Burns Gravel Pit
Preliminary Assessment/Site Inspection
Fort Hall, Idaho
TDD: 04-05-0007

Ecology and Environment, Inc.
Contract: 68-S0-01-01
September 2005

Region 10

START-2

Superfund Technical Assessment and Response Team

Submitted To: Ken Marcy, Task Monitor
United States Environmental Protection Agency, Region 10
1200 Sixth Avenue
Seattle, Washington 98101

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

RECEIVED
NOV 04 2005
DEPT. OF ENVIRONMENTAL QUALITY
WASTE PROGRAM

November 2, 2005

Reply To
Attn Of: ECL-115

Kelly Wright
The Shoshone-Bannock Tribes
CERCLA/RCRA Program
P.O. Box 306
Fort Hall, ID 83203

Dear Mr. Wright:

The U.S. Environmental Protection Agency (EPA), through its contractor, Ecology and Environment, Inc., has completed a report summarizing the findings of a visit conducted at the Burns Gravel Pit in May, 2005. A copy of the report, called a Preliminary Assessment/Site Inspection, is enclosed.

Based on a review of this report, EPA has determined that no further action is warranted at the Burns Gravel Pit site. A no further action designation means that no additional steps under the Federal Superfund Program will be taken at the site unless new information warranting further Superfund consideration is discovered. EPA's no further action designation does not relieve your facility from complying with appropriate Idaho state regulations.

In accordance with EPA's decision regarding the tracking of no further action sites, the above named site will be removed from the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) data base and placed in a separate archival data base as a historical record. Archived sites may be returned to the CERCLIS site inventory if new information necessitating further Superfund consideration is discovered.

If you have any questions, please feel free to contact me at (206)553-2782.

Sincerely,

Ken Marcy
Site Assessment Manager

Enclosure

cc: Bruce Schuld, IDEQ
Craig Conant, USEPA

BURNS GRAVEL PIT
PRELIMINARY ASSESSMENT/SITE INSPECTION REPORT
FORT HALL, IDAHO

TABLE OF CONTENTS

Section Page

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

Acronym	Definition
AFLB	American Falls Lake Beds
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CRQL	Contract Required Quantitation Limit
DUP	Duplicate
DQO	Data Quality Objectives
E & E	Ecology and Environment, Inc.
EDB	ethylene dibromide
EPA	United States Environmental Protection Agency
ESI	Expanded Site Inspection
ESRP	Eastern Snake River Plain
GPS	Global Positioning System
herbicides	Clorinated herbicides
IDW	Investigation derived waste
MEL	Manchester Environmental Laboratory
MS	Matrix Spike
MSD	MS Duplicate
PA/SI	Preliminary Assessment/Site Inspection
PCBs	Polychlorinated biphenyls
pesticides	Chlorinated pesticides
PPE	Probable point of entry
QA/QC	Quality Assurance/Quality Control
RPD	Relative percentage difference
SMC	System monitoring compound
SQAP	Sampling and Quality Assurance Plan

SQL	Sample Quantitation Limit
START	Superfund Technical Assessment and Response Team
SVOCs	semivolatile organic compounds
TAL	target analyte list
TDL	Target distance limit
TM	Task Monitor
VOCs	volatile organic compounds

BURNS GRAVEL PIT
PRELIMINARY ASSESSMENT/SITE INSPECTION
FORT HALL, IDAHO

1. INTRODUCTION

The United States Environmental Protection Agency (EPA) has tasked Ecology and Environment, Inc. (E & E) to provide technical support and conduct a preliminary assessment/site inspection (PA/SI) at the Burns Gravel Pit site which is located near Fort Hall, Idaho. E & E completed the PA/SI activities under Technical Direction Document Number 04-05-0007 issued under EPA, Region 10, Superfund Technical Assessment and Response Team (START)-2 Contract Number 68-S0-01-01. The specific goals for this PA/SI were intended to address site assessment objectives and are presented below:

- Collect and analyze samples to characterize potential sources discussed in subsection 2.6;
- Determine off-site migration of contaminants;
- Provide the EPA with adequate information to determine whether the site is eligible for placement on the National Priorities List; and
- Document any threat or potential threat to public health or the environment posed by the site.

Completion of this PA/SI including reviewing site information, determining regional characteristics, collecting receptor information within the site's range of influence, executing a sampling plan, and producing this report.

This document includes site background information (Section 2), field sampling activities and analytical protocols (Section 3), quality assurance/quality control (QA/QC) criteria (Section 4), analytical results reporting and background sampling (Section 5), potential sources (Section 6), migration/exposure pathways and targets (Section 7), summary and conclusions (Section 8), and references (Section 9).

2. SITE BACKGROUND

This section describes the site location (subsection 2.1), site description (subsection 2.2), site ownership history (subsection 2.3), site operations and waste characteristics (subsection 2.4), site characterization (subsection 2.5), and summary of investigation locations (subsection 2.6).

2.1 SITE LOCATION

Site Name:	Burns Gravel Pit
CERCLIS ID Number:	IDN001002604
Location:	West of Interstate 15, east of Bannock Road
Latitude:	43° 4' 25.38" North
Longitude:	112° 24' 11.62" West
Legal Description:	Section 18, Township 4 South, Range 35 East, Willamette Meridian
County:	Bingham
Congressional District:	2
Site Owner:	The Shoshone-Bannock Tribes P.O. Box 306 Fort Hall, Idaho 83203 Phone (208) 478-3910
Site Contact:	Kelly Wright The Shoshone-Bannock Tribes P.O. Box 306 Fort Hall, Idaho 83203 Phone (208) 478-3910

2.2 SITE DESCRIPTION

The Burns Gravel Pit is an unauthorized landfill located approximately 3.5 miles northeast of Fort Hall, Idaho, on the Fort Hall Indian Reservation (Figure 2-1). The site is located in the northeast ¼, section 18, township 4 south, range 35 east, Willamette meridian. The site is approximately 14 acres in size. The gravel pit has had several reports of abandoned waste, chemicals, batteries, and dead animals (Turner 2004). Current site conditions indicate that additional waste in the form of construction debris is being placed in the gravel pit by Tribal Construction (Youree 2004b). A sign posted at the site indicates "Closed - No Dumping by order of the FHBC" (Appendix A; Photograph 2-14).

2.3 SITE OWNERSHIP HISTORY

Property at the Burns Gravel Pit is owned by the Shoshone-Bannock Tribes (Youree 2004b).

2.4 SITE OPERATIONS AND WASTE CHARACTERISTICS

The Burns Gravel Pit was created approximately 15 to 20 years ago when clean fill was taken from the area for the creation of a highway overpass. After the excavation, people began depositing waste and debris in the pit (Youree 2004a). In the spring of 2003, Tribal Construction erected a berm around the site to prevent continued dumping, and the Fort Hall Business Council posted a sign indicated the pit was closed (E & E 2005; Appendix A, Photograph 2-14). Anecdotal information indicated materials dumped in the pit included chemicals, batteries, dead animals, and 55-gallon drums. Current site conditions indicate the site is again being used as a dump for construction debris by Tribal Construction (Youree 2004b; Appendix A, Photograph 1-4). Potential contaminants of concern at the site associated with the dumping include chlorinated herbicides (herbicides), chlorinated pesticides (pesticides), polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), Target Analyte List (TAL) metals, and volatile organic compounds (VOCs).

2.5 SITE CHARACTERIZATION

This subsection describes previous investigations and observations made during the START-2 sampling visit.

2.5.1 Previous Investigations

No previous investigations of this site are known to have occurred. From 1995 to 1999, the EPA conducted a groundwater investigation in the Fort Hall area. The objectives of the expanded site inspection included attempting to determine whether ethylene dibromide (EDB) contamination detected in area wells was attributable to potential point sources or to legal pesticide application. In order to accomplish these objectives, soil and soil gas samples were collected from source areas, groundwater samples were collected from area wells, and background information about potential EDB point sources and characterization of the geologic and hydrogeologic framework was collected. Based on this information, 15 potential source areas were identified (the Burns Gravel Pit was not one), and 14 of these areas were sampled. A total of 43 domestic, municipal, community, irrigation, and monitoring wells were identified for sampling during this investigation. The investigation concluded that there were several possible sources of groundwater contamination; possibly including the legal application of pesticides in the area. (E & E 1999)

The Burns Gravel Pit is in a more upgradient area within the EDB plume. Due to its location relative to the plume, tribal representatives have expressed concern that an EDB source could be present at the Burns Gravel Pit. Samples were not collected from this area during the 1999 EPA investigation.

2.6 START-2 SITE VISIT AND SAMPLING EVENT

The START-2 conducted a site visit and sampling event from May 23 through 26, 2005. The START-2 met with Kelly Wright of the Shoshone-Bannock Tribes. The site is accessed by following a gravel road that runs parallel to Interstate 15. The site consists of a gravel pit with various debris such as household appliances, construction debris including concrete and rebar, and reportedly numerous canine carcases. Photographic documentation of the site visit and sampling event are provided in Appendix A.

The START-2 sampled six locations within the gravel pit. During sampling, dump trucks were noted entering the gravel pit and dumping what appeared to be dirt and tree stumps (Appendix A; Photograph 2-12).

Adjacent to the site, and across Interstate 15, is the Tribal Farm Services Facility where herbicides and pesticides are stored.

2.7 SUMMARY OF PA/SI INVESTIGATION LOCATIONS

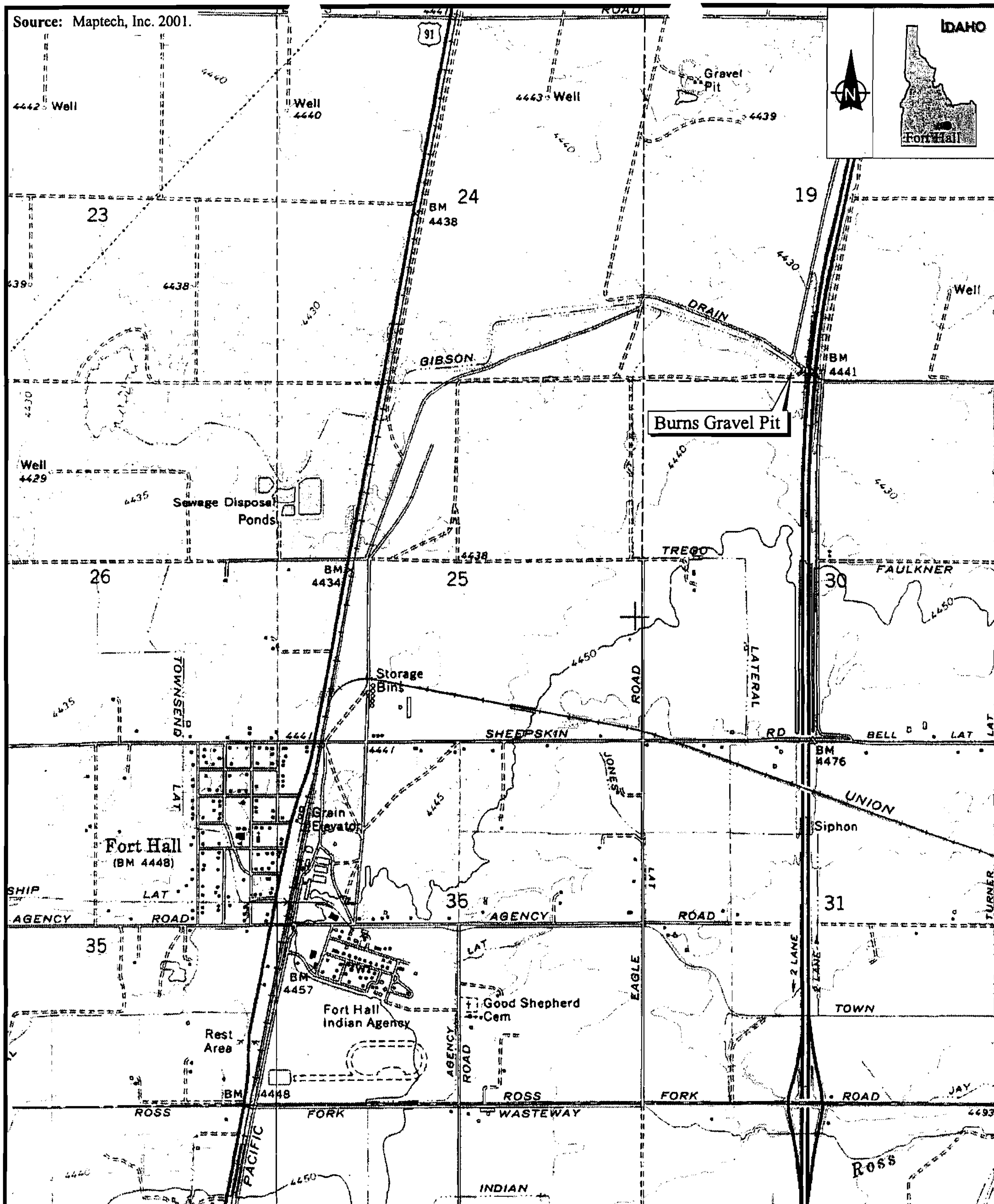
Sampling under the PA/SI was conducted at possible sources of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) -regulated hazardous substances. The features identified for inspection under the Burns Gravel Pit PA/SI were determined based on a review of background information and interviews with representatives of the Shoshone-Bannock Tribes. These features are discussed below:

Sources

- **Site Soils.** The unauthorized landfill is approximately 14 acres in size. Based on anecdotal information regarding the materials that may have been placed in the gravel pit, potential contaminants of concern include herbicides, pesticides, PCBs, SVOCs, TAL metals, and VOCs.

Targets

- **Groundwater.** Groundwater potentially has been impacted by on-site or off-site sources or both. This investigation will assist in determining whether the shallow aquifer beneath the site has elevated concentrations of contaminants. Contaminants of concern include herbicides, pesticides, PCBs, SVOCs, TAL metals, and VOCs.



ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

BURNS GRAVEL PIT
SITE INSPECTION
Fort Hall, Idaho

0 1000 2000
Approximate Scale in Feet

Figure 2-1
SITE LOCATION MAP

Date:	Drawn by:	
9-13-05	AES	10:START-2\04050007\fig 2-1

3. FIELD ACTIVITIES AND ANALYTICAL PROTOCOL

A sampling and quality assurance plan (SQAP) for the Burns Gravel Pit project was developed by the START-2 prior to field sampling (E & E 2005). The SQAP describes the sampling strategy, sampling methodology, and analytical programs used to investigate potential hazardous substance sources. With few exceptions, PA/SI field activities were conducted in accordance with the approved SQAP. Deviations from the SQAP are described in the sample plan alteration form (Appendix B) and, when applicable, in this section and in the sampling location discussions in Section 6 (source areas) and Section 7 (target areas). All deviations to this SQAP were pre-approved by the EPA Task Monitor (TM) during the field sampling event.

The PA/SI field sampling event was conducted from May 23 through 26, 2005. A total of 23 samples (13 subsurface soil, 6 groundwater, 1 rinsate, and 3 trip blanks), including background samples, were collected from on-site and off-site locations. Sample types and the methods of collection are described below. A summary of the samples collected for laboratory analysis during the PA/SI is contained in Table 3-1.

In addition to the EPA-assigned regional tracking number (referred to in this report as the EPA sample identification number), samples were tracked with a six- or eight-character field sample code system. Sample locations are identified on the sample location figure (Figure 3-1) using the assigned field sample codes. Table 3-2 summarizes the sample tracking and location codes. The sample locations on the figures were approximated from Global Positioning System (GPS) data.

The following subsections describe sampling methods (subsection 3.1), analytical protocol (subsection 3.2), GPS (subsection 3.3), and investigation derived waste (IDW; subsection 3.4).

3.1 SAMPLING METHODS

This subsection describes subsurface soil and groundwater sampling conducted for the PA/SI. The standard operating procedures for sample collection presented in the SQAP (E & E 2005) were followed. In general, soil materials for all analyses except VOCs were homogenized in dedicated stainless steel bowls using dedicated stainless steel spoons prior to containerization. Organic and gravelly materials were removed from samples as much as possible prior to placing the aliquots in prelabeled containers. The aliquot of each sample being collected for VOC analysis was placed directly into sample containers directly from the acetate geoprobe sample liner. All samples were stored in iced coolers that were maintained continuously under chain of custody.

The following subsections describe collection of subsurface soil samples (subsection 3.1.1) and groundwater samples (subsection 3.1.2).

3.1.1 Subsurface Soil Samples

A total of 11 subsurface soil samples and two background subsurface soil samples were collected from 7 direct push-probe technology soil borings (GP01 through GP06 and BG01; Figure 3-1). Each boring location was continuously logged and sampled to a total depth of 10 feet. Soil was sampled from each boring at two intervals [2 to 6 feet below ground surface (bgs) and 6 to 10 feet bgs].

After the direct push-probe sampler was driven to the designated sample depth, the VOC aliquot was collected directly from the acetate geoprobe sample liner using CORE N' ONE samplers. After the VOC aliquot was collected, the remaining sample material was transferred to a dedicated stainless steel bowl, homogenized using dedicated stainless steel spoons, and then placed in prelabeled sample containers for chlorinated herbicides, pesticide/PCBs, TAL metals, and SVOC analyses. The direct push-probe technology sampler was decontaminated between sample locations. One rinsate sample (RS01) was collected to ensure decontamination procedures were adequate. After sample collection, the borehole was abandoned according to the requirements of the state of Idaho. For each borehole, a Professional Geologist completed borehole drill reports (copies of the borehole reports are provided in Appendix C).

3.1.2 Groundwater Samples

A total of six groundwater samples (including one background sample) were collected (Figure 3-1). Two samples (GP03GW and GP04GW) were collected from on-site boreholes. These samples were collected using dedicated Teflon tubing with a vacuum pump. One sample (IR01GW) was collected from a nearby irrigation well. Three samples (MW01GW, MW02GW, and BG02GW) were collected from nearby monitoring wells. Prior to sampling the monitoring wells, three volumes of well water were purged from the well and water quality parameters were measured using a Horiba U-10 water quality meter. Water quality readings were taken to verify that the parameters had stabilized prior to sample collection. The irrigation well (IR01GW) was sampled by turning on the spigot and measuring water quality parameters using the Horiba U-10 quality meter until the parameters had stabilized for three successive readings. Flow from the spigot was pressurized and prohibited sample collection directly from the spigot. For this reason, after water quality parameters had stabilized, a dedicated 1-liter polyethylene bottle was used to collect the water and transfer it to prelabeled sample containers. The monitoring well samples (BG02GW, MW01GW, and MW02GW) were collected by disconnecting the flow-through-cell and taking samples directly through the pump discharge into prelabeled sample containers. All groundwater sample aliquots requiring preservative, were preserved immediately after sample collection. All groundwater samples were analyzed for chlorinated herbicides, pesticide/PCBs, TAL metals, SVOCs and VOCs.

3.2 ANALYTICAL PROTOCOL

All samples were collected following the guidance of the SQAP (E & E 2004). START-2 subcontracted chlorinated herbicides water (EPA SW-846 method 8151) analyses were performed by Laucks Testing Laboratories, Inc., Seattle, Washington. EPA laboratory chlorinated herbicide soil (EPA SW-846 method 8151) analyses were performed by the Manchester Environmental Laboratory (MEL), Port Orchard, Washington. TAL metals (EPA contract laboratory program [CLP] Statement of Work ILM05.3) analyses were performed by CompuChem Environmental Testing, Inc., a CLP laboratory in Cary, North Carolina. Pesticide/PCB, SVOC, and VOC analyses (EPA CLP Statement of Work OLM04.3) were performed by Liberty Analytical, Inc., a CLP laboratory in Cary, North Carolina, and Envirosystems, Inc., a CLP laboratory in Columbia, Maryland.

3.3 GLOBAL POSITIONING SYSTEM

Trimble Pathfinder Professional GPS survey units and Corvalis data loggers were used by the START-2 personnel to approximate the sample location coordinates of subsurface soil and groundwater samples. Recorded GPS coordinates by sample point were used to prepare the sample locations map (Figure 3-1) and are listed in Appendix D.

3.4 INVESTIGATION DERIVED WASTE

IDW generated during the PA/SI sampling effort consisted of solid disposable sampling equipment and approximately 55 gallons of decontamination and purge water. The purge water was from the monitoring and irrigation well sampling and the decontamination water was from decontaminating the Geoprobe samplers which were used in the collection of subsurface soil sampling. The disposable sampling equipment IDW was disposed as non-hazardous waste at a local municipal landfill. The decontamination and purge water IDW will be disposed as appropriate based on PA/SI analytical results of soil and water samples collected at the site.

Table 3-1

SAMPLE COLLECTION AND ANALYTICAL SUMMARY
BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/SITE INSPECTION
FORT HALL, IDAHO

EPA Sample ID	Station Location	CLP Inorganic ID	CLP Organic ID	Matrix	Sample Depth (feet bgs)	Date	Time	Chlorinated herbicides	TAL MeTals	Pesticide/ PCBs	SVOCs	VOCs	Description
05214000	GP01SB06	MJ4J33	J4J33	SB	2-6	5/23/2005	12:05	X	X	X	X	X	Collected from Gravel Pit, poorly graded sand, dry, light brown.
05214001	GP01SB10	MJ4J34	J4J34	SB	6-10	5/23/2005	12:20	X	X	X	X	X	Collected from Gravel Pit, inorganic silt with clay, dry, light brown.
05214003	GP02SB06	MJ4J36	J4J36	SB	2-6	5/23/2005	13:20	X	X	X	X	X	Collected from Gravel Pit, inorganic silt with clay, dry, light brown.
05214004	GP02SB10	MJ4J37	J4J37	SB	6-10	5/23/2005	13:30	X	X	X	X	X	Collected from Gravel Pit, inorgnic silt with clay, dry, light brown.
05214006	GP03SB06	MJ4J39	J4J39	SB	2-6	5/24/2005	09:00	X	X	X	X	X	Collected from Gravel Pit, silty clay, light brown, dry.
05214007	GP03SB10	MJ4J40	J4J40	SB	6-10	5/24/2005	09:25	X	X	X	X	X	Collected from Gravel Pit, well graded sand, light brown, dry.
05214008	GP03GW	MJ4J41	J4J41	GW	NA	5/24/2005	10:25	X	X	X	X	X	Collected from Gravel Pit, clear, no odor.
05214009	GP04SB06	MJ4J42	J4J42	SB	2-6	5/24/2005	13:50	X	X	X	X	X	Collected from Gravel Pit, inorganic silt, light brown, dry.
05214010	GP04SB10	MJ4J43	J4J43	SB	6-10	5/24/2005	14:05	X	X	X	X	X	Collected from Gravel Pit, inorganic silt, light brown, dry.
05214011	GP04GW	MJ4J44	J4J44	GW	NA	5/24/2005	17:05	X	X	X	X	X	Collected from Gravel Pit, clear, no odor.
05214012	GP05SB06	MJ4J45	J4J45	SB	2-6	5/26/2005	08:50	X	X	X	X	X	Collected from Gravel Pit, poor graded sand, and well graded gravel with sand, light brown, dry.
05214013	GP05SB10	MJ4J46	J4J46	SB	6-10	5/26/2005	09:05	X	X	X	X	X	Collected from Gravel Pit, inorganic silt with clay, dry, light brown.
05214015	GP06SB06	MJ4J48	J4J48	SB	2-6	5/26/2005	09:55	X	X	X	X	X	Collected from Gravel Pit, inorganic silt with clay, dry, light brown.
05214016	GP06SB10	MJ4J49	J4J49	SB	6-10	5/26/2005	10:05	X	X	X	X	X	Collected from Gravel Pit, inorganic silt, light brown, dry.
05214018	IR01GW	MJ4J51	J4J51	GW	NA	5/25/2005	09:30	X	X	X	X	X	Collected from Irrigation well, clear, no odor.
05214019	MW01GW	MJ4J52	J4J52	GW	NA	5/25/2005	14:00	X	X	X	X	X	Collected from Monitoring Well 1, clear, no odor.
05214020	MW02GW	MJ4J53	J4J53	GW	NA	5/25/2005	12:57	X	X	X	X	X	Collected from Monitoring Well 2, clear no odor.
05214021	BG01SB06	MJ4J54	J4J54	SB	2-6	5/26/2005	13:30	X	X	X	X	X	Background, well graded gravel with sand, light brown, dry, MS/MSD.
05214022	BG01SB10	MJ4J55	J4J55	SB	6-10	5/26/2005	13:40	X	X	X	X	X	Background, well graded gravel with sand, light brown, dry.
05214023	BG02GW	MJ4J56	J4J56	GW	NA	5/25/2005	10:45	X	X	X	X	X	Background, collected from Monitoring Well, clear, no odor, MS/MSD
05214030	RS01WT	MJ4J63	J4J63	RS	NA	5/26/2005	08:15	X	X	X	X	X	Rinsate, collected from Geoprobe sampler.
05214032	TB01WT	NA	J4J65	TB	NA	5/23/2005	12:00	NA	NA	NA	NA	X	Trip blank.
05214033	TB02WT	NA	J4J66	TB	NA	5/24/2005	08:10	NA	NA	NA	NA	X	Trip blank.
05214034	TB03WT	NA	J4J67	TB	NA	5/25/2005	09:20	NA	NA	NA	NA	X	Trip blank.

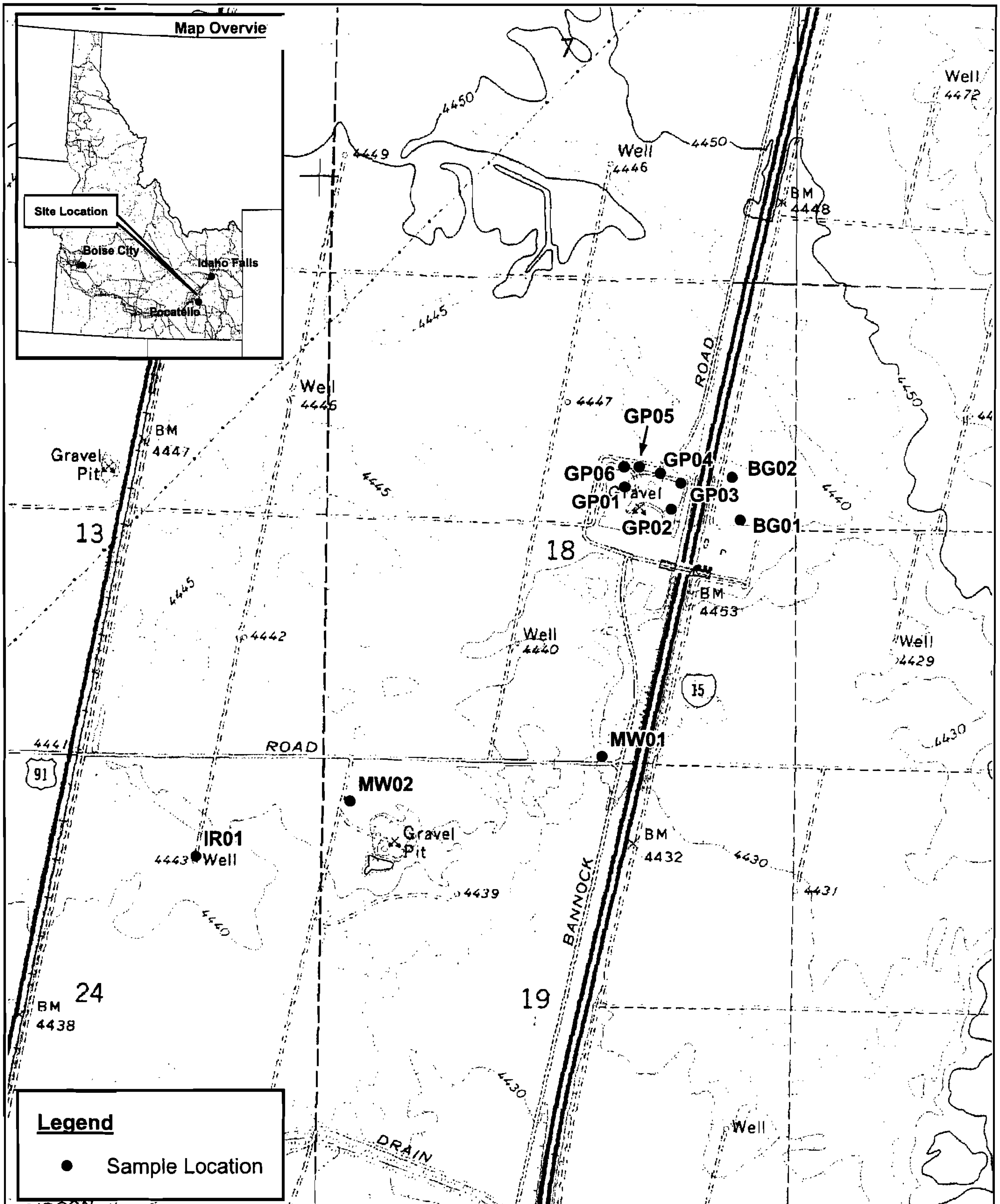
Key:

bgs	= below ground surface.
CLP	= Contract Laboratory Program.
EPA	= United States Environmental Protection Agency.
GW	= Groundwater.
ID	= Identification.
MS	= Matrix Spike.
MSD	= Matrix Spike Duplicate.
NA	= Not Applicable.
PCBs	= Polychlorinated Biphenyls.
RS	= Rinsate.
SB	- Subsurface.
SVOCs	= Semivolatile Organic Compounds.
TAL	= Target Analyte List.
TB	= Trip Blank.
VOCs	= Volatile Organic Compounds.

Table 3-2

SAMPLE CODING
BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/SITE INSPECTION
FORT HALL, IDAHO

Digits	Descriptions	Code Example
1,2	Source Code	BG (Background) GP (Gravel Pit) IR (Irrigation Well) MW (Monitoring Well) RS (Rinsate) TB (Trip Blank)
3,4	Consecutive Number	01 (First Sample of Source Code)
5,6	Matrix Code	GW (Groundwater) SB (Subsurface Soil) WT (Water)
7,8	Consecutive Number	01 (Lowest depth of subsurface soil samples)



N
W E
S

0 250 500 1,000 1,500 2,000 2,500
Feet

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

Figure 3-1
SAMPLE LOCATION MAP

Fort Hall, Idaho

BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/ SITE INSPECTION

Job Id: 001281.0382.01SI	
Date: August 2, 2005	GIS Analyst: avh
Map Source Information: USGS Topographic Maps; Scale = 1:24K	

4. QUALITY ASSURANCE/QUALITY CONTROL

QA/QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware and reagents. Specific QC requirements for laboratory analyses are incorporated in the Contract Laboratory Program Statement of Work for Inorganic Analyses (EPA 2004b) and the Contract Laboratory Program Statement of Work for Organic Analyses (EPA 2003). These QC requirements or equivalent requirements found in the analytical method were followed for analytical work on the project. This section describes the QA/QC measures taken and provides an evaluation of the usability of data presented in this report.

All samples were collected following the guidance of the SQAP (E & E 2005). START-2 subcontracted chlorinated herbicides water (EPA SW-846 method 8151) analyses were performed by Laucks Testing Laboratories, Inc., Seattle, Washington. EPA laboratory chlorinated herbicide soil (EPA SW-846 method 8151) analyses were performed by the Manchester Environmental Laboratory (MEL), Port Orchard, Washington. TAL metals (EPA CLP Statement of Work ILM05.3) analyses were performed by CompuChem Environmental Testing, Inc., a CLP laboratory in Cary, North Carolina. Pesticide/PCB, SVOC, and VOC analyses (EPA CLP Statement of Work OLM04.3) were performed by Liberty Analytical, Inc., a CLP laboratory in Cary, North Carolina, and Envirosystems, Inc., a CLP laboratory in Columbia, Maryland.

Data from the MEL and CLP laboratories were reviewed and validated by EPA chemists. A data summary check was performed by a START-2 chemist. Data from the START-2 subcontracted laboratory were reviewed and validated by a START-2 chemist. Data qualifiers were applied as necessary according to the following guidance:

- EPA (2004a) Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, and
- EPA (1999) Contract Laboratory Program National Functional Guidelines for Organic Data Review.

In the absence of other QC guidance, method-specific QC limits were also utilized to apply qualifiers to the data.

4.1 SATISFACTION OF DATA QUALITY OBJECTIVES

The following EPA (EPA 2000) guidance document was used to establish data quality objectives (DQOs) for this project:

- Guidance for the Data Quality Objectives Process (EPA QA/G-4), EPA/600/R-96/055.

The EPA TM determined that definitive data without error and bias determination would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the field work produced sufficient data that met the DQOs stated in the SQAP (E & E 2004). A discussion of accomplished objectives is presented in the following subsections.

4.2 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

QA samples (rinsate blank and trip blank samples) were collected for this project. One rinsate blank was collected per 20 samples collected using non-dedicated sampling equipment. One trip blank sample was collected for each sample cooler submitted for VOC analysis. QC samples included matrix spike (MS)/duplicate (DUP) samples for inorganic analyses at a rate of one MS/DUP per 20 samples per matrix per analysis and MS/MS Duplicate (MSD) samples for organic analyses at a rate of one MS/MSD per 20 samples per matrix per analysis.

4.3 PROJECT-SPECIFIC DATA QUALITY OBJECTIVES

The laboratory data were reviewed to ensure that DQOs for the project were met. The following describes the laboratory's ability to meet project DQOs for precision, accuracy, and completeness and the field team's ability to meet project DQOs for representativeness and comparability. The laboratory and the field team were able to meet DQOs for the project.

4.3.1 Precision

Precision measures the reproducibility of the sampling and analytical methodology. Laboratory and field precision is defined as the relative percent difference (RPD) between duplicate sample analyses. The laboratory duplicate samples or MS/MSD samples measure the precision of the analytical method.

The RPD values were reviewed for all commercial laboratory samples. All duplicate RPD results were within QC limits, therefore the DQO for precision of 85% was met.

4.3.2 Accuracy

Accuracy measures the reproducibility of the sampling and analytical methodology. Laboratory accuracy is defined as the system monitoring compound (SMC) percent recoveries for organic analyses and MS percent recoveries for all analyses. Seven sample results (approximately 0.2% of the data) were qualified as estimated quantities (J or UJ) based on SMC percent recovery outliers. Twenty-one sample results (approximately 0.6% of the data) were qualified as estimated quantities (J or UJ) and two sample results (approximately 0.06% of the data) were rejected (R) based on MS percent recovery outliers. The project DQO for accuracy of 85% was met.

4.3.3 Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). All data were reviewed for usability. Two sample results (approximately 0.06% of the data) were rejected (R), therefore the project DQO for completeness of 90% was met.

4.3.4 Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point or environmental condition. The number and selection of samples were determined in the field to account accurately for site variations and sample matrices. The DQO for representativeness of 85% was met.

4.3.5 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this site followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

4.4 LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PARAMETERS

The laboratory data also were reviewed for holding times/temperature, laboratory blank samples, and serial dilution analyses. These QA/QC parameters are summarized below. In general, the laboratory and field QA/QC parameters were considered acceptable.

4.4.1 Holding Times/Temperature

A total of 128 sample results (approximately 3.8% of the data) were qualified as estimated quantities (J or UJ) because holding times were exceeded and seven sample results (approximately 0.2% of the data) were qualified as estimated quantities because the sample temperature exceeded QC limits due to a shipping error.

4.4.2 Laboratory Blanks

All laboratory blanks met the frequency criteria. The following analytes were detected in laboratory blanks:

Pesticides:	Gamma-chlordane, endosulfan I, endosulfan II.
TAL Metals:	Aluminum, antimony, arsenic, beryllium, copper, magnesium, nickel, sodium, zinc.
SVOCs:	Acetophenone, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, di-n-butylphthalate, di-n-octylphthalate, phenol.
VOC:	Acetone, carbon disulfide, methylene chloride.

Associated sample results less than five times the blank concentrations (ten times for common laboratory contaminants) were qualified as not detected (U).

4.4.3 Serial Dilution

One serial dilution sample was analyzed per 20 samples per matrix, therefore meeting frequency criteria. Seven sample results (approximately 0.2% of the data) were qualified as estimated quantities (J or UJ) based on serial dilution outliers.

5. ANALYTICAL RESULTS REPORTING AND BACKGROUND SAMPLES

This section describes the reporting methods applied to analytical results presented in Sections 6 and 7 of this report, and discusses background sample locations and sample results. Table 3-1 lists all samples collected for this PA/SI for laboratory analysis.

5.1 ANALYTICAL RESULTS EVALUATION CRITERIA

Analytical results presented in the summary tables in Sections 6 and 7 show all compounds detected above laboratory detection limits in bold type. Analytical results indicating significant concentrations of contaminants in source samples (Section 6) with respect to background concentrations are shown underlined and in bold type. Similarly, analytical results indicating elevated concentrations of contaminants in target samples (Section 7) with respect to background concentrations are also shown underlined and in bold type. For the purposes of this investigation, significant/elevated concentrations are those concentrations that are:

- Equal to or greater than the sample's Contract Required Quantitation Limit (CRQL) or the sample quantitation limit (SQL) when a non-CLP laboratory was used; and
- Equal to a greater than the background sample's CRQL or SQL when the background concentration is below detection limits; or
- At least three times greater than the background concentration when the background concentration equals or exceeds the detection limits.

The analytical summary tables present all detected compounds, but only those detected analytes at potential sources or in targets meeting the significant/elevated concentration criteria are discussed in the report sources (Section 6) and migration/exposure pathway (Section 7) sections.

5.1.1 Sample Results Reporting

When reporting the analytical results in Sections 6 and 7, the number of analytes compounds for an analytical suite at a significant/elevated are provided. Based on EPA, Region 10 policy, evaluation of aluminum, calcium, iron, magnesium, potassium, and sodium (common earth crust elements) is generally employed only in water mass tracing, which is beyond the scope of this report. For this reason, these elements will not be discussed in this report.

5.2 BACKGROUND SAMPLES

Background samples were collected for each of the naturally occurring media from which PA/SI samples were collected. These media are subsurface soil and groundwater. Results for the appropriate background samples are shown in the first column of the analytical results summary tables in Section 6 and 7 for comparison against source or target results. Analytical data QA forms and validation memoranda from laboratory analyses are included in Appendix E.

5.2.1 Background Subsurface Soil

5.2.1.1 Sample Location

One off-site background subsurface soil sample location (BG01) was selected approximately 0.16 mile east of the site in a field used to store irrigation pipe (Figure 3-1). Two samples (BG01SB06 and BG01SB10) were collected from this sample location (Appendix A; Photographs 2-9 and 2-10, respectively). The background soil types matched those of the samples collected on-site. The soil from 0 to 2 feet bgs was not recorded on the borehole record. The soil type from 2 to 10 feet bgs was described as well graded gravel with sand.

5.2.1.2 Sample Results

Background subsurface soil sample results for samples collected from 2 to 6 feet bgs are presented in Table 6-1. One pesticide/PCB (4,4'-DDE) was detected in the background subsurface soil sample collected from 2 to 6 feet bgs. A total of nine TAL metals (arsenic, barium, chromium, copper, lead, manganese, nickel, vanadium, and zinc) were detected in the background subsurface soil sample collected from 2 to 6 feet bgs. No chlorinated herbicides, SVOCs, or VOCs detected in the background subsurface soil sample collected from 2 to 6 feet bgs.

Background subsurface soil sample results for samples collected from 6 to 10 feet bgs are presented in Table 6-2. A total of seven TAL metals (arsenic, barium, chromium, lead, manganese, vanadium, and zinc) were detected in the background subsurface soil sample collected from 6 to 10 feet bgs. No chlorinated herbicides, pesticides/PCBs, SVOCs, or VOCs were detected in the subsurface soil sample collected from 6 to 10 feet bgs.

5.2.2 Background Groundwater

5.2.2.1 Sample Location

One background groundwater sample (BG02GW) was collected from monitoring well # 1, which is located approximately 0.17 mile northeast of the site. The location of groundwater sample BG02GW likely is hydraulically crossgradient from the site. The water level at monitoring well #1 was measured at 37.22 feet from the top of the casing on the well. The Well Driller's Report indicates the well is a 2-inch diameter well that is drilled to a total depth of 41 feet. The report indicates the lithology of the well as coarse sand from 0 to 3 feet, gravel from 3 to 10 feet, sandy gravel from 10 to 15 feet, gravelly sand from 15 to 20 feet, brown sand and gravel with water from 20 to 35 feet, and gravel and coarse sand from 35 to 41 feet (IDWR various dates).

5.2.2.2 Sample Results

Background groundwater sample results are presented in Table 7-2. No chlorinated herbicides, pesticides/PCBs, TAL metals, SVOCs, or VOCs were detected in the background groundwater sample.

6. POTENTIAL SOURCES

This section describes sample locations and analytical results of PA/SI samples obtained from potential sources. The sampling locations, sampling rationale, and analytical results are summarized in the following sections. Laboratory data sheets of analytical results for all samples are provided in Appendix E.

6.1 GRAVEL PIT

The gravel pit is approximately 3 to 5 acres in size. Based on anecdotal information and visual inspection of the gravel pit, various debris such as household appliances, construction debris including concrete and rebar, and reportedly numerous canine carcases have been deposited over the years. The gravel pit is not contained in order to control potential leaching into the groundwater or capped to prevent potential exposure to contaminated soil, or potential releases of contamination to the air.

6.1.1 Subsurface Soils

6.1.1.1 Sample Locations

Six borehole locations (GP01 through GP06) were selected on the gravel pit to characterize the extent and type of contamination (Figure 3-1). Samples were collected from 4-foot intervals to 10 feet bgs, two subsurface soil samples were collected from each location. No staining or odors were noted during sampling. No municipal debris, construction debris, or canine carcasses were encountered in any of the subsurface soil samples. Sample locations were co-located with groundwater samples in the two locations in which groundwater was encountered. The borehole records are presented in Appendix C.

Samples GP01SB06 and GP01SB10 (Appendix A; photographs 1-1 and 1-2, respectively) were collected from borehole GP01 located approximately the center of the gravel pit. The soil from 0 to 1 foot bgs is described as overburden and crushed gravel, from 1 to 5 feet bgs as poorly graded sand, from 5 to 9 feet bgs as inorganic silt with clay, and from 9 to 10 feet bgs as inorganic silt with clay. No groundwater was encountered at this location. The borehole was abandoned by pouring ⅜ inch bentonite chips into the hole and then saturating the top.

Samples GP02SB06 and GP02SB10 (Appendix A; Photograph 1-3) were collected from borehole GP02 located in the middle of the eastern wall of the gravel pit, near a large pile of debris (Appendix A; photograph 1-4). The soil from 0 to 2 feet bgs was not described in the borehole record. The soil from 2 to 10 feet bgs was described as inorganic silt with clay. No groundwater was encountered at this location. The borehole was abandoned by pouring ⅜ inch bentonite chips into the hole and then saturating the top.

Samples GP03SB06 and GP03SB10 (Appendix A; Photographs 1-5 and 1-6, respectively) were collected from borehole GP03 located in the northeast corner of the landfill (Appendix A; Photograph 1-8). Since groundwater was not encountered in boreholes GP01 and GP02 at 10 feet bgs and site lithology appeared conducive to deeper drilling, a decision was made following consultation with the EPA Task Monitor to advance all remaining boreholes to groundwater until collection of a water sample was prohibitive due to time constraints (Appendix B). The soil from 0 to 2 feet bgs was not recorded on the borehole record. The soil from 2 to 13 feet bgs was described as inorganic clay with silt, at 9 to 9.5 feet bgs, a very fine to coarse grained sand with silt bands was encountered. The geoprobe operator reported a change in resistence which is likely to be a result of a change in the lithology (to coarse sand and gravel) at approximately 16 feet bgs. Groundwater was encountered at 17.5 feet bgs. After the groundwater sample was collected, the borehole was abandoned by filling it with a bentonite and water mixture. Appendix B includes the reasoning for continuation of drilling below 10 feet bgs as prescribed in the SQAP.

Samples GP04SB06 and GP04SB10 (Appendix A; Photographs 1-10 and 1-11, respectively) were collected from borehole GP04 located in the middle of the northern wall of the gravel pit (Appendix A; Photograph 1-9). The soil from 0 to 2 feet bgs was not recorded on the borehole record. The soil from 2 to 5 feet bgs was described as poorly graded sand with gravel at the base of the unit, from 5 to 6.5 feet bgs as inorganic silt, soft with ⅛-inch bedding planes. The soil from 9.5 to 10 feet bgs was described as inorganic clay. Groundwater was encountered at 22 feet bgs. After the groundwater sample was collected, the borehole was abandoned by filling it with a bentonite and water mixture.

Samples GP05SB06 and GP05SB10 (Appendix A; Photographs 2-1 and 2-3, respectively) were collected from borehole GP05 located in the northwest corner of the gravel pit (Appendix A; Photograph 2-2). The soil from 0 to 2 feet bgs was not recorded on the borehole record. The soil from 2 to 4 feet bgs was described as poor graded sand, from 4 to 4.5 feet bgs as well graded gravel with sand, from 4.5 to 7.5 feet bgs as inorganic clay with silt, and from 7 to 10 feet as inorganic silt with clay. At approximately 18 feet the geoprobe operator reported an increase in resistence. Coring continued to 20 feet bgs; however, no groundwater was encountered. The borehole was abandoned by filling it with a bentonite and water mixture.

Samples GP06SB06 and GP06SB10 (Appendix A; Photographs 2-4 and 2-6, respectively) were collected from borehole GP06 located in the northwest corner of the gravel pit between locations GP01 and GP05 (Appendix A; Photograph 2-5). The soil from 0 to 2 feet bgs was not recorded on the borehole record. The soil from 2 to 7.5 feet bgs was described as poorly graded sand, from 7.5 to 8 feet bgs as well graded gravel with sand, and from 8 to 10 feet bgs as inorganic silt. Coring continued to approximately 20 feet; however, no groundwater was encountered. The borehole was abandoned by filling it with a bentonite and water mixture.

6.1.1.2 Sample Results

Sample results for subsurface soil samples collected from 2 to 6 feet bgs are presented in Table 6-1. A total of six TAL metals were detected at significant concentrations with respect to background concentrations in the subsurface soil samples collected from 2 to 6 feet bgs. No chlorinated herbicides, pesticides/PCBs, SVOCs, or VOCs were detected in the subsurface soil samples collected from this interval. Two TAL metals (antimony and manganese) were detected in three of the six sample locations.

Sample results for subsurface soil samples collected from 6 to 10 feet bgs are presented in Table 6-2. A total of three pestcide/PCBs were detected at significant concentrations with respect to background concentrations in the subsurface soil samples collected from 6 to 10 feet bgs. A total of ten TAL metals were detected at significant concentrations with respect to background concentrations in the subsurface soil samples collected from this interval. No chlorinated herbicides, SVOCs, or VOCs were detected in the subsurface soil samples collected from 6 to 10 feet bgs. Two of the TAL metals (copper and nickel) were detected at significant concentrations in all of the sample locations.

Five of the TAL metals (antimony, barium, cadmium, manganese, and thallium) detected at significant concentrations were present in both the 2 to 6 feet bgs and 6 to 10 feet bgs intervals.

Table 6-1

SUBSURFACE SOIL SAMPLES ANALYTICAL RESULTS SUMMARY
2 TO 6 FEET BELOW GROUND SURFACE
BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/SITE INSPECTION
FORT HALL, IDAHO

EPA Sample ID	**05214021**	**05214000**	**05214003**	**05214006**	**05214009**	**05214012**	**05214015**
CLP Inorganic ID	**MJ4J54**	**MJ4J33**	**MJ4J36**	**MJ4J39**	**MJ4J42**	**MJ4J45**	**MJ4J48**
CLP Organic ID	**J4J54**	**J4J33**	**J4J36**	**J4J39**	**J4J42**	**J4J45**	**J4J48**
Station Location	**BG01SB06**	**GP01SB06**	**GP02SB06**	**GP03SB06**	**GP04SB06**	**GP05SB06**	**GP06SB06**
Description	**Background**	**Gravel Pit**					
[redacted]							
4,4'-DDE	**69 JL**	3.6 U	3.9 U	4.0 U	0.74 U	3.9 U	0.28 J
[redacted]							
Aluminum	**5390**	**2570**	**8220**	**11400**	**9120**	**7830**	**2160**
Antimony	0.26 UJL	R	**0.27 JL**	**0.26 JL**	**0.3 JL**	7 UJL	7.2 UJL
Arsenic	**2.3**	**1.5**	**3.0**	**3.0**	**1.5**	**2.5**	**2.0**
Barium	**59.8**	**69.6**	**174**	**209**	**121**	**153**	**53.8**
Beryllium	0.29 J (SQL = 0.6)	0.14 J	0.5 J	**0.69**	0.58 J	0.48 J	0.14 U
Cadmium	0.49 J (SQL = 0.6)	0.094 J	0.35 J	0.42 J	0.32 J	**0.93**	0.29 J
Calcium	**2190**	**18700**	**69400**	**64100**	**17800**	**25400**	**15500**
Chromium	**7.8 JH**	**4.8**	**10.2**	**15.2**	**13.5**	**10.1 JH**	**5.4 JH**
Copper	**6.4**	**3.6**	**8.1**	**11.6**	**13.3**	**10.1**	3.2 U
Iron	**7420**	**4700**	**11800**	**14200**	**12400**	**11000**	**4430**
Lead	**4.6**	**4.2**	**7.9**	**11.3**	**10.1**	**7.3**	**3.5**
Magnesium	**1500**	**2410**	**16800**	**16500**	**4640**	**6060**	**1530**
Manganese	**176 JH**	**204**	**929**	**718**	**251**	**653 JH**	**162 JH**
Nickel	**5.9**	4.1 J	**11.5**	**15.8**	**12.8**	**10.9**	3.7 J
Potassium	**1350**	497 J	**1450**	**2320**	**2280**	**1640**	376 J
Thallium	1.8 J (SQL = 2.8)	0.67 J	2.9 J	**3.2**	2.3 J	**3.3**	0.59 J
Vanadium	**9.2**	**6.8**	**18.1**	**22.0**	**18.7**	**16.1**	**6.3**
Zinc	**25.4**	**19.4**	**44.5**	**56.2**	**61.1**	**42.8**	**15.7**

Note: Bold type indicates the sample result is above the instrument detection limit.
Underline type indicates the sample result is significant as defined in Section 5.

Key:

CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
H = High bias.
ID = Identification.
J = The analyte was positively identified. The associated numerical result is an estimate.
L = Low bias.
mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
PCBs = Polychlorinated biphenyls.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
U = The analyte was not detected at or above the reported result.

Table 6-2

SUBSURFACE SOIL SAMPLES ANALYTICAL RESULTS SUMMARY
6 TO 10 FEET BELOW GROUND SURFACE
BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/SITE INSPECITON
FORT HALL, IDAHO

EPA Sample ID	05214022	05214001	05214004	05214007	05214010	05214013	05214016
CLP Inorganic ID	**MJ4J55**	**MJ4J34**	**MJ4J37**	**MJ4J40**	**MJ4J43**	**MJ4J46**	**MJ4J49**
CLP Organic ID	**J4J55**	**J4J34**	**J4J37**	**J4J40**	**J4J43**	**J4J46**	**J4J49**
Station Location	**BG01SB10**	**GP01SB10**	**GP02SB10**	**GP03SB10**	**GP04SB10**	**GP05SB10**	**GP06SB10**
Description	**Background**	**Gravel Pit**					
[illegible]							
4,4'-DDT	3.4 U	0.66 J	4 U	**20**	0.75 J	3.0 J	0.80 J
Endosulfan I	1.8 U	2.1 U	2.1 U	2.1 U	2 U	**39 JL**	2 U
Endosulfan II	3.4 U	4 U	4 U	4.1 U	3.9 U	**24**	3.8 U
[illegible]							
Aluminum	**1830**	**8760**	**10900**	**7930**	**8390**	**8740**	**4390**
Antimony	0.25 UJL	R	**0.38 JL**	**0.26 JL**	**0.35 JL**	7 UJL	6.9 UJL
Arsenic	**1.4**	**2.3**	**3.8**	**1.8**	**1.6**	**2.6**	**1.6**
Barium	**46.9**	**224**	**171**	**141**	**111**	**114**	**90.6**
Cadmium	0.24 J (SQL = 0.57)	0.36 J	0.37 J	0.35 J	0.22 J	**0.93**	0.42 J
Calcium	**9020**	**57400**	**63600**	**59700**	**41100**	**47900**	**29200**
Chromium	**9.6 JH**	**11.0**	**14.4**	**11.8**	**11.3**	**10.5 JH**	**6.3 JH**
Copper	3.0 U	**10.3**	**11.6**	**9.4**	**9.7**	**8.8**	**5.4**
Iron	**3960**	**11400**	**14500**	**10900**	**12000**	**11900**	**5980**
Lead	**3.1**	**9.2**	**10.3**	**8.9**	**8.6**	**7.7**	**4.0**
Magnesium	**911**	**14100**	**13700**	**15000**	**15000**	**15000**	**5790**
Manganese	**120 JH**	**1010**	**671**	**431**	**234**	**479 JH**	**366 JH**
Nickel	3.0 J (SQL = 4.55)	**10.9**	**15.1**	**11.7**	**10.8**	**11.2**	**6.6**
Potassium	329 J	**1660**	**2330**	**1640**	**1490**	**1650**	**718**
Thallium	0.55 J (SQL 2.84)	3 J	2.8 J	1.8 J	2.4 J	**3.7**	1.4 J
Vanadium	**5.7**	**17.8**	**21.2**	**17.7**	**18.4**	**17.3**	**11.2**
Zinc	**14.2**	**49.9**	**51.9**	**43.6**	**45.5**	**39.9**	**21.5**

Note: Bold type indicates the sample result is above the instrument detection limit.
Underline type indicates the sample result is significant as defined in Section 5.

Key:
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
H = High bias.
ID = Identification.
J = The analyte was positively identified. The associated numerical result is an estimate.
L = Low bias.
mg/kg = milligrams per kilogram.
µg/kg = micrograms per kilogram.
PCBs = Polychlorinated biphenyls.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
U = The analyte was not detected at or above the reported result.

7. MIGRATION/EXPOSURE PATHWAYS AND TARGETS

The following subsections describe migration/exposure pathways and potential targets within the site's range of influence. Analytical data QA Forms from laboratory analyses are included in Appendix E. This section discusses the groundwater migration pathway (subsection 7.1), surface water migration pathway (subsection 7.2), soil exposure pathway (subsection 7.3), and air migration pathway (subsection 7.4).

7.1 GROUNDWATER MIGRATION PATHWAY

7.1.1 Pathway Description

The target distance limit (TDL) for the groundwater migration pathway is a 4-mile radius that extends from the sources at the site. Figure 7-1 depicts the groundwater 4-mile TDL.

The following summary of geologic and hydrogeologic conditions at the site is based upon data provided by Trimble (1976), Houser (1992), Parliman and Young (1992), Whitehead (1992), Lindholm et al. (1987), Lindholm (1996), Hernandez (1997), and well logs (Tribes various dates; IHS various dates; HEW various dates; USGS various dates; and IDWR various dates).

The site lies within the Eastern Snake River Plain (ESRP), a northeast-trending structural trough approximately 200 miles long and 70 miles wide in the vicinity of the site. The boundary of the ESRP is generally marked by the contacts between Tertiary and older rocks bordering the ESRP and the Quaternary volcanic and sedimentary rocks underlying the ESRP. In the vicinity of the site, the boundary of the ESRP is approximated by the base of the Pocatello Range. The ESRP originated in the late Cenozoic. Its origin is uncertain, although it possibly marks the migration of the thermal anomaly presently centered beneath the geothermally active Yellowstone Plateau. The ESRP is filled with Cretaceous to Holocene mafic and silicic volcanic rocks and intercalated volcaniclastic and sedimentary rocks. The stratigraphy and total thickness of these rocks and sediments, in particular the deeper rocks and sediments, are not well constrained. One well drilled east of Arco, Idaho (located northwest of the site) to a depth of 10,365 feet indicated that ESRP fill is present to at least that depth. The total thickness of the ESRP fill decreases toward the ESRP margins. The lithologic units of the ESRP are described below.

Miocene Volcanics. The deepest rocks observed in the ESRP are the older Miocene silicic volcanic rocks. These rocks are believed to be correlative with the Miocene Idavada volcanics (Whitehead 1992).

Overlying the older Miocene silicic volcanic rocks are younger Miocene basaltic and silicic volcanic rocks including the Starlight Formation (Trimble 1976).

Pliocene and Quaternary Basalt. Overlying the younger Miocene basaltic and silicic volcanic rocks are the primarily basaltic rocks of the Snake River Group, which include the Pliocene and early Pleistocene basalt of the Buckskin Basin (Houser 1992). These basaltic rocks constitute bedrock in the vicinity of the site. On a small scale, the structure of the top of the basalt is not well constrained; however, based upon lithologic data obtained from well logs (Tribes various dates; IHS various dates; HEW various dates; USGS various dates; and IDWR various dates) the surface appears to dip generally westward. Ferry Butte is a topographic and structural dome floored with basalt of the Buckskin Basin that is believed to have been upwarped by the forceful emplacement of rhyolite magma beneath it (Houser 1992). The basalt ranges in character from dense with few fractures to highly vesicular and broken, particularly at the tops and bottoms of individual basalt flows. Interflow deposits of fine-grained sediments (possibly loess) and coarser-grained sediments are observed locally.

Pliocene to Holocene Deposits. The lithologic units overlying the basalt bedrock in the study area comprise upper Pliocene to Holocene alluvial deposits of the ancestral and modern Snake River locally intercalated with loess, alluvial fan deposits, other alluvial deposits, and lacustrine deposits resulting from the damming of the Snake River by basalt flow dams.

Alluvial deposits of the ancestral and modern Snake River consist of well-sorted, sandy gravel with local boulders and subordinate discrete beds of clay and sand (Houser 1992).

Locally overlying the older Snake River alluvium are older Pleistocene deposits of clay, silt, and sand deposited in lacustrine and fluvial depositional environments. Lacustrine sediments were deposited in a lake formed when the ancestral Snake River was dammed by a basalt flow. These deposits, up to greater than 50 meters thick in the area of the site, have been correlated with the Raft Formation (Houser 1992).

Locally overlying the deposits of the Raft Formation, and possibly additional Snake River alluvial deposits, are the Pleistocene American Falls Lake Beds (AFLB), consisting of clay, silt, and sand and a basal gravel unit. The boundaries of the AFLB throughout the region are not agreed upon. It is generally agreed, however, that the upper fine-grained deposits of the AFLB are lacustrine, deposited in a lake formed when a basalt flow dammed the ancestral Snake River at a location west of the site (Houser 1992).

Locally overlying the AFLB are the Bonneville flood deposits, consisting of alluvial sediments deposited as a result of a catastrophic flood caused by the rapid discharge of the contents of Lake Bonneville approximately 14,500 years before present. The flood issued northward from the lower Portneuf River valley, located in the vicinity of Pocatello, Idaho, and fanned out across nearby parts of the ESRP. Close to the confining valley walls of the lower Portneuf River, the flood deposited chiefly gravel and boulders upwards of 10 feet in diameter (also referred to as the Michaud gravel). Within the area of the site, the deposits include sand and gravel. The flooding which deposited these sediments is responsible for locally eroding the preexisting ESRP sediments and basalt (Houser 1992; Trimble 1976).

Deposits of loess (windblown silt) and sand dunes exist locally at various depths throughout the area. Loess was deposited primarily during Pleistocene glacial stages, and locally ranges up to 9 meters thick (Houser 1992).

Alluvial fan deposits are locally intercalated with the other upper Pliocene to Holocene deposits near the margins of the ESRP (including the eastern margin of the site; E & E 1999).

Geologic cross sections were constructed as part of the Fort Hall expanded site inspection (ESI; E & E 1999). The geologic cross sections illustrate lithology, water-bearing zones, and well completion information reported by the well driller at each well location. Correlations between several salient geologic features are illustrated. The correlations are represented by straight lines which do not reflect the actual geologic relationships between the features. The correlations illustrated include the top of the basalt and, where they exist, the tops and bottoms of two fine-bearing sedimentary deposits. The upper fine-bearing interval correlated on all cross sections is believed to correspond to the lacustrine deposits of the AFLB. The lower fine-bearing interval is believed to correspond to the lacustrine sediments of the Raft Formation. Other fine-bearing intervals present but not correlated are possibly loess deposits or fine-grained alluvial deposits (E & E 1999).

Based on the cross section and review of the individual well logs used to construct the geologic cross section, the upper fine-bearing interval in the area of the site likely exists at a depth of approximately 7 feet bgs (E & E 1999).

Previous hydrogeologic evaluation of the study area has identified two principal geologic units in the study area: the unconsolidated deposits present from the surface to varying depths, and the underlying basalt observed throughout the study area (Parliman and Young 1992). The water-yielding zones within the unconsolidated deposits consist primarily of sand and gravel; within the basalt, they consist of cinder and fractured zones. For the purpose of evaluation of groundwater elevations, Parliman and Young subdivided the wells involved in their study based on the principal geologic units in which the wells are completed. For the purposes of the PA/SI, E & E has adopted this distinction. Wells completed in the unconsolidated deposits are referred to as "Zone A" wells; those completed in the basalt are referred to as "Zone B" wells (E & E 1999).

Groundwater recharge is principally from underflow, precipitation, applied irrigation water, and drain leakage from the Gibson Drain. Groundwater within the shallow unconsolidated deposits is typically under unconfined conditions, whereas deeper unconsolidated deposits and basalt zones likely are a combination of unconfined and confined conditions (Parliman and Young 1992).

As observed by Parliman and Young, the water-yielding zones within each of the units locally exhibit some degree of hydraulic segregation from each other. Likely aquitards within the unconsolidated deposits include the clay- and silt-bearing lacustrine deposits of the AFLB and the Raft Formation. Fine-grained zones believed to correspond to these deposits are correlated in the geologic cross sections prepared as a part of the Fort Hall ESI (E & E 1999). In addition to the lacustrine deposits of the AFLB and Raft Formation, other more localized (not correlated) fine-bearing zones also likely serve to compartmentalize groundwater in Zone A on a local basis. Locally within the shallow part of Zone A, a silt layer ranging in depth between 3 and 17 feet bgs has been observed (Hernandez 1997). This silt layer appears to be responsible for perching groundwater locally, particularly in areas of irrigation. In some areas, this perched water breaks the surface in the form of ponds. Efforts have been made by farmers cultivating this affected acreage to dewater the ponded areas, including the excavation of trenches to breach the silt layer, thereby allowing perched water to drain into the deeper subsurface, the installation of shallow sump wells to collect the ponded water, and pumping the water into adjacent irrigation wells that are completed in deeper zones (Hernandez 1997). Within Zone B, dense zones in the basalts and possibly fine-bearing interflow deposits (which may be loess) likely act as aquitards locally (E & E 1999).

As indicated in the cross sections, the lateral extent of each of the fine-grained zones of the AFLB and Raft Formation, as correlated, is limited. The fine-grained deposits of the AFLB appear to be non-existent near the eastern margin of the area (E & E 1999). Based on the well logs, the cross sections may include the area in the immediate vicinity of the site. The fine-grained deposits of the Raft Formation appear to be non-existent over a larger area in the eastern portion of the ESI area, from which the geologic cross sections were obtained. Due to a lack of data provided in most well logs, it is not possible to correlate possible aquitards within Zone B. The effectiveness of the possible aquitards within

Zone A and within Zone B in the area of the site, where they do exist, is not certain given available data (E & E 1999).

Based on the discontinuity and uncertain effectiveness of the possible aquitards in the study area, and the lack of other hydrologic data, the hydraulic segregation of any given water-yielding interval over a large area cannot be demonstrated. Therefore, although hydraulic segregation surely exists and governs groundwater flow within the ESI area and possibly the Burns Gravel Pit PA/SI area, the water-yielding intervals at the site are treated as a single aquifer for the purposes of the PA/SI (E & E 1999).

7.1.2 Targets

There are no municipal drinking water wells located within the 4-mile TDL. There are 64 groundwater drinking water wells located within the 4-mile TDL. These wells serve approximately 198.4 people based on the average number of persons of 3.1 for Bingham County, Idaho (USDC 2000). The closest well to the site is 1 to 2 miles. Table 7-1 indicates the groundwater drinking water wells and population by distance ring. Groundwater at the site is assumed to flow in a southwest direction (Youree 2004a).

Based on the agricultural nature of the surrounding area, the START-2 assumes that groundwater is used to irrigate five or more acres.

The site is not located within a sole source aquifer wellhead protection area.

7.1.3 Groundwater Sample Locations

Two on-site groundwater samples (GP03GW and GP04GW) were collected from the gravel pit. Groundwater was collected from 17.5 feet bgs in borehole GP03, and from approximately 22 feet bgs in borehole GP04 (the description of the soil from these boreholes can be found in subsection 6.1.1.1 above).

One irrigation well (IR01GW), which is located hydraulically downgradient of the site, was sampled (Appendix A; Photograph 1-12). The Well Driller's Report indicates the well a 16-inch diameter well that is drilled to a total depth of 270 feet. The report describes the lithology as dirt and soil from 0 to 4 feet, sand and gravel from 4 to 21 feet, white clay from 21 to 40 feet, sand and gravel with water from 40 to 63 feet, gravel and clay from 63 to 67 feet, large gravel with water from 67 to 115 feet, small gravel with water from 115 to 132 feet, gravel and clay from 132 to 147 feet, clay and brown sand from 147 to 156 feet, grey basalt from 156 to 175 feet, soft red basalt from 175 to 182 feet, hard red basalt from 182 to 186 feet, very hard grey basalt from 196 to 224 feet, cider with the first good water in the rock from 245 to 250 feet, and cinder, basalt, and chert from 250 to 270 feet (IDWR various dates).

Two monitoring wells (monitoring well # 1 and monitoring well # 2), which are located hydraulically downgradient of the site, were sampled (MW01and MW02, respectively; Appendix A, Photographs 1-14 and 1-15). The Well Driller's Report indicates the Monitoring Well # 1 is a 2-inch diameter well that is drilled to a total depth of 32 feet. The report indicates the lithology of the well as light brown sand and gravel from 0 to 5 feet, light brown sand with water from 5 to 25 feet, and gravelly sand from 25 to 32 feet. The Well Driller's Report for Monitoring Well # 2 indicates it is a 2-inch diameter well that is drilled to a total depth of 30 feet. The report indicates the lithology of the well as course sand from 0 to 2 feet, gravelly sand from 2 to 12.6 feet, gravel with water from 12.6 to 20 feet, and sandy gravel from 20 to 30 feet. (IDWR various dates)

7.1.4 Groundwater Sample Results

Sample results are presented in Table 7-2. A total of twelve TAL metals were detected at elevated concentrations with respect to background concentrations in the groundwater samples; however, three of these (arsenic, cobalt, and mercury) metals were not similarly detected in subsurface source samples at the site. For this reason, these three analytes are not considered to be attributable to the site. One pesticide/PCB (alpha-BHC) was detected at an elevated concentration with respect to background concentrations in the groundwater samples; however, this analyte was not similarly detected in subsurface source samples at the site. For this reason, alpha-BHC is not considered to be attributable to the site. No chlorinated herbicides, SVOCs, or VOCs were detected at elevated concentrations with respect to background concentrations in the groundwater samples. The TAL metals detected at elevated concentrations were only found in the on-site sample locations and not in the off-site irrigation or monitoring wells.

7.2 SURFACE WATER MIGRATION PATHWAY

7.2.1 Pathway Description

The surface water migration pathway TDL begins at the probable point to entry (PPE) of surface water runoff from the site to a surface water body and extends downstream for 15 miles. Due to the presence of roads between the site and the nearest surface water body, the Gibson Drain, there is no overland route to surface water, and, therefore, no PPE to the surface water migration pathway. Since there is no PPE, the surface water migration pathway will not be discussed further or evaluated.

7.3 SOIL EXPOSURE PATHWAY

The soil exposure pathway is evaluated based on the threat to resident and nearby populations from soil contamination within the first 2 feet of the surface.

Based on photographs of the site provided by a Shoshone-Bannock tribal representative, debris is documented at the site but no areas of soil contamination are documented. The town of Fort Hall is located more than 2 miles from the site. No residences, schools, daycare facilities, or places of work are located within 200 feet of the site. Thirty-five people live within 1 mile of the site (Table 7-3). Commercial agriculture, silviculture, or livestock production or grazing do not occur at the site or within 1 mile of the site.

There are no terrestrial sensitive environments on a source of contamination at the site.

The site is fenced, and a gate and berm have been placed around the site to discourage access. The site is considered accessible with no recreational use.

7.4 AIR MIGRATION PATHWAY

The air migration pathway TDL is a 4-mile radius that extends from the sources at the site (Figure 7-1).

The START-2 estimates that 2,050 people reside within 4 miles of the site (EPA 2004a). Three schools are located in Fort Hall. The Shoshone-Bannock elementary school (grades kindergarten through 6) has a population of approximately 140 students and 15 teachers, the high school (grades 7 through 12) has 150 students and 20 teachers, and the Head Start Program has approximately 60 children and six teachers.

No commercial agriculture, silviculture, or a major or designated recreation area are present with 0.5 mile of the site. Approximately 175.26 acres of wetlands occur within the 4-mile TDL. Table 7-3 provides population and estimated wetlands acreage within a 4-mile radius of the site.

No threatened or endangered species occur within the 4-mile TDL.

Table 7-1

GROUNDWATER DRINKING WATER POPULATION WITHIN A 4-MILE RADIUS
BURNS GRAVEL PIT
FORT HALL, IDAHO

Distance Ring (miles)	Well Identification	Well Population[a]	Total Population per Distance Ring
0 to 0.25	Domestic (0)	0	0
0.25 to 0.5	Domestic (0)	0	0
0.5 to 1	Domestic (0)	0	0
1 to 2	Domestic (10)	31	31
2 to 3	Domestic (24)	74.4	74.4
3 to 4	Domestic (30)	93	93
Total			198.4

Source: IDWR various dates.

[a] Domestic well population was estimated based on the average number of persons per household for Bingham County of 3.1 people (USDC 2000).

Table 7-2

GROUNDWATER SAMPLES ANALYTICAL RESULTS SUMMARY
BURNS GRAVEL PIT PRELIMINARY ASSESSMENT/SITE INSPECTION
FORT HALL, IDAHO

EPA Sample ID	05214023	05214008	05214011	05214018	05214019	05214020
CLP Inorganic ID	MJ4J56	MJ4J41	MJ4J44	MJ4J51	MJ4J52	MJ4J53
CLP Organic ID	J4J56	J4J41	J4J44	J4J51	J4J52	J4J53
Station Location	BG02GW	GP03GW	GP04GW	IR01GW	MW01GW	MW02GW
Description	Background	Gravel Pit		Irrigation	Helsel 2	Helsel 3
[illegible]						
Alpha-BHC	0.05 U	0.05 U	**0.082**	0.05 U	0.05 U	0.05 U
[illegible]						
Aluminum	200 U	**55200**	**24500**	33.8 U	42.7 U	76.9 J
Arsenic	10 U	**37.3**	**20.7**	10 U	5.5 U	10 U
Barium	73.7 J (SQL = 200)	**1400**	**1700**	105 J	150 J	92.2 J
Cadmium	5 U	**8.2**	**9.0**	5 U	5 U	5 U
Calcium	**119000**	**452000**	**705000**	**65200**	**58600**	**125000**
Chromium	2.8 J (SQL = 10)	**140**	**130**	0.82 J	5.6 J	1.4 J
Cobalt	50 U	**81.5**	**58.6**	50 U	50 U	50 U
Copper	6.7 U	**125**	**183**	6.7 U	6.2 U	6.6 U
Iron	100 U	**71700**	**61000**	100 U	100 U	100 U
Lead	1.6 J (SQL = 3)	**141**	**97.4**	10 U	10 U	10 U
Magnesium	**30400**	**63400**	**82400**	**27700**	**36400**	**32700**
Manganese	15 U	**2590**	**12100**	15 U	0.94 J	1.3 J
Mercury	0.2 U	**0.38**	0.2 U	0.041 J	0.2 U	0.2 U
Nickel	2.5 U	**112**	**123**	1.5 U	1.4 U	1.8 U
Potassium	**4570 JH**	**13200 JH**	**10600 JH**	**4890 JH**	**7410 JH**	**5350 JH**
Sodium	**29600**	**27700**	**26300**	**25000**	**82600**	**53100**
Thallium	4.2 J (SQL = 10)	**27.6**	22.7 J	25 U	25 U	25 U
Vanadium	4.3 J (SQL = 50)	**109**	**55.2**	4.9 J	8.3 J	4.3 J
Zinc	34.9 U	**260**	**645**	24 U	20.7 U	19.2 U

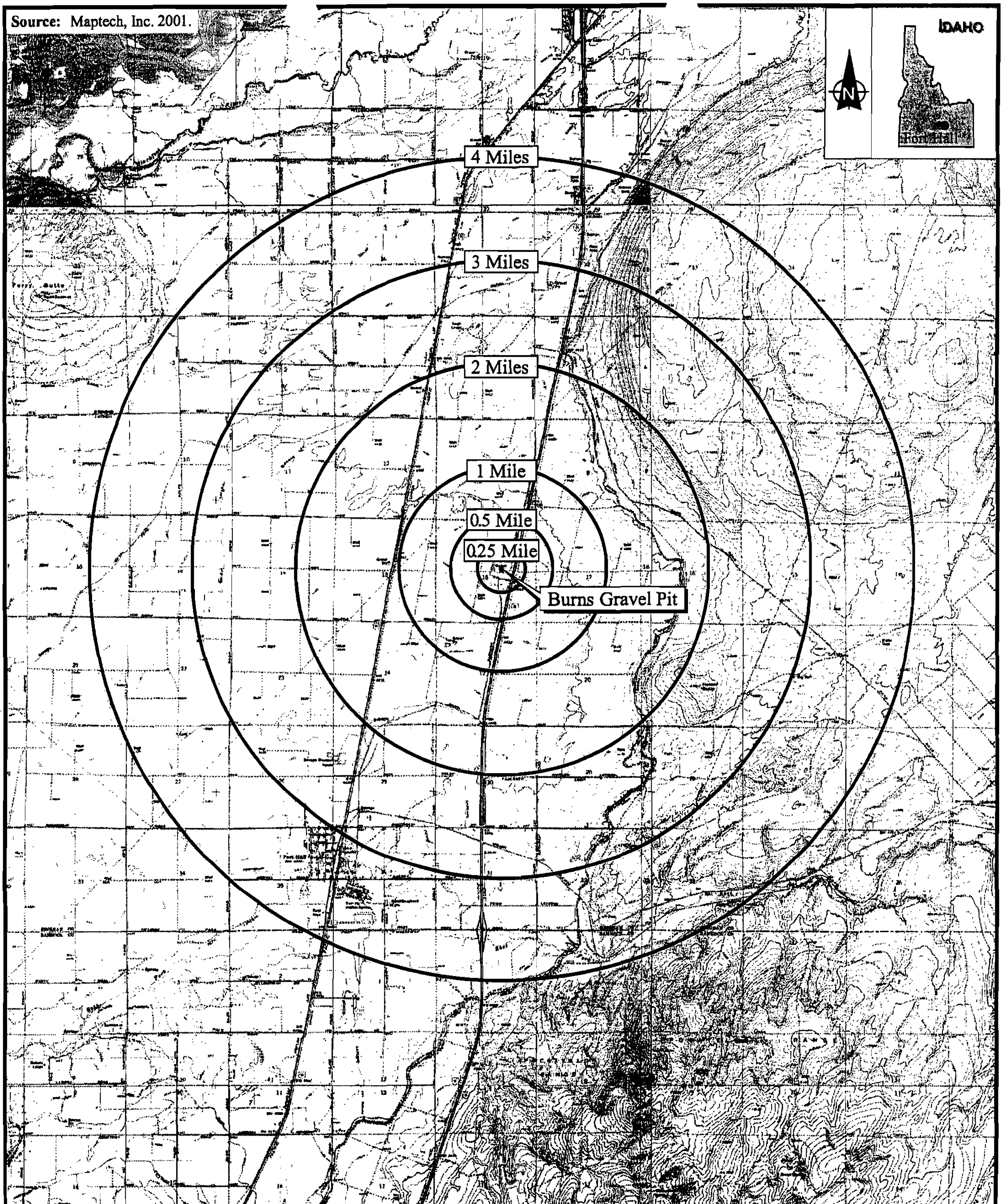
Note: Bold type indicates the sample result is above the instrument detection limit.
Underline type indicates the sample result is elevated as defined in Section 5.

Key:
CLP = Contract Laboratory Program.
EPA = United States Environmental Protection Agency.
H = High bias.
ID = Identification.
J = The analyte was positively identified. The associated numerical result is an estimate.
mg/L = milligrams per liter.
µg/L = micrograms per liter.
PCBs = Polychlorinated biphenyls.
SQL = Sample quantitation limit.
TAL = Target Analyte List.
U = The analyte was not detected at or above the reported result.

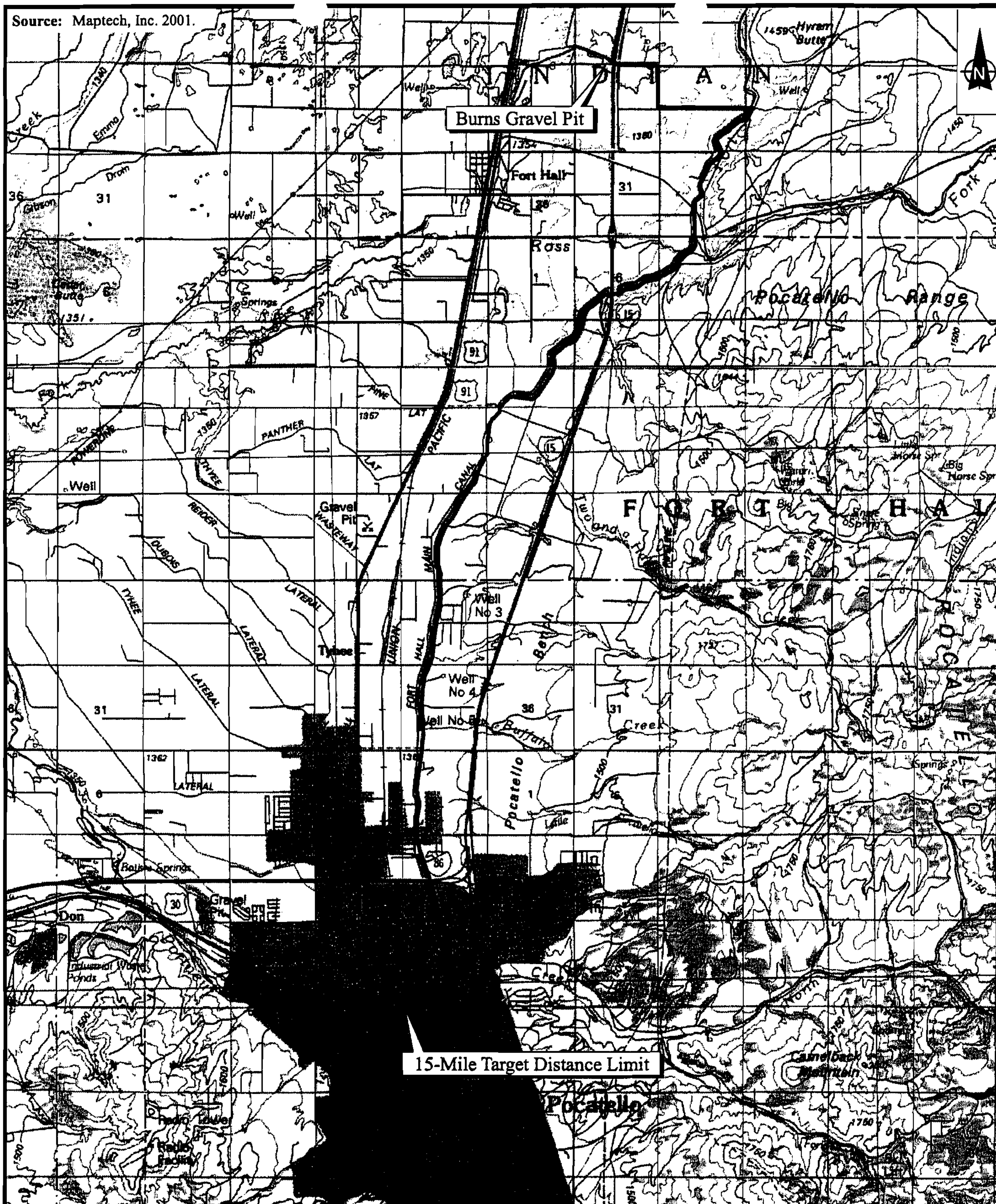
Table 7-3

POPULATION AND WETLAND ACREAGE WITHIN A 4-MILE RADIUS
BURNS GRAVEL PIT
FORT HALL, IDAHO

Distance (miles)	Residents	Wetland Acreage
On a source	0	0
0 to 0.25	1	0
0.25 to 0.5	5	0
0.5 to 1	29	0
1 to 2	1152	8.57
2 to 3	485	57.87
3 to 4	378	108.82
Total	2050	175.26



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	BURNS GRAVEL PIT SITE INSPECTION Fort Hall, Idaho	Figure 7-1 4-MILE MAP
	0 .5 1 Approximate Scale in Miles	Date: 9-13-05 · Drawn by: AES · 10:START-2\04050007\fig 7-1



ecology and environment, inc. International Specialists in the Environment Seattle, Washington	BURNS GRAVEL PIT SITE INSPECTION Fort Hall, Idaho	Figure 7-2 15-MILE MAP	
	0 1 2 Approximate Scale in Miles	Date: 9-13-05	Drawn by: AES	10:START-2\04050007\fig 7-2

8. SUMMARY AND CONCLUSIONS

In May 2005, the START-2 conducted PA/SI sampling activities at the Burns Gravel Pit site which is located near Fort Hall, Idaho. The Burns Gravel Pit is an unauthorized landfill located approximately 2 miles northeast of Fort Hall, Idaho, on the Fort Hall Indian Reservation . The primary site feature is a gravel pit.

The PA/SI involved the collection of samples from on-site potential sources of hazardous substances and target areas potentially impacted through contamination migration. Twenty-three samples, including background and QA/QC samples were collected. Samples were collected from the gravel pit, an irrigation well, and two monitoring wells.

8.1 SOURCES

To evaluate the presence of potentially hazardous substances at the Burns Gravel Pit, the START-2 collected a total of 12 subsurface soil samples from six different locations within the gravel pit. Sample results indicate the presence of pesticides/PCBs (4,4'-DDT, endosulfan I, and endosulfan II) and TAL metals (antimony, barium, beryllium, cadmium, copper, lead, manganese, nickel, thallium vanadium, and zinc) at significant concentrations in the subsurface soil samples. Of these analytes, only antimony, barium, cadmium, manganese, and thallium were detected at significant concentrations in samples collected from both the 2 to 6 feet bgs and 6 to 10 feet bgs samples.

8.2 TARGETS

8.2.1 Groundwater Migration Pathway

To evaluate the potential impact of the mine on nearby wells, the START-2 collected one irrigation well and two monitoring well groundwater samples. The sample results confirm that hazardous materials are migrating through the soil to the on-site shallow groundwater. TAL metals were detected at elevated concentrations in the on-site groundwater samples; however, the sample results did not confirm the migration of hazardous substances to the off-site targets including irrigation or monitoring wells.

8.3 CONCLUSIONS

Results of the PA/SI indicate that hazardous substances are present at the Burns Gravel Pit, but do not appear to be migrating downgradient to targets including irrigation and drinking water wells.

9. REFERENCES

Ecology and Environment, Inc. (E & E), March 2005, *Burns Gravel Pit Sampling and Quality Assurance Plan*, prepared for the United States Environmental Protection Agency, Contract Number 68-S0-01-01, Seattle, Washington.

———, 2001a, *Region 10 START-2 Quality Management Plan*, prepared for the United States Environmental Protection Agency, Contract Number 68-S0-01-01, Seattle, Washington.

———, 2001b, *Region 10 START-2 Quality Assurance Project Plan*, prepared for the United States Environmental Protection Agency, Contract Number 68-S0-01-01, Seattle, Washington.

———, 1999, *Expanded Site Inspection Report Fort Hall Groundwater Contamination Site*, prepared for the United States Environmental Protection Agency, Contract Number 68-W6-0008, Technical Direction Document 97-06-0011.

Hernandez, Sam, September 11, 1997 U.S. Bureau of Indian Affairs, personal communication with Mark Longtine, E & E, Seattle, Washington, regarding agricultural practices on the For Hall Indian Reservation.

Houser, Brenda, 1992, Quarternary stratigraphy of an area northeast of American Falls Reservoir, eastern Snake River Plain, Idaho, included in *Geological Society of America Memoir 179*.

Idaho Department of Water Resources (IDWR), various dates, driller's logs for wells located within the Fort Hall Indian Reservation.

Indian Health Service (IHS), various dates, driller's logs for wells located within the Fort Hall Indian Reservation.

Lindholm, G.F., 1996, Summary of the Snake River Plain Regional Aquifer System Analysis in Idaho and Eastern Oregon, *U.S. Geological Survey Professional Paper 1408-A*.

Lindholm, G.F., S.P. Garaedian, G.D. Newton, and R.L. Whitehead, 1987, Configuration of the Water Table and Depth to Water, Spring, 1980,v Water-Level Fluctuations, and Water Movement in the Snake River Plain Regional Aquifer System, Idaho and Easter Oregon, *U.S. Geological Survey Hydrologic Investigations*, Atlas HA-703.

National Oceanic and Atmospheric Administration (NOAA), 1973, *Precipitation-Frequency Atlas of the Western United States*.

Parliman D.J. and H.W. Young, 1992, *Water Levels in Selected Wells and Directions of Ground-Water Movement Near Fort Hall, Fort Hall Indian Reservation, Southeastern Idaho*, United States Geological Survey Water-Resources Investigations Report 92-4014.

———, 1988, *Selected Water Quality Data for the Fort Hall Indian Reservation, Southeastern Idaho, July, 1988*, U.S. Geological Survey, Open-File Report 88-496.

Shoshone-Bannock Tribes Water Quality Department (Tribes), various dates, driller's logs for wells located within the Fort Hall Indian Reservation.

Trimble, D., 1976, *Geology if the Micahud and Pocatellos Quadrangles, Bannock and Power Counties, Idaho*, U.S. Geological Survey Bulletin 1400.

Turner, Roger, February 20, 2004, Shoshone-Bannock Tribes CERCLA/RCRA Program Manager, memorandum to Sylvia Kawabata, site assessment unit manager, EPA, Region 10, regarding potential site assistance projects, Fort Hall Reservation, Idaho.

United States Department of Health, Education, and Welfare, (HEW) Public Health Service, Division of Indian Health, various dates

United States Department of Agriculture-Soil Conservation Service (USDA-SCS), 1991, *Preliminary Investigations Report, Fort Hall Ground Water Quality Project, Bingham County, Idaho.*

United States Department of Commerce (USDC), 2000, Bingham County, Idaho, profile of general demographic characteristics, United States Census Bureau.

United States Environmental Protection Agency (EPA), July 14, 2004a, Geographic Information Query System.

———, January 2004b, *USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, ILM05.3.*

———, January 2004c, *Contract Laboratory Program Guidance for Field Samplers, Draft Final,* OSWER 9240.0-35, EPA 540-R-00-003.

———, August 2003, *USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, OLM04.3.*

———, December 2002a, *Guidance for Quality Assurance Project Plans*, EPA QA/G-5, Office of Environmental Information, Washington, D.C., EPA/240/R-02/009.

———, July 2002b, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, OSWER 9240.1-35, EPA 540-R-01-008.

———, August 2000, *Guidance for the Data Quality Objectives Process,* EPA QA/G-4, Office of Research and Development, Washington, D.C., EPA/600/R-96/055.

———, October 1999, *USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review*, OSWER 9240.1-05A-P, PB 99-963506, EPA 540/R-99/008.

———, September 1993, *Data Quality Objectives Process for Superfund, Interim Final Guidance*, OSWER 9355.9-01, PB 94-963203, EPA 540/R-93/071.

United States Geological Survey (USGS), 1971a, Fort Hall, Idaho 7.5-Minute Topographic Map.

———, 1971b, Michaud, Idaho 7.5-Minute Topographic Map.

———, 1971c. Pocatello North, Idaho 7.5-Minute Topographic Map.

———, various dates, driller's logs for wells located within the Fort Hall Indian Reservation.

Western Regional Climate Center (WRCC), July 12, 2004, Period of Record Monthly Climate Summary, Fort Hall Indian Agency, Idaho, accessed via the Internet at: http://www.wrcc.dri.edu/cgi-bin/cliRECtM.pl?idfort.

Whitehead, R.L., 1992, *Geohydrologic Framework of the Snake River Plain Regional Aquifer System, Idaho and Eastern Oregon*, United States Geological Survey Professional Paper 1408-B.

Youree, Scott, September 23, 2004a, personal communication regarding site characterization with Renee Nordeen, Ecology and Environment, Inc., Seattle, Washington.

———, September 8, 2004b, personal communication regarding ownership and site conditions with Renee Nordeen, Ecology and Environment, Inc., Seattle, Washington.