: 7/29/10
Location:
Sampled By: Ron Simmons
Purged By: RS

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): * 92.80
Depth of Well (feet): 94.88
Reference Point (surveyor's notch, etc.): top PVC casing
Date/Time Sampled: 7/29/10, 12:10
Purge Volume Measurement Method: 5 g. bucket
Date Purged: 7/29/10
Purge Time (from/to): 1110 - 1200

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): –
Actual Purge Volume (gallons): ~5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	SAL %	REDOX (mv)
5 gal ~~1208~~	92.80	–	–	–	–	–	–
1213	92.80	7.15	554	7.82	18.81	–	210

Purge Equipment: PE bailer
Sampling Equipment: Teflon bailer

Laboratory: On Site Enviro
Chain-of-Custody ([✓ yes]/no):
Shipment Method: sampler (RS)
Date Sent to Lab: 7/30/10
Field QC Sample Number: –
Split With (names[s]/organization): –

Well Integrity: OK
Remarks: * DTW was 92.69' on 7/16/10.
Signature: Ronald A. Sim

* should have been labeled WSP-XX-08-GW

Parametrix, Inc.

Well #: MW-3
Sample #: WSP-MW-03-GW-102510

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N. 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 10/25/2010
Location AOC #1
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 73.63
Depth of Well (feet) 78.6
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 10/25/2010 12:00

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/25/2010
Purge Time (from/to) 1110 - 1200
Flow ~ 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) ~3.5 gal

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1110	73.68	6.90	83.9	6.79	13.7	>1000	277	
1114	73.69	6.90	81.8	6.71	15.1	>1000	186	
1118	73.66	6.90	81.2	6.74	17.2	572	142	
1122	73.67	6.90	81.7	6.80	18.2	279	141	
1126	73.66	6.90	82.9	6.92	18.5	194	149	
1130	73.65	6.90	85.0	7.00	18.8	162	154	
1134	73.66	6.90	85.9	7.01	18.4	99.1	158	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 10/26/2010
Field QC Sample Number ____
Split with (name(s)/organization) ____

Well Integrity Ok - locked and capped.
Remarks Pump set at 76'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-2
Sample #: WSP-MW-02-GW-102510

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N. 13th Ave
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 10/25/2010
Location AOC #1
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" X 4" ______ 6" ______ Other ______

Depth to Water (feet) 45.04
Depth of Well (feet) 50.15
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 10/25/2010 1300

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/25/2010
Purge Time (from/to) 1225 - 1300
Flow = 300ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ______ Actual Purge Volume (gallons) 2.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1232	45.02	6.89	82.9	8.45	15.5	24.0	227	
1236	45.02	6.93	83.0	8.50	16.8	13.8	205	
1240	45.03	6.94	82.9	8.64	17.5	14.2	193	
1244	45.01	6.96	82.9	8.72	18.2	8.3	190	
1248	45.03	6.95	82.8	7.77	18.2	6.5	192	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 10/26/2010
Field QC Sample Number ______
Split with (name(s)/organization) ______

Well Integrity OK - locked and capped
Remarks Pump set at 48'.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-9
Sample #: WSP-MW-09-GW-102510

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N. 13th Ave
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 10/25/2010
Location Heifer Farm
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet) 84.10
Depth of Well (feet) 86.95
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 10/25/2010 1455

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/25/2010
Purge Time (from/to) 1330 - 1415
Flow = 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ___ Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1332	84.25	6.93	87.9	9.54	13.9	<1000	274	
1336	84.30	6.93	81.2	9.50	16.1	<1000	215	
1340	84.25	6.96	75.2	10.01	17.3	636	195	
1344	84.02	6.99	74.6	10.07	17.0	367	192	
1348	—	6.99	71.9	9.87	17.4	266	177	
1352	84.22	6.99	70.4	9.55	18.4	204	160	
1356	84.23	6.98	69.7	9.01	19.3	227	166	
1400	84.20	6.99	70.0	9.29	21.5	220	165	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 10/26/2010
Field QC Sample Number ___
Split with (name(s)/organization) ___

Well Integrity ok - capped and locked
Remarks Pump set at 85'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-1
Sample #: WSP-MW-01-GW-102510

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N 13th Ave
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 10/25/2010
Location ~~WSP - Walla Walla, WA~~ AOC #1
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 62.40
Depth of Well (feet) 65.90
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 10/25/2010 1510

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/25/2010
Purge Time (from/to) 1440 - 1510
Flow ~ 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1448	62.52	6.62	0.107	9.70	15.0	44.5	274	
1452	62.53	6.57	0.104	8.50	19.0	40.9	232	
1456	62.48	6.59	0.109	8.91	16.8	38.8	238	
1500	62.53	6.59	0.104	8.47	19.5	48.6	240	
1504	62.54	6.58	0.108	8.98	17.7	49.8	229	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 10/26/2010
Field QC Sample Number ____
Split with (name(s)/organization) ____

Well Integrity Good - locked + capped
Remarks Set pump at 64'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-14
Sample #: WSP-MW-14-GW-102510

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/25/2010
Project Name	RI/FS WA State Penitentiary	Location	Field west of WSP
Project Address	1313 N. 13th Ave Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	69.36	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	72.97	Date Purged	10/25/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	1548 – 1630
Date/Time Sampled	10/25/2010 1620		Flow = 380 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \mathrm{gal/ft^3})$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1550	69.41	6.84	93.9	8.49	14.9	>1000	287	
1554	69.39	6.81	95.9	8.41	15.4	749	261	
1558	69.40	6.81	93.4	8.32	17.2	751	251	
1602	69.37	6.84	97.4	8.65	15.5	123	150	
1606	69.38	6.85	96.6	8.51	15.0	67.4	187	
1610	69.35	6.85	96.0	8.42	17.0	62.1	203	
1614	69.37	6.83	91.3	7.68	20.5	81.6	187	
1618	–	6.84	97.1	8.54	19.2	65.8	202	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/26/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	Fed Ex Overnight	Split with (name(s)/organization)	

Well Integrity OK - locked and capped
Remarks set pump at ~ 71'
Signature ____ Page 1 of 1

Parametrix, Inc.

Well #: MW-6
Sample #: WSP-MW-06-GW-102610

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/26/2010
Project Name	RI/FS WA State Penitentiary	Location	13th Ave + Gravel Rd
Project Address	1313 N 13th Ave Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	24.76	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	32.87	Date Purged	10/26/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	0754 – 0854
Date/Time Sampled	10/26/2010 0830	Flow = 350 ml/min	

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0756	24.95	6.38	48.3	0.82	14.0	650	98	
0800	24.97	6.39	47.2	0.15	14.9	234	81	
0804	24.97	6.50	43.9	0.07	15.6	88.8	70	
0808	24.97	6.55	42.6	0.01	15.7	28.6	53	
0812	24.98	6.57	42.1	0.01	15.8	49.2	46	
0816	24.95	6.58	41.9	0.00	15.1	13.7	36	
0820	24.97	6.60	41.5	0.00	15.5	11.6	29	
0824	—	6.60	41.4	0.00	15.3	10.1	23	
0828	24.95	6.60	41.3	0.00	15.4	9.7	20	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/26/10
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	FedEx overnight	Split with (name(s)/organization)	

Well Integrity OK - capped and locked
Remarks Pump set at 31'
Signature ____ Page 1 of 1

\\SUMNFS01\shared\clients\2662-WAStDeptofCorrections\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI Field Investigation\06P-GW-SW Sampling PMX\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-7
Sample #: WSP-MW-07-GW-102610

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/26/2010
Project Name	RI/FS WA State Penitentiary	Location	Approx. 13th Ave & Currie Ave
Project Address	1313 N 13th Ave Walla Walla, WA	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	57.33	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	61.14	Date Purged	10/26/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	1002 - 1053
Date/Time Sampled	10/26/2010 1035	Flow = 250 ml/min	

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1005	57.39	6.60	71.4	7.26	12.8	602	343	
1009	57.38	6.69	68.6	7.85	14.1	345	347	
1013	57.35	6.76	67.0	7.45	16.0	144	276	
1017	57.35	6.82	66.7	7.32	16.6	120	240	
1021	57.36	6.84	66.2	7.16	18.9	94.5	212	
1025	57.36	6.86	65.8	7.14	20.6	58.2	193	
1029	-	6.87	64.8	7.49	20.9	42.1	191	
1033	57.37	6.87	64.0	7.70	19.9	34.6	202	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/26/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	

Well Integrity OK - capped and locked
Remarks Pump set at 59'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-12
Sample #: WSP-MW-12-GW-102710

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/27/2010
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 N 13th Ave Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet)	71.55	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	78.95	Date Purged	10/27/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	1057 - 1135
Date/Time Sampled	10/27/2010 1125		Flow = 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ___ Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1100	71.76	6.99	92.4	7.76	16.3	>1000	135	
1104	71.67	7.01	90.4	7.84	17.0	714	123	
1108	71.61	7.02	87.4	8.02	17.9	393	123	
1112	71.60	7.02	86.8	7.95	–	279	121	
1116	71.61	7.01	86.6	7.83	18.2	259	123	
1120	–	7.00	88.5	7.93	19.1	245	124	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/28/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	Hand delivered (HWA)	Split with (name(s)/organization)	

Well Integrity ok - capped and locked
Remarks Set pump at 74'
Signature
Page 1 of 1

\\SUMNFS01\shared\clients\2662-WAStDeptofCorrections\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI Field Investigation\06P-GW-SW Sampling PMX\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-11
Sample #: WSP-MW-11-GW-102710

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N. 13th Ave
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date ~~10/26/2010~~ MB 10/29/2010
Location AOC #6
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 70.80
Depth of Well (feet) 76.15
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled ~~10/26/2010~~ ~~1230~~ MB 1230
10/29/2010
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged ~~10/26/2010~~ MB 10/29/2010
Purge Time (from/to) 1205 - 1240
Flow = 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \mathrm{gal/ft^3})$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1208	70.09	6.89	0.100	10.56	18.3	>1000	192	
1212	70.83	6.88	0.099	9.78	20.1	347	173	
1216	70.86	6.88	0.100	9.70	20.6	492	161	
1220	70.85	6.86	0.100	8.77	20.5	452	159	
1224	70.87	6.87	0.100	8.67	21.2	170	143	
1228	70.84	6.88	0.100	8.55	22.0	70.3	152	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2
Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered (HWA)
Date Sent to Lab 10/28/2010
Field QC Sample Number ____
Split with (name(s)/organization) ____

Well Integrity OK - capped and locked
Remarks Set pump at 74'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-5
Sample #: WSP-MW-05-GW-102710

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N 13th Ave
Walla Walla WA 99362
Client Name WA State Dept. of Corrections
Date 10/27/2010
Location AOC #2
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ______ 6" ______ Other ______

Depth to Water (feet) 82.25
Depth of Well (feet) 99.95
Reference Point (surveyors notch/etc) ______
Date/Time Sampled 10/27/2010 1400
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/27/2010
Purge Time (from/to) 1320 - 1410
Flow = 320 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ______ Actual Purge Volume (gallons) 3.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1324	85.05	7.35	44.6	10.31	16.9	>1000	244	
1328	85.32	7.23	44.0	9.49	17.4	593	135	
1332	85.00	7.17	43.3	9.43	17.7	442	121	
1336	85.00	7.09	41.6	9.21	19.0	431	130	
1340	85.19	7.09	40.4	8.58	19.5	381	142	
1344	86.00	7.09	39.9	8.91	20.6	377	121	
1348	85.85	7.13	39.1	8.64	21.7	307	139	
1352	85.79	7.17	38.2	8.76	21.7	306	165	
1356	86.90	7.15	38.0	8.37	22.0	307	152	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 10/28/2010
Field QC Sample Number ______
Split with (name(s)/organization) ______

Well Integrity No cap or lock!
Remarks Set pump at 95'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-10
Sample #: WSP-MW-10-GW-102710

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/27/2010
Project Name	RI/FS WA State Penitentiary	Location	AOC #3
Project Address	1313 N. 13th Ave Walla Walla WA 99362	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ___ 6" ___ Other ___

Depth to Water (feet)	74.41	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	83.00	Date Purged	10/27/2010
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1437-1526
Date/Time Sampled	10/27/2010 1515	Flow = 300 ml/min	

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ___ Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1442	74.45	6.73	71.5	7.75	16.5	>1000	278	
1446	74.45	6.68	71.4	7.51	18.1	>1000	265	
1450	74.45	6.67	72.6	7.74	19.3	823	257	
1454	74.45	6.70	74.2	7.77	20.0	671	247	
1458	74.45	6.73	74.3	7.56	21.1	351	228	
1502	74.45	6.75	73.7	7.34	21.3	292	214	
1506	74.46	6.73	73.0	7.81	22.1	358	207	
1510	74.46	6.78	73.4	8.09	21.9	406	219	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/28/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	Hand delivered (HWA)	Split with (name(s)/organization)	

Well Integrity OK - capped and locked.
Remarks Pump set at 88'
Signature
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Parametrix, Inc.

Well #: MW-13
Sample #: WSP-MW-13-GW-102810

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	10/28/2010
Project Name	RI/FS WA State Penitentiary	Location	West of MSC Yard, along road
Project Address	1313 N 13th Ave Walla Walla	Sampled By	Mike Baxter (PMX)/Pete Pearson (HWA)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2” X 4” ____ 6” ____ Other ____

Depth to Water (feet)	54.6	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	58.1	Date Purged	10/28/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	0748 - 0849
Date/Time Sampled	10/28/2010 0815	Flow = 350 ml/min	

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 2.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0752	54.69	6.58	0.115	6.81	15.1	931	300	
0756	54.72	6.61	0.114	6.59	16.6	698	241	
0800	54.70	6.63	0.114	6.44	16.9	581	230	
0804	54.70	6.63	0.113	6.40	17.5	423	206	
0808	54.69	6.63	0.113	6.58	18.3	350	198	
0812	54.69	6.64	0.113	6.46	18.2	224	199	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	10/28/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	Hand delivered	Split with (name(s)/organization)	

Well Integrity Ok - capped and locked.
Remarks Set pump at 56', collected MS/MSD
Signature ____ Page 1 of 1

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Parametrix, Inc.

Well #: MW-8
Sample #: WSP-MW-08-GW-102810

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 N. 13th Ave
Walla Walla WA 99362
Client Name WA State Dept. of Corrections

Date 10/28/2010
Location Superintendent's residence on 13th Ave
Sampled By Mike Baxter (PMX)/Pete Pearson (HWA)
Purged By Same as above.

Casing Diameter: 2” ✓ 4” ____ 6” ____ Other ____

Depth to Water (feet) 89.54
Depth of Well (feet) 95.55
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 10/28/2010 0945

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 10/28/2010
Purge Time (from/to) 0924 - 1000
Flow = 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0927	89.60	7.13	79.4	10.15	14.2	>1000	293	
0931	89.57	7.10	78.6	9.96	14.1	>1000	281	
0935	89.60	7.09	76.4	9.91	15.0	>1000	269	
0939	89.61	7.09	76.1	10.21	15.3	903	264	
0943	89.61	7.09	76.2	10.28	16.0	698	262	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered (HWA)
Date Sent to Lab 10/28/2010
Field QC Sample Number
Split with (name(s)/organization)

Well Integrity ok - capped and sealed
Remarks set pump at 93'
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-10
Sample #: SLF-MW-10-GW-110410

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	11/4/2010
Project Name	RI/FS WA State Penitentiary	Location	Sudbury LF
Project Address		Sampled By	Mike Baxter (PMX) ~~Pete Pearson (HWA)~~ Jay Vonkero (WW)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	26.52	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	45.30	Date Purged	11/4/2010
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	0937 - 1040
Date/Time Sampled	11/4/2010 1005	Flow = 300 ml/min	

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0940	26.53	5.81	58.8	4.60	12.7	44.9	239	
0944	26.55	5.88	59.3	4.41	129	36.9	214	
0948	26.53	6.05	58.6	4.16	13.0	29.3	203	
0952	26.54	6.12	57.7	4.01	13.3	25.3	199	
0956	26.54	6.14	57.3	4.25	13.6	26.9	195	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	11/5/2010
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	Hand delivery	Split with (name(s)/organization)	

Well Integrity: Ok - capped and locked.
Remarks: ~~Pump set at 37' bgs~~ Dedicated pump (Grundfos)
Signature: Page 1 of 1

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Parametrix, Inc.

Well #: MW-9
Sample #: SLF-MW-09-GW-110410

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address
Client Name WA State Dept. of Corrections

Date 11/4/2010
Location Sudbury LF
Sampled By Mike Baxter (PMX)/~~Pete Pearson (HWA)~~ Jay Yonkers (WW)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) See remarks below.
Depth of Well (feet) 210 (historical measurement)
Reference Point (surveyors notch/etc) ____
Date/Time Sampled 11/4/2010 1115

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 11/4/2010
Purge Time (from/to) 1110-1125
Flow = >30 L/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)(\#\ \text{Casing volumes})$
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)

The size of the pump hose and flow rate was too great to attach WQ meter and collect field parameter measurements. No variable control to control pump flow rate.

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivery
Date Sent to Lab 11/8/2010
Field QC Sample Number ____
Split with (name(s)/organization) ____

Well Integrity Ok - capped and locked
Remarks Could not measure DTW due to size of opening on well pump. Water level probe would not fit.
Signature ____ Page 1 of 1

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Parametrix, Inc.

Well #: MW-7
Sample #: SLF-MW-07-GW-110510

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address
Client Name WA State Dept. of Corrections

Date 11/5/2010
Location Sudbury LF
Sampled By Mike Baxter (PMX)/~~Pete Pearson (HWA)~~ Dennis Kakestraw (WW)
Purged By Same as above.

Casing Diameter: 2” ✓ 4” ____ 6” ____ Other ____

Depth to Water (feet) 43.72
Depth of Well (feet) 175 ~~151 (historical?)~~ MB
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 11/5/2010 1145

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 11/5/2010
Purge Time (from/to) 1124 - 1154
Flow = 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) ____ Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1126	43.86	6.02	20.6	7.53	13.6	0.0	233	
1130	43.87	6.42	20.2	7.03	13.6	39.7	226	
1134	43.88	6.55	20.1	6.77	13.6	194	224	
1138	43.81	6.65	20.0	6.60	13.6	79.8	221	
1142	43.82	6.70	19.8	6.55	13.7	50.9	217	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivery
Date Sent to Lab 11/8/2010
Field QC Sample Number
Split with (name(s)/organization)

Well Integrity OK - capped, and locked.
Remarks Set pump at 173'
Signature
Page 1 of 1

\\SUMNFS01\shared\clients\2662-WAStDeptofCorrections\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI Field Investigation\06P-GW-SW Sampling PMX\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-1
Sample #: WSP-MW-01-GW-020711

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 2/7/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ______ 6" ______ Other ______

Depth to Water (feet) 59.62
Depth of Well (feet) 66.65
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/7/2011 0925

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/7/2011
Purge Time (from/to) 0856 - 0952
Flow Rate (ml/min) 500

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0901	59.64	6.04	1.41	5.09	14.20	0.0	131	
0905	59.64	6.34	1.36	4.94	15.98	0.0	89	
0909	59.64	6.47	1.32	4.59	16.86	0.0	70	
0913	59.65	6.55	1.34	4.77	16.08	0.0	61	
0917	59.62	6.56	1.31	4.73	16.05	0.0	52	
0921	59.62	6.61	1.28	4.65	15.77	0.0	50	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 2/8/2011
Field QC Sample Number WSP-DUP-GW-020711
Split with (name(s)/organization) n/a

Well Integrity Ok locked
Remarks Set pump at 65'. Sampled Field Dups, also.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-2
Sample #: WSP-MW-02-GW- 020711

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/7/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	4249	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	50.53	Date Purged	2/7/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1034 - 1119
Date/Time Sampled	2/7/2011 1110	Flow Rate (ml/min)	400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1045	42.52	7.05	0.823	8.72	15.27	30.9	35	
1049	42.53	7.04	0.817	8.35	15.61	29.3	38	
1053	42.51	7.03	0.816	8.27	15.55	29.6	43	
1057	42.51	7.00	0.824	8.31	16.21	0.0	39	
1101	42.51	7.02	0.842	8.36	15.94	0.0	41	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/8/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	n/a
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	n/a

Well Integrity OK locked
Remarks Set pump at 48'
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-3
Sample #: WSP-MW-03-GW-020711

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 2/7/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 70.75
Depth of Well (feet) 79.36
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/7/2011 1330

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/7/2011
Purge Time (from/to) 1307 - 1345
Flow Rate (ml/min) 350

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1306	70.73	6.91	0.936	5.19	14.26	41.4	82	
1310	70.75	6.81	0.917	5.42	15.63	35.6	41	
1314	70.75	6.79	0.915	5.44	17.26	34.1	24	
1318	70.76	6.83	0.925	5.26	17.22	42.6	29	
1322	70.76	6.83	0.932	5.26	16.73	48.7	30	
1326	70.76	6.82	0.928	5.27	16.66	56.5	25	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 2/8/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity OK - clear of debris, locked
Remarks set pump at 78'.
Signature
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Parametrix, Inc.

Well #: MW-14
Sample #: WSP-MW-14-GW-020711

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 2/7/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 66.34
Depth of Well (feet) 74.00
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/7/2011 1450
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/7/2011
Purge Time (from/to) 1425 - 1515
Flow Rate (ml/min) 350

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1426	66.42	7.01	0.954	5.96	14.47	205.0	42	
1430	66.41	6.93	0.942	5.35	15.64	252.0	35	
1434	66.42	6.90	0.952	5.43	16.05	36.9	40	
1438	66.42	6.89	0.953	5.43	16.12	18.3	43	
1442	66.42	6.89	0.957	5.43	16.06	15.6	45	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Fed Ex Overnight
Date Sent to Lab 2/8/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity OK: clear of debris, locked.
Remarks Set pump at 72'
Signature
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Parametrix, Inc.

Well #: MW-13
Sample #: WSP-MW-13-GW- 020711

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/7/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	~~66.39~~ MB 51.63	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	~~74.00~~ MB 58.45	Date Purged	2/7/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1605-1645
Date/Time Sampled	2/7/2011 1635	Flow Rate (ml/min)	350

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1610	51.67	7.10	0.709	7.46	14.56	393.0	145	
1614	51.66	6.92	0.787	6.83	14.10	>1000	145	
1618	51.66	6.86	0.771	6.62	13.25	>1000	49	
1622	51.67	6.78	0.744	6.37	16.69	857.0	30	
1626	51.66	6.79	0.749	6.39	16.94	570.0	32	
1630	—	6.79	0.747	6.44	17.02	358.0	32	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/8/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	n/a
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	n/a

Well Integrity ok - clear of debris, locked
Remarks Set pump at 56'
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-6
Sample #: WSP-MW-06-GW- 020811

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 2/8/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 23.57
Depth of Well (feet) 32.95
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/8/2011 0820

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/8/2011
Purge Time (from/to) 0750-0830
Flow Rate (ml/min) 500

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 6

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0756	23.80	5.73	0.426	2.37	13.17	108.0	63	
0800	23.82	6.11	0.445	1.06	14.89	0.0	32	
0804	23.84	6.21	0.421	0.57	15.22	0.0	20	
0808	23.82	6.26	0.407	0.41	15.66	0.0	11	
0812	23.82	6.33	0.399	0.32	15.76	0.0	4	
0816	23.83	6.35	0.384	0.28	15.92	0.0	-1	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx Overnight
Date Sent to Lab 2/8/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity in clear of debris, locked.
Remarks Set pump at 28'; Purge water orange in color, smelled like petroleum.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-7
Sample #: WSP-MW-07-GW- 020811

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/8/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	53.64	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	59.55	Date Purged	2/8/2011
Reference Point (surveyors notch/etc)		Purge Time (from/to)	0915 - 0950
Date/Time Sampled	2/8/2011 0935	Flow Rate (ml/min)	400

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 2.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0915	53.73	6.77	0.181	9.34	16.62	223.6	65	
0919	53.79	6.74	0.174	8.71	13.93	91.6	59	
0923	53.85	6.76	0.614	8.65	15.56	69.3	53	
0927	53.76	6.80	0.672	8.56	16.58	39.8	50	
0931	—	6.83	0.669	8.18	16.04	42.8	46	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/8/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	n/a
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	n/a

Well Integrity OK - clear of debris, not locked.
Remarks Set pump at 57'.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-8
Sample #: WSP-MW-08-GW-020811

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/8/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2” ✓ 4” ____ 6” ____ Other ____

Depth to Water (feet)	86.58	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	97.10	Date Purged	2/8/2011
Reference Point (surveyors notch/etc)	Top of casing	Purge Time (from/to)	1020 - 1055
Date/Time Sampled	2/8/2011 1045	Flow Rate (ml/min)	320

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1022	86.50	7.15	0.734	11.28	12.17	>1000	72	
1026	86.66	7.10	0.716	11.09	15.65	307.0	72	
1030	86.55	7.10	0.709	11.29	17.39	166.0	59	
1034	86.57	7.13	0.701	11.37	17.40	99.9	54	
1038	—	7.13	0.693	11.43	17.17	66.8	49	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/8/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	n/a
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	n/a

Well Integrity OK- clean of debris, not locked.
Remarks Set pump at 92'.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-9
Sample #: WSP-MW-09-GW- 020811

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/8/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	81.07	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	88.64	Date Purged	2/8/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1135 - 1213
Date/Time Sampled	2/8/2011 1200	Flow Rate (ml/min)	420

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1139	81.19	7.35	1.06	10.12	12.10	>1000	88	
1143	81.17	7.21	0.776	10.07	14.84	156.0	58	
1147	81.17	7.12	0.816	10.27	16.58	60.7	49	
1151	81.17	7.09	0.791	10.37	16.86	56.3	43	
1155	81.17	7.07	0.782	10.44	16.88	38.4	40	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/8/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	N/A
Shipment Method	FedEx Overnight	Split with (name(s)/organization)	N/A

Well Integrity OK - clear of debris, locked.
Remarks Set pump at 85'.
Signature ____ Page 1 of 1

Parametrix, Inc.

Well #: MW-5
Sample #: WSP-MW-05-GW- 020911

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 2/9/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 79.07
Depth of Well (feet) 101.82
Reference Point (surveyors notch/etc) Top of casing
Date/Time Sampled 2/9/2011 0935

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/9/2011
Purge Time (from/to) 0905 - 0950
Flow Rate (ml/min) 450

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 2.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0905	81.14	5.70	0.285	9.75	15.55	>1000	155	
0912	82.21	6.29	0.276	9.03	15.92	610.0	98	
0916	83.00	6.56	0.275	8.97	16.94	255.0	70	
0920	82.40	6.76	0.274	8.75	16.37	109.0	57	
0924	82.28	6.86	0.270	8.69	17.10	151.0	55	
0928	82.39	6.85	0.269	8.76	17.47	115.0	51	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 2/11/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity Flush-mount bolted but no cap on well casing.
Remarks Set pump at 95'.
Signature
Page 1 of 1

U:\Puya\Projects\Clients\2662-WSDOC\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI FieldInvestgte\06P-GW-SWSamplesPMX\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-12
Sample #: WSP-MW-12-GW- 020911

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 2/9/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 68.66
Depth of Well (feet) 77.48
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/9/2011 1105
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/9/2011
Purge Time (from/to) ~~0932~~ 1032-1105
Flow Rate (ml/min) 360

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/c Actual Purge Volume (gallons) 5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1037	68.66	7.04	0.96	7.29	12.70	610.0	85	
1041	68.64	6.94	0.95	6.69	14.95	401.0	74	
1045	68.61	6.93	0.93	6.95	17.45	205.0	55	
1049	68.62	6.97	0.92	7.34	17.82	122.0	45	
1053	68.61	6.99	0.91	7.48	18.06	75.0	40	
1057	68.60	7.02	0.91	7.63	17.46	47.3	36	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand Delivered
Date Sent to Lab 2/9/2011
Field QC Sample Number WSP-MW-12-GW-020911 MS/MSD
Split with (name(s)/organization) n/a

Well Integrity OK. flush mount bolted, locked. Clear of debris.
Remarks Set pump at 74'. Collected MS/MSD.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-11
Sample #: WSP-MW-11-GW-020411

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004 AM1/06P	Date	2/4/2011
Project Name	RI/FS WA State Penitentiary	Location	WSP
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter (PMX)/Lara Linde (PMX)
Client Name	WA State Dept. of Corrections	Purged By	Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet)	67.70	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	77.76	Date Purged	2/4/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1305 - 1345
Date/Time Sampled	2/4/2011 1330	Flow Rate (ml/min)	400

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1306	67.72	7.61	1.01	9.57	15.28	>1000	85	
1310	67.74	7.28	0.99	8.66	17.55	696.0	85	
1314	67.72	7.14	0.98	8.41	20.12	221.0	63	
1318	67.72	7.06	0.98	8.45	20.62	68.3	50	
1322	67.72	7.05	0.98	8.44	20.69	44.8	48	
1326	—	7.03	0.98	8.46	20.76	32.5	47	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	2/11/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	n/a
Shipment Method	Hand Delivered	Split with (name(s)/organization)	n/a

Well Integrity Flush mount bolted and locked. Clear of debris.
Remarks Set pump at 72'.
Signature
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Parametrix, Inc.

Well #: MW-10
Sample #: WSP-MW-10-GW-020411

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 2/4/2011
Location WSP
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ______ 6" ______ Other ______

Depth to Water (feet) 71.26
Depth of Well (feet) 84.15
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/4/2011 1440
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/4/2011
Purge Time (from/to) 1416 - 1452
Flow Rate (ml/min) 400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1419	71.31	7.32	0.90	9.07	14.39	>1000	92	
1423	71.30	6.96	0.942	8.65	17.56	269.0	59	
1427	71.29	6.90	0.94	8.79	18.43	164.0	47	
1431	71.30	6.88	0.93	8.89	18.59	110.0	42	
1435	7.30	6.86	0.93	8.91	18.75	83.5	41	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand Delivered
Date Sent to Lab 2/11/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity Ok - flush mount bolted and cap locked. Clear of debris.
Remarks Set pump at 84'.
Signature
Page 1 of 1

509-527-4591
Dennis Rakestraw

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Parametrix, Inc.

Well #: MW-10
Sample #: SLF-MW-10-GW- 021011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 2/10/2011
Location Sudbury LF
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ____ 6" ____ Other ____

Depth to Water (feet) 24.51
Depth of Well (feet) —
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/10/2011 0915

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/10/2011
Purge Time (from/to) 0845-0930
Flow Rate (ml/min) 300

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)(\#\ \text{Casing volumes})$
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0848	24.54	5.97	0.532	7.46	11.51	0.0	155	
0852	24.55	6.38	0.522	5.25	12.67	0.0	129	
0856	24.53	6.48	0.521	5.54	12.84	0.0	117	
0900	24.53	6.58	0.520	5.49	13.01	0.0	109	
0904	24.54	6.64	0.523	5.15	12.70	0.0	104	
0908		6.68	0.528	5.05	12.44	0.0	98	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 2/11/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity Ok - locked.
Remarks Dedicated pump well.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-7
Sample #: SLF-MW-07-GW- 021011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 2/10/2011
Location Sudbury LF
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ✓ 4" ______ 6" ______ Other ______

Depth to Water (feet) 41.55
Depth of Well (feet) 181 (historical)
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/10/2011 1025
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/10/2011
Purge Time (from/to) 1000 - 1045
Flow Rate (ml/min) 450

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)(\#\ \text{Casing volumes})$
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/a Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1004	42.02	7.32	0.208	8.02	12.70	179.0	78	
1008	42.01	7.37	0.203	7.64	12.76	747.0	77	
1012	41.90	7.45	0.201	7.55	12.91	307.0	76	
1016	41.92	7.50	0.197	7.55	12.47	236.0	72	
1020	41.92	7.56	0.191	7.68	13.00	129.0	68	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2
Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand Delivered
Date Sent to Lab 2/11/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity Ok - capped and locked, clear of debris.
Remarks set pump at 173'.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-9
Sample #: SLF-MW-09-GW- 021011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004 AM1/06P
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 2/10/2011
Location Sudbury LF
Sampled By Mike Baxter (PMX)/Lara Linde (PMX)
Purged By Same as above.

Casing Diameter: 2" ~~✓~~ 4" ✓ 6" ____ Other ____

Depth to Water (feet) Not measurable
Depth of Well (feet) 290 (historical)
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 2/10/2011 1135
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 2/10/2011
Purge Time (from/to) 1110 - 1150
Flow Rate (ml/min) 420

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) n/c
Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1115	–	7.13	0.97	10.23	13.25	67.2	-19	
1119	–	7.04	0.97	10.37	13.47	15.6	33	
1123	–	7.03	0.97	10.33	13.35	0.0	45	
1127	–	7.02	0.97	10.23	13.40	0.0	51	
1131	–	7.02	0.97	10.15	13.40	0.0	56	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method Hand Delivered
Date Sent to Lab 2/11/2011
Field QC Sample Number n/a
Split with (name(s)/organization) n/a

Well Integrity OK- capped, locked. Dedicated pump.
Remarks Not able to record water depth. Probe gets caught up on pump hose/wires. 12" monument
Signature
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Parametrix, Inc.

Well #: MW-1
Sample #: WSP-MW-01-GW- 062011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 6/20/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2” X 4” 6” Other

Depth to Water (feet) 58.00
Depth of Well (feet) 66.80
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/20/2011 1020
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/20/2011
Purge Time (from/to) 0940 - 1020
Flow Rate (ml/min) 250

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A
Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0950	58.02	6.77	0.123	7.93	16.86	55.2	86	
0954	58.03	6.78	0.121	8.26	17.55	32.5	77	
0958	58.02	6.78	0.119	7.84	19.27	27.6	78	
1002	58.02	6.81	0.119	7.43	19.89	19.8	79	
1006	58.02	6.80	0.121	7.02	19.70	20.2	80	
1010	58.02	6.80	0.121	6.95	19.29	22.7	74	2gal

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number
Split with (name(s)/organization) N/A

Well Integrity OK - locked. Had to clear spiders and wasps.
Remarks Pump set at 64'. Low producing well. Trouble establishing flow.
Signature
Page 1 of 1

U:\Puya\Projects\Clients\2662-WSDOC\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI FieldInvestgte\06P-GW-SWSamplesPMX\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-9
Sample #: WSP-MW-09-GW-062011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/20/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet) 79.13
Depth of Well (feet) 87.75
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/20/2011 1140

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/20/2011
Purge Time (from/to) 1105 - 1145
Flow Rate (ml/min) 400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1109	79.23	7.37	99.9	8.52	15.85	>1000	122	
1113	79.24	7.20	99.9	7.54	18.10	>1000	89	
1117	79.22	7.19	99.9	7.50	19.00	796	74	
1121	79.22	7.18	99.9	7.44	19.93	481	66	
1125	79.24	7.18	99.9	7.50	20.02	250	60	
1129	79.25	7.16	99.9	8.16	19.76	201	49	
1133	79.25	7.16	99.9	8.15	19.45	251	56	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number —
Split with (name(s)/organization) N/A

Well Integrity Ok - locked, clear of debris.
Remarks Set pump at 85'
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-2

Sample #: WSP-MW-02-GW-062011

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	6/20/2011
Project Name	RI/FS WA State Penitentiary	Location	WA State Penitentiary
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter/Lara Linde
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	40.99	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	50.78	Date Purged	6/20/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1312 - 1355
Date/Time Sampled	6/20/2011 1340	Flow Rate (ml/min)	300

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3.5

TIME (2400 hr)	WATER LEVEL (feet) 2*	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1314	42.97	7.43	99.9	10.34	16.84	193	109	
1318	45.81	7.30	0.090 S/cm	10.20	17.58	97.1	63	
1322	45.94	7.25	0.090 S/cm	10.09	18.25	82.6	51	
1326	41.00	7.27	99.9	10.14	18.82	74.7	57	
1330	41.00	7.26	0.090 S/cm	10.03	18.79	51.7	53	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	6/21/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	—
Shipment Method	FedEx	Split with (name(s)/organization)	N/A

Well Integrity Ok - locked, clear of debris

Remarks Set pump at 48'. * Readings suspect since WLI not working well. MS/MSD set.

Signature

Page 1 of 1

Parametrix, Inc.

Well #: MW-3
Sample #: WSP-MW-03-GW- 062011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/20/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet) 69.08
Depth of Well (feet) 79.20
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/20/2011 1505

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/20/2011
Purge Time (from/to) 1435 - 1510
Flow Rate (ml/min) 325

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1438	69.15	7.17	99.9	7.61	18.64	180	77	
1442	69.14	6.96	99.9	7.29	18.10	107	61	
1446	69.14	6.95	99.9	7.48	19.06	74.0	54	
1450	69.14	6.59	99.9	7.04	20.52	53.2	66	
1454	69.14	6.81	99.9	6.70	21.29	54.9	65	
1458	–	6.85	99.9	6.79	20.86	55.4	68	3gal

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number
Split with (name(s)/organization) N/A

Well Integrity Ok-locked, clear of debris.
Remarks Set pump at 77'.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-14
Sample #: WSP-MW-14-GW-062011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 6/20/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 64.79
Depth of Well (feet) 74.43
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/20/2011 1605
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/20/2011
Purge Time (from/to) 1535 - 1610
Flow Rate (ml/min) 400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1542	64.79	7.34	94	11.33	18.24	184	85	
1546	64.80	7.15	91	11.02	17.51	51.6	53	
1550	64.80	7.08	91	10.88	17.54	20.4	62	
1554	64.80	7.05	91	10.83	17.49	15.4	71	
1558	64.80	7.03	91	10.68	17.30	16.12	76	
1602	64.81	7.04	91	10.70	17.48	12.3	76	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number —
Split with (name(s)/organization) N/A

Well Integrity Ok - locked, clear of debris.
Remarks Set pump at 72'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-6
Sample #: WSP-MW-06-GW- 062111

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/21/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 23.04
Depth of Well (feet) 33.15
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/21/2011 0810

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/21/2011
Purge Time (from/to) 0739-0825
Flow Rate (ml/min) 350

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0741	23.30	6.03	99.9	1.02	15.81	>1000	26	
0745	23.27	6.28	95.7	0.61	15.47	261	41	
0749	23.27	6.37	93.3	0.62	17.13	55.4	47	
0753	23.30	6.42	91.4	0.61	17.45	32.2	45	
0757	23.32	6.46	89.4	0.51	17.66	22.2	41	
0801	23.30	6.47	90.2	0.49	17.53	23.4	40	
0805		6.44	90.0	0.47	17.34	40.0	32	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number
Split with (name(s)/organization) N/A

Well Integrity OK - locked, clear of debris.
Remarks Set pump at 31'. Field Duplicate collected (WSP-MW-DUP-GW-062111).
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-7
Sample #: WSP-MW-07-GW- 062111

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/21/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet) 52.03
Depth of Well (feet) 61.02
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/21/2011 0940

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/21/2011
Purge Time (from/to) 0853-0945
Flow Rate (ml/min) 400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3.25

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0855	—	6.72	99.9	8.13	16.46	>1000	120	
0859	52.10	6.84	99.9	7.33	17.30	982.0	73	
0903	52.10	6.93	99.9	8.52	18.38	846.0	82	
0907	52.09	6.86	99.9	8.20	18.98	748.0	78	
0911	52.10	6.93	99.9	8.15	19.34	677.0	68	
0915	52.10	6.88	99.9	8.05	19.53	568.0	60	
0919	52.10	6.95	99.9	7.06	19.26	427.0	37	
0923	52.09	6.89	99.9	7.62	21.61	102.0	40	
0927	52.10	6.78	99.9	7.66	22.19	102.0	55	
0931	52.10	6.98	99.9	7.23	21.07	67.2	53	
0935	52.09	6.90	99.9	7.16	21.47	78.2	64	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/21/2011
Field QC Sample Number —
Split with (name(s)/organization) N/A

Well Integrity Ok-locked, clear of debris.
Remarks Set pump at 59'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-8
Sample #: WSP-MW-08-GW-062111

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	6/21/2011
Project Name	RI/FS WA State Penitentiary	Location	WA State Penitentiary
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter/Lara Linde
Client Name	WA State Dept. of Corrections	Purged By	(Same as above)

Casing Diameter: 2" X 4" 6" Other

Depth to Water (feet)	84.78	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	96.70	Date Purged	6/21/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1025 - 1105
Date/Time Sampled	6/21/2011 1100	Flow Rate (ml/min)	400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3.5

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1029	—	7.40	99.9	10.72	16.42	>1000	137	
1033	85.12	7.30	90	9.75	16.90	>1000	133	
1037	85.15	7.29	99.9	9.35	18.50	>1000	131	
1041	85.17	7.23	90	10.18	17.55	677.0	132	
1045	85.18	7.23	99.9	9.88	21.86	208.0	110	
1049	85.17	7.22	99.9	9.98	20.31	300.0	122	
1053	85.18	7.23	99.9	9.86	19.61	225.0	125	
1057	—	7.28	99.9	9.52	20.15	177.0	123	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	6/21/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	
Shipment Method	FedEx	Split with (name(s)/organization)	N/A

Well Integrity: OK - locked, clear of debris. Some standing water.
Remarks: Set pump at 94'.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-13

Sample #: WSP-MW-13-GW- 062111

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	6/21/2011
Project Name	RI/FS WA State Penitentiary	Location	WA State Penitentiary
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter/Lara Linde
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	50.02	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	58.90	Date Purged	6/21/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1135 - 1218
Date/Time Sampled	6/21/2011 1215	Flow Rate (ml/min)	300

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1139	51.35	7.22	99.9	7.31	17.94	>1000	116	
1143	51.26	7.03	99.9	6.10	18.69	>1000	104	
1147	50.05	6.90	99.9	5.99	20.03	>1000	108	
1151	50.05	6.89	99.9	6.02	19.42	788.0	86	
1155	50.07	6.87	99.9	6.50	19.64	893.0	89	
1159	50.08	6.86	99.9	6.00	19.55	296.0	78	
1203	50.01	6.82	99.9	5.73	19.49	233.0	81	
1207	—	6.85	99.9	5.81	20.27	259.0	87	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	6/21/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	–
Shipment Method	FedEx	Split with (name(s)/organization)	N/A

Well Integrity OK - locked, clear of debris.

Remarks Set pump at 57'.

Signature ____ Page 1 of 1

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Parametrix, Inc.

Well #: MW-12
Sample #: WSP-MW-12-GW- 062211

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	6/22/2011
Project Name	RI/FS WA State Penitentiary	Location	WA State Penitentiary
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	Mike Baxter/Lara Linde
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet)	66.72	Purge Vol. Meas.Method	Grad cyl & stop watch
Depth of Well (feet)	76.40	Date Purged	6/22/2011
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	0755 - 0831
Date/Time Sampled	6/22/2011 0825	Flow Rate (ml/min)	300

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 2

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0801	66.82	6.35	136	5.74	17.14	>1000	128	
0805	66.74	6.65	133	5.56	17.63	>1000	101	
0809	66.77	6.78	129	5.45	19.97	776.0	79	
0813	66.78	6.84	130	5.39	20.93	482.0	80	
0817	66.78	6.95	125	5.83	20.69	799.0	83	
0821	66.78	6.99	124	5.80	20.61	901.0	84	

Purge Equipment	Grundfos Readyflow 2	Sampling Equipment	Grundfos Readyflow 2
Laboratory	OnSite Environmental	Date Sent to Lab	6/23/2011
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	–
Shipment Method	FedEx	Split with (name(s)/organization)	N/A

Well Integrity OK - locked, clear of debris
Remarks Set pump at 64'.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-11
Sample #: WSP-MW-11-GW- 062211

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections
Date 6/22/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet) 65.43
Depth of Well (feet) 76.45
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/22/2011 0925
Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/22/2011
Purge Time (from/to) 0901-0950
Flow Rate (ml/min) 350

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A
Actual Purge Volume (gallons) 3.25

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0905	66.00	7.14	98	8.21	19.25	>1000	139	
0909	65.99	7.06	95	7.71	20.13	>1000	61	
0913	66.00	7.06	96	7.80	20.20	494.0	68	
0917	65.97	7.05	96	7.75	20.84	209.0	71	
0921	65.97	7.04	97	7.78	20.85	69.6	75	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/23/2011
Field QC Sample Number —
Split with (name(s)/organization) N/A

Well Integrity Ok-locked, clear of debris.
Remarks set pump at 74'.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-10
Sample #: WSP-MW-10-GW- 062211

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/22/2011
Location WA State Penitentiary
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 69.60
Depth of Well (feet) 84.50
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/22/2011 1030

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/22/2011
Purge Time (from/to) 1001 - 1034
Flow Rate (ml/min) 350

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1006	69.69	7.22	40	8.23	18.09	>1000	105	
1010	69.68	7.02	100	7.85	18.12	>1000	72	
1014	69.69	6.93	90	7.87	19.55	459.0	67	
1018	69.70	6.97	90	7.75	19.40	330.0	70	
1022	69.70	6.95	90	7.83	20.01	179.0	73	
1026	69.70	6.95	90	7.78	20.05	174.0	75	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/23/2011
Field QC Sample Number —
Split with (name(s)/organization) N/A

Well Integrity Ok-locked, clear of debris.
Remarks Set pump at 82'
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-5

Sample #: WSP-MW-05-GW-062211

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004

Project Name RI/FS WA State Penitentiary

Project Address 1313 North 13th Avenue
Walla Walla, WA 99362

Client Name WA State Dept. of Corrections

Date 6/22/2011

Location WA State Penitentiary

Sampled By Mike Baxter/Lara Linde

Purged By (Same as above.)

Casing Diameter: 2" X 4" ______ 6" ______ Other ______

Depth to Water (feet) 77.30

Depth of Well (feet) ~~103.20~~ 102.20

Reference Point (surveyors notch/etc) Top of Casing

Date/Time Sampled 6/22/2011 1350

Purge Vol. Meas.Method Grad cyl & stop watch

Date Purged 6/22/2011

Purge Time (from/to) 1315 - 1356

Flow Rate (ml/min) 350

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 3

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1322	—	7.88	55.2	8.59	20.14	>1000	90	
1326	90.30	7.74	52.6	7.97	20.01	872	69	
1330	90.43	7.71	52.3	7.35	21.30	664	66	
1334	90.28	7.63	52.3	8.20	20.93	558.0	63	
1338	90.29	7.62	51.3	7.29	22.77	420.0	58	
1342	90.26	7.59	51.5	7.21	23.64	555.0	64	
1346	—	7.58	51.5	7.40	22.57	257.0	63	

Purge Equipment Grundfos Readyflow 2

Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental

Chain-of-Custody (yes/no) YES

Shipment Method FedEx

Date Sent to Lab 6/23/2011

Field QC Sample Number —

Split with (name(s)/organization) N/A

Well Integrity Monument bolted, but no cap on well casing.

Remarks Set pump at 95'.

Signature

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Parametrix, Inc.

Well #: MW-9
Sample #: SLF-MW-09-GW- 062311

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/23/2011
Location Sudbury Landfill
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 59.73
Depth of Well (feet) N/A
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/23/2011 1015

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/23/2011
Purge Time (from/to) 0945 - 1026
Flow Rate (ml/min) 400

Purge Volume Calculation: (πr^2h)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0948	63.64	6.39	90	8.25	14.73	502.0	-28	
0952	63.80	6.70	90	8.24	14.79	258.0	41	
0956	63.84	6.86	90	8.10	14.82	205.0	68	
1060	63.20	6.96	90	8.22	14.76	201.0	79	
1004	63.90	6.93	90	8.51	14.80	202.0	86	
1008	64.00	6.91	90	8.76	14.85	182.0	89	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/23/2011
Field QC Sample Number
Split with (name(s)/organization) N/A

Well Integrity Ok - clear of debris.
Remarks Dedicated pump w/ adapter for wellhead. MS/MSD set.
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-7
Sample #: SLF-MW-07-GW-062311

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/23/2011
Location Sudbury Landfill
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 40.65
Depth of Well (feet) N/A
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/23/2011 1120

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/23/2011
Purge Time (from/to) 1050 - 1130
Flow Rate (ml/min) 400

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 4

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1056	40.80	7.50	54.9	6.24	15.59	76.0	103	
1100	40.73	7.53	53.3	6.41	15.46	73.5	86	
1104	40.73	7.54	52.8	5.95	15.44	35.7	72	
1108	40.75	7.56	52.5	5.81	15.55	39.1	67	
1112	40.75	7.57	52.1	5.83	15.55	37.3	66	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method FedEx
Date Sent to Lab 6/23/2011
Field QC Sample Number –
Split with (name(s)/organization) N/A

Well Integrity OK-clear of debris. Not locked.
Remarks Set pump at 175'.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-10
Sample #: SLF-MW-10-GW-062311

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 6/23/2011
Location Sudbury Landfill
Sampled By Mike Baxter/Lara Linde
Purged By (Same as above.)

Casing Diameter: 2" X 4" 6" Other

Depth to Water (feet) 23.16
Depth of Well (feet) N/A
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 6/23/2011 1216

Purge Vol. Meas.Method Grad cyl & stop watch
Date Purged 6/23/2011
Purge Time (from/to) 1146-1220
Flow Rate (ml/min) 400

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) 2.25

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1148	23.19	7.23	99.9	6.59	14.71	123	129	
1152	23.19	7.06	90	8.03	16.11	18.4	87	
1156	23.18	6.95	90	7.76	16.63	15.8	85	
1200	23.15	6.91	90	4.66	17.78	20.6	96	
1204	23.15	6.93	90	4.45	18.14	22.3	99	
1208	23.15	6.88	90	4.42	17.97	22.2	98	

Purge Equipment Grundfos Readyflow 2
Sampling Equipment Grundfos Readyflow 2

Laboratory OnSite Environmental
Chain-of-Custody (yes/no) YES
Shipment Method
Date Sent to Lab
Field QC Sample Number
Split with (name(s)/organization) N/A

Well Integrity Ok - clear of debris. Monument cap hinge broken. Cannot lock.
Remarks Dedicated pump. Need City adapter and controller.
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: mw-1

Sample #: WSP-1-091911

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/19/11
Location Landfill
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 59.49
Depth of Well (feet) 67.30
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/19/11 1435

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/19/11
Purge Time (from/to) 1412 - 1432
Flow Rate (ml/min) 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1412	59.49	6.98	82.2	5.89	18.52	37.5	83	
1416	59.49	6.80	80.4	5.19	19.18	30.2	87	
1420	59.49	6.71	79.4	5.00	20.81	29.6	82	
1424	59.49	6.54	80.5	5.39	21.75	32.3	88	
1428	59.49	6.47	81.1	5.29	22.46	35.8	92	
1432	59.49	6.51	82.0	5.27	21.17	32.8	89	1.5 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory Test America
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks pump @ 63 ft, cannot maintain constant flow
Signature L Linde
Page 1 of 1

Parametrix, Inc.

Groundwater Sampling Field Data Sheet

Well #: mw-2

Sample #: WSP-2-91911

Project Number	215-2662-004	Date	9/19/11
Project Name	RI/FS WA State Penitentiary	Location	Field by composting facility
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	L.Linde/E. Heinitz/S.Trecanni
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet)	42.14	Purge Vol. Meas.Method	Meas cup & stop watch
Depth of Well (feet)	50.90	Date Purged	9/19/11
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1534-1558
Date/Time Sampled	9/19/11 1605	Flow Rate (ml/min)	325 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ___

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1534	42.15	7.31	62.5	8.61	17.28	166	79	
1538	42.16	7.08	62.5	7.73	18.53	152	70	
1542	42.16	6.95	62.5	7.75	18.85	142	71	
1546	42.16	6.83	62.4	7.91	18.87	111	76	
1550	42.16	6.72	62.5	7.82	18.67	91	81	
1554	42.17	6.67	62.4	7.72	18.67	85	85	
1558	42.13	6.64	62.5	7.64	18.69	90	86	4 gal

Purge Equipment	Grundfos Readyflo 2	Sampling Equipment	Grundfos Readyflo 2
Laboratory	TestAmerica	Date Sent to Lab	9/21/11
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	N/A
Shipment Method	Hand delivered	Split with (name(s)/organization)	N/A

Well Integrity Good

Remarks Pump @ 46 ft

Signature LLinde

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Parametrix, Inc.

Well #: MW-3
Sample #: WSP-3-~~3~~91911

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/19/11
Location Perimeter Rd
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2” X 4” 6” Other

Depth to Water (feet) 70.59
Depth of Well (feet) 80.20
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/19/11 1655

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/19/19
Purge Time (from/to) 1625 - 1648
Flow Rate (ml/min) 325 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons)

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1625	71.90	7.09	74.2	8.40	17.82	188	87	
1629	71.41	6.87	74.0	6.45	18.35	109	81	
1633	71.43	6.87	0.103 S/m	7.43	18.64	79.6	80	
1637	70.30	6.68	0.101	6.18	20.36	63.2	78	
1641	70.61	6.66	0.103	6.44	20.43	73.6	76	
1645	70.60	6.69	0.104	6.42	19.62	42.6	70	
1648	70.61	6.72	0.103	6.40	19.76	35.0	67	2.5 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks pump @ 75 ft, cannot maintain constant flow
Signature
Page 1 of 1

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Parametrix, Inc.

Well #: MW-5

Sample #: WSP-5-[illegible]92011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/20/11
Location Big Yard
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) ~~80.82~~ 79.93 LL 9/20/11
Depth of Well (feet) 100.65
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/20/11 ~~100~~ 1010 LL 9/20/11

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/20/11
Purge Time (from/to) 0937 - 1006
Flow Rate (ml/min) 350 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0937	82.40	7.44	14.2	8.85	17.40	927	98	
0941	82.65	7.32	14.0	8.24	18.16	527	106	
0945	82.60	7.27	13.9	8.07	18.49	456	108	
0949	82.65	7.20	13.9	8.67	19.54	>1000	112	
0953	83.01	7.20	13.8	7.98	20.23	396	117	
0957	83.85	7.21	13.8	7.74	20.68	302	90	
1002	83.41	7.15	13.7	7.32	21.90	734	90	
1006	83.52	7.19	13.8	7.48	21.74	256	92	3 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks missing cap and lock, pump @ 95'
Signature L Linde
Page 1 of 1

Parametrix, Inc.

Groundwater Sampling Field Data Sheet

Well #: MW-6

Sample #: WSP-~~MW~~ 6-091911 LL 9/19/11

Project Number	215-2662-004	Date	9/19/11
Project Name	RI/FS WA State Penitentiary	Location	Stormwater Pond
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	L.Linde/E. Heinitz/S.Trecanni
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ___ 6" ___ Other ___

Depth to Water (feet)	25.56	Purge Vol. Meas.Method	Meas cup & stop watch
Depth of Well (feet)	33.05	Date Purged	9/19/11
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	0845 - 0909
Date/Time Sampled	9/19/11 0915	Flow Rate (ml/min)	300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ___

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0845	25.70	5.57	37.3	1.13	16.97	144	102	
0849	25.74	5.52	33.4	0.42	18.15	21.9	51	
0853	25.71	5.67	32.6	0.33	18.37	21.4	35	
0857	25.6[illegible]	5.74	32.3	0.24	18.56	14.6	25	
0901	25.68	5.81	31.9	1.20	18.95	14.8	16	
0905	25.63	5.86	31.8	0.35	19.34	20.2	12	
0909	25.67	5.91	31.7	0.87	19.60	20.5	6	3.5 gal

Purge Equipment	Grundfos Readyflo 2	Sampling Equipment	Grundfos Readyflo 2
Laboratory	TestAmerica	Date Sent to Lab	9/21/11
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	See below ~~N/A~~ LL 9/19/11
Shipment Method	Hand delivered	Split with (name(s)/organization)	N/A

Well Integrity Good

Remarks pump @ 28', petroleum odor, purge water has orange tint

Signature L Linde Page 1 of 1

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Field duplicate collected @ 0920, WSP-6D-[illegible]91911

Parametrix, Inc.

Groundwater Sampling Field Data Sheet

Well #: mw-7
Sample #: WSP-7-9/911

Project Number: 215-2662-004
Project Name: RI/FS WA State Penitentiary
Project Address: 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name: WA State Dept. of Corrections

Date: 9/19/11
Location: Parking Lot
Sampled By: L.Linde/E. Heinitz/S.Trecanni
Purged By: (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet): 55.17
Depth of Well (feet): 60.19
Reference Point (surveyors notch/etc): Top of Casing
Date/Time Sampled: 9/19/11 1030

Purge Vol. Meas.Method: Meas cup & stop watch
Date Purged: 9/19/11
Purge Time (from/to): 1006 - 1026
Flow Rate (ml/min): 300 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ gal/ft^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): N/A
Actual Purge Volume (gallons): ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1006	55.21	6.79	53.2	9.03	16.95	861	71	
1010	55.22	6.58	50.8	7.16	18.53	381	59	
1014	51.21	6.44	50.0	7.09	19.12	150	68	
1018	51.21	6.41	50.3	7.31	19.90	120	72	
1022	51.19	6.46	51.7	7.93	19.21	132	70	
1026	51.20	6.49	50.7	7.61	20.41	146	75	3 gal

Purge Equipment: Grundfos Readyflo 2
Sampling Equipment: Grundfos Readyflo 2

Laboratory: Test America
Chain-of-Custody (yes/no): YES
Shipment Method: Hand delivered
Date Sent to Lab: 9/21/11
Field QC Sample Number: N/A
Split with (name(s)/organization): N/A

Well Integrity: Good
Remarks: Water in monument, missing 1 bolt, pump @ 58'
Signature: ____ Page ____ of ____

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Parametrix, Inc.

Well #: mw-8

Sample #: WSP-8-91911

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004

Project Name RI/FS WA State Penitentiary

Project Address 1313 North 13th Avenue
Walla Walla, WA 99362

Client Name WA State Dept. of Corrections

Date 9/19/11

Location Superintendents House

Sampled By L.Linde/E. Heinitz/S.Trecanni

Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 87.73

Depth of Well (feet) 96.28

Reference Point (surveyors notch/etc) Top of Casing

Date/Time Sampled 9/19/11 1145

Purge Vol. Meas.Method Meas cup & stop watch

Date Purged 9/19/11

Purge Time (from/to) 1116 - 1140

Flow Rate (ml/min) 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1116	87.75	7.25	51.9	12.54	17.46	>1000	76	
1120	87.75	7.08	50.5	9.58	18.12	632	85	
1124	87.75	7.00	50.3	9.65	19.57	386	90	
1128	87.75	6.97	50.0	9.69	19.58	236	93	
1132	87.75	6.94	49.7	9.65	19.60	151	93	
1136	87.75	6.91	49.6	9.67	19.50	104	88	
1140	87.75	6.88	49.4	9.65	19.32	120	84	5gal

Purge Equipment Grundfos Readyflo 2

Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica

Chain-of-Custody (yes/no) YES

Shipment Method Hand delivered

Date Sent to Lab 9/21/11

Field QC Sample Number N/A

Split with (name(s)/organization) N/A

Well Integrity Good

Remarks Water in monument, pump @ 92'

Signature Linde

Page 1 of 1

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Parametrix, Inc.

Well #: MW-9
Sample #: WSP-9-91911

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	9/19/11
Project Name	RI/FS WA State Penitentiary	Location	Dairy Farm
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	L.Linde/E. Heinitz/S.Trecanni
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet)	80.81	Purge Vol. Meas.Method	Meas cup & stop watch
Depth of Well (feet)	88.90	Date Purged	9/19/11
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1310 - 1338
Date/Time Sampled	9/19/11 1340	Flow Rate (ml/min)	400 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1310	80.86	7.33	46.8	10.20	17.47	71000	95	
1314	80.86	7.12	46.7	9.67	18.88	908	100	
1318	80.84	6.96	46.8	9.67	20.43	409	98	
1322	80.88	6.92	46.8	9.35	20.52	328	94	
1326	80.84	6.85	46.8	9.10	20.55	265	89	
1330	80.84	6.78	46.8	8.91	21.25	247	71	
1334	80.84	6.76	46.8	8.88	22.07	196	66	
1338	80.84	6.80	46.9	9.18	22.73	160	61	3 gal

Purge Equipment	Grundfos Readyflo 2	Sampling Equipment	Grundfos Readyflo 2
Laboratory	TestAmerica	Date Sent to Lab	9/21/11
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	N/A
Shipment Method	Hand delivered	Split with (name(s)/organization)	N/A

Well Integrity Good
Remarks Pump set @ 84 ft
Signature
Page 1 of 1

U:\Puya\Projects\Clients\2662-WSDOC\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI FieldInvestgte\T06-Groundwater Sampling\Blank GW Form.doc

Parametrix, Inc.

Well #: MW-10

Sample #: WSP-10-092011

Groundwater Sampling Field Data Sheet

Project Number	215-2662-004	Date	9/20/11
Project Name	RI/FS WA State Penitentiary	Location	BAR Units
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	L.Linde/E. Heinitz/S.Trecanni
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2" X 4" 6" Other

Depth to Water (feet)	72.09	Purge Vol. Meas.Method	Meas cup & stop watch
Depth of Well (feet)	83.00	Date Purged	9/20/11
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1134-1150
Date/Time Sampled	9/20/11 1155	Flow Rate (ml/min)	400 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons)

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1134	72.13	7.05	62.0	9.92	17.01	71000	107	
1138	72.10	6.91	63.4	8.36	19.35	952	107	
1142	72.12	6.86	62.4	8.25	19.68	427	112	
1146	72.13	6.84	62.2	8.20	19.58	281	94	
1150	72.12	6.83	61.2	8.21	19.46	153	92	4gal

Purge Equipment	Grundfos Readyflo 2	Sampling Equipment	Grundfos Readyflo 2
Laboratory	TestAmerica	Date Sent to Lab	9/21/11
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	N/A
Shipment Method	Hand delivered	Split with (name(s)/organization)	N/A

Well Integrity Good

Remarks pump @ 79'

Signature LLinde

Page 1 of 1

U:\Puya\Projects\Clients\2662-WSDOC\215-2662-004-RI-FS WallaWallaStPnitntry\02 WBS\PAM1-RI FieldInvestgte\T06-Groundwater Sampling\Blank GW Form.doc

Parametrix, Inc.

Groundwater Sampling Field Data Sheet

Well #: MW-11
Sample #: WSP-11-092011

Project Number	215-2662-004	Date	9/20/11
Project Name	RI/FS WA State Penitentiary	Location	Infirmary
Project Address	1313 North 13th Avenue Walla Walla, WA 99362	Sampled By	L.Linde/E. Heinitz/S.Trecanni
Client Name	WA State Dept. of Corrections	Purged By	(Same as above.)

Casing Diameter: 2” X 4” 6” Other

Depth to Water (feet)	68.09	Purge Vol. Meas.Method	Meas cup & stop watch
Depth of Well (feet)	76.6	Date Purged	9/20/11
Reference Point (surveyors notch/etc)	Top of Casing	Purge Time (from/to)	1039-1103
Date/Time Sampled	9/20/11 1110	Flow Rate (ml/min)	350 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons)

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1039	68.11	6.94	0.100 S/m	8.09	18.69	>1000	114	
1043	68.11	6.88	0.100	7.70	19.71	680	107	
1047	68.10	6.86	0.100	7.71	21.16	265	82	
1051	68.10	6.84	0.100	7.75	21.65	158	70	
1055	68.10	6.86	0.100	7.53	22.00	146	67	
1059	68.10	6.84	0.100	7.41	22.31	150	64	
1103	68.10	6.84	0.100	7.50	22.12	100	63	3 gal

Purge Equipment	Grundfos Readyflo 2	Sampling Equipment	Grundfos Readyflo 2
Laboratory	TestAmerica	Date Sent to Lab	9/21/11
Chain-of-Custody (yes/no)	YES	Field QC Sample Number	N/A
Shipment Method	Hand delivered	Split with (name(s)/organization)	N/A

Well Integrity Good
Remarks pump @ 72', water in monument
Signature
Page 1 of 1

Parametrix, Inc.

Well #: MW-12
Sample #: WSP-12-~~7~~092011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/20/11
Location Delta Unit
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 68.61
Depth of Well (feet) 76.9
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/20/11 0815

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/20/11
Purge Time (from/to) 0751 - 0811
Flow Rate (ml/min) 400 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)(\#\ \text{Casing volumes})$
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
0751	–	5.98	63.8	7.95	16.03	>1000	180	
0755	72.20	6.39	62.0	8.04	16.93	>1000	169	
0759	72.20	6.60	61.8	7.83	18.15	>1000	158	
0804	72.20	6.70	61.7	8.06	18.83	>1000	153	
0807	72.21	6.77	61.9	7.95	18.88	>1000	147	
0811	72.21	6.85	62.1	7.58	18.52	914	143	2.5 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks Pump @ 72', water in monument
Signature LLinde
Page 1 of 1

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Parametrix, Inc.

Well #: MW-13

Sample #: WSP-13-092011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/20/11
Location Perimeter Rd Corner)
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2" X 4" ____ 6" ____ Other ____

Depth to Water (feet) 52.12
Depth of Well (feet) 59.5
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/20/11 1350

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/20/11
Purge Time (from/to) 1314 - 1346
Flow Rate (ml/min) 400 ml/min

Purge Volume Calculation: $(\pi r^2 h)(7.48\ \text{gal/ft}^3)$(# Casing volumes)
Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1314	52.16	7.11	52.0	9.58	17.80	>1000	113	
1318	52.15	6.86	52.0	7.18	20.13	>1000	115	
1322	52.14	6.79	52.2	7.47	19.06	>1000	117	
1326	52.14	6.76	52.5	6.93	20.25	>1000	117	
1330	52.13	6.71	52.3	6.92	21.01	994	115	
1334	52.14	6.75	52.1	7.31	18.94	206	110	
1338	52.14	6.74	52.2	6.64	19.09	154	104	
1342	52.14	6.85	52.2	6.85	20.45	144	102	
1346	52.15	6.72	52.2	6.86	20.62	140	97	4.5 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks pump @ 56', low to ground surface
Signature Linde
Page ____ of 1

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Parametrix, Inc.

Well #: mW-14

Sample #: WSP-14-92011

Groundwater Sampling Field Data Sheet

Project Number 215-2662-004

Project Name RI/FS WA State Penitentiary

Project Address 1313 North 13th Avenue
Walla Walla, WA 99362

Client Name WA State Dept. of Corrections

Date 9/20/11

Location Perimeter Rd - tower

Sampled By L.Linde/E. Heinitz/S.Trecanni

Purged By (Same as above.)

Casing Diameter: 2" X 4" 6" Other

Depth to Water (feet) 66.29

Depth of Well (feet) 74.15

Reference Point (surveyors notch/etc) Top of Casing

Date/Time Sampled 9/20/11 1435

Purge Vol. Meas.Method Meas cup & stop watch

Date Purged 9/20/11

Purge Time (from/to) 1413 - 1429

Flow Rate (ml/min) 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)

Purge Volume (gallons) for 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)

Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons)

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1413	66.32	6.93	0.103 S/m	8.77	18.43	508	105	
1417	66.41	6.81	0.103	7.98	18.12	78.2	78	
1421	–	6.75	0.103	7.92	18.49	32.0	66	
1425	66.32	6.72	0.103	7.98	18.37	18.1	73	
1429	66.32	6.67	0.103	7.95	18.30	9.8	76	3gal

Purge Equipment Grundfos Readyflo 2

Sampling Equipment Grundfos Readyflo 2

Laboratory TestAmerica

Chain-of-Custody (yes/no) YES

Shipment Method Hand delivered

Date Sent to Lab 9/21/11

Field QC Sample Number WSP-14-92011R

Split with (name(s)/organization) N/A

Well Integrity Good

Remarks pump @ 70'

Signature

Page 1 of 1

Rinsate collected @ 1445 WSP-14-92011R

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Parametrix, Inc.

Groundwater Sampling Field Data Sheet

Well # MW-15

Sample #: ~~WSP-15-91111~~ hh 9/19/11 WSP-15-91911

Project Number 215-2662-004
Project Name RI/FS WA State Penitentiary
Project Address 1313 North 13th Avenue
Walla Walla, WA 99362
Client Name WA State Dept. of Corrections

Date 9/19/11
Location Training Center
Sampled By L.Linde/E. Heinitz/S.Trecanni
Purged By (Same as above.)

Casing Diameter: 2” X 4” ____ 6” ____ Other ____

Depth to Water (feet) 99.54
Depth of Well (feet) 110.77
Reference Point (surveyors notch/etc) Top of Casing
Date/Time Sampled 9/19/11 1235

Purge Vol. Meas.Method Meas cup & stop watch
Date Purged 9/19/11
Purge Time (from/to) hh 9/19/11 ~~1230~~ 1214 - 1230
Flow Rate (ml/min) 300 ml/min

Purge Volume Calculation: ($\pi r^2 h$)(7.48 gal/ft^3)(# Casing volumes)
Purge Volume (gallons) for 2” = (0.16)(h)(#Cv); 4” = (0.653)(h)(#Cv); 6” = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons) N/A Actual Purge Volume (gallons) ____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units) ± 0.1	COND (mS/cm) ± 3%	DO (mg/L) ±10%	TEMP °C	TURB. ±10%	ORP (mV) ±10mV	CUM. VOL. (gal)
1214	99.59	7.15	58.8	8.05	16.68	71000	78	
1218	99.58	6.93	59.2	7.86	17.87	71000	85	
1222	99.58	6.78	59.4	7.83	18.68	71000	95	
1226	99.57	6.66	59.3	7.75	19.59	71000	97	
1230	99.57	6.63	59.6	7.51	20.91	71000	90	2.5 gal

Purge Equipment Grundfos Readyflo 2
Sampling Equipment Grundfos Readyflo 2

Laboratory Test America
Chain-of-Custody (yes/no) YES
Shipment Method Hand delivered
Date Sent to Lab 9/21/11
Field QC Sample Number N/A
Split with (name(s)/organization) N/A

Well Integrity Good
Remarks pump set @ 105 ft
Signature
Page 1 of 1

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Well Number MW-1
Project Name WSP gw

Depth to Water 59.72'
Depth of Well 67'
Pump Depth 64'

Purge Time 12:57 - 1310

Date 12-13-11 12:50
Sampled By EH & ST 121311-01

Purge Flow Rate 700 mL/min
Water Column Volume 4 gal

Actual Purge Volume 4.5 gal

Notes sample @ 1310

Well Number MW-2
Project Name WSP gw

Depth to Water 42.44'
Depth of Well 51'
Pump Depth 48'

Purge Time 1332 - 1340

Date 12-13-11 1328
Sampled By EH & ST 121311-02

Purge Flow Rate 800 mL/min
Water Column Volume 4.5 gal

Actual Purge Volume

Notes Sample @ 1340

Well Number MW-3
Project Name WSP gw

Depth to Water 70.83'
Depth of Well 80'
Pump Depth 77' (approx - not hit bottom)

Purge Time 1452 - 1507

Date 12-13-11 1442
Sampled By EH & ST 121311-03

Purge Flow Rate 750 mL/min
Water Column Volume 5 gal

Actual Purge Volume 4 gal

Notes sample @ 1507

Well Number MW-5

Project Name WSP gw

Date 12-~~13~~14-11 1325

Sampled By EH & ST

Depth to Water 79.89'

Depth of Well 102'

Pump Depth unknown - 85-90 ft

Purge Flow Rate 700 mL/min

Water Column Volume 1.0 gal

Purge Time 1333 - 1348

Actual Purge Volume 4.5 gal

Notes sampled @ 1348

Well Number MW-6

Project Name WSP gw

Date 12-13-11 8:45

Sampled By EH & ST 121311-06

Depth to Water 26.47'

Depth of Well 30'

Pump Depth 27'

Purge Flow Rate 750 mL/min

Water Column Volume 1.5 gal

Purge Time 8:53 - 9:05

Actual Purge Volume 6 gal

Notes sampled @ 9:05 - slight petroleum odor, no sheen

Well Number MW-7

Project Name WSP gw

Date 12-13-11 10:15

Sampled By EH & ST 121311-07

Depth to Water 55.13'

Depth of Well 65'

Pump Depth 53'

Purge Flow Rate 850 mL/min

Water Column Volume 5 gal

Purge Time 10:28 - 10:37

Actual Purge Volume 4 gal

Notes Sampled @ 10:37 - water in well bore, frozen

Well Number MW-8

Project Name WSP gw

Date 12-13-11 10:50

Sampled By EH & ST 121311-08

Depth to Water 87.36'

Depth of Well 95'

Pump Depth 93' (approx - didnt hit bottom)

Purge Flow Rate 700 mL/min

Water Column Volume 3.5 gal

Purge Time 11:02 - 11:17

Actual Purge Volume

Notes sample @ 11:15 - water in well bore, frozen

Well Number MW-9

Project Name WSP gw

Date 12-13-11 12:11

Sampled By EH & ST 121311-09

Depth to Water 81.01'

Depth of Well 90'

Pump Depth 87'

Purge Flow Rate 750 mL/min

Water Column Volume 4.5 gal

Purge Time 12:18 - 12:35

Actual Purge Volume 5 gal

Notes sample @ 12:35

Well Number MW-10

Project Name WSP gw

Date 12-14-11 1150

Sampled By

Depth to Water 72.12'

Depth of Well 85'

Pump Depth 82'

Purge Flow Rate 625 mL/min

Water Column Volume 6.5 gal

Purge Time 1203 - 1215

Actual Purge Volume 4 gal

Notes sample @ 1215

Well Number MW-11

Project Name WSP gw

Date 12-14-11 1234

Sampled By EH & ST 121411-11

Depth to Water 68.20'

Depth of Well 76'

Pump Depth 73'

Purge Flow Rate 750 mL/min

Water Column Volume 4 gal

Purge Time 1240 - 1253

Actual Purge Volume 4 gal

Notes sample @ 1253

Well Number MW-12

Project Name WSP gw

Date 12-14-11 1435

Sampled By EH & ST

Depth to Water 68.75'

Depth of Well 76'

Pump Depth 73'

Purge Flow Rate 725 mL/min

Water Column Volume 4 gal

Purge Time 1443 - 1454

Actual Purge Volume 4 gal

Notes sample @ 1454

Well Number MW-13

Project Name WSP gw

Date 12-14-11 1017

Sampled By EH & ST 121411-13

Depth to Water 52.25'

Depth of Well 56'

Pump Depth 53'

Purge Flow Rate 550 mL/min

Water Column Volume 3 gal

Purge Time 1027- 1037

Actual Purge Volume 4 gal

Notes sample @ 1037

Well Number	MW-14	Date	12 13-11 1526
Project Name	WSP gw	Sampled By	EH & ST 121311-14
Depth to Water	66.55'	Purge Flow Rate	550 mL/min
Depth of Well	70'	Water Column Volume	1.5 gal
Pump Depth	67'		
Purge Time	1435-1450	Actual Purge Volume	4.5 gal

Notes sample @ 1450

Well Number	MW-15	Date	12-14-11 925
Project Name	WSP gw	Sampled By	EH & ST 121411-15
Depth to Water	99.68'	Purge Flow Rate	600 mL/min
Depth of Well	110'	Water Column Volume	5.5 gal
Pump Depth	105 (approx - didn't hit bottom)		
Purge Time	932-950	Actual Purge Volume	4 gal

Notes sample @ 950

Well Number	SMW-7	Date	
Project Name		Sampled By	
Depth to Water		Purge Flow Rate	
Depth of Well	181'	Water Column Volume	
Pump Depth			
Purge Time		Actual Purge Volume	

Notes

Appendix H

Laboratory Reports

**This information is available
upon request by calling (509) 329-3415.**

Appendix I

Vapor Intrusion Statistic Reports

TCE

Number of samples		Uncensored values	
Uncensored	64	Mean	0.78
Censored		Lognormal mean	0.88
Detection limit or PQL		Std. devn.	0.811035845
Method detection limit		Median	0.46
TOTAL	64	Min.	0.1
		Max.	3.3

Lognormal distribution?		Normal distribution?	
r-squared is:	0.820	r-squared is:	0.824

Recommendations:

Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (Land's method) is 1.34102203534992

Tetrachloroethylene

Number of samples		Uncensored values	
Uncensored	64	Mean	0.46
Censored		Lognormal mean	0.42
Detection limit or PQL		Std. devn.	0.728632594
Method detection limit		Median	0.215
TOTAL	64	Min.	0.1
		Max.	5.3

Lognormal distribution?		Normal distribution?	
r-squared is:	0.836	r-squared is:	0.473

Recommendations:

Reject BOTH lognormal and normal distributions. See Statistics Guidance.

UCL (based on t-statistic) is 0.610571431574631

Chloroform

Number of samples		Uncensored values	
Uncensored	64	Mean	0.84
Censored		Lognormal mean	0.97
Detection limit or PQL		Std. devn.	0.59128047
Method detection limit		Median	0.795
TOTAL	64	Min.	0.1
		Max.	2.6

Lognormal distribution?		Normal distribution?	
r-squared is:	0.849	r-squared is:	0.923

Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.968143167516383

Appendix J

Opinion of Probable Costs for Alternatives

Opinion of Probable Cost for Alternative 1
Monitored Natural Attenuation, Land Use Controls and Permeable Soil Cap Improvements

Item	Quantity	Units	Unit Cost	Capital Cost	O&M Cost		Source
					Annual	Present Worth^2	
Land Use Engineering Control Construction							
Soil Cover Repair	1.8	Acre	$30,000	$54,000			Similar Project
Plantings	1.8	Acre	$1,500	$2,700			Similar Project;
Mobilization	8%	LS	$56,700	$4,536			Similar Project; Percentage of Capital Cost
Irrigation Well #4 Decommissioning							
Well Decommissioing	1	LS	$134,475	$134,475			Driller's Estimate
Monitoring Well Decommissioning							
Well Decommissioing	14	ea	$2,000	$28,000			Similar Project
Subtotal				$223,711			
Contingency	25% of Capital Cost			$55,928			
Construction/Project Management	20% of Capital Cost			$44,742			
Engineering (PS&E)	15% of Capital Cost			$33,557			
Construction Cost Subtotal				**$357,938**			
Sales Tax			**8.7%**	**$31,141**			
Environmental Oversight							
General Reporting							
Draft Groundwater Monitoring and Well Maintenance Plan	0	Each	$14,000	$0			Engineer's Estimate
Final Groundwater Monitoring and Well Maintenance Plan	0	Each	$6,500	$0			Engineer's Estimate
Annual Groundwater Monitoring Reports	0	Each	$10,700		#DIV/0!	$0	Engineer's Estimate
Periodic Review Report (every 5 years)	0	Each	$27,700		#DIV/0!	$0	Engineer's Estimate
Project Management	0	LS	$5,890	$0			Engineer's Estimate
Land Use Controls							
Environmental Covenant	1	LS	$6,000	$6,000	$500	$7,143	Engineer's Estimate
Draft Land Use Control Implementation Plan (LUCIP)	1	LS	$5,000	$5,000			Engineer's Estimate
Final LUCIP	1	LS	$2,200	$2,200	$500	$7,143	Engineer's Estimate
Notice of Conveyance or Other Transfer of an Interst in the Property	1	LS	$2,000			$2,136	Engineer's Estimate
Fencing and Signage	1	LS					
Land Use Control Maintenance	1	LS	$1,000		$1,000	$14,286	Engineer's Estimate
Short Term Groundwater Monitoring (yr 1)							
Sample Collection (Quarterly)	0	ea	$8,564	$0			Engineer's Estimate
Sample Analysis (Quarterly)	0	ea	$3,811	$0			Engineer's Estimate
Long Term Groundwater Monitoring (yrs 2-5)							
Sample Collection (Semiannual)	0	ea	$8,564		#DIV/0!		Engineer's Estimate
Sample Analysis (Semiannual)	0	ea	$3,811				Engineer's Estimate
Environmental Oversight Subtotal				**$13,200**			
Operation and Maintenance Subtotal						$30,707	
O&M Project Management and Support	10% of O&M Present Worth					$3,070.74	
O&M Contingency	25% of O&M Present Worth					$7,676.85	
Operation and Maintenance Total						**$41,455**	
NET PRESENT WORTH						**$443,733**	

Notes:

1 - Annual land use controls' costs occur each year in perpetuity.

2 - Discount rate used for all present worth calculations per EPA Guidance = 7%

Opinion of Probable Cost for Alternative 2
Low Permeability Soil Cap with Monitored Natural Attenuation and Land Use Controls

Item	Quantity	Units	Unit Cost	Capital Cost	O&M Cost		Source
					Annual	Present Worth[2]	
Low Permeability Caps							
WSP Landfill							
Low Permeability Cap	7.7	Acre	$84,000	$646,800			Similar Projects
Mobilization	8%	LS	$646,800	$51,744			Similar Project; Percentage of Capital Cost
Asphalt Caps							
Soil Excavation, Haul, and Disposal	1,145	CY	$12.00	$13,740			R.S. Means 2011; Similar Projects
Subgrade Preparation and Grading	6,871	SY	$1.25	$8,589			R.S. Means 2011; Similar Projects
6" Base Course (Material, Haul, Placement, Compaction)	1,145	CY	$34.63	$39,651			R.S. Means 2011; Similar Projects
2.5" Asphalt Cap (Material, Haul, Placement, Compaction)	6,871	SY	$16.50	$113,372			R.S. Means 2011; Similar Projects
Mobilization	8%	LS	$175,352	$14,028			Similar Project; Percentage of Capital Cost
Irrigation Well #4 Decommissioning							
Well Decommissioing	1	LS	$134,475	$134,475			Driller's Estimate
Monitoring Well Decommissioning							
Well Decommissioing	14	ea	$2,000	$28,000			Similar Project
Subtotal				$1,050,399			
Contingency	25% of Capital Cost			$262,599.68			
Construction/Project Management	20% of Capital Cost			$210,079.75			
Engineering (PS&E)	15% of Capital Cost			$157,559.81			
Construction Cost Subtotal				**$1,680,638**			
Sales Tax			**8.7%**	**$146,216**			
Environmental Oversight							
General Reporting							
Draft Groundwater Monitoring and Well Maintenance Plan	0	Each	$14,000	$0			Engineer's Estimate
Final Groundwater Monitoring and Well Maintenance Plan	0	Each	$6,500	$0			Engineer's Estimate
Annual Groundwater Monitoring Reports	0	Each	$10,700		#DIV/0!		Engineer's Estimate
Periodic Review Report (every 5 years)	0	Each	$27,700		#DIV/0!		Engineer's Estimate
Project Management	0	LS	$5,890	$0			Engineer's Estimate
Land Use Controls							
Environmental Covenant	1	LS	$6,000	$6,000	$500	$7,143	Engineer's Estimate
Draft Land Use Control Implementation Plan (LUCIP)	1	LS	$5,000	$5,000			Engineer's Estimate
Final LUCIP	1	LS	$2,200	$2,200	$500	$7,143	Engineer's Estimate
Notice of Conveyance or Other Transfer of an Interst in the Property	1	LS	$2,000			$2,136	Engineer's Estimate
Land Use Control Maintenance	1	LS	$2,000		$2,000	$28,571	Engineer's Estimate
Short Term Groundwater Monitoring (yr 1)							
Sample Collection (Quarterly)	0	ea	$8,564	$0			Engineer's Estimate
Sample Analysis (Quarterly)	0	ea	$3,811	$0			Engineer's Estimate
Long Term Groundwater Monitoring (yrs 2-5)							
Sample Collection (Semiannual)	0	ea	$8,564		#DIV/0!	$0	Engineer's Estimate
Sample Analysis (Semiannual)	0	ea	$3,811				Engineer's Estimate
Environmental Oversight Subtotal				**$13,200**			
Operation and Maintenance Subtotal						$44,993	
O&M Project Management and Support	10% of O&M Present Worth					$4,499.31	
O&M Contingency	25% of O&M Present Worth					$11,248.28	
Operation and Maintenance Total						**$60,741**	
NET PRESENT WORTH						**$1,900,794**	

Notes:
1 - Annual land use controls' costs occur each year in perpetuity.
2 - Discount rate used for all present worth calculations per EPA Guidance = 7%