A Sampling & Analysis Plan

This page intentionally left blank

Washington State Penitentiary
RI/FS Work Plan
APPENDIX A:
Final Sampling & Analysis Plan

Contract No. C0700036
Work Assignment No. EANE026

Prepared for:

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Toxics Cleanup Program
North 4601 Monroe
Spokane, Washington 99205-1295

By:

Ecology & Environment, Inc.
720 Third Avenue, Suite 1700
Seattle, WA 98104

June 2009

Updated by Parametrix, Inc.
1231 Fryar Avenue
Sumner, WA 98390

February 2010

Under Contract to the Washington State Department of Corrections
Contract No. 10-321A

This page intentionally left blank

Table of Contents

Table of Contents (Cont.)

Section **Page**

Section Page

This page intentionally left blank

List of Figures

Figures

This page intentionally left blank

List of Tables

Table **Page**

List of Abbreviations and Acronyms

µg/l	micrograms per liter
AOC	area of concern
bgs	below ground surface
CCOC	Confirmed Contaminant of Concern
COC	Contaminant of Concern
CDL	construction debris landfill
CFR	Code of Federal Regulations
COC	contaminant of concern
DOC	Department of Corrections
Ecology	Washington State Department of Ecology
EM	electromagnetic
GE	General Electric Company
GPM	Government Project Manager
GPS	global positioning system
HAS	hollow-stem auger
HWA	HWA Geosciences, Inc.
IDW	investigation-derived waste
L/min	liters per minute
MTCA	(State of Washington) Model Toxics Control Act
NAD	North American Datum
O & M	operation and maintenance
PAHs	polycyclic aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PPE	personal protective equipment

List of Abbreviations and Acronyms (Cont.)

RCW	Revised Code of Washington
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SCOC	Suspected Contaminant of Concern
SOP	Standard Operating Procedure
SVOCs	semi-volatile organic compounds
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons-diesel range
UTM	Universal Transverse Mercator
VOCs	volatile organic compounds
WSP	Washington State Penitentiary

1 Introduction

The Washington State Penitentiary (WSP) is the subject of a remedial investigation / feasibility study (RI/FS) under the management of the Washington State Department of Corrections (DOC) and Washington Department of Ecology (Ecology) Toxics Cleanup Program. The objective of the RI/FS is to determine the nature and extent of contamination related to activities of the WSP. The property lines of the WSP serve as the boundary of the investigation study area as illustrated in Work Plan Figure 1. This area includes the WSP facilities in the eastern half of the property and the WSP Landfill to the northwest of the facilities. The facilities include the buildings and improvements both inside and outside of secure areas. If impacted areas are encountered outside of the property lines, they may also be included in the investigation.

Previous investigations have confirmed the presence of volatile organic compounds (VOCs) in the groundwater at the Sudbury Road Municipal Landfill (Sudbury Landfill) and in monitoring wells upgradient of the Sudbury landfill. These monitoring wells are considered to be downgradient of the WSP. In several monitoring wells at the Sudbury Landfill and the WSP Landfill, the concentration of tetrachloroethene (PCE) and trichloroethene (TCE) have exceeded the Model Toxics Control Act (MTCA) Method A cleanup levels for groundwater.

The objective of this Sampling and Analysis Plan (SAP) is to characterize the nature and extent of contamination that can be reasonably identified in areas of concern (AOCs) or potential AOCs at the WSP site, and to determine if contaminants may be migrating onto WSP property from upgradient sources. Although the AOC initially identified was the WSP Landfill, this SAP includes other AOCs within the WSP that may be sources of contamination that may be migrating in groundwater beneath the WSP Landfill or may be migrating off site through other pathways. These additional AOCs were identified based on a review of available information about past investigations and activities that were known to have involved hazardous materials. This SAP describes the proposed investigation activities to characterize the nature and extent (vertical and horizontal) of soil and groundwater contamination in AOCs at the site, and to define the characteristics of soils and groundwater to support a future feasibility study.

The DOC is the Potentially Liable Party (PLP) responsible for completing the RI/FS at WSP. DOC retained Parametrix, Inc. to implement the RI/FS, including updating this RI/FS SAP with specific information regarding AOCs, supporting historical information, investigation rationale, media to be sampled, sampling methods, sample types, sampling locations, chemicals to be analyzed, and the phasing and scheduling of the RI/FS. This Final RI/FS SAP retains the structure and much of the content of the Work Plan prepared by Ecology and Environment, Inc., incorporates updates and revisions from a supplemental data search completed by Parametrix, and has been approved by Ecology subsequent to detailed discussions between Ecology and DOC.

1.1 Site Description

The WSP is an active correctional facility located at 1313 North 13th Avenue, Walla Walla, Washington (Work Plan Figures 1 and 2). The facility itself occupies a 560-acre site, and the adjacent WSP Landfill occupies an area of approximately 7.7 acres.

Current and past operations at the WSP include a license plate factory, sign shop, furniture refinishing facility, cannery, and dairy. Institution support activities include food service, janitorial, and various operation and maintenance (O & M) functions. Prison O & M functions include a photo processing shop (no longer in use); X-ray, dental and medical laboratories; laundry and dry cleaning operations; motor pool; fix it shop; and grounds maintenance facility.

The WSP Landfill (also referred to as the Construction Demolition Landfill) is located in a former topographic depression northwest of the WSP facility. The landfill was the principal disposal site for DOC construction and demolition debris from the early 1970s until 1987. During its operation, the WSP Landfill received construction, demolition, yard, and farm waste. The landfill is divided into an east cell (3.4 acres) and a west cell (4.3 acres), separated by a north-south access road (Ecology 2000).

Southwest of the WSP facility is a pond and wetlands area. A portion of the WSP facility surface water runoff and storm water drainage is directed to this pond and wetlands area.

1.2 Regulatory Framework

Regulations govern both the RI/FS and continuing operations at the WSP. The RI/FS investigation and remedial activities will be conducted in accordance with the MTCA, including the Revised Code of Washington (RCW) Chapter 70.105D and the MTCA Cleanup Regulation, Chapter 173-340. Together, these regulations will also guide determination of final contaminant cleanup levels following further site investigation.

1.3 Previous Investigations

Previous investigations conducted in the vicinity of the WSP and Sudbury Landfills are briefly summarized below. For further details refer to the RI/FS Work Plan.

ecology and environment, inc.

Surface soil, subsurface soil, surface water, and groundwater samples have been collected and analyzed from locations in and around the WSP during previous investigations conducted over 20 years. Groundwater samples have been collected beneath and upgradient of the Sudbury Landfill at locations shown in Work Plan Figure 1.

The results of previous investigations indicate the following:

- In 1984, General Electric Company (GE) prepared a polychlorinated biphenyls (PCB) Regulatory Compliance Report. GE conducted a site-wide search of all PCB and non-PCB facilities and inspected all PCB transformers on site. A total of 92 transformers plus oil-filled circuit breakers and oil-filled disconnects on site were inspected. Two transformers filled with insulating oil (potentially containing PCBs) were found to be leaking (GE 1984).
- In March 1992, Ecology conducted an Initial Investigation at the Washington State Penitentiary due to anonymous complaints of chemical dumping on-site. 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 1992). 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.
- 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. The overall ranking given to the WSP Landfill after the field site hazard assessment was “3” (Ecology 1995).
- In 1995, Parametrix, Inc., performed a Site Assessment concluding 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 rule out or confirm the possibility that contaminants might have been buried in the WSP Landfill (Parametrix 1995).
- In 1996, DOC decommissioned and removed seven USTs from the WSP facility. Total petroleum hydrocarbons in the diesel range (TPH-D) were detected in some of the UST excavations, but none of the results exceeded current MTCA soil cleanup levels. Additional soil was excavated at the one site where levels exceeded the cleanup levels in effect at the time and the final sample results were non-detect (DOC 1996).
- In 1998, HWA Geosciences, Inc., (HWA) performed a hydrogeologic evaluation and evaluated surface water and ground water quality of the closed WSP Landfill. HWA installed four groundwater monitoring wells. Groundwater samples were collected from the Sudbury Landfill and the newly installed monitoring wells. In some samples the following analytes exceeded MTCA Method A cleanup levels

ecology and environment, inc.

or Washington State Maximum Contaminant Levels (MCLs): total dissolved solids, iron, manganese, nitrate-nitrogen, TCE, and PCE. Arsenic, benzene, chloroform, chromium, copper, lead, manganese, and toluene were also detected in the samples (HWA 1998).

- 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 Landfill. 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 Sudbury Landfill groundwater monitoring data for 1991 through 1998. Available groundwater data indicated that groundwater quality in the shallow aquifer was being impacted by upgradient sources. 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 (Ecology 1999).
- In 2000, Ecology released a PA report. PA activities consisted of research and file review. One of the conclusions from the PA stated that the shallow sedimentary aquifer had been impacted by VOCs and the WSP Landfill has been assessed as a high potential source of the contamination (Ecology 2000).

1.4 Contaminants of Concern

Contaminants of Concern (COCs) are chemicals (analytes) that may pose a threat to human health or the environment. For this SAP, an analyte was classified as a Confirmed Contaminant of Concern (CCOC) if a previous quantitative analysis detected it in soil or groundwater. Applicable cleanup levels were not used as minimum standards to establish CCOCs, because the site has not been adequately characterized. If the site is not adequately characterized, then detections in some locations do not rule out the possibility of an exceedance in other locations. An analyte was classified as a Suspected Contaminant of Concern (SCOC) if it is known or suspected to have been used or produced, and a reasonable possibility of a spill or release to the environment could not be ruled out.

Previous investigations have confirmed the presence of volatile organic compounds (VOCs) in groundwater. The concentrations of PCE and TCE in some samples were above the MTCA Method A cleanup levels for groundwater. CCOCs that were detected, but were below cleanup applicable levels, are arsenic, benzene, chloroform, chromium, copper, lead, manganese, and toluene.. Table 1-1 lists the CCOCs and the MTCA Method A groundwater cleanup levels (WAC 173-340-900). When a MTCA groundwater cleanup level does not exist for a given contaminant, the Washington State Water Quality Standards Maximum Contaminant Level (MCL) for groundwater is shown (WAC 173-200-040).

SCOCs include TPH as diesel (TPH-D); semivolatile organic compounds (SVOCs), which include polycyclic aromatic hydrocarbons (PAHs); and polychlorinated biphenyls (PCBs). Confirmed and suspected COCs are summarized in the tables below.

Table 1-1. Confirmed Contaminants of Concern for WSP

Arsenic	Groundwater	S-3	0.046	5	HWA 1998
Benzene	Groundwater	MW-3	0.6	5	EMCON 1995
Chloroform	Groundwater	MW-4, MW-9	2.87	7**	HWA 1998
Copper	Groundwater	S-1	5.2	1,000**	HWA 1998
Lead	Groundwater	S-1	1.6	15	HWA 1998
Manganese	Groundwater	S-3	735	50**	HWA 1998
Tetrachloroethene	Groundwater	MW-2*, MW-5, MW-7, MW-8, MW-9	7.1	5	EMCON 1995
Toluene	Surface Water	S-1, S-2, S-3	2.2	1,000	EMCON 1995
Trichloroethene	Groundwater	MW-1, MW-2, MW-3, MW-4, MW-5	6.56	5	HWA 1998

*This MW-2 is not the same as the one associated with the WSP Landfill.
**This contaminant has no MTCA Method A cleanup level for groundwater. The limit shown is for the WA State MCL.

Table 1-2. Suspected Contaminants of Concern for WSP

Diesel	Groundwater and Soil	WSP Landfill, Former motor pool, Hazardous waste area	Underground storage tank and motor pool
Ethyl benzene	Groundwater and Soil	WSP Landfill, Former motor pool, Haz waste area	Underground storage tank and motor pool
PCBs	Soil, concrete pads and foundations	WSP Landfill, power plants, unknown transformer location(s)	Former power plant and suspected storage area in WSP
SVOCs	Groundwater and Soil	WSP Landfill, Former motor pool, Haz waste area	Underground storage tank and motor pool
Vinyl chloride	Soil	WSP Landfill, Dry Cleaners, Sudbury Landfill	A breakdown product of TCE
Xylenes	Groundwater and Soil	WSP Landfill, Former motor pool, Haz waste area	Underground storage tank and motor pool

1.5 Areas of Concern

Based on the preliminary site conceptual model and evaluation of existing data, AOCs for the site have been chosen and are shown in the tables and described below (also, see Figure 7 of the Work Plan).

ecology and environment, inc.

Table 1-3. Areas of Concern

1. WSP Landfill (AOC)	VOCs, metals	VOCs, TPH-D, SVOCs, PAHs (boiler ash fill at various WSP locations)
2. Former dry cleaning services (AOC)		VOCs
3. Former motor pool (potential AOC)		VOCs, TPH-D, SVOCs
4. Former UST areas (potential AOC)	TPH-D	TPH-D, SVOCs
5. Former auto body shop and furniture refurbishing facility (potential AOC)		VOCs, TPH-D, SVOCs
6. Former hazardous waste accumulation area (potential AOC)		VOCs, SVOCs, metals, PCBs and TPH
7. Steam plant boiler ash (potential AOC)		PAHs
8. Sign shop (potential AOC)		VOCs
9. Metal Plant #1 (potential AOC)		VOCs
10. PCB storage area (location of two leaking transformers unknown) (potential AOC)	PCBs Not an AOC based on additional information and discussions with Ecology	

*Analytes that have been detected in previous sampling events.

PCB = Polychlorinated biphenyl compound
SVOCs = Semi-volatile organic compounds
TPH = Total petroleum hydrocarbons
TPH-D = Total petroleum hydrocarbons-diesel
VOCs = Volatile organic compounds
PAHs = polycyclic aromatic hydrocarbons

AOC #1: WSP Landfill – PCE, TCE, and chloroform were detected in groundwater samples adjacent to or down gradient of the WSP Landfill. In addition, toluene was detected in seasonal surface water samples collected near the landfill. Due to the suspicion of buried drums other SCOCs are diesel and SVOCs.

AOC #2: Former dry cleaning facility – Two dry cleaning locations existed formerly at the WSP. Dry cleaning was originally done in a building (F20) that has since been demolished, and the second location was in building C30. According to DOC the dry cleaning solvent used was perchloroethene (PCE, a chlorinated solvent). Stoddard solvent is another common solvent used in the dry cleaning process, but its use at WSP is not confirmed and is not considered a significant environmental threat.

AOC #3: Former motor pool – Typical operations for such a facility include fueling, parts degreasing and hazardous material storage. These are possible sources of VOCs, SVOCs, TPH, and Metals.

AOC #4: Former UST Areas – Although most of the UST excavations had confirmation samples below the MTCA Method A cleanup levels in effect at the time, no data was found regarding two UST areas. At former UST #11 it is unclear if any petroleum contamination extends beneath the adjacent building foundation to the south. There is also an additional former UST location near the former motor pool, and no data was available for confirmation samples.

Additional information obtained by DOC in September 2009, and further data evaluation by Ecology, resulted in the conclusion that sufficient soil sampling was done during removal of the former USTs, and that additional soil sampling will not be required. However, testing of groundwater in future monitoring wells drilled at WSP will include petroleum hydrocarbons.

AOC #5: Former auto body shop and furniture refurbishing – Possible sources of TPH, metals, SVOCs, and VOCs.

AOC #6: Former Hazardous Waste Accumulation Area – Adjacent to the current power house, this area was used to store unknown quantities of hazardous waste. SCOCs include VOCs, SVOCs, metals, PCBs and TPH.

AOC #7: Steam Plant Boiler Ash – Since coal and wood were used until the late 1990s as fuel sources for producing steam at WSP, PAHs are a concern in areas where boiler ash was deposited as fill on the site. Also, to the extent that any PCB oil-filled electrical transformers or equipment was used in these areas, this area may also have been a potential source of PCBs. On the basis of additional clarification provided by DOC in September 2009 regarding historical power use, steam generation, and associated electrical components at the site, Ecology eliminated PCBs as SCOCs for AOC #7. Regarding the boiler ash issue, the greatest potential for exposure to ash is in unpaved areas of WSP where ash may have been used as fill (such as the "yards" associated with the BAR units and the western edge of the WSP facility).

AOC #8: Sign shop – Possible source of VOCs and SVOCs.

AOC #9: Metal plant #1 – This area is suspected due to the former use of paint and solvents here. Chemicals of concern for this AOC are VOCs and metals.

AOC #10: PCB storage area– Additional information obtained by DOC in September 2009 documented the location of the former cement block building where transformers were stored, which had a concrete floor and was demolished in the mid 1990s. The area of this former building was subsequently graded and is now an open grass-covered area. A facility wide changeout and cleanup of PCB-containing transformers was completed at WSP in 1986. Any potential leakage of older transformers in the former storage building would have been contained within the building. After considering this information, Ecology concluded that AOC 10 would be eliminated from further investigation.

1.6 Additional Areas of Interest

Some locations in the vicinity of the WSP are not considered potential source locations, but there is a need to assess the current level of contamination, either as an assessment of background levels or as an assessment of impact. The following locations will be evaluated for potential their impacts:

- Sudbury Landfill monitoring wells
- Nearby irrigation wells
- Industrial areas across the street to the east and to the south (see Ecology 1999)

2 Objectives and Design

This section discusses the sampling design and approach to meet the overall project objectives and the data quality objectives for the investigation. For technologies where soil, soil gas or groundwater samples are collected, field screening and/or laboratory analyses will be conducted for the COCs that apply for the given AOC. Both field screening and laboratory analytical results will be used to confirm potential source areas, and determine the lateral and vertical extent of COCs.

2.1 Field Data Collection Technologies

Below are the kinds of technologies that this SAP utilizes to collect the desired data. This section provides a general description of the technology and its uses, and why it is applicable to the site. Specific details are provided in Section 3.2 on how samples or data are to be collected using these technologies.

2.1.1 Topographical Survey

A topographical survey will be conducted to confirm surface flow direction of stormwater runoff into catch basin and other runoff management devices. The survey will be conducted by a licensed land surveyor and based on North American Datum of 1983 (NAD 83). Survey data from WSP facility files and recent project will be evaluated prior to scoping this task, to avoid duplication of effort.

If accessible the elevations of stormwater culverts and pipelines may be measured if flow direction cannot otherwise be determined. It is believed that some stormwater discharges to land to the north, some discharges to a drainage channel that leads to the southern pond, and some likely discharges to the combined sanitary sewer. A better understanding of the stormwater pathways will help to determine the potential transport of COCs.

2.1.2 Geophysical – Survey

An EM or Ground Penetrating Radar (GPR) survey will be conducted at the WSP Landfill before any intrusive investigation measures are used, unless field observations indicate that soil gas sampling may help interpret geophysical survey findings. The geophysical survey will be performed on both cells to assess the potential presence of drums or other metal containers buried at the landfill. Whichever geophysical method proves effective during initial testing will be used to survey both landfill cells. EM survey equipment measures ground conductivity through electromagnetic induction. GPR sends a radar signal into the ground and measures the return signal. The results of the geophysical survey could help direct other landfill investigation activities, such as locations of soil gas sample points and test pits.

2.1.3 Direct-Push Soil and Soil Gas Sampling

The ability of a truck-mounted direct-push drilling rig to collect soil and soil gas samples beneath the site will be evaluated, based on geologic conditions, sample depths, and equipment capabilities. This decision will be based on geologic conditions encountered during installation of monitoring wells at the WSP site (see Section 2.1.4). The rig forces a narrow diameter probe into the earth to any desired depth, but is limited by the geotechnical constraints of the subsurface. If appropriate, this technology can be used to collect soil and soil gas samples:

Soil: Soil samples will be collected at 5-foot depth intervals (starting at ground surface) to a depth of 25 feet, or until refusal depth is reached. Depths may be exceeded if observable contamination is present. One soil sample will be collected from each interval.

Soil Gas[1]: Soil gas samples will be collected at 2-foot depth intervals to a depth of 20 feet or until refusal depth is reached. A gas sampling vacuum pump will be attached to the probe and connected to field sampling equipment that tests for methane, oxygen, carbon dioxide, and volatile organics. The soil gas sample results will be used to identify potential source areas where soil sampling will be required (if methane percent is greater than 25 percent of the lower explosive limit or the volatile organic vapors are above background concentrations). Samples may be sent to a laboratory to confirm field screening results.

Groundwater: If feasible a truck-mounted direct-push drilling rig will be used to collect groundwater samples, if groundwater is encountered during soil or soil gas sampling. However, it is not anticipated that groundwater will be found at depths accessible by direct-push technology. When practical, one groundwater sample will be collected from each location.

2.1.4 Monitoring Well Drilling and Soil Sampling

A truck-mounted hollow-stem auger (HSA) drilling rig was originally considered to install groundwater monitoring wells at the WSP site. However, based on the depths to groundwater observed in prior test drilling at the site (up to 65 feet), the HSA method would not likely penetrate to the depths required and allow proper completion of monitoring wells at these depths. Therefore, the sonic drilling method will be applied to install monitoring wells at WSP. Sonic drilling advances a hollow casing using sound energy and provides a continuous core of geologic materials penetrated during drilling that is retained inside the drill casing by a plastic sleeve. The extruded geologic material

[1] An alternative passive soil gas sampling method can be used for this site but would require additional lead time. A passive sampling device would be placed underground for a period of one to two weeks. After retrieval it is sent to the laboratory for analysis, requiring even more lead time. This method can be considered for this site, but would be implemented one month ahead of the activities described herein.

is then available for visual description, soil property testing, and collection of soil samples for chemical analysis. The entire length of the core will be examined for physical description, odor, visual stratification, disposed debris, organic vapors, and any other distinguishing characteristics. Up to five soil samples will be collected at each monitoring well location for chemical analysis with sample materials determined by field observations.

Upon reaching the targeted depth below the water table, a monitoring well consisting of a 2-inch diameter Schedule 40 PVC screen (10 to 15 feet, to straddle the water table) and riser pipe will be installed in the borehole, and will be designed and completed in compliance with the WAC 173-160 regulations pertaining to resource protection wells. Completed monitoring wells will be developed by the drilling contractor by means of surging and pumping, to remove as many residual fine particles from the well installation process.

2.1.5 Groundwater Sampling

Groundwater samples from monitoring wells installed as part of this RI, and from other selected existing wells near WSP (to the extent they are available and practical) will be sampled four times during the RI. The three pre-existing monitoring wells associated with the Sudbury Landfill adjacent to the WSP property boundary (MW-7, MW-9, and MW-10) will be sampled (with permission from the City of Walla Walla). The existing inventory of records of private water wells in the vicinity of the WSP will be evaluated and selectively field checked to identify which wells to sample. Criteria for selection include:

- Confirmation of total well depth, from a well log or a field measurement.
- A location and depth that could be affected by groundwater contamination from the WSP.
- A determination by Ecology and DOC that water quality from a well needs to be verified to ensure the safety of a private water supply.
- A location that would provide hydrogeologic data for the RI.
- Permission by the well owner to collect samples.

Groundwater sampling parameters and techniques are described in Section 3 of this SAP.

2.1.6 Test Pits

Based on the results of the geophysical investigation, test pits will be dug to determine the subsurface conditions of the landfill and to determine whether hazardous materials are present. An excavator or backhoe will be used. If objects are encountered that require careful excavation, hand digging will be used. Ambient air monitoring will be conducted during excavation, and soil samples will be collected from test pits. If any drums or other containers are found during the excavation of test pits, the Parametrix team will consult with DOC and Ecology before implementing a container sampling and removal plan.

2.1.7 Grab Sampling

Grab sampling is a straight forward method of collecting easily accessible soil or surface water. This includes soil at or near the ground surface, soil exposed by excavation, or water from runoff streams or stagnant ponds. A typical depth used is 6 inches but this can vary depending on location circumstances. In addition to the specific sample locations, surface soil samples will be collected if a location shows visible signs of contamination such as distressed vegetation or discolored soil. The surface soil sample will be collected and analyzed for the applicable contaminant of concern based on the sample location.

2.1.8 Surface Water Sampling

The surface water sample results will be used to help determine whether CCOCs or SCOCs are being transported off site via stormwater. The surface water sample will be collected and analyzed for the applicable contaminant of concern based on the sample location.

3 RI Field Investigation

3.1 Groundwater Investigation

3.1.1 Security and Safety Orientation of Field Staff

The field investigation team and all field work subcontractors will review in detail the WSP security procedures and policies included in Attachment D to the Work Plan and will be thoroughly prepared to follow these procedures and policies while on the WSP property. The team will proceed through security clearance procedures, on-site security briefings, and on-site safety briefings required to conduct contractor work at WSP.

3.1.2 Clearance of Drilling Locations

Maps and plans of subsurface structures, utility systems, and other underground infrastructure will be obtained through the WSP Plant Manager. A meeting of the field investigation leaders and DOC staff will be held at WSP to discuss each proposed drilling location with respect to security access, the potential to negatively impact DOC operations, the locations of underground utilities and structures, and access/egress of drilling equipment. Once locations have been approved by DOC, an underground utility locating company will be retained to check each drilling location with field detection equipment. Drilling locations will be adjusted based on this field check, as necessary.

3.1.3 Monitoring Well Installation and Sampling

The depth to groundwater and the direction of groundwater flow in the uppermost aquifer beneath the WSP site (the shallow aquifer), which occurs within sand and gravel lacustrine sediments, is important to establish early in the RI. Although the general groundwater flow direction is to the west, flow directions beneath WSP must be delineated to assess upgradient and downgradient relationships of on-site AOCs and potential off-site groundwater contamination sources. Collection of groundwater samples early during the RI is also important for comparison of current groundwater quality data with CCOCs and SCOCs described above in Section 1.4, and with applicable groundwater quality standards.

A total of nine new monitoring wells are proposed for installation during the RI field work, at the locations shown on Figure 1. The rationale for each of these monitoring wells is described in Table 3-1. The monitoring wells will be drilled and installed by the sonic method, as previously described in Section 2.1.4. The final locations of these monitoring wells will be established after a thorough check of location access and subsurface utilities.

Table 3-1. Rationale for Installation of New RI Monitoring Wells at WSP

MW-6, -7, -8	none	Upgradient of WSP and downgradient from potential contamination sources east of WSP
MW-9	none	Upgradient of WSP (background well)
MW-10	3	Adjacent to AOC 3 (former motor pool)
MW-11	6	Downgradient of AOC 6 (former hazardous waste accumulation area)
MW-12	2	Downgradient of the former dry cleaning area
MW-13	multiple	Downgradient of the southern portion of WSP at boundary of built facility; upgradient of Sudbury LF wells MW-7 and MW-10
MW-14	multiple	Downgradient of WSP Landfill and upgradient of Sudbury LF monitoring wells MS-7 and MW-9

3.1.4 Assessment of Vicinity Water Wells as Potential Sampling Locations

Area water well data collected by Ecology will be evaluated in detail to determine if any local water wells with documented well construction details are completed in the shallow aquifer and could be available for sampling as part of the WSP RI. This evaluation will include location checking of candidate wells in the field, without accessing private property. A list of water wells for potential sampling will be prepared and discussed by DOC and Ecology, including options for obtaining access to these wells. No private well owners will be contacted until approved by DOC and Ecology. If such water wells are available for sampling, sampling procedures will specifically be developed for each private water well system, to assure collection of representative groundwater samples and measurement of groundwater levels. Approximate well elevations and locations will be established with GPS equipment.

3.1.5 Groundwater Sampling

The first quarterly sampling event of the RI will be conducted immediately after the new monitoring wells have been installed and developed. Table 3-2 lists the new and previously existing monitoring wells to be sampled and the analytes to be tested. Groundwater sampling procedures are described below in Section 4.

Table 3-2. Analytes for Quarterly RI Sampling

Parameter	Quarterly RI Sampling Event			
	1st	2nd	3rd	4th
VOCs	X	X	X	X
Metals [1]	X	X	X	X
SVOCs	X		X	
PAHs	X		X	
TPH-Gx, TPH-Dx	X		X	
Conventionals [2]	X	X	X	X
Field Parameters [3]	X	X	X	X

[1] Metals: MTCA Metals + Confirmed Metals: arsenic, cadmium, chromium, mercury, lead, copper, manganese; total and dissolved metals (samples filtered in the field) will be tested.
[2] Conventionals: sodium, calcium, ammonia, nitrate, carbonate, bicarbonate/alkalinity, sulfate
[3] Field Parameters: pH, specific conductance, temperature, dissolved oxygen, redox

Four quarterly groundwater sampling events provide data representative of differing seasonal conditions (including variations in factors such as precipitation, evapotranspiration, leakage from irrigation canals, net recharge to groundwater, groundwater elevations, and groundwater gradients). All of the quarterly sampling events include the CCOCs. Two of the quarterly events (opposite seasons) also include the suspected chemical groups SVOCs, PAHs, and TPH. This sampling approach provides sufficient data to assess repeatability of results, support the risk assessment, and facilitate the selection of remedial alternatives in the FS.

3.1.6 Site Topographic Survey

The topographic survey will be conducted using the methodology described in Section 2.1.1 of this SAP. This work will be closely coordinated with the WSP Plant Manager and associated engineering staff,

3.2 AOC Investigation

Based on the historical data discussed in the RI Work Plan and in previous sections of this RI SAP, preliminary sampling areas and the type of sampling to be performed in each AOC were developed and are described in the following sections of this SAP. All final sampling methods and technologies will be decided in the field after a thorough site examination has been conducted.

Any soil sampling or soil gas probe work will be done in areas of exposed soil, as close as possible to contamination sources. Coring and drilling through pavement or building floors will be avoided by selection of appropriate drilling and soil sampling locations in open and accessible areas.

3.2.1 Area of Concern #1: WSP Landfill

An EM or GPR geophysical survey will be conducted on both cells of the landfill to the extent possible. The primary function of the survey is to locate any abandoned drums or metal containers. The geophysical survey will help direct potential landfill investigation activities such as locating soil gas sample points, test pit activities, and possible drum sampling and removal actions. If the EM survey identifies any metallic anomalies that could be drums or other metal containers, the Parametrix team will consult with DOC and Ecology before implementing a container sampling and removal plan.

If a drum (or suspected drum) is discovered during any subsequent WSP Landfill investigation activities, then the same notification procedures will be followed and further investigation work at the WSP Landfill will stop immediately. No other field activities at the WSP Landfill will continue until a disposition for the drums has been determined.

Soil gas probes will be installed in both cells of the WSP Landfill to assess the potential presence of methane and VOCs in the landfill. Preliminary locations of twelve gas probes are shown on Figure 1. However, based on the geophysical survey interpretation, any probe location that poses a potential risk of puncturing a container will be reconsidered. If a location is suspected of having a buried container, a gas probe will not be placed there until container presence can be ruled out.

Additionally, if present, surface water samples and sediment samples will be collected from the catch basins east of the landfill, runoff streams, and the manufactured ponds (if possible) near the landfill.

Once soil and possibly soil gas analytical results have been received from the soil gas survey, test pits will be excavated within the landfill to further characterize the contents of the landfill. Locations of test pits will be based on the geophysical survey and soil sampling results. Additional soil samples will be collected during test pit excavation. There will be a minimum of two test pits for each landfill cell (see Figure 1).

3.2.2 Area of Concern #2: Former Dry Cleaning Services

A preliminary soil gas survey will be conducted at both dry cleaning locations. Surface soils will be collected during the soil gas investigation if locations show visible signs of contamination such as distressed vegetation or discolored soil. If field screening results of the soil gas survey show the presence of VOCs, then confirmatory direct-push soil sampling will be conducted at a minimum of three locations to determine soil concentrations of COCs (see Figure 1).

3.2.3 Area of Concern #3: Former Motor Pool

A preliminary visual survey of the area will be done to identify the most appropriate sampling locations. If there is evidence of a spill (e.g., visible signs of contamination such as distressed vegetation or discolored soil), then surface soils will be collected. Direct-push soil gas and soil sampling will be collected at a minimum of two locations near the former motor pool building foundation.

3.2.4 Area of Concern #4: Former UST Locations

No soil sampling; see Section 1.5 of this SAP.

3.2.5 Area of Concern #5: Former Auto Body/Furniture Refurbishing Site

Similar to the former motor pool AOC, sampling activities include an initial visual survey followed by a soil gas survey and direct-push soil sampling at a minimum of two locations.

3.2.6 Area of Concern #6: Former Hazardous Waste Accumulation Area

After a thorough inspection of the facility to identify the most appropriate sampling locations, a preliminary soil gas survey will be followed by confirmatory direct-push soil sampling at a minimum of two locations. Drain lines near this location will be inspected, and water and sediments in drains will be sampled if practical.

3.2.7 Area of Concern #7: Steam Plant Boiler Ash

The greatest potential for exposure to ash is in unpaved areas of WSP where ash may have been used as fill (such as the “yards” associated with the BAR units and the western edge of the WSP facility). Surface soil samples will be collected at the approximate unpaved locations shown on Figure 1 to check for chemical components of the ash.

3.2.8 Area of Concern #8: Sign Shop

If the location of this AOC can be confirmed, sampling activities would be similar to the former motor pool AOC, including an initial visual survey followed by a soil gas survey and direct-push soil sampling at a minimum of two locations.

3.2.9 Area of Concern #9: Metal Plant #1

If the location of this AOC can be confirmed, sampling activities will be similar to the former motor pool AOC, including an initial visual survey followed by a soil gas survey and direct-push soil sampling at a minimum of two locations.

3.2.10 Additional Areas of Interest

The visible elements of the stormwater pathway to the south of the WSP will be inspected. If water or sediments are present in an appropriate location, samples will be collected according to procedure. The investigator will note at what point it appears that stormwater from other adjacent facilities is co-mingled with the WSP stormwater effluent.

3.3 Sampling Limitations

In keeping with the objectives of the preliminary investigation, no biological sampling or toxicity testing is planned for this investigation.

Due to the nature of the facility, there will be access restrictions and site security procedures for all field personnel. Prior to mobilization, the WSP facility administration will be notified of the proposed schedule. All site procedures for access and security will be followed by every team member. In addition, during any field work near or within the WSP facility, the administration of the WSP facility will be notified on a daily basis of the proposed activities. Sample locations and daily field activities may be changed or curtailed due to site access restrictions and/or security requirements.

ecology and environment, inc.

4 Field Sampling Methods

This section describes the various details necessary for collecting data and samples in the field. Specific instructions are discussed for recording sample locations, decontaminating equipment between and after sampling, labeling sampling containers, documenting activities and managing waste resulting from the field. The next section (Section 4) discusses how the samples are handled as they leave the site.

4.1 Station Positioning Methods

Based on the EM survey, field observations, and historical data, sample locations will be determined in the field. A global positioning system (GPS) will be used to determine the coordinates for all sample locations. Coordinates will be referenced to the Universal Transverse Mercator (UTM) Zone 11 North coordinate system using North American Datum of 1983 (NAD 83).

In coordination with DOC a utility location survey will be conducted in any areas where any means of invasive sampling is planned. Existing utility maps will be a useful guide, but will not be relied upon for accuracy.

4.2 Sample Collection and Other Field Procedures

4.2.1 Geophysical Survey

A geophysical contractor will be retained to test ground-penetrating radar (GPR) and electromagnetic (EM) survey methods of the WSP Landfill. Whichever method appears to be most effective in identifying buried objects and the landfill/native material interface will be used to survey both cells of the landfill. All field activities and visual observations will be recorded in the daily logbook. After the survey has been done and the data reviewed, the data will be used to determine the potential locations of any buried drums or containers.

4.2.2 Drum Sampling

If drums are discovered at the WSP Landfill, the Contactor will contact DOC. The Contactor will have a drum sampling and removal plan prepared and ready to implement in case drums are found. No other field activities at the WSP Landfill will continue until a disposition for the drums has been determined. Once a drum or container has been removed, several soil grab samples will be collected in the vicinity to determine whether any soil was contaminated by leakage.

4.2.3 Soil Grab Sampling

This procedure applies to any soil sample collected from an exposed surface, including both typical ground cover and soil exposed by the excavation of test pits. Using a decontaminated sampling spoon or other instrument, the sampler will collect a soil sample into a decontaminated stainless steel bowl and, to the extent feasible, large pieces of debris and organic matter will be removed. If the sample is scheduled for VOC analyses, then three VOC sample aliquots will be collected using an EnCore® soil VOC collection units or their equivalent. The EnCore® soil VOC collections units are hermetically-sealed sample vials designed to decrease the amount of VOC loss due to sample transport, handling, and analyses.

If the remaining sample shows any signs of localized contamination (e.g., staining, strong odors, discoloration, etc.), then a sample of the suspected higher concentration will be collected before homogenizing the remainder of the sample. The remaining sample material is then thoroughly homogenized with the spoon. Aliquots of homogenized soil for laboratory analysis will be placed directly into the appropriate, labeled sample containers. Any field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth will be recorded in a field logbook.

If an excavator is used, the operator will use the bucket and scoop up approximately ½ cubic foot of soil. Once the excavator is no longer in motion and it is safe to proceed, the sampler will signal the operator and approach the excavator bucket to collect an aliquot of soil. From this point the sampler follows the same steps as for the hand dug samples.

4.2.4 Direct-Push Sampling

The ability of a truck-mounted direct-push drilling rig to collect soil samples beneath the site will be evaluated, based on geologic conditions, sample depths, and equipment capabilities. This decision will be based on geologic conditions encountered during installation of monitoring wells at the WSP site (see Section 2.1.4).

If feasible, the sampling team will initially use the direct-push rig to collect soil gas for field screening and laboratory analyses as necessary. For field screening sample locations, the direct-push would advance up to 20 feet bgs. A soil gas reading would be collected at 2 foot intervals and recorded in the field logbook[2]. If no detections of COCs are encountered in successive readings, the field team may abandon the sample location and proceed to the next. If indications of COCs are detected by field measuring equipment, then the field team may continue to a deeper depth until refusal is met. A laboratory sample would be collected periodically to back up both field detections and non-detections. Each push probe location would be abandoned following all applicable WAC requirements.

[2] At the discretion of the field supervisor, sampling intervals may be increased to 4 feet after 10 feet bgs

For subsurface soil sample locations, the direct-push would advance up to 25 feet bgs. A soil sample would be collected and recovered at 5-foot intervals. The recovered soil sample for a given interval would be placed into a decontaminated stainless steel bowl and to the extent feasible, large pieces of debris and organic matter will be removed. If the sample is scheduled for VOC analyses, EPA Method 5035A would be used and three VOC sample aliquots would be collected using an EnCore® soil collection unit or their equivalent. If the remaining sample shows any signs of localized contamination (e.g., staining, strong odors, discoloration, etc.), then a sample of the suspected higher concentration would be collected before homogenizing the remainder of the sample. Then the remaining sample in the bowl would be thoroughly homogenized with a decontaminated stainless steel spoon. Aliquots of homogenized soil for laboratory analysis would be placed directly into the appropriate, labeled sample containers. Any field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth would be recorded in a field logbook. The well location would be abandoned following all applicable WAC requirements.

In addition, if groundwater is encountered during the soil sampling a water sample would be collected if possible. At least one casing volume would be removed prior to sampling. Volatile organic samples would be collected first for analysis. Additional aliquots for laboratory analysis would be placed directly into appropriate labeled sample containers. Any field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth would be recorded in a field logbook. The well location would be abandoned following all applicable WAC requirements.

4.2.5 Soil Sampling During Sonic Drilling

Sonic drilling advances a hollow casing using sound energy and provides a continuous core of geologic materials penetrated during drilling that is retained inside the drill casing by a plastic sleeve. The extruded geologic material is then available for visual description, soil property testing, and collection of soil samples for chemical analysis. The entire length of the core will be examined for physical description, odor, visual stratification, debris, and any other distinguishing characteristics. Up to five soil samples will be collected at each monitoring well location for chemical analysis.

The soil material will be photographed and observations will be recorded in a field logbook. For each core interval section, the following data will be recorded on the core log at depth intervals to the nearest 0.1 feet:

- Physical description in accordance with the Unified Soil Classification System (includes soil type, density, consistency, and color);
- Odor (e.g., petroleum hydrocarbons);
- Visual stratification;
- Vegetation;
- Debris;

- Presence of oil sheen; and
- Any other distinguishing characteristics or features.

4.2.6 Monitoring Well Sampling

Groundwater samples will be collected from new well locations, as well as preexisting locations at (1) upgradient from the Sudbury Landfill (MW-7, MW-9, & MW-10), (2) at the WSP Landfill, and (3) the existing well near the dry cleaning facility. The sampling team will purge and sample all monitoring wells using flow rates of 0.2–0.3 liters per minute (L/min; Barcelona 1989). Using a flow-through cell, temperature, dissolved oxygen, pH, and redox will be recorded. Prior to sampling, all four water quality parameters should be within 5% for three consecutive readings. The pump will be disconnected from the flow-through cell and the sample will be collected from the pump in the appropriate sample containers. Any field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth will be recorded in a field logbook.

4.2.7 Surface Water Sampling

The sampling team will collect surface water samples by dipping a decontaminated bottle into the water and pouring the water sample into the appropriate sample containers. Any field observations such as date, time, sample physical characteristics, sample location, sampler, and approximate sample depth will be recorded into a field logbook

4.3 Decontamination Procedures

The HSA auger flights, split spoons, direct-push drilling rods, soil samplers, compositing pans, groundwater pumps, and sampling utensils will be thoroughly decontaminated prior to use in accordance with standard operating procedures. The equipment will be washed with non-phosphate detergent and water, rinsed with fresh water, and rinsed with distilled/deionized water. If a noticeable oily sheen or petroleum odor is observed, the sampling bowls and utensils used to process those samples will not be used for subsequent sample processing.

All hand work will be conducted with disposable nitrile gloves, which will be changed after handling each individual sample and between sampling locations to prevent cross-contamination between samples.

4.4 Sample Handling

Unless the sample is intended for VOC analysis, all soil samples will be placed into a separate decontaminated stainless-steel pan and homogenized until a consistent color and texture is achieved. Soil coming in direct contact with the core tube wall will be not be included in the samples to the extent practical. The volume of homogenized soil needed to perform the required analyses will then be placed in appropriately labeled sample containers obtained from the analytical laboratories.

All groundwater samples will be collected directly from the pump into the appropriate labeled sample containers obtained from the analytical laboratories. All surface water samples will be collected using a dedicated sampling container and poured into appropriately labeled sample containers obtained from the analytical laboratories.

Table A-1 lists sample container, volume, and preservation requirements.

4.5 Sample Identification, Containers, and Labels

Each sample will be labeled with a unique alphanumeric sample identification number that identifies the characteristics of the sample. The sample identification structure will be AAA-##-##-AA-###, with the characters defined as follows:

- Characters 1, 2, and 3 –Site Location, Washington State Penitentiary: WSP.
- Characters 4 and 5 – AOC number.
- Characters 6 and 7 – Station location sequential number: 01, 02, 03, etc.
- Characters 8 and 9 – Matrix: SS = surface soil; SB = subsurface soil; SW = surface water; GW = groundwater; SG = soil gas; DM = drum.
- Characters 10, 11, and 12 – Sample depth interval bottom depth: 000 = surface, 010 = 8 to 10 feet, 110 = 108 to 110 feet, etc.

For example, the subsurface soil sample collected from 1.0 to 2.0 feet bgs from the fifth monitoring well location in the WSP Landfill (AOC #1) would be labeled WSP-01-05-SB-002.

Sample aliquots submitted to the analytical laboratories will be placed in pre-cleaned sample containers and preserved as specified in Table A-1. The procedure for sample storage and shipping is described in Section 4.

Sample labels will be self-adhering, waterproof material. An indelible pen will be used to fill out each label. Each sample label will contain the project name, sample identification number, date and time of collection, analyses, preservation, and initials of the person preparing the sample. Sample labels will be protected by packaging tape wrapped around the entire jar to prevent loss or damage of the labels during handling and storage.

4.6 Field Documentation Procedures

A complete record of field activities will be maintained. Documentation necessary to meet QA objectives includes field notes and field forms, sample container labels, and chain of custody forms. The field documentation will provide descriptions of all sampling activities and weather conditions as well as names of sampling personnel, and will record all modifications, decisions, and/or corrective actions to the study design and procedures identified in this SAP.

Field logbooks will be kept on site during field operations. Daily activities will be recorded in a bound field logbook of water-resistant paper. Two additional logbooks will be used: one consisting of bound, paginated field forms for core sampling; and one for an inventory of sample containers (separate from the chain of custody documentation). All entries will be made legibly, in indelible ink, and will be signed and dated. Information recorded will include the following:

- Date, time, place, and location of sampling
- Names of on-site personnel and visitors
- Daily safety discussion notes and any safety issues
- QA samples collected (duplicate samples, field blanks, etc.)
- Field measurements and their units
- Observations about site, location, and samples (weather, current, odors, appearance, etc.)
- Equipment decontamination verification

Field logbooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occur during field activities. Entries should be factual, detailed, and objective. Unless restricted by weather conditions, all original data recorded in field logbooks, on sample identification tags, on chain of custody records, and on field forms will be written in waterproof ink. If an error is made, the individual responsible may make corrections by crossing out the error with a single line and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated. All documentation, including voided entries, will be maintained with project files.

4.7 Investigation-Derived Waste

Investigation-derived waste (IDW) expected to be generated by sampling activities during the field activities includes:

- Soil core sample material not submitted to the laboratories;
- Groundwater from developing, purging, and sampling monitoring wells;
- Equipment decontamination fluids; and
- Disposable protective clothing and sampling supplies.

The monitoring well HSA cores will be processed at each monitoring well. Excess soil core material will be containerized in drums and disposed of properly. Groundwater from well development, purging, and sampling will be containerized in drums and disposed of properly. Fluids generated during equipment decontamination will be contained in drums and disposed of properly following field activities.

Used personal protective equipment (PPE) such as Tyvek suits or gloves and disposable supplies such as paper towels and packaging will be placed in plastic storage bags and disposed of as municipal waste. If PPE contains residual soil, the PPE will be decontaminated using the procedures outlined in Section 3.3, and will be disposed of as non-hazardous waste. Waste material such as cardboard and aluminum will be recycled as feasible.

5 Sample Handling Procedures

5.1 Sample Storage Requirements

All samples will be stored in insulated coolers and preserved by cooling with ice or frozen gelpacks to a temperature of 4°C. Maximum sample holding and extraction times will be strictly adhered to by field personnel and the analytical and testing laboratories. Preparation of jars for shipment to fixed laboratories will be performed in the following manner:

- Samples will be packaged and shipped in accordance with U.S. Department of Transportation regulations as specified in 49 Code of Federal Regulations (CFR) 173.6 and 49 CFR 173.24.
- Sample containers will be placed in plastic zip-loc bubble-pack bags or wrapped in bubble pack and secured with packaging tape.
- Three to four ice packs in a garbage bag will be placed at the bottom of a cooler. Sample containers will be placed in a garbage bag and filled with the sample bottles. Additional bags of ice will be added as needed to surround the bag containing the samples.
- Chain of custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler.
- The cooler will be sealed with strapping tape and a custody seal.

Samples for chemical analyses will be hand-couriered or shipped via overnight delivery to the analytical laboratories at the close of sampling activities, and accompanied by the chain of custody record. The chain of custody record will be signed by the individual relinquishing the samples to be couriered or shipped. When samples are received at the laboratory, the shipping container seal will be broken and the condition of the samples will be recorded by the receiver. The field personnel will be responsible for the following:

- Packaging the samples;
- Signing the chain of custody before placing it inside the cooler;

- Applying a shipping label, a waybill, a custody seal, and strapping tape to the cooler;
- Shipping the samples in accordance with the maximum holding time allowed for the analyses to be performed;
- Notifying the laboratory of when the samples are shipped; and
- Confirming receipt of the samples in good condition by the laboratory.

All samples will be retained for a minimum of six months from the time they were received using standard laboratory handling procedures. They may be removed from the laboratory prior to the end of the six-month period only at the direction of the Contactor project manager.

5.2 Chain of Custody Procedures

Samples will be retained at all times in the field crew's custody until they are delivered or shipped to the appropriate laboratory by the Contactor personnel. Chain of custody forms will be initiated at the time of sample collection to ensure that all collected samples are properly documented and traceable through storage, transport, and analysis. When all line items on the form are completed or when the samples are relinquished, the sample collection custodian will sign and date the form, list the time, and confirm the completeness of all descriptive information contained on the form. Each individual who subsequently assumes responsibility for the samples will sign and date the form. The field chain of custody terminates when the laboratory receives the samples. The field sample custodian will retain a copy of the completed, signed chain of custody form(s) for project files.

6 Laboratory Analytical Methods

6.1 Chemical Analyses and Target Detection Limits

All of the chemical analytical procedures used in this program will be performed in accordance with the most current federal and state analyses, where applicable.

The samples will be analyzed by an approved laboratory for one or more of the following analyte groups: VOCs, NWTPH-Diesel, SVOCs, PCBs, and total metals. The laboratory will use the methods summarized in Attachment A, Table A-1. All samples for chemical analyses will be maintained at the analytical laboratory at the temperatures specified and analyzed within the holding times shown in Table A-1.

7 QA/QC Requirements

7.1 QA/QC for Chemical Analyses

The chemistry QA/QC procedures summarized in Table A-1 will be followed.

A written report will be prepared by the analytical laboratory documenting all the activities associated with sample analyses. At a minimum, the following will be included in the report:

- Results of the laboratory analyses and QA/QC results;
- All protocols used during analyses;
- COC procedures including explanation of any deviation from those identified in the report;
- Any protocol deviations from the approved sampling plan; and
- Location and availability of the data.

7.2 Data Quality Assurance Review Procedures

At a minimum, all laboratory data will undergo a QA1 review (PTI 1989a). If requested by Ecology, the data will be reviewed following QA2 procedures (PTI 1989b). If data fail the review, the laboratory will be contacted and the data will be re-analyzed, qualified, or unqualified with an explanation. For each data type, the quality of the data will be summarized in validation memos.

This page intentionally left blank

8 Data Analysis, Record Keeping and Reporting Requirements

8.1 Chemical and Physical Data

The analysis of soil, groundwater, soil gas, and field screening data will include: (1) tabulation of chemistry and other physical parameter results, including field screening and laboratory results; (2) comparison of any applicable chemistry results with the most stringent regulatory levels for groundwater contaminants derived from criteria in Chapter 173-340-720 WAC; (3) spatial evaluation of chemical results; (4) preparation of overlay maps with pertinent data; and (5) data quality assurance of chemistry results. Additional data evaluations (e.g., spatial analysis, isopleth maps, measures of central tendency, and regression analysis) may be conducted, as needed, to discern origins and trends in contamination.

8.2 Data Interpretation

Soil, groundwater, and soil gas chemical and physical data, including field screening results and laboratory results, will be evaluated primarily to assess the presence of contaminants of concern. The evaluation will follow the criteria established to identify contaminated soil and groundwater described in Section 1.5. Results of this assessment, in conjunction with waste characterization and other physical data, will be used in the development of a feasibility study to remove the contaminants of concern.

8.3 Record Keeping Procedures

Records and documents generated during planning and implementing the investigation will be maintained in accordance with the Records Management section of the contract.

8.4 Reporting Procedures

A written report will be prepared that documents all activities associated with collection, preparation and handling, transportation, and chemical and physical analysis of samples. The analytical laboratory reports will be included as appendices.

At a minimum, the following will be included in the data report:

- A brief statement of the purpose of the remedial investigation.
- A brief summary of the field sampling and laboratory analytical procedures followed, referencing the SAP and detailing any deviations from that plan that were necessitated by conditions encountered during sampling.
- A general vicinity map showing the location of the site with respect to familiar landmarks.
- Sampling station map and tabulated coordinate values (latitude and longitude) and their datum.
- Soil, groundwater, and soil gas data tables summarizing the chemical and physical parameter results, as well as pertinent QA/QC data.
- Interpretation of the results of the remedial investigation.
- Copies of complete laboratory data packages, as appendices or attachments.
- Quality assurance reports, as appendices or attachments.
- Copies of field logs, as appendices or attachments.

9 Health and Safety Plan

A Site-specific Health and Safety Plan (HASP) has been prepared for the field investigation and is included as Appendix C to the Work Plan. This HASP incorporates the requirements and policies of WSP regarding health, safety, and security measures.

This page intentionally left blank

10 Schedule

The preliminary schedule for the RI field investigation and the RI/FS project is included as Appendix E to the Work Plan. This schedule will be updated as the field investigation progresses.

This page intentionally left blank

11 Project Team and Coordination

The WSP RI/FS will include the following subtasks:

1. Project planning and agency coordination
2. Mobilization
3. Field sample collection
4. Laboratory preparation and analysis
5. QA/QC management
6. Draft and Final data reports

11.1 Project Planning and Coordination

Mr. Shane Loper, DOC, will be the Government Project Manager (GPM) and will provide overall project coordination, supply government-furnished data and services, provide review comments on the report, and coordinate with the Parametrix project team. Mike Warfel will be the Parametrix project manager and will be responsible for executing the approved SAP, overseeing the collection and storage of field samples, and reporting analytical results to Ecology. Ecology's representative is Ms. Sandra Treccani.

11.2 Mobilization

Mobilization will include the following activities:

- Procurement of sub-Contractor services, equipment, and materials – This may include, but is not limited to, geophysical surveys, drilling services, equipment rental, laboratory services, and waste disposal and safety supplies;
- Coordination with the WSP facility administration staff – Sampling near and around the areas within or near the facility will require coordination with the WSP administration staff; and
- Establishing site support facilities – Land-based support services will be required to facilitate the site activities.

- Testing and inspection of equipment – All drilling rigs, communication devices, sampling equipment, locating equipment, and safety equipment will be inspected, and tested if necessary, each day prior to deployment.

11.3 Field Sample Collection

Parametrix team staff will be responsible for collection and processing of samples in accordance with the SAP and transport of samples to the analytical laboratory for chemical analysis.

11.4 Laboratory Sample Preparation and Analysis

The Parametrix team will be responsible for sample processing and delivery to the analytical laboratory. Established protocols for decontamination, sample preservation, holding times, and chain of custody documentation will be observed. Analytical laboratories will be determined later.

11.5 QA/QC Management

The Parametrix team will perform QA oversight for the laboratory programs. The Contractor will ensure that the laboratory analytical and QA/QC data are considered valid and procedures meet the required analytical quality control limits.

11.6 Data Report

The Parametrix team will coordinate preparation of the Remedial Investigation Report, which will be prepared in accordance with the most stringent regulatory levels for groundwater contaminants derived from Chapter 173-340-720 WAC.

12 References

General Electric (GE). 1984. PCB Appraisal. Conducted by GE for DOC. April 2-5, 1984.

HWA Geosciences Inc. (HWA). 1998. Preliminary Hydrogeologic Evaluation- Construction Demolition Landfill Washington State Penitentiary Walla Walla, WA. Prepared for the Washington State Department of Corrections. September 3, 1998.

Parametrix. 1995. Closed Construction/Demolition Landfill Washington State Penitentiary Walla Walla, WA. Prepared for the Washington State Department of Corrections. June 23, 1995.

PTI Environmental Services, 1989a. Data validation guidance manual for selected sediment variable. Prepared for Ecology, Olympia, WA.

_________. 1989b, Puget Sound Dredged Disposal Analysis guidance manual: data quality evaluation for proposed dredged material disposal projects. Prepared for Ecology, Olympia, WA.

Washington State Department of Corrections (DOC). 1996. Division of Correctional Industries. Underground Storage Tank Removal and Health and Safety Plan. June 1996.

Washington State Department of Ecology (Ecology). 2000. Preliminary Assessment Washington State Penitentiary Narrative Report. Prepared by Phil Leinhart, Hydrologist Toxics Cleanup Program, Ecology. October 2000.

_________. 1999. Sudbury Road Landfill Site Contaminant Source Identification/Assessment Report. Prepared under an Agreement between Ecology and the U.S. Environmental Protection Agency. June 1999.

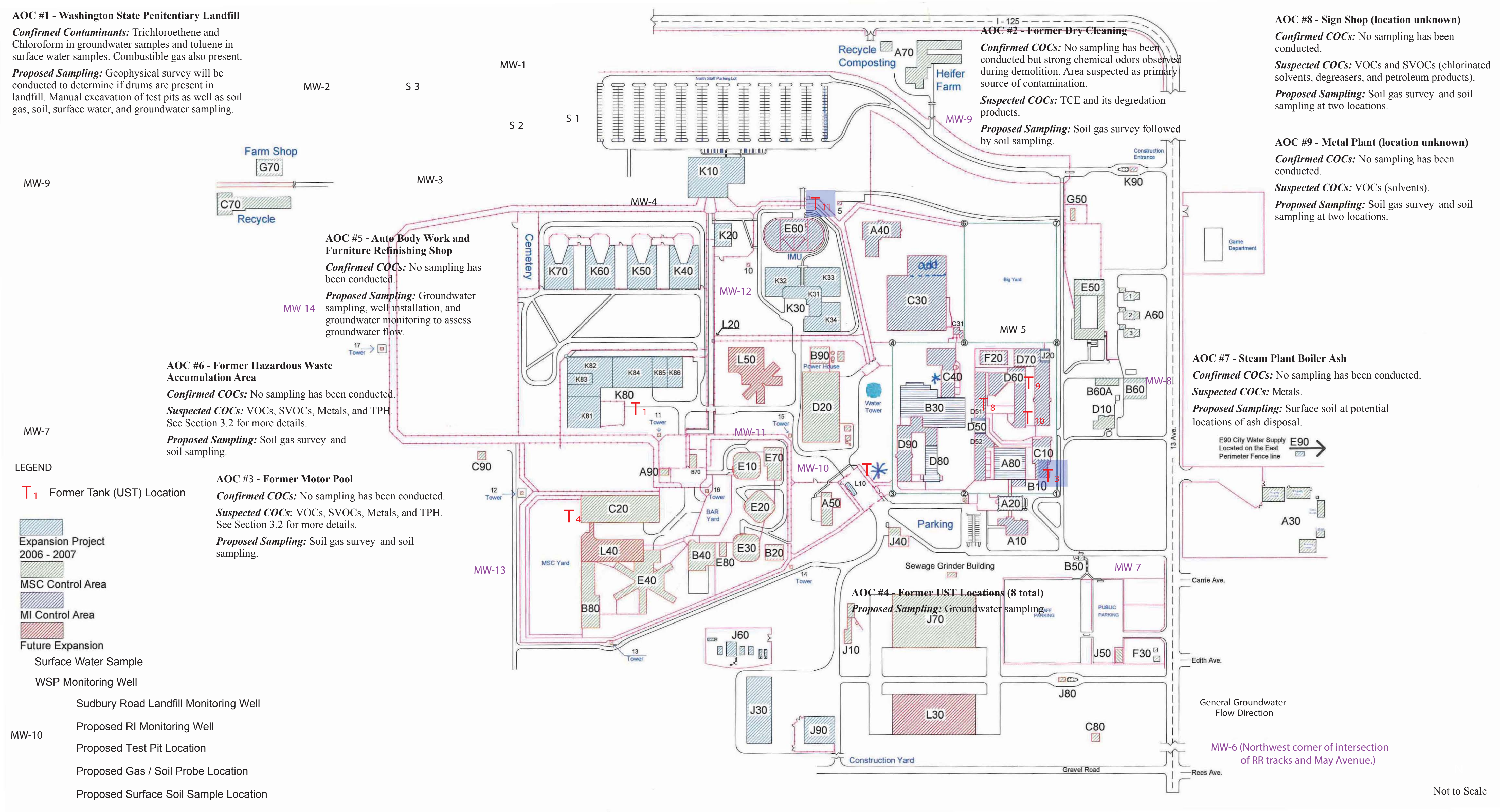
_________. 1995. Site Hazard Assessment Data Collection Summary Sheets for the Washington Ranking Method –Surface Water, Air, and Groundwater routes only. Prepared for the Washington State Penitentiary. April 25, 1995.

_________. 1992. Initial Investigation Data Sheets. Prepared by the Washington State Penitentiary.

This page intentionally left blank

Figures

This page intentionally left blank



ecology and environment, inc.
Seattle, Washington

Source: Washington State Department of Corrections, 2009.

WASHINGTON STATE PENITENTIARY
Walla Walla, Washington

Figure 1
PRELIMINARY RI SAMPLING LOCATIONS

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

Updated 02/11/2010 by **Parametrix**, Inc.

A

Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

This is Appendix A to the document:
Appendix A: Final Sampling & Analysis Plan

This page intentionally left blank

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water	SPE	SPE	SPE
PAHs by Method 8270D SIM	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**
Naphthalene	0.000372	0.0067	ppm	0.0137	0.10	ppb	0.0154	0.10	ppb
2-Methylnaphthalene	0.000281	0.0067	ppm	0.0195	0.10	ppb	0.0141	0.10	ppb
1-Methylnaphthalene	0.000204	0.0067	ppm	0.00587	0.10	ppb	0.0142	0.10	ppb
Acenaphthylene	0.000179	0.0067	ppm	0.00438	0.10	ppb	0.0108	0.10	ppb
Acenaphthene	0.000282	0.0067	ppm	0.00617	0.10	ppb	0.0190	0.10	ppb
Fluorene	0.000176	0.0067	ppm	0.00589	0.10	ppb	0.0123	0.10	ppb
Phenanthrene	0.000186	0.0067	ppm	0.00590	0.10	ppb	0.0101	0.10	ppb
Anthracene	0.000151	0.0067	ppm	0.00494	0.10	ppb	0.00979	0.10	ppb
Fluoranthene	0.000179	0.0067	ppm	0.00431	0.10	ppb	0.00729	0.10	ppb
Pyrene	0.000125	0.0067	ppm	0.00693	0.10	ppb	0.00479	0.10	ppb
Benzo[a]anthracene	0.0000872	0.0067	ppm	0.00418	0.010	ppb	0.00585	0.010	ppb
Chrysene	0.000103	0.0067	ppm	0.00503	0.010	ppb	0.00626	0.010	ppb
Benzo[b]fluoranthene	0.000134	0.0067	ppm	0.00611	0.010	ppb	0.00618	0.010	ppb
Benzo[k]fluoranthene	0.0000966	0.0067	ppm	0.00553	0.010	ppb	0.00594	0.010	ppb
Benzo[a]pyrene	0.0000577	0.0067	ppm	0.00607	0.010	ppb	0.0143	0.010	ppb
Indeno[1,2,3-c,d]pyrene	0.0000706	0.0067	ppm	0.00391	0.010	ppb	0.00603	0.010	ppb
Dibenz[a,h]anthracene	0.0000530	0.0067	ppm	0.00353	0.010	ppb	0.00618	0.010	ppb
Benzo[g,h,i]perylene	0.0000638	0.0067	ppm	0.00412	0.010	ppb	0.00646	0.010	ppb
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
Semivolatiles by Method 8270D	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
N-Nitrosodimethylamine	0.0103	0.033	ppm	0.195	1.0	ppb			
Pyridine	0.245	0.33	ppm	0.144	1.0	ppb			
Phenol	0.0128	0.033	ppm	0.233	1.0	ppb			
Aniline	0.146	0.17	ppm	0.266	1.0	ppb			
bis(2-chloroethyl)ether	0.0135	0.033	ppm	0.441	1.0	ppb			
2-Chlorophenol	0.0138	0.033	ppm	0.392	1.0	ppb			
n-Decane	0.0141	0.033	ppm	0.302	1.0	ppb			
1,3-Dichlorobenzene	0.0118	0.033	ppm	0.328	1.0	ppb			
1,4-Dichlorobenzene	0.0123	0.033	ppm	0.323	1.0	ppb			
Benzyl alcohol	0.0127	0.033	ppm	0.305	1.0	ppb			
1,2-Dichlorobenzene	0.0118	0.033	ppm	0.322	1.0	ppb			
2-Methylphenol (o-Cresol)	0.0125	0.033	ppm	0.320	1.0	ppb			
bis(2-Chloroisopropyl)ether	0.0127	0.033	ppm	0.360	1.0	ppb			
(3+4)-Methylphenol (m,p-Cresol)	0.0118	0.033	ppm	0.287	1.0	ppb			
N-Nitroso-di-n-propylamine	0.0142	0.033	ppm	0.349	1.0	ppb			
Hexachloroethane	0.0142	0.033	ppm	0.393	1.0	ppb			
Nitrobenzene	0.0157	0.033	ppm	0.369	1.0	ppb			
Isophorone	0.0129	0.033	ppm	0.346	1.0	ppb			
2-Nitrophenol	0.0151	0.033	ppm	0.392	1.0	ppb			
2,4-Dimethylphenol	0.0162	0.83	ppm	0.360	1.0	ppb			
bis(2-Chloroethoxy)methane	0.0129	0.033	ppm	0.382	1.0	ppb			

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water			
Semivolatiles by Method 8270D	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
2,4-Dichlorophenol	0.0126	0.033	ppm	0.313	1.0	ppb			
Benzoic acid	0.0175	0.17	ppm	0.0356	5.0	ppb			
1,2,4-Trichlorobenzene	0.0130	0.033	ppm	0.407	1.0	ppb			
Naphthalene	0.0147	0.033	ppm	0.429	1.0	ppb			
4-Chloroaniline	0.00586	0.033	ppm	2.68	10	ppb			
Hexachlorobutadiene	0.0131	0.033	ppm	0.354	1.0	ppb			
4-Chloro-3-methylphenol	0.0112	0.033	ppm	0.339	1.0	ppb			
2-Methylnaphthalene	0.0143	0.033	ppm	0.387	1.0	ppb			
1-Methylnaphthalene	0.0140	0.033	ppm	0.344	1.0	ppb			
Hexachlorocyclopentadiene	0.0102	0.033	ppm	0.265	1.0	ppb			
2,4,6-Trichlorophenol	0.0130	0.033	ppm	0.346	1.0	ppb			
2,3-Dichloroaniline	0.0117	0.033	ppm	0.280	1.0	ppb			
2,4,5-Trichlorophenol	0.0128	0.033	ppm	0.206	1.0	ppb			
2-Chloronaphthalene	0.0127	0.033	ppm	0.309	1.0	ppb			
2-Nitroaniline	0.00964	0.033	ppm	0.334	1.0	ppb			
1,4-Dinitrobenzene	0.0108	0.033	ppm	0.322	1.0	ppb			
Dimethylphthalate	0.0121	0.033	ppm	0.287	1.0	ppb			
1,3-Dinitrobenzene	0.00868	0.17	ppm	0.236	1.0	ppb			
2,6-Dinitrotoluene	0.00822	0.033	ppm	0.377	1.0	ppb			
1,2-Dinitrobenzene	0.0118	0.033	ppm	0.292	1.0	ppb			
Acenaphthylene	0.0119	0.033	ppm	0.293	1.0	ppb			
3-Nitroaniline	0.00612	0.033	ppm	0.249	1.0	ppb			
2,4-Dinitrophenol	0.00478	0.033	ppm	3.95	10	ppb			
Acenaphthene	0.0102	0.033	ppm	0.397	1.0	ppb			
4-Nitrophenol	0.0116	0.033	ppm	0.222	1.0	ppb			
2,4-Dinitrotoluene	0.00969	0.17	ppm	0.345	1.0	ppb			
Dibenzofuran	0.0109	0.033	ppm	0.275	1.0	ppb			
2,3,4,6-Tetrachlorophenol	0.00843	0.033	ppm	0.287	1.0	ppb			
2,3,5,6-Tetrachlorophenol	0.00954	0.033	ppm	0.235	1.0	ppb			
Diethylphthalate	0.0131	0.17	ppm	0.357	1.0	ppb			
4-Chlorophenyl-phenylether	0.0110	0.033	ppm	0.228	1.0	ppb			
4-Nitroaniline	0.0185	0.033	ppm	0.345	1.0	ppb			
Fluorene	0.00948	0.033	ppm	0.262	1.0	ppb			
4,6-Dinitro-2-methylphenol	0.00699	0.033	ppm	0.267	5.0	ppb			
n-Nitrosodiphenylamine	0.0118	0.033	ppm	2.12	10	ppb			
1,2-Diphenylhydrazine	0.0156	0.033	ppm	0.271	1.0	ppb			
4-Bromophenyl-phenylether	0.00984	0.033	ppm	0.170	1.0	ppb			
Hexachlorobenzene	0.0100	0.033	ppm	0.240	1.0	ppb			
Pentachlorophenol	0.00902	0.33	ppm	0.468	5.0	ppb			
n-Octadecane	0.0199	0.033	ppm	0.335	1.0	ppb			
Phenanthrene	0.0109	0.033	ppm	0.283	1.0	ppb			
Anthracene	0.0101	0.033	ppm	0.230	1.0	ppb			
Carbazole	0.00910	0.033	ppm	0.276	1.0	ppb			

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
Semivolatiles by Method 8270D	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
Di-n-butylphthalate	0.0140	0.033	ppm	0.276	1.0	ppb			
Fluoranthene	0.00986	0.033	ppm	0.250	1.0	ppb			
Benzidine	0.00128	0.33	ppm	1.19	10	ppb			
Pyrene	0.0117	0.033	ppm	0.271	1.0	ppb			
Butylbenzylphthalate	0.0222	0.033	ppm	0.359	1.0	ppb			
bis-2-Ethylhexyladipate	0.0148	0.033	ppm	0.285	1.0	ppb			
3,3'-Dichlorobenzidine	0.115	0.33	ppm	2.13	10	ppb			
Benzo[a]anthracene	0.0125	0.033	ppm	0.309	1.0	ppb			
Chrysene	0.0126	0.033	ppm	0.321	1.0	ppb			
bis(2-Ethylhexyl)phthalate	0.0191	0.033	ppm	0.172	1.0	ppb			
Di-n-octylphthalate	0.0131	0.033	ppm	0.235	1.0	ppb			
Benzo[b]fluoranthene	0.0106	0.033	ppm	0.240	1.0	ppb			
Benzo[k]fluoranthene	0.0151	0.033	ppm	0.316	1.0	ppb			
Benzo[a]pyrene	0.00922	0.033	ppm	0.228	1.0	ppb			
Indeno[1,2,3-c,d]pyrene	0.0111	0.033	ppm	0.233	1.0	ppb			
Dibenz[a,h]anthracene	0.00938	0.033	ppm	0.257	1.0	ppb			
Benzo[g,h,i]perylene	0.00920	0.033	ppm	0.274	1.0	ppb			
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
NWTPH-Dx	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
Diesel	8.78	25	ppm	0.0791	0.25	ppm			
Lube Oil	14.6	50	ppm	0.138	0.40	ppm			
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
Volatiles by Method 8260B	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
Dichlorodifluoromethane	0.628	1.0	ppb	0.143	0.20	ppb			
Chloromethane	1.69	5.0	ppb	0.0313	1.0	ppb			
Vinyl Chloride	0.857	1.0	ppb	0.0399	0.20	ppb			
Bromomethane	0.536	1.0	ppb	0.0978	0.20	ppb			
Chloroethane	1.69	5.0	ppb	0.175	1.0	ppb			
Trichlorofluoromethane	0.647	1.0	ppb	0.0599	0.20	ppb			
1,1-Dichloroethene	0.210	1.0	ppb	0.0459	0.20	ppb			
Acetone	4.57	5.0	ppb	0.562	5.0	ppb			
Iodomethane	0.643	5.0	ppb	0.343	1.0	ppb			
Carbon Disulfide	0.281	1.0	ppb	0.0258	0.20	ppb			
Methylene Chloride	2.74	5.0	ppb	0.175	1.0	ppb			
(trans) 1,2-Dichloroethene	0.789	1.0	ppb	0.0335	0.20	ppb			
Methyl t-Butyl Ether	0.173	1.0	ppb	0.0507	0.20	ppb			
1,1-Dichloroethane	0.219	1.0	ppb	0.0426	0.20	ppb			
Vinyl Acetate	0.231	5.0	ppb	0.163	2.0	ppb			
2,2-Dichloropropane	0.253	1.0	ppb	0.0702	0.20	ppb			
(cis) 1,2-Dichloroethene	0.179	1.0	ppb	0.0380	0.20	ppb			

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

Volatiles by Method 8260B	Soil MDL	Soil PQL	Soil Units	Water MDL	Water PQL	Water Units			
2-Butanone	1.23	5.0	ppb	0.523	5.0	ppb			
Bromochloromethane	0.489	1.0	ppb	0.0710	0.20	ppb			
Chloroform	0.315	1.0	ppb	0.0527	0.20	ppb			
1,1,1-Trichloroethane	0.286	1.0	ppb	0.0336	0.20	ppb			
Carbon Tetrachloride	0.366	1.0	ppb	0.0329	0.20	ppb			
1,1-Dichloropropene	0.346	1.0	ppb	0.0612	0.20	ppb			
Benzene	0.142	1.0	ppb	0.0241	0.20	ppb			
1,2-Dichloroethane	0.266	1.0	ppb	0.0359	0.20	ppb			
Trichloroethene	0.554	1.0	ppb	0.0484	0.20	ppb			
1,2-Dichloropropane	0.302	1.0	ppb	0.0542	0.20	ppb			
Dibromomethane	0.351	1.0	ppb	0.0661	0.20	ppb			
Bromodichloromethane	0.273	1.0	ppb	0.0217	0.20	ppb			
2-Chloroethyl Vinyl Ether	3.29	5.0	ppb	0.210	1.0	ppb			
(cis) 1,3-Dichloropropene	0.197	1.0	ppb	0.0613	0.20	ppb			
Methyl Isobutyl Ketone	0.518	5.0	ppb	0.141	2.0	ppb			
Toluene	0.291	5.0	ppb	0.0291	1.0	ppb			
(trans) 1,3-Dichloropropene	0.203	1.0	ppb	0.0506	0.20	ppb			
1,1,2-Trichloroethane	0.375	1.0	ppb	0.0978	0.20	ppb			
Tetrachloroethene	0.297	1.0	ppb	0.0457	0.20	ppb			
1,3-Dichloropropane	0.229	1.0	ppb	0.0660	0.20	ppb			
2-Hexanone	0.679	5.0	ppb	0.0969	2.0	ppb			
Dibromochloromethane	0.298	1.0	ppb	0.0382	0.20	ppb			
1,2-Dibromoethane	0.199	1.0	ppb	0.0952	0.20	ppb			
Chlorobenzene	0.196	1.0	ppb	0.0340	0.20	ppb			
1,1,1,2-Tetrachloroethane	0.254	1.0	ppb	0.0465	0.20	ppb			
Ethylbenzene	0.168	1.0	ppb	0.0243	0.20	ppb			
m,p-Xylene	0.401	2.0	ppb	0.0333	0.40	ppb			
o-Xylene	0.273	1.0	ppb	0.0255	0.20	ppb			
Styrene	0.178	1.0	ppb	0.0231	0.20	ppb			
Bromoform	0.538	1.0	ppb	0.0928	1.0	ppb			
Isopropylbenzene	0.162	1.0	ppb	0.0284	0.20	ppb			
Bromobenzene	0.244	1.0	ppb	0.117	0.20	ppb			
1,1,2,2-Tetrachloroethane	0.462	1.0	ppb	0.0557	0.20	ppb			
1,2,3-Trichloropropane	0.306	1.0	ppb	0.0939	0.20	ppb			
n-Propylbenzene	0.179	1.0	ppb	0.0188	0.20	ppb			
2-Chlorotoluene	0.325	1.0	ppb	0.0401	0.20	ppb			
4-Chlorotoluene	0.336	1.0	ppb	0.0402	0.20	ppb			
1,3,5-Trimethylbenzene	0.258	1.0	ppb	0.0258	0.20	ppb			
tert-Butylbenzene	0.262	1.0	ppb	0.0243	0.20	ppb			
1,2,4-Trimethylbenzene	0.209	1.0	ppb	0.0217	0.20	ppb			
sec-Butylbenzene	0.183	1.0	ppb	0.0220	0.20	ppb			
1,3-Dichlorobenzene	0.278	1.0	ppb	0.0266	0.20	ppb			
p-Isopropyltoluene	0.242	1.0	ppb	0.0257	0.20	ppb			

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water			
Volatiles by Method 8260B	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
1,4-Dichlorobenzene	0.269	1.0	ppb	0.123	0.20	ppb			
1,2-Dichlorobenzene	0.321	1.0	ppb	0.107	0.20	ppb			
n-Butylbenzene	0.222	1.0	ppb	0.0394	0.20	ppb			
1,2-Dibromo-3-chloropropane	0.940	5.0	ppb	0.468	1.0	ppb			
1,2,4-Trichlorobenzene	0.383	1.0	ppb	0.0398	0.20	ppb			
Hexachlorobutadiene	0.503	5.0	ppb	0.0529	0.20	ppb			
Naphthalene	0.314	1.0	ppb	0.0547	1.0	ppb			
1,2,3-Trichlorobenzene	0.259	1.0	ppb	0.0586	0.20	ppb			
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
Volatiles by Method 8260B/SIM	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
Vinyl Chloride					0.020	ppb			
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**	**Dissolved**	**Dissolved**	**Dissolved**
ICP Metals by Method 200.7/6010B	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**
Antimony	3.55	5.0	ppm	53.1	100	ppb	63.2	100	ppb
Arsenic	1.65	10	ppm	25.8	200	ppb	44.1	200	ppb
Beryllium	0.0103	0.50	ppm	0.223	10	ppb	0.466	10	ppb
Cadmium	0.0744	0.50	ppm	1.49	10	ppb	1.17	10	ppb
Chromium	0.155	0.50	ppm	4.40	10	ppb	3.26	10	ppb
Copper	0.384	0.50	ppm	5.98	10	ppb	6.42	10	ppb
Lead	1.18	5.0	ppm	35.6	100	ppb	20.9	100	ppb
Nickel	0.389	2.5	ppm	7.34	50	ppb	7.99	50	ppb
Selenium	3.37	10	ppm	52.5	200	ppb	102	200	ppb
Silver	0.201	0.50	ppm	5.54	10	ppb	5.41	10	ppb
Thallium	9.64	10	ppm	135	200	ppb	184	200	ppb
Zinc	0.361	2.5	ppm	4.95	50	ppb	5.85	50	ppb

Table A-1. Chemical Analytical Parameters, Laboratory Methods, and Method Detection Limits

	Soil	Soil	Soil	Water	Water	Water	Dissolved	Dissolved	Dissolved
ICP/MS Metals by Method 200.8/6020	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**
Antimony	0.0180	5.0	ppm	0.160	5.5	ppb	0.0441	5.0	ppb
Arsenic	0.0104	10	ppm	0.577	3.3	ppb	0.0661	1.0	ppb
Beryllium	0.00720	0.50	ppm	0.230	11	ppb	0.0517	10	ppb
Cadmium	0.00461	0.50	ppm	0.0401	4.4	ppb	0.0154	4.0	ppb
Chromium	0.0438	0.50	ppm	0.654	11	ppb	0.109	10	ppb
Copper	0.0153	0.50	ppm	0.321	11	ppb	0.304	10	ppb
Lead	0.0353	5.0	ppm	0.218	1.1	ppb	0.0123	1.0	ppb
Nickel	0.0178	2.5	ppm	0.303	56	ppb	0.0364	40	ppb
Selenium	0.0485	10	ppm	1.06	5.6	ppb	0.127	5.0	ppb
Silver	0.0163	0.50	ppm	0.199	11	ppb	0.0609	10	ppb
Thallium	0.00547	5.0	ppm	0.0284	5.6	ppb	0.0133	5.0	ppb
Zinc	0.133	2.5	ppm	2.32	56	ppb	0.487	50	ppb
	Soil	**Soil**	**Soil**	**Water**	**Water**	**Water**			
Mercury by Method 7470A/7471A	**MDL**	**PQL**	**Units**	**MDL**	**PQL**	**Units**			
Mercury	0.000247	0.25	ppm	0.0126	0.50	ppb			
Mercury (low)	n/a	n/a	n/a	0.0145	0.038	ppb			

B Quality Assurance Project Plan

This page intentionally left blank

Washington State Penitentiary
RI/FS Work Plan
APPENDIX B:
Final Quality Assurance Project Plan

Contract No. C0700036
Work Assignment No. EANE026

Prepared for:

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Toxics Cleanup Program
North 4601 Monroe
Spokane, Washington 99205-1295

By:

Ecology & Environment, Inc.
720 Third Avenue, Suite 1700
Seattle, WA 98104

June 2009

Updated by Parametrix, Inc.
1231 Fryar Avenue
Sumner, WA 98390

February 2010

Under Contract to the Washington State Department of Corrections
Contract No. 10-321A

Publication and Contact Information

This plan is available on the Department of Ecology website at
http://www.ecy.wa.gov/programs/tcp/sites/state/pen_hp.htm

Data for this project will be available on Ecology's Environmental Information Management (EIM) website at www.ecy.wa.gov/eim/index.htm.

Work Assignment Information

1. Firm: Parametrix, Inc. 2. Contract No.: Department of Corrections Contract No. 10-321A

3. Project Name: Washington State Penitentiary RI/FS at Walla Walla

4. Work Assignment Number:

5. SIC: Project: Fund Code:

6. Start Date: End Date:

For more information please contact:

Sandra Treccani
Washington State Department of Ecology
Toxics Cleanup Program
North 4601 Monroe
Spokane, Washington 99205-1295
Email: Treccani, Sandra (ECY) [satr461@ECY.WA.GOV]
Phone: 509/329-3412

Distribution List:

Sandra Treccani, Washington State Department of Ecology
Lauren S. Loper, Washington State Department of Corrections

This page intentionally left blank.

Quality Assurance Project Plan

Washington State Penitentiary RI/FS

June 2009

Updated February 2010

Approved By:
[Final Approval List TBD]

Signature	Date

Michael R. Warfel, Project Manager, Parametrix, Inc.

Signature	Date

Stuart Currie, QA Lead and Senior Chemist, Parametrix, Inc.

Signature	Date

Bill Kammin, QA Officer, Washington State Department of Ecology

This page intentionally left blank.

Table of Contents

Table of Contents (Cont.)

Section **Page**

Appendices

List of Tables

This page intentionally left blank.

List of Abbreviations and Acronyms

^{o}C	degrees Celsius
CDL	construction debris landfill
COC	chain of custody
DOC	Washington State Department of Corrections
DQOs	data quality objectives
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management (database)
EPA	United States Environmental Protection Agency
FS	Feasibility Study
GC	gas chromatograph
GC/ECD	gas chromatograph/electron capture detector
GC/FID	gas chromatograph/flame ionization detector
GC/MS	gas chromatograph/mass spectrometer
IDW	investigation-derived wastes
LCS	laboratory control sample
MS	matrix spike
MSD	matrix spike duplicate
NWTPH	Northwest total petroleum hydrocarbons
PAHs	polycyclic aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
RI	Remedial Investigation
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control

List of Abbreviations and Acronyms (Cont.)

SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SVOCs	semivolatile organic compounds
TCE	trichloroethene
ug/L	micrograms per liter
TPH	total petroleum hydrocarbons
UST	underground storage tank
VOCs	volatile organic compounds
WSP	Washington State Penitentiary

Abstract

This Quality Assurance Project Plan (QAPP) is provided for the preliminary Remedial Investigation/Feasibility Study (RI/FS) to be managed by the Washington State Department of Corrections and Department of Ecology Toxics Cleanup Program. The goal of the RI/FS is to determine the nature and extent of contamination related to and downgradient of the Washington State Penitentiary in Walla Walla, Washington. Further information on the project objectives can be found in the Work Plan.

This QAPP describes the objectives of the field study and the quality assurance procedures to be followed to achieve those objectives. This QAPP is supplemental to the project Work Plan as Appendix B and supports the Sampling and Analysis Plan (SAP, Work Plan Appendix A). The contractor who will implement the Work Plan, SAP, and QAPP has not been selected at this time. After the study is completed, analytical data will be uploaded to the Department of Ecology's Environmental Information Management database and a final report describing the results will be posted to Ecology's website.

This page intentionally left blank.

1 Introduction

The Washington State Department of Ecology (Ecology), in coordination with the Department of Corrections (DOC), became involved with the Washington State Penitentiary (WSP) in Walla Walla, Washington in 1992. The WSP Landfill was added to Ecology's Confirmed and Suspected Contamination Sites List on June 8, 1992 because of concerns about the WSP Landfill, and other past activities at the WSP facility being potential sources of contamination detected in groundwater downgradient from the site.

On behalf of Ecology and DOC, Ecology and Environment, Inc., (E & E) prepared the preliminary Quality Assurance Project Plan (QAPP). It was based on the Ecology document "Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies" (2004a) and on guidance provided by Ecology's site manager and representatives of DOC.

The Washington State Department of Corrections (DOC) is the Potential Liable Party (PLP) responsible for completing the RI/FS at WSP. DOC retained Parametrix, Inc. to implement the RI/FS, including updating this RI/FS QAPP with information specific to the project team and analytical laboratory that will complete the project.

The "site" is defined by the property boundaries of the WSP. The site definition may be updated by new information as it becomes available. A site area map can be seen in Figure 1 of the Work Plan.

1.1 Background

Previous investigations have confirmed the presence of volatile organic compounds (VOCs) in the groundwater upgradient of the Sudbury Road Municipal Landfill (Sudbury Road Landfill) and downgradient of the WSP Landfill. In several monitoring wells, the concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) have exceeded the Model Toxics Control Act (MTCA) Method A cleanup levels for groundwater (see Work Plan Table 2-1).

1.2 Previous Studies

Surface soil, subsurface soil, surface water, and groundwater samples have been collected and analyzed from locations in and around the WSP during previous investigations conducted at various times between 1984 and 2000. Groundwater samples have been collected upgradient of the Sudbury Road Landfill and surrounding the WSP landfill. Previous investigations conducted in the vicinity of the WSP and the Sudbury Road Landfill are summarized in the project Work Plan.

ecology and environment, inc.

2 Project Description

The overall project objectives are to characterize both the nature and the vertical and horizontal extents of soil, surface water, and groundwater contamination at specified areas of concern (AOCs) around the site and define the characteristics of soils and groundwater to support a future feasibility study.

The project will evaluate concentrations of several contaminants of concern (COCs):

- Volatile organic compounds (VOCs)
- Total petroleum hydrocarbons as diesel (TPH-D)
- Polycyclic aromatic hydrocarbons (PAHs)
- Semivolatile organic compounds (SVOCs)
- Total metals

Each of these contaminants is of concern for one or more of the following reasons:

- The contaminant has been detected in previous investigations, or
- Historical records have indicated the contaminants were used or stored on site.

Surface soil, subsurface soil, storm drain sediments, surface water, groundwater, and soil gas samples will be collected from the WSP and the WSP Landfill.

The general location of the WSP is illustrated in Work Plan Figure 1. The boundary of the study area for the investigation is illustrated in Work Plan Figures 1 and 2.

This page intentionally left blank.

3 Organization and Schedule

3.1 Organization

This QAPP was developed in conjunction with a review of information about the WSP facility. Key staff assigned to this work and their responsibilities are shown in the following organization chart:

Table 1 Organization Chart

Personnel	Project Role	Company	Cell Phone	Email
Jack Olson, P.E.	DOC Client	Department of Corrections	360-239-4619	jaolson@doc1.wa.gov
Sandra Treccani, LG, LHG	Site Manager	Department of Ecology		satr461@ecy.wa.gov
Teresita Bala, PhD	Site Engineer	Department of Ecology		tbal461@ecy.wa.gov
Mike Warfel, LG, LHG	Project Manager, Contract with DOC	Parametrix	425-457-0621	mwarfel@parametrix.com
Arnie Sugar, LG, LHG	RI Manager	HWA Geosciences	206-794-3130	asugar@hwageo.com
To Be Determined	Field Team Manager			
To Be Determined	Field Team Site Safety Officer			
Stuart Currie	QA Lead	Parametrix		

3.2 Schedule

The anticipated schedule for the deliverables and the field sampling event is shown in Table 2. Any DOC-approved schedule changes will be relayed as soon as possible to the project team by the Contractor’s project manager by telephone and email.

Table 2 Proposed Project Schedule

Status Reports	Monthly
Draft QAPP	
Final QAPP	
Phase I Sampling Event	
Phase II Sampling Event	See Project Schedule in Appendix E of the Final Work Plan
Data Verification and Validation	
Data Entry into EIM	
Draft Technical Report	
Final Technical Report	

Key:

EIM Environmental Information Management Database

QAPP Quality Assurance Project Plan