
**Wenatchee Orchard
Targeted Brownfields Assessment Report
Wenatchee, Washington
TDD: 99-06-0002**

Contract: 68-W6-0008
June 2000

Region 10

START

Superfund Technical Assessment and Response Team

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**WENATCHEE ORCHARD
TARGETED BROWNFIELDS ASSESSMENT REPORT
WENATCHEE, WASHINGTON**

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LIST OF ACRONYMS AND ABBREVIATIONS

<u>Acronym</u>	<u>Definition</u>
bgs	below ground surface
CFR	Code of Federal Regulations
CLARC	Cleanup Levels and Risk Calculations
CL Pesticides	Chlorinated Pesticides
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Service
DDD	4,4-dichlorodiphenyldichloroethane
DDE	4,4-dichlorodiphenyldichloroethylene
DDT	4,4-dichlorodiphenyltrichloroethane
DQOs	data quality objectives
DUP	duplicate
E & E	Ecology and Environment, Inc.
EPA	United States Environmental Protection Agency
ESA	Environmental Site Assessment
F	Fahrenheit
Forsgren	Forsgren Associates, Inc.
Geoprobe™	Geoprobe™ direct-push sampler
GPS	Global Positioning System
IDW	investigation-derived waste
J	the associated numerical value is an estimated quantity
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
MTCA	Model Toxics Control Act
OP Pesticides	Organophosphorus Pesticides
PCBs	polychlorinated biphenyls
PRGs	preliminary remediation goals
QA	quality assurance
QC	quality control
%R	percent recovery
R	the sample results are rejected

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

<u>Acronym</u>	<u>Definition</u>
RPD	relative percent difference
SQAP	Sampling and Quality Assurance Plan
START	Superfund Technical Assessment and Response Team
SVOC	semivolatile organic compounds
TAL	Target Analyte List
TBA	Targeted Brownfields Assessment
TCLP	Toxicity Characteristic Leaching Procedure
the City	the City of Wenatchee
the site	the Wenatchee Orchard site
TM	task monitor
U	the associated numerical value is the sample quantitation limit
UJ	the reported detection limit is estimated because quality control criteria were not met
USGS	United States Geological Survey
VOC	volatile organic compounds
WDOE	Washington Department of Ecology
WRCC	Western Regional Climate Center

**WENATCHEE ORCHARD
TARGETED BROWNFIELDS ASSESSMENT REPORT
WENATCHEE, WASHINGTON**

1. INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Superfund Technical Assessment and Response Team (START) Contract No. 68-W6-0008 and Technical Direction Document No. 99-06-0002, Ecology and Environment, Inc., (E & E) performed a Targeted Brownfields Assessment (TBA) at the Wenatchee Orchard site located in Wenatchee, Washington. The EPA's Brownfields Economic Redevelopment Initiative is designed to empower states, cities, tribes, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields sites.

The City of Wenatchee owns an 8.8-acre property, located on North Western Avenue, that is leased to residents for use as an apple and cherry orchard. An adjacent piece of land, including a house and an orchard waste debris pile, was sold by the City in 1996. The City is interested in determining potential contamination from farming practices at the property to assist in the assessment of future use of the property as a city park and therefore requested a TBA at the property.

This TBA consisted of limited on-site sampling at potential contaminant source areas for site characterization purposes. This report outlines the technical and analytical approaches that were employed by the START during TBA fieldwork and characterizes actual contaminants detected.

2. SITE BACKGROUND

The information and descriptions provided in this section are based on a review of previous investigations and a START site visit conducted on March 22, 1999.

2.1 SITE LOCATION AND DESCRIPTION

The site is located at 1404 North Western Avenue in Wenatchee, Washington (Figure 2-1) at latitude 47° 26' 57" North and longitude 120° 20' 81" West in Section 32, Township 23N, Range 20E, Willamette Meridian (USGS 1966).

The 8.8 acre site, consisting mainly of an apple and cherry orchard (Figure 2-2), is located in the foothills of the adjacent Cascade Mountain Range on flood deposits of silts, sands, and gravels (Forsgren 1996). Surface topography at the site generally slopes easterly towards North Western Avenue. The drainage area for surface water passing through the site consists of water collected from the 17.6 acres west of the site and the 8.8 acres of the site for a total of 26.4 acres (USGS 1966). Surface water runoff likely travels via sheet flow and follows various pathways to nearby storm drains along Western Avenue. Groundwater is approximately 30 feet below ground surface (bgs) with an easterly flow direction (Forsgren 1996). The land uses within 1 mile of the site are residential and agricultural (Forsgren 1996). A total of 1,915 residences with 4,382 are within 1 mile of the site (EPA 1999a). The nearest residence is located adjacent to the site at 1404 Western Avenue (Figure 2-2). The property is not fenced and access is unrestricted (Woodke 1999), and there is potential for direct contact with on-site soils and inhalation of windblown dust.

In addition to potential contamination associated with the operation of apple and cherry orchards, a sump, an open excavation, unlined septic pool located near the reported former laboratory/apartment building (in use because of the failure of the residential septic system) and a pile of solid waste debris (branches and discarded vegetation) related to orchard activities are other areas of potential contamination on site (Figure 2-2). The former laboratory/apartment building burned down in 1996. It was reportedly used as a chemist's laboratory (specific uses are unknown) as early as the 1920s and recently was used as an apartment and storage building (Forsgren 1996). For the purposes of this project, the START assumes that the building was used as a laboratory at one time. The sump was located in the

former chemist's laboratory and was not investigated during a previous inspection (Forsgren 1996). The location and specific uses for the sump are unknown. The City intends to develop the property into a city park, potentially with picnic tables and playground equipment, but no other specific information regarding future improvements at the site is available.

2.2 WENATCHEE REGIONAL CONDITIONS

Wenatchee is located in central Washington in the Cascade Mountains at an approximate elevation of 620 to 900 feet (USGS 1966). The average temperatures in January range from 21.2° to 33.5° Fahrenheit (°F) and in July range from 60.1° to 87.1°F. Annual precipitation is 8.58 inches, with 33.0 inches of snowfall (WRCC 1999). The site is not located in a 100-year flood plain.

The primary municipal water supplies (approximately 99.99 percent) within the city are provided by the City of Wenatchee Water Department and the Chelan County Public Utilities Department water system (Curry 1999). These public systems draw water from an aquifer located on the east side of the Columbia River approximately 6 miles north of the site and east of the Rocky Reach Dam. Public water is treated and piped throughout the city (Curry 1999; Erickson 1999; Walker 1999). Groundwater at the site is not used for drinking water. The orchard is irrigated using Chelan County water (Forsgren 1996).

2.3 SITE OWNERSHIP HISTORY

The site was owned by Dick and Rielle Crocker from 1946 to 1996 (Forsgren 1996), when it was purchased by the City.

2.4 SITE OPERATIONS AND WASTE CHARACTERISTICS

The site has operated as an apple orchard for at least 50 years (Forsgren 1996). Notable physical changes to the property since 1996 include the total destruction of the former laboratory/apartment by fire. The property currently is leased to a local family that continues to operate the orchard in a manner similar to that practiced by the previous owners (Jacobsen 1999). Presumed contaminants of concern associated with the orchard operation include chlorinated pesticides, organophosphorus pesticides (OP Pesticides), and Target Analyte List (TAL) metals (including arsenic, copper, iron, manganese, and zinc), which are believed to have been applied as part of the customary operations of apple and cherry orchards (Forsgren 1996). Arsenic was applied in lead arsenate pesticides, and copper, iron, manganese, and zinc are essential elements critical for apple production. A sump and septic pool located near the former laboratory/apartment and a solid waste debris pile were also noted during a previous investigation

(Forsgren 1996). The presence of these features could not be confirmed during the TBA. Specific uses and contaminants at the septic pool, debris pile, and former laboratory sump have not been documented (Forsgren 1996), therefore, suspected potential contaminants of concern at these locations include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), chlorinated pesticides/polychlorinated biphenyls (PCBs), OP Pesticides, and TAL metals.

2.4.1 Previous Investigations

A Phase I Environmental Site Assessment (ESA) was conducted in 1996 (Forsgren 1996). Sample collection was not performed as part of the ESA. No signs of distressed vegetation were noted during the ESA site visit, and no evidence of underground storage tanks or hazardous material disposal activities was found during the site background research (Forsgren 1996). Groundwater in the area was documented at approximately 30 feet bgs during the ESA, based on local well log information (Forsgren 1996). The ESA Report documents concerns about the open septic pool (located near the former apartment building) on the property but concludes that the site presents a low risk of environmental concern. No other environmental investigations are known to have occurred at the site (Stalheim 1999).

2.4.2 START Site Visit

On March 22, 1999, the EPA task monitor (TM) and START project manager conducted a site visit and interviewed City personnel, including the director of the Department of Community Development and the Street/Fleet and Facilities manager for the Public Works Department, to ascertain information regarding historical and current site usage, and potential future use of the property. City personnel provided the site location and approximate position of the former laboratory/apartment building during the site visit. The main historical and current site usage information was obtained from the ESA Report, which includes an interview with the former site owner (Forsgren 1996). One residence and apple and cherry trees were the only significant features noted during the site visit (Woodke 1999). It was determined later that the residence is no longer part of the site. The former laboratory/apartment building and septic pool are no longer present on site.

2.4.3 Potential Future Property Uses

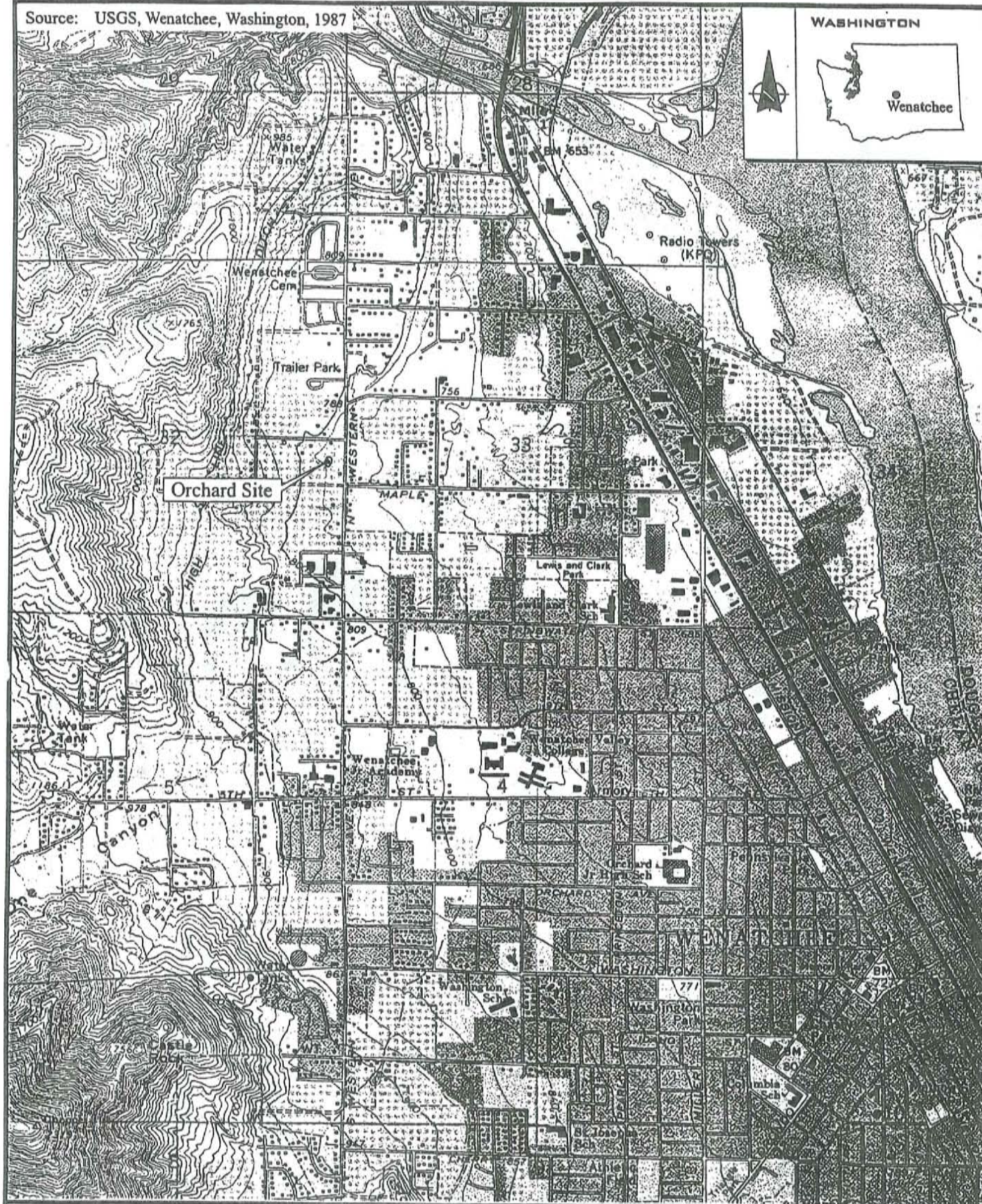
City personnel have indicated that the Orchard property is likely to be converted into a City park, potentially with picnic tables and playground equipment, but no other specific information regarding future improvements of the site is available (Woodke 1999).

2.4.4 Areas of Potential Contamination

Sampling was conducted at those areas considered to be potential contamination sources and at on-site areas that may have been contaminated through migration of hazardous substances from sources on site. Based on a review of background information and discussions with site representatives, the following areas were evaluated during the Wenatchee Orchard TBA:

- **Orchard Soil:** Pesticides and fertilizers were applied according to the manufacturers' directions during orchard operations. Potential contaminants of concern include chlorinated pesticides, OP Pesticides, and TAL metals. Additionally, the area was evaluated for PCBs (included with chlorinated pesticide analyses);
- **Solid Waste Piles:** Two solid waste piles with unknown contaminants existed at the site during the ESA in 1996. Part of the property, including the location of one of the waste piles, was sold by the City since that time. Potential contaminants of concern at the on-site waste pile include VOCs, SVOCs, chlorinated pesticides/PCBs, OP Pesticides, and TAL metals;
- **Former Laboratory Sump:** A sump located in the former laboratory existed at the site during the 1996 ESA; however, the laboratory burned down since that time and the sump was not located during the TBA. One surface soil sample was collected in the approximate location of the former sump based on information provided by City personnel and visual observations. Operations associated with the former laboratory and sump are unknown; therefore, suspected potential contaminants of concern include VOCs, SVOCs, chlorinated pesticides/PCBs, OP Pesticides, and TAL metals;
- **Open Septic Pool:** An open septic pool with unknown contaminants existed at the site during the ESA; however, the pool was not located during the TBA. One surface soil sample was collected from the approximate location of the former septic pool based on information provided by City personnel and visual observations. Suspected potential contaminants of concern include VOCs, SVOCs, chlorinated pesticides/PCBs, OP Pesticides, and TAL metals.

Source: USGS, Wenatchee, Washington, 1987



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WENATCHEE ORCHARD
TARGETED
BROWNFIELDS ASSESSMENT
Wenatchee, Washington

0 .25 .5
Approximate Scale in Miles

Figure 2-1
SITE LOCATION MAP

Drawn:
AES

DATE:
12/9/99

JOB NO.
DF0201SIT0

Dwg.No.
DF0201 2-1b

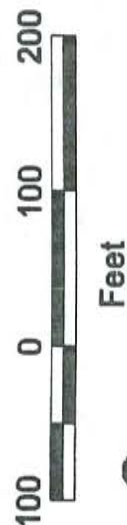
Figure 2-2

Site Map

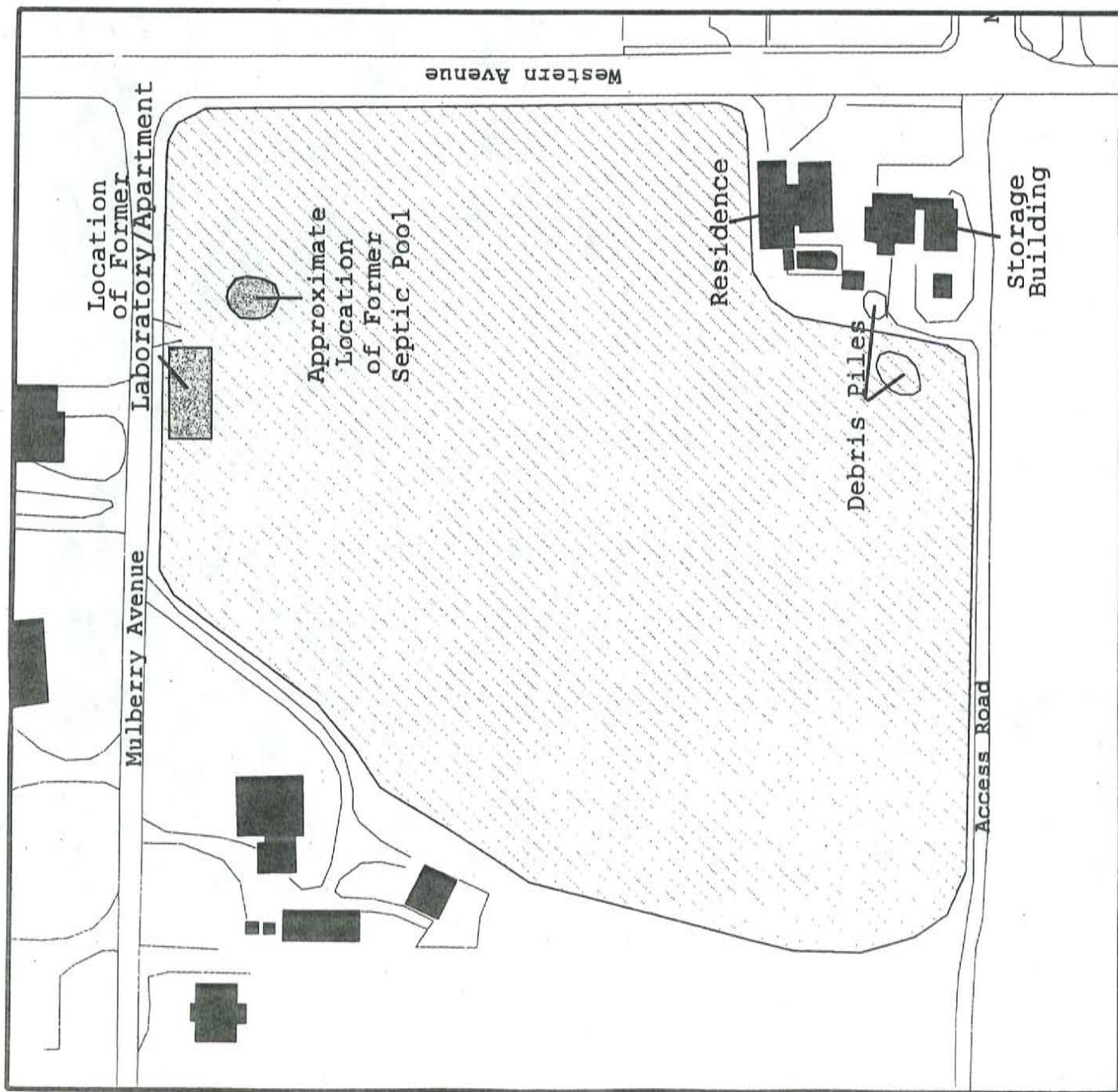
Wenatchee, Washington

Legend

- Approximate Orchard Location
- Existing Building Location
- Former Location



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3. BROWNFIELDS INVESTIGATION AND RESULTS

3.1 FIELD ACTIVITIES

TBA field activities were conducted at the site during the weeks of June 28 and July 5, 1999. Photographic documentation of site activities is presented in Appendix A. All sampling was conducted in accordance with the EPA-approved Sampling and Quality Assurance Plan (SQAP) dated June 23, 1999 (E & E 1999). Deviations from the SQAP included not collecting samples at the former sump (not located), former septic pool (not located), and one waste pile that was located on an adjacent property. The Sample Plan Alteration Form summarizes these deviations (Appendix B). Quality assurance (QA) /quality control (QC) information, laboratory analytical data, and QA review memoranda are provided in Appendix C. Global Positioning System (GPS) coordinates were obtained for locations of all samples (except OR12) collected during the TBA and are provided in Appendix D. The location of OR12 is approximated in Figure 3-1.

3.2 REGULATORY STANDARDS AND REPORTING

The goals of TBAs are to empower states, cities, tribes, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields. In order to interpret analytical results, conservative screening levels and background concentrations were used for comparison.

Both Washington Department of Ecology (WDOE) Model Toxics Control Act (MTCA) cleanup levels (WDOE 1996) and EPA Region 9 Preliminary Remediation Goals (PRGs) were used as conservative screening levels to assess whether contaminants present pose a potential threat to human health under a variety of exposure conditions and based on expected future property uses (i.e., development into a park). The industrial concentrations also were provided for informational purposes as an alternative cleanup goal for soils.

Washington MTCA levels are presented according to three categories: Methods A, B, and C. Method A levels are generally the most conservative, may or may not be risk-based, and are intended for use at simple sites with a limited number of contaminants. Method A values are available for groundwater (assuming human consumption), residential soil, and industrial soil. Generally, if a Method

A value is available for a given contaminant, it should be used as the screening level for that contaminant, unless it is based on a pathway that is not important at a given site (e.g., migration to groundwater).

Method B levels are based on residential land use; consequently, groundwater cleanup levels are based on household use of groundwater as a drinking water source while soil levels assume high frequency of contact in a residential setting. Method B cleanup levels account for exposures to children. Method B cleanup levels correspond to a one in a million excess lifetime cancer risk for carcinogens or a hazard quotient of 1 for noncarcinogens. (A hazard quotient is a ratio between the level to which someone may be exposed to a contaminant in the environment and the level deemed "safe" by regulatory agencies. This "safe" exposure level is usually referred to as a reference dose or reference concentration.)

Method C levels are based on commercial or industrial land use; consequently, soil and groundwater cleanup levels are based on adult contact only. The risk levels for Method C are an excess lifetime cancer risk of one in 100,000 for carcinogens and a hazard quotient of 1 for noncarcinogens. While MTCA has provided tables of Method B and C values in their Cleanup Levels and Risk Calculations (CLARC) tables, the equations used to derive these levels are provided in Chapter 173-340 Washington Administrative Code so that levels for existing chemicals in the table or additional chemicals can be calculated as new toxicity data becomes available. Because of the limited scope of the TBA, levels available in the 1996 version of the CLARC table were used where available.

When MTCA levels were not available, the most recent EPA Region 9 PRG table (EPA 1999b) was used as the source of screening levels. EPA Region 9 PRGs are risk-based levels that are useful as screening values at sites to determine whether levels of contaminants pose a potential threat to human health. PRGs are based on an excess lifetime cancer risk of one in 1,000,000 for carcinogens and a hazard quotient of 1 for noncarcinogens. Soil PRGs are available for residential exposure scenarios (including children) and industrial exposure scenarios (adults only). Tap water PRGs can be used for comparison to groundwater, assuming the groundwater is used for domestic purposes in a residential exposure setting (i.e., drinking, washing clothing and dishes, bathing, etc.).

At the EPA TM's direction, site-specific background samples were not collected, however metals results were compared to Washington State natural background levels as listed in *Natural Background Soil Metals Concentrations in Washington State*, Toxics Cleanup Program, WDOE, October, 1994 (WDOE 1994).

In this section's analytical summary tables, analytical concentrations were evaluated using the following guidelines:

- Analytes that were not detected in any sample in a given medium were deleted from the table;
- All detected analytes were bolded;
- Analytes detected at concentrations above one or more screening levels or Washington State natural background levels were considered elevated and are underlined; and
- In the absence of applicable screening levels, analytical concentrations were included in the tables but could not be quantitatively evaluated.

Based on EPA, Region 10, policy, evaluation of aluminum, calcium, iron, magnesium, potassium, and sodium (i.e., common earth crust metals) generally is employed only in water mass tracing, which is beyond the scope of this report. Additionally, calcium, iron, magnesium, potassium, and sodium are not associated with toxicity to humans under normal circumstances (EPA 1996c). For these reasons, these elements are not discussed in the report.

3.3 ANALYTICAL PROTOCOL, SAMPLING METHODS, AND RATIONALE

This section describes the surface and subsurface soil sample collection conducted for the TBA. Following collection, all samples were stored in iced coolers and maintained under chain of custody. Twenty-three soil samples, excluding QA samples (rinsate blanks and trip blanks), were collected during the TBA. Sample types and the methods of collection are described below. Sample locations were determined based on background information and were designed to investigate the areas of concern identified in Section 2.4.4. A list of all samples collected for laboratory analysis during the TBA is presented in Table 3-1. Alphanumeric identification numbers applied to each sample location (e.g., OR01) are the sample location identifiers used in the report. Sample collection locations are shown in Figure 3-1. These locations are based on GPS data collected at the time of sampling (except location OR12 as discussed in Section 3.1).

3.3.1 Surface Soil Sampling

Surface soil samples were analyzed for combinations of the following parameters as specified in the approved SQAP: VOCs (Contract Laboratory Program Analytical Service [CLPAS] OLM03.2), SVOCs (CLPAS OLM03.2), chlorinated pesticides/PCBs (CLPAS OLM03.2), TAL metals (CLPAS ILM04.0), and OP Pesticides (EPA SW-846 Method 8141). Surface soil samples were collected using dedicated stainless steel spoons and bowls. The samples were collected from 0 to 6 inches bgs as specified in the approved SQAP, were thoroughly homogenized in stainless steel bowls (except for aliquots for VOC analyses, which were placed directly into the sample containers), and were placed into pre-labeled sample containers using the same dedicated stainless steel spoons.

3.3.2 Subsurface Soil Sampling

Subsurface soil samples were analyzed for combinations of the following parameters as specified in the approved SQAP: VOCs (CLPAS OLM03.2), SVOCs (CLPAS OLM03.2), chlorinated pesticides/PCBs (CLPAS OLM03.2), TAL metals (CLPAS ILM04.0), and OP Pesticides (EPA SW-846 Method 8141). Soil from borings in the orchard was collected using a Geoprobe™ direct-push sampler (Geoprobe™) and split-spoon stainless steel samplers with dedicated acetate liners. The samples were collected from two to six feet bgs as stated in the approved SQAP. The samples were thoroughly homogenized with dedicated stainless steel spoons in dedicated stainless steel bowls (except for aliquots for VOC analyses, which were placed directly into the sample containers) and placed into prelabeled sample containers using the same dedicated stainless steel spoons. The Geoprobe™ sampler was decontaminated with soapy water and rinsed with a steam cleaner between sample locations. After sample collection, the boreholes were backfilled with bentonite grout.

3.4 SAMPLING ACTIVITIES AND ANALYTICAL RESULTS

Surface soil samples were collected from 0 to 6 inches bgs from three locations (OR01, OR02, and OR03) in the former laboratory/apartment building area. Surface and subsurface soil samples were collected from 0 to 6 inches bgs and 2 to 6 feet bgs (composited), respectively, from two locations in the solid waste debris pile area (OR06 and OR12). Surface and subsurface soil samples were collected at depths of 0 to 6 inches bgs and 2 to 6 feet bgs (composited), respectively, from seven locations in the orchard (OR04, OR05, OR07, OR08, OR09, OR10, and OR11) at places representative of site conditions. The samples were analyzed for the parameters listed in Table 3-1. Surface soil sample results are provided in Table 3-2 and a summary of surface soil results compared to screening levels is provided in Table 3-3. Surface soil sample results that exceeded screening levels are shown in Figure 3-2. Subsurface soil sample results are provided in Table 3-4 and a summary of subsurface soil results compared to screening levels is provided in Table 3-5. Subsurface soil sample results that exceeded screening levels are shown in Figure 3-3.

3.4.1 Surface Soil Samples

Surface soil samples were collected from 12 locations at the depths indicated in Table 3-1. Nine SVOCs, one OP Pesticide, nine chlorinated pesticides, and 23 TAL metals were detected in the surface

soil samples. Screening levels were exceeded at 11 of 12 locations. The following analytes exceeded one or more screening level concentrations:

<u>Analyte</u>	<u>Sample Locations with Exceedances</u>	<u>Exceedance Concentration Range</u>
4,4'-DDE	One	4,500 $\mu\text{g/kg}$
4,4'-DDT	Three	1,200 and 5,000 $\mu\text{g/kg}$
Arsenic	Seven	22.7 and 104 mg/kg
Beryllium	Nine	0.26 and 0.69 mg/kg
Lead	Six	267 and 622 mg/kg

Each of the surface soil sample screening level exceedances were greater than the applicable residential standards, which are reasonable to use for a potential city park because children are expected to be present. However, they are not expected to be exposed to these chemicals as frequently as if they were in the yards at their residences. None of the chemicals were detected at concentrations exceeding the respective industrial cleanup levels. The chlorinated pesticides exceedances occurred at varied locations including the orchard and near the solid waste debris pile. The TAL metal exceedances also occurred throughout the property. The beryllium exceedances are all below the Washington State natural background average of 2 mg/kg (WDOE 1994), therefore beryllium should not require additional consideration. The arsenic and lead results may warrant further attention at this potential future city park.

3.4.2 Subsurface Soil Samples

Subsurface soil samples were collected from eight locations at the depths indicated in Table 3-1 (i.e. 2 - 6 feet bgs). Five chlorinated pesticides and 21 TAL metals were detected in the subsurface soil samples. Screening levels were exceeded at all eight locations. The following exceeded one or more screening level concentrations:

<u>Analyte</u>	<u>Sample Locations with Exceedances</u>	<u>Exceedance Concentration Range</u>
Arsenic	Two	24.8 and 25.6 mg/kg
Beryllium	Eight	0.24 and 0.86 mg/kg

The beryllium results are below the Washington State natural background average of 2 mg/kg (WDOE 1994). Both arsenic result exceedances were greater than the Washington State natural background average of 7 mg/kg and MTCA Method A residential level of 20 mg/kg. None of the detected arsenic concentrations exceed the MTCA Method A industrial level of 200 mg/kg.

Table 3-1

**SAMPLE COLLECTION INFORMATION
WENATCHEE, WASHINGTON**

Date	Time	Station ID	Matrix	Depth*	Sample Description	Analyses
6/29/99	0800	LF01TB00	Water	N/A	Trip Blank	VOCs
6/29/99	0800	LF01TB01	Water	N/A	Trip Blank	VOCs
6/30/99	1350	OR01SS00	Surface soil	0" - 6" bgs	Dry medium to fine brown sand to silty sand	VOCs, SVOCs, CL Pesticides/PCBs, TAL metals
6/30/99	1405	OR02SS00	Surface soil	0" - 6" bgs	Dry medium to fine brown sand to silty sand	VOCs, SVOCs, CL Pesticides/PCBs, TAL metals
6/30/99	1420	OR03SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	VOCs, SVOCs, CL Pesticides/PCBs, TAL metals
7/6/99	1305	OR10SS00	Surface soil	0" - 6" bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/6/99	1310	OR10SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand; few small rocks	CL Pesticides/PCBs, TAL metals, OP pesticides
7/6/99	1325	OR11SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/6/99	1330	OR11SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1930	OR01SS00	Surface soil	0" - 6" bgs	Dry medium to fine brown sand to silty sand	OP pesticides
7/8/99	1950	OR02SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	OP pesticides
7/8/99	2000	OR03SS00	Surface soil	0" - 6" bgs	Slightly moist medium to fine brown sand to silty sand	OP pesticides
7/8/99	1840	OR04SS00	Surface soil	0" - 6" bgs	Dry medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1850	OR04SB02	Subsurface soil	2 ft - 6 ft bgs	Dry medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1856	OR05SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1900	OR05SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1910	OR06SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1915	OR06SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1940	OR07SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	1950	OR07SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	2000	OR08SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	CL Pesticides/PCBs, TAL metals, OP pesticides

Table 3-1

SAMPLE COLLECTION INFORMATION
WENATCHEE, WASHINGTON

Date	Time	Station ID	Matrix	Depth*	Sample Description	Analyses
7/8/99	2000	OR08SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	2015	OR09SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	2020	OR09SB02	Subsurface soil	2 ft - 6 ft bgs	Slightly moist medium to fine brown sand to silty sand	CL Pesticides/PCBs, TAL metals, OP pesticides
7/8/99	2010	OR12SS00	Surface soil	0" - 6" bgs	Slightly moist medium brown sand to silty sand	VOCs, SVOCs, TAL metals, CL Pesticides/PCBs, OP pesticides
7/9/99	0700	LF01TB06	Water	N/A	Trip blank	VOCs
7/9/99	1320	OR01RB01	Water	N/A	Rinsate Blank	CL Pesticides/PCBs, TAL metals, OP pesticides
7/9/99	1340	OR01RB02	Water	N/A	Rinsate Blank	SVOCs, TAL metals, OP pesticides

*The samples collected from 2 to 6 feet bgs were composite samples.

Key:

- bgs - below ground surface.
- CLP - Contract Laboratory Program.
- EPA - United States Environmental Protection Agency.
- ft - Feet.
- ID - Identification.
- N/A - Not applicable.
- OP Pesticides - Organophosphorus pesticides.
- CL Pesticides/PCBs - Chlorinated pesticides/polychlorinated biphenyls.
- SVOCs - Semi volatile organic compounds.
- TAL - Target analyte list.
- VOCs - Volatile organic compounds.

TABLE 3-2

**SURFACE SOIL SAMPLE ANALYTICAL RESULTS SUMMARY
WENATCHEE, WASHINGTON**

LOCATION ID		Residential Cleanup Standards	Industrial Cleanup Standards																
DEPTH				OR01SS00 0 - 6 in bgs	OR02SS00 0 - 6 in bgs	OR03SS00 0 - 6 in bgs	OR10SS00 0 - 6 in bgs	OR11SS00 0 - 6 in bgs	OR03SS00 0 - 6 in bgs	OR03SS00 0 - 6 in bgs									
SVOCs (µg/kg)																			
Benzo(a)pyrene		137 ^b	18,000 ^c	440 U	37 J	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Benzo(b)fluoranthene		137 ^b	18,000 ^c	440 U	42 J	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Benzo(k)fluoranthene		137 ^b	18,000 ^c	440 U	19 J	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Bis(2-ethylhexyl)phthalate		71,400 ^b	9,370,000 ^c	440 U	1,300	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Butylbenzylphthalate		16,000,000 ^b	100,000,000 ^c	440 U	47 J	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Chrysene		137 ^b	18,000 ^c	440 U	340 U	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Di-n-butylphthalate		8,000,000 ^b	350,000,000 ^c	440 U	120 J	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Fluoranthene		3,200,000 ^b	140,000,000 ^c	440 U	340 U	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Pyrene		2,400,000 ^b	105,000,000 ^c	440 U	340 U	420 U	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Organophosphorus Pesticides (µg/kg)																			
Azinphos, methyl		-	-	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA				
Chlorinated Pesticides (µg/kg)																			
4,4'-DDD		4,170 ^b	547,000 ^c	4.4 U	34 U	16	320	120	NA	NA	NA	NA	NA	NA	NA				
4,4'-DDE		2,940 ^b	386,000 ^c	96	510	560	4,500	1,600	NA	NA	NA	NA	NA	NA	NA				
4,4'-DDT		1,000 ^a	5,000 ^a	30	340	230	5,000	850	NA	NA	NA	NA	NA	NA	NA				
Dieldrin		62.5 ^b	8,200 ^c	4.4 U	34 U	8.0 J	75 U	38 U	NA	NA	NA	NA	NA	NA	NA				
Endosulfan I		480,000 ^b	21,000,000 ^c	0.26 J	34 U	2.3 J	39 U	20 U	NA	NA	NA	NA	NA	NA	NA				
Endosulfan II		-	-	4.4 U	34 U	13.4 J	75 U	38 U	NA	NA	NA	NA	NA	NA	NA				
Endosulfan sulfate		-	-	1.3 J	28 J	160	39 J	20 J	NA	NA	NA	NA	NA	NA	NA				
Gamma chlordane		-	-	2.3 U	18 U	2.2 U	39 U	20 U	NA	NA	NA	NA	NA	NA	NA				
Methoxychlor		400,000 ^b	17,500,000 ^c	0.44 J	5.5 J	2.2 J	390 U	200 U	NA	NA	NA	NA	NA	NA	NA				

Key at end of the table.

TABLE 3-2

SURFACE SOIL SAMPLE ANALYTICAL RESULTS SUMMARY
WENATCHEE, WASHINGTON

LOCATION ID	Residential Cleanup Standards	Industrial Cleanup Standards	OR01SS00 0 - 6 in bgs	OR02SS00 0 - 6 in bgs	OR03SS00 0 - 6 in bgs	OR10SS00 0 - 6 in bgs	OR11SS00 0 - 6 in bgs	OR03SS00 0 - 6 in bgs
DEPTH								
Inorganics (mg/kg)								
Aluminum	76,000 ^d	100,000 ^d	7,920 J	8,250 J	17,200 J	13,200	17,000	NA
Antimony	30 ^d	750 ^d	0.94 J	R	R	R	R	NA
Arsenic	20 ^a	200 ^a	13.4 J	9.8 J	22.7 J	74.9 J	104 J	NA
Barium	5,600 ^b	245,000 ^c	91.2	253	228	163	177	NA
Beryllium	0.233 ^b	30.5 ^c	0.16 J	0.18 J	0.39 J	0.56 J	0.69 J	NA
Cadmium	2 ^a	10 ^a	0.13 U	1.1	0.16 J	0.11 U	0.11 U	NA
Calcium	-	-	3,320 J	9,860 J	8,590 J	3,900	3,210	NA
Chromium	100 ^a	500 ^a	16.1	18.8	36.9	35.8	40.4	NA
Cobalt	3,300 ^d	29,000 ^d	5.1 J	5.6 J	8.9 J	9.2 J	9.7 J	NA
Copper	2,960 ^b	130,000 ^c	20.8	32	41.1	19.7	19.2	NA
Iron	23,000 ^d	100,000 ^d	12,800	14,800	20,200	19,800	23,900	NA
Lead	250 ^a	1,000 ^a	210 J	271 J	333 J	557	622	NA
Magnesium	-	-	3,670 J	4,040 J	5,480 J	5,130	5,380	NA
Manganese	11,200 ^b	490,000 ^c	265	367	390	348	496	NA
Mercury	1.0 ^a	1.0 ^a	0.06 U	0.05 U	0.1 J	0.06 U	0.06 U	NA
Nickel	1,600 ^b	70,000 ^c	14.8	16.1	22	20.8 J	21.6 J	NA
Potassium	-	-	1,720	2,460	5,170	4,090	4,890	NA
Selenium	400 ^b	17,500 ^c	1.1 UJ	1.5 U	1.7 U	2.1	2.1	NA
Silver	400 ^b	17,500 ^c	0.55 J	0.63 J	0.86 J	0.83 J	1.1 J	NA
Sodium	-	-	242 J	221 J	342 J	337 J	382 J	NA
Thallium	5.6 ^b	245 ^c	0.85 U	0.75 J	1.2 J	1.2 J	1.5 J	NA
Vanadium	560 ^b	24,500 ^c	25.3	28.1	44.4	43.8	54	NA
Zinc	24,000 ^b	1,050,000 ^c	111 J	289 J	287 J	160	133	NA

Key at end of the table.

TABLE 3-2

**SURFACE SOIL SAMPLE ANALYTICAL RESULTS SUMMARY
WENATCHEE, WASHINGTON**

LOCATION ID	Residential Cleanup Standards	Industrial Cleanup Standards	OR04SS00 0 - 6 in bgs	OR05SS00 0 - 6 in bgs	OR06SS00 0 - 6 in bgs	OR07SS00 0 - 6 in bgs	OR08SS00 0 - 6 in bgs	OR09SS00 0 - 6 in bgs	OR12SS00
DEPTH									
SVOCs (µg/kg)									
Benzo(a)pyrene	137 ^b	18,000 ^c	NA	NA	NA	NA	NA	NA	430 U
Benzo(b)fluoranthene	137 ^b	18,000 ^c	NA	NA	NA	NA	NA	NA	48 J
Benzo(k)fluoranthene	137 ^b	18,000 ^c	NA	NA	NA	NA	NA	NA	430 U
Bis(2-ethylhexyl)phthalate	71,400 ^b	9,370,000 ^c	NA	NA	NA	NA	NA	NA	77 J
Butylbenzylphthalate	16,000,000 ^b	100,000,000 ^c	NA	NA	NA	NA	NA	NA	430 U
Chrysene	137 ^b	18,000 ^c	NA	NA	NA	NA	NA	NA	44 J
Di-n-butylphthalate	8,000,000 ^b	350,000,000 ^c	NA	NA	NA	NA	NA	NA	430 U
Fluoranthene	3,200,000 ^b	140,000,000 ^c	NA	NA	NA	NA	NA	NA	75 J
Pyrene	2,400,000 ^b	105,000,000 ^c	NA	NA	NA	NA	NA	NA	60 J
Organophosphorus Pesticides (µg/kg)									
Azinphos, methyl	-	-	7.9 U	7.5 U	6.6 U	7.1 U	7.2 U	36	550
Chlorinated Pesticides (µg/kg)									
4,4'-DDD	4,170 ^b	547,000 ^c	12	3.8 U	3.3 U	31 J	46 J	36 J	13 U
4,4'-DDE	2,940 ^b	386,000 ^c	1,000	290	19	1,800	1,800	1,500	2,200
4,4'-DDT	1,000 ^a	5,000 ^a	470	88 J	15	1,200	860 J	580	1,500
Dieldrin	62.5 ^b	8,200 ^c	200 U	3.8 U	3.3 U	7.3 J	36 U	18 U	42 J
Endosulfan I	480,000 ^b	21,000,000 ^c	10 U	1.6 J	0.26 J	9.1 U	19 U	9.6 U	19
Endosulfan II	-	-	20 U	3.8 U	3.3 U	18 U	36 U	18 U	4.3 U
Endosulfan sulfate	-	-	72	4.0 J	0.52 J	16 J	37 J	48	610
Gamma chlordane	-	-	10 U	1.9 U	0.82 J	9.1 U	19 U	9.6 U	2.2 U
Methoxychlor	400,000 ^b	17,500,000 ^c	100 U	19 U	17 U	91 U	190 U	96 U	5.7 J

Key at end of the table.

TABLE 3-2

SURFACE SOIL SAMPLE ANALYTICAL RESULTS SUMMARY
WENATCHEE, WASHINGTON

LOCATION ID DEPTH		Residential Cleanup Standards	Industrial Cleanup Standards										
				OR04SS00 0 - 6 in bgs	OR05SS00 0 - 6 in bgs	OR06SS00 0 - 6 in bgs	OR07SS00 0 - 6 in bgs	OR08SS00 0 - 6 in bgs	OR09SS00 0 - 6 in bgs	OR12SS00			
Inorganics (mg/kg)													
Aluminum	76,000 ^d	100,000 ^d	8,870	7,370	7,250	13,500	16,300	13,000	9,100				
Antimony	30 ^d	750 ^d	R	R	R	R	R	R	R				
Arsenic	20 ^a	200 ^a	41.6 J	14.1 J	8.6 J	29.8 J	26.0 J	33.2 J	13.5				
Barium	5,600 ^b	245,000 ^c	103	71.8	75.3	152	188	173	212				
Beryllium	0.233 ^b	30.5 ^c	0.4 J	0.26 J	0.27 J	0.54 J	0.66 J	0.53 J	0.23 J				
Cadmium	2 ^a	10 ^a	0.12 U	0.11 U	0.10 U	0.10 U	0.11 U	0.11 U	0.17 J				
Calcium	-	-	3,450	3,270 J	3,040 J	2,940 J	4,250 J	3,990 J	23,100				
Chromium	100 ^a	500 ^a	20.1	17.3 J	14.3 J	35.8 J	41.0 J	37.7 J	21.3 J				
Cobalt	3,300 ^d	29,000 ^d	6.3 J	4.9 J	5.6 J	9.7 J	10.5 J	9.6 J	5.9 J				
Copper	2,960 ^b	130,000 ^c	14.0	11.6	12.9	22.5	26.9	23.3	35.2				
Iron	23,000 ^d	100,000 ^d	13,900	12,000	11,900	20,100	22,600	20,600	12,300				
Lead	250 ^a	1,000 ^a	546	151 J	28.7 J	242 J	200 J	267 J	160 J				
Magnesium	-	-	3,810	3,370 J	3,460 J	5,030 J	5,610 J	5,300 J	4,070				
Manganese	11,200 ^b	490,000 ^c	292	250	249	352	380	335	286 J				
Mercury	1.0 ^a	1.0 ^a	0.06 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U	0.07 U				
Nickel	1,600 ^b	70,000 ^c	15.4 J	13.5	15.9	19.1	22.7	20.4	13.7				
Potassium	-	-	2,550	1,610 J	1,720 J	4,560 J	4,920 J	4,480 J	3,610				
Selenium	400 ^b	17,500 ^c	1.5	1.1	1.0	1.8	1.9	2.3	2.7 UJ				
Silver	400 ^b	17,500 ^c	0.62 J	0.47 J	0.56 J	0.82 J	0.86 J	0.96 J	0.46 J				
Sodium	-	-	269 J	259 J	304 J	329 J	362 J	334 J	406 J				
Thallium	5.6 ^b	245 ^c	1.1 J	0.90 J	0.65 U	0.95 J	1.3 J	1.2 J	0.88 U				
Vanadium	560 ^b	24,500 ^c	27.6	23.7	24.0	46.1	51.3	47.1	28.5				
Zinc	24,000 ^b	1,050,000 ^c	115	103 J	56.0 J	115 J	144 J	154 J	191 J				

Key at end of the table.

- a = WDOE Method A cleanup level.
- b = WDOE Method B cleanup level.
- c = WDOE Method C cleanup level.
- d = EPA, Region 9, Preliminary Remediation Goals.

Note: Bold type indicates concentrations above sample quantitation limits or detection limits.
 Underline indicates concentrations above one or more regulatory benchmarks.

Key:

- Regulatory benchmark not available.
- bgs = Below ground surface.
- BHC = Benzene hexachloride.
- CLP = Contract Laboratory Program.
- DDD = Dichlorodiphenyldichloroethane.
- DDE = Dichlorodiphenyldichloroethylene.
- DDT = Dichlorodiphenyltrichloroethane.
- EPA = United States Environmental Protection Agency.
- ID = Identification.
- in = Inches.
- J = The analyte was positively identified. The associated numerical value is an estimate.
- µg/kg = Micrograms per kilogram.
- mg/kg = Milligrams per kilogram.
- NA = Not analyzed.
- R = Rejected.
- SVOCs = Semivolatile Organic Compounds.
- U = Not detected.
- UJ = The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.
- WDOE = Washington Department of Ecology.

Table 3-3

**SURFACE SOIL SAMPLES SCREENING LEVEL SUMMARY
WENATCHEE, WASHINGTON**

Analyte	Range of Detection Limits	Range of Detected Concentrations*	Frequency of Detection	Frequency of Exceedence of Screening Level	Screening Level Source	Residential Cleanup Standards	Industrial Cleanup Standards
SVOCs (µg/kg)							
Benzo(a)pyrene	340 - 440	37	1/4	0/4	MTCA Method B	137 ^b	18,000 ^c
Benzo(b)fluoranthene	340 - 440	42 - 48	2/4	0/4	MTCA Method B	137 ^b	18,000 ^c
Benzo(k)fluoranthene	340 - 440	19	1/4	0/4	MTCA Method B	137 ^b	18,000 ^c
Bis(2-ethylhexyl)phthalate	340 - 440	77 - 1,300	2/4	0/4	MTCA Method B	71,400 ^b	9,370,000 ^c
Butylbenzylphthalate	340 - 440	47	1/4	0/4	MTCA Method B	16,000,000 ^b	100,000,000 ^c
Chrysene	340 - 440	44	1/4	0/4	MTCA Method B	137 ^b	18,000 ^c
Di-n-butylphthalate	340 - 440	120	1/4	0/4	MTCA Method B	8,000,000 ^b	350,000,000 ^c
Fluoranthene	340 - 440	75	1/4	0/4	MTCA Method B	3,200,000 ^b	140,000,000 ^c
Pyrene	340 - 440	60	1/4	0/4	MTCA Method B	2,400,000 ^b	105,000,000 ^c
Organophosphorus Pesticides (µg/kg)							
Azinphos, methyl	6.6 - 7.9	17 - 550	5/10	NA	NA	NA	NA
Chlorinated Pesticides (µg/kg)							
4,4'-DDD	3.3 - 4.4	12 - 320	7/12	0/12	MTCA Method B	4,170 ^b	547,000 ^c
4,4'-DDE	3.3 - 4.4	19 - 4,500	12/12	1/12	MTCA Method B	2,940 ^b	386,000 ^c
4,4'-DDT	3.3 - 4.4	15 - 5,000	12/12	3/12	MTCA Method A	1,000 ^a	5,000 ^a
Dieldrin	3.3 - 20	7.3 - 42	3/12	0/12	MTCA Method B	62.5 ^b	8,200 ^c
Endosulfan I	3.5 - 75	0.26 - 19	5/12	0/12	MTCA Method B	480,000 ^b	21,000,000 ^c
Endosulfan II	3.5 - 75	13.4	1/12	NA	NA	NA	NA
Endosulfan sulfate	3.4 - 7.2	0.52 - 610	12/12	NA	NA	NA	NA
Gamma chlordane	1.8 - 39	0.82	1/12	NA	NA	NA	NA
Methoxychlor	18 - 390	0.44 - 5.7	4/12	0/12	MTCA Method B	400,000 ^b	17,500,000 ^c
Inorganics (mg/kg)							
Antimony	0.60 - 0.88	0.94	1/12	0/12	EPA Region 9 PRG	30 ^d	750 ^d
Arsenic	0.66 - 0.89	8.6 - 104	12/12	7/12	MTCA Method A	20 ^a	200 ^a
Barium	0.14 - 0.21	71.8 - 228	12/12	0/12	MTCA Method B	5,600 ^b	245,000 ^c
Beryllium	0.08 - 0.21	0.18 - 0.69	12/12	9/12	MTCA Method B	0.233 ^b	30.5 ^c
Cadmium	0.10 - 0.11	0.16 - 1.1	3/12	0/12	MTCA Method A	2 ^a	10 ^a
Chromium	0.20 - 0.30	14.3 - 41.0	12/12	0/12	MTCA Method A	100 ^a	500 ^a
Cobalt	0.44 - 0.67	4.9 - 10.5	12/12	0/12	EPA Region 9 PRG	3,300 ^d	29,000 ^d
Copper	0.50 - 0.76	11.6 - 41.1	12/12	0/12	MTCA Method B	2,960 ^b	130,000 ^c
Lead	0.34 - 0.52	28.7 - 622	12/12	6/12	MTCA Method A	250 ^a	1,000 ^a
Manganese	0.12 - 0.18	249 - 496	12/12	0/12	MTCA Method B	11,200 ^b	490,000 ^c
Mercury	0.05 - 0.06	0.1	1/12	0/12	MTCA Method A	1.0 ^a	1.0 ^a
Nickel	0.50 - 0.76	13.5 - 22.7	12/12	0/12	MTCA Method B	1,600 ^b	70,000 ^c
Selenium	1.1 - 2.7	1.0 - 2.3	8/12	0/12	MTCA Method B	400 ^b	17,500 ^c
Silver	0.28 - 0.42	0.46 - 1.1	12/12	0/12	MTCA Method B	400 ^b	17,500 ^c
Thallium	0.65 - 0.88	0.75 - 1.5	9/12	0/12	MTCA Method B	5.6 ^b	245 ^c
Vanadium	0.28 - 0.42	23.7 - 54	12/12	0/12	MTCA Method B	560 ^b	24,500 ^c
Zinc	0.48 - 0.73	103 - 289	12/12	0/12	MTCA Method B	24,000 ^b	1,050,000 ^c

* Detected concentrations less than the associated detection limits are considered estimated quantities.

^a WDOE Method A cleanup level.

^b WDOE Method B cleanup level.

^c WDOE Method C cleanup level.

^d EPA, Region 9, Preliminary Remediation Goals.

Key:

µg/kg = Micrograms per kilogram.

mg/kg = Milligrams per kilogram.

MTCA = Model Toxics Control Act.

NA = Not applicable.

PRG = Preliminary remediation goal.

SVOCs = Semivolatile organic compounds.

TABLE 3-4

SUBSURFACE SOIL SAMPLE ANALYTICAL RESULTS SUMMARY
WENATCHEE, WASHINGTON

LOCATION ID DEPTH	Residential Cleanup Standards		Industrial Cleanup Standards		OR10SB02 2 - 6 ft bgs	OR11SB02 2 - 6 ft bgs	OR04SB02 2 - 6 ft bgs	OR05SB02 2 - 6 ft bgs	OR06SB02 2 - 6 ft bgs	OR07SB02 2 - 6 ft bgs	OR08SB02 2 - 6 ft bgs	OR09SB02 2 - 6 ft bgs
Chlorinated Pesticides (ug/kg)												
4,4'-DDD	4,170 ^b	547,000 ^c	1.6 J	2.5 J	3.8 U	3.5 U	3.4 U	3.5 U	3.5 U	3.5 U	3.5 U	3.5 U
4,4'-DDE	2,940 ^b	386,000 ^c	31	32	0.45 J	0.58 J	2.6 J	3.0 J	5.2	2.3 J	2.3 J	2.3 J
4,4'-DDT	1,000 ^a	5,000 ^a	14	19	3.8 U	3.5 U	9.6	1.9 J	1.4 J	3.5 U	3.5 U	3.5 U
Beta-BHC	-	-	3.7 U	1.8 U	2.0 U	1.8 U	1.8 U	1.8 U	1.9 J	1.8 U	1.9 J	1.8 U
Endosulfan sulfate	-	-	7.2 U	3.6 U	3.8 U	3.5 U	3.4 U	0.95 J	3.5 U	3.5 U	3.5 U	3.5 U
Inorganics (mg/kg)												
Aluminum	76,000 ^d	100,000 ^d	18,600	11,200	15,600	7,990	5,690	12,400	13,400	13,400	13,400	13,300
Antimony	30 ^d	750 ^d	R	R	R	R	R	R	R	R	R	R
Arsenic	20 ^a	200 ^a	24.8 J	10.1 J	25.6 J	18.4 J	2.0 J	2.5 J	2.2 J	2.5 J	2.2 J	2.7 J
Barium	5,600 ^b	245,000 ^c	211	108	173	79.9	58.9	131	147	133	147	133
Beryllium	0.233 ^b	30.5 ^c	0.86 J	0.49 J	0.65 J	0.28 J	0.24 J	0.59 J	0.61 J	0.58 J	0.61 J	0.58 J
Calcium	-	-	3,040	6,840	2,720	2,970 J	2,660 J	2,170 J	2,330 J	2,050 J	2,330 J	2,050 J
Chromium	100 ^a	500 ^a	57.4	22.8	46.9	15.6 J	12.2 J	39.3 J	42.0 J	39.5 J	42.0 J	39.5 J
Cobalt	3,300 ^d	29,000 ^d	13.0	8.3 J	13.3	5.4 J	4.8 J	10.5 J	10.9	9.8 J	10.9	9.8 J
Copper	2,960 ^b	130,000 ^c	29.5	17.8	28.0	12.4	11.7	19.8	21.2	20.8	21.2	20.8
Iron	23,000 ^d	100,000 ^d	31,000	19,100	26,600	12,000	9,770	22,000	23,400	22,400	23,400	22,400
Lead	250 ^a	1,000 ^a	38.2	30.8	11.2	5.0 J	4.5 J	8.7 J	9.3 J	8.8 J	9.3 J	8.8 J
Magnesium	-	-	8,190	5,450	7,420	3,480 J	3,120 J	5,800 J	5,960 J	5,920 J	5,960 J	5,920 J
Manganese	11,200 ^b	490,000 ^c	416	324	383	243	218	287	309	282	309	282
Nickel	1,600 ^b	70,000 ^c	32.4 J	17.2 J	28.7 J	16.2	13.1	22.3	24.0	22.1	24.0	22.1
Potassium	-	-	4,420	2,120	3,650	1,740 J	1,420 J	2,800 J	3,390 J	2,790 J	3,390 J	2,790 J
Selenium	400 ^b	17,500 ^c	2.6	1.6	3.2	1.3	0.61 J	2.0	2.1	2.3	2.1	2.3
Silver	400 ^b	17,500 ^c	1.3 J	0.81 J	1.2 J	0.54 J	0.52 J	0.91 J	1.0 J	0.82 J	1.0 J	0.82 J
Sodium	-	-	428 J	433 J	369 J	293 J	267 J	348 J	317 J	305 J	317 J	305 J
Thallium	5.6 ^b	245 ^c	2.0 J	0.73 J	1.6 J	0.69 U	0.73 J	1.4 J	1.4 J	0.94 J	1.4 J	0.94 J
Vanadium	560 ^b	24,500 ^c	72.8	37.0	59.3	24.5	19.0	49.9	54.1	50.4	54.1	50.4
Zinc	24,000 ^b	1,050,000 ^c	79.1	60.5	67.2	33.9 J	42.6 J	55.2 J	57.8 J	54 J	57.8 J	54 J

Key at end of the table.

- a = WDOE Method A cleanup level.
- b = WDOE Method B cleanup level.
- c = WDOE Method C cleanup level.
- d = EPA, Region 9, Preliminary Remediation Goals.

Note: Bold type indicates concentrations above sample quantitation limits or detection limits.
 Underline indicates concentrations above one or more comparison standard.

Key:

- . = Regulatory benchmark not available.
- bgs = Below ground surface.
- BHC = Benzene hexachloride.
- CLP = Contract Laboratory Program.
- DDD = Dichlorodiphenyldichloroethane.
- DDE = Dichlorodiphenyldichloroethylene.
- DDT = Dichlorodiphenyltrichloroethane.
- EPA = United States Environmental Protection Agency.
- ft = Feet.
- ID = Identification.
- U = Not detected.
- J = The analyte was positively identified. The associated numerical value is an estimate.
- µg/kg = Micrograms per kilogram.
- mg/kg = Milligrams per kilogram.
- R = Rejected.
- WDOE = Washington Department of Ecology.

Table 3-5

SUBSURFACE SOIL SAMPLES SCREENING LEVEL SUMMARY
WENATCHEE, WASHINGTON

Analyte	Range of Detection Limits	Range of Detected Concentrations*	Frequency of Detection	Frequency of Exceedence of Screening Level	Screening Level Source	Residential Cleanup Standards	Industrial Cleanup Standards
Chlorinated Pesticides (µg/kg)							
4,4'-DDD	3.3 - 13	1.6-2.5	2/8	0/8	MTCA Method B	4,170 ^b	547,000 ^c
4,4'-DDE	3.3 - 13	0.45-32	8/8	0/8	MTCA Method B	2,940 ^b	386,000 ^c
4,4'-DDT	3.3 - 13	1.4-19	5/8	0/8	MTCA Method B	1,000 ^a	5,000 ^a
Beta-BHC	1.7 - 39	1.9	1/8	0/8	NA	NA	NA
Endosulfan sulfate	3.4 - 7.2	0.95	1/8	0/8	NA	NA	NA
Inorganics (mg/kg)							
Arsenic	0.66 - 0.89	2.0-25.6	8/8	2/8	MTCA Method A	20 ^a	200 ^a
Barium	0.14 - 0.21	58.9-211	8/8	0/8	MTCA Method B	5,600 ^b	245,000 ^c
Beryllium	0.08 - 0.21	0.24-0.86	8/8	8/8	MTCA Method B	0.233 ^b	30.5 ^c
Chromium	0.20 - 0.30	12.2-57.4	8/8	0/8	MTCA Method A	100 ^a	500 ^a
Cobalt	0.44 - 0.67	4.8-13.3	8/8	0/8	EPA Region 9 PRG	3,300 ^d	29,000 ^d
Copper	0.50 - 0.76	11.7-29.5	8/8	0/8	MTCA Method B	2,960 ^b	130,000 ^c
Lead	0.34 - 0.52	4.5-38.2	8/8	0/8	MTCA Method A	250 ^a	1,000 ^a
Manganese	0.12 - 0.18	218-416	8/8	0/8	MTCA Method B	11,200 ^b	490,000 ^c
Nickel	0.50 - 0.76	13.1-32.4	8/8	0/8	MTCA Method B	1,600 ^b	70,000 ^c
Selenium	1.1 - 2.7	0.61-3.2	8/8	0/8	MTCA Method B	400 ^b	17,500 ^c
Silver	0.28 - 0.42	0.52-1.3	8/8	0/8	MTCA Method B	400 ^b	17,500 ^c
Thallium	0.65 - 0.88	0.73-2.0	7/8	0/8	MTCA Method B	5.6 ^b	245 ^c
Vanadium	0.28 - 0.42	19.0-72.8	8/8	0/8	MTCA Method B	560 ^b	24,500 ^c
Zinc	0.48 - 0.73	33.9-79.1	8/8	0/8	MTCA Method B	24,000 ^b	1,050,000 ^c

* Detected concentrations less than the associated detection limits are considered estimated quantities.

^a WDOE Method A cleanup level.

^b WDOE Method B cleanup level.

^c WDOE Method C cleanup level.

^d EPA, Region 9, Preliminary Remediation Goals.

Key:

µg/kg = Micrograms per kilogram.

mg/kg = Milligrams per kilogram.

MTCA = Model Toxics Control Act.

NA = Not applicable.

PRG = Preliminary remediation goal.

Figure 3-3

Subsurface Soil Sample Screening Level Exceedance Map Wenatchee, Washington

Legend

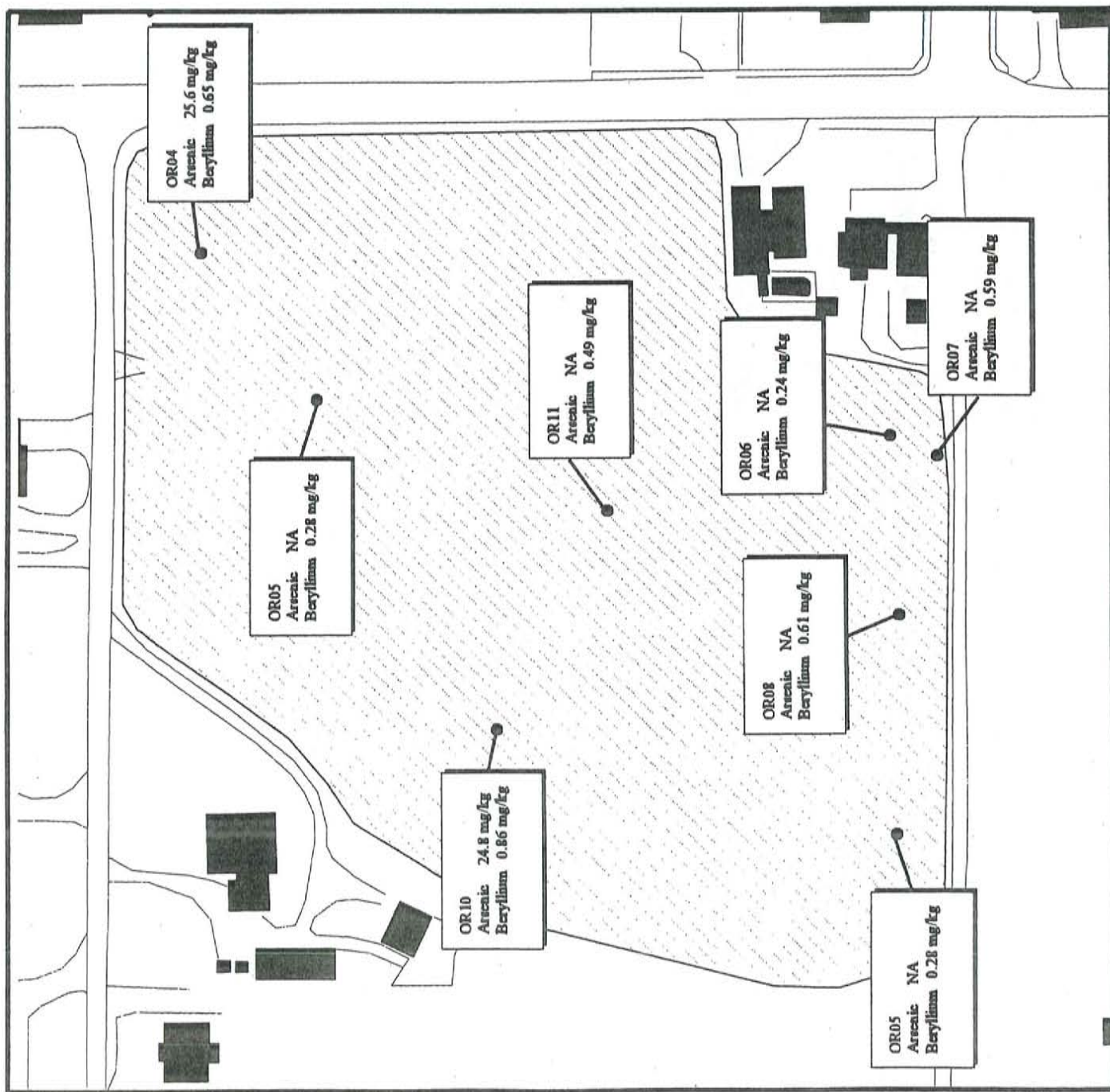
- Approximate Orchard Location
- Existing Building Location

Sample Location	Analyte	Concentration
	Analyte	Concentration

NA = Not Applicable
mg/Kg = milligrams per kilogram



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



4. CLEANUP OPTIONS AND COSTS

The City is interested in developing the current orchard property into a City park, possibly including picnic tables and playground equipment. The following information is presented based on current site conditions. As changes occur at the site, the information presented in this report should be modified as necessary to support appropriate exposure scenarios.

For the purposes of this report, conclusions have been drawn with respect to potential source areas under the assumption that the property will be redeveloped as a City park, therefore applicable MTCA and EPA Region 9 PRG residential standards were considered with respect to soil contamination. Washington State natural background metals concentrations were also used to evaluate site conditions.

The analytes that exceeded screening levels were detected at various locations and depths throughout the orchard. The beryllium exceedances in the surface and subsurface soil samples were all less than the Washington State natural background average concentration (WDOE 1994) and is not considered a contaminant of potential concern. The likely origin of the detected 4,4'-DDE, 4,4'-DDT, arsenic, and lead is the use of agricultural chemicals applied to the subject orchard and neighboring orchards. The chlorinated pesticide exceedances occurred only in surface soil samples; these results are consistent with the application of pesticides according to manufacturer's instructions. The arsenic and lead results may warrant further consideration at this potential future city park.

Cleanup actions are recommended for the Orchard property assuming that the future use will potentially involve human contact with soil at the property. The cleanup actions outlined conform to the WDOE MTCA Method A and Method B residential levels. The cleanup cost estimates below are based on the recommended action and assumptions outlined in the following sections. Cleanup cost estimates were obtained from *Environmental Remediation Cost Data - Unit Price*, 6th Annual Edition, R. S. Means and Company and Talisman Partners, Ltd. (Means 2000a), and *Site Work and Landscape Cost Data*, 19th Annual Edition, R. S. Means and Company (Means 2000b). The quantities assumed below are conservative; cleanup costs may be less than estimated based on the actual conditions or if certain recommended activities are determined unnecessary. The following recommended cleanup activities which require soil excavation and backfilling and/or capping of native soil should be coordinated during the same field effort to reduce mobilization and demobilization charges and to expedite the work. Recommended options at the Orchard property include: 1) continued operation as an orchard; 2) soil excavation and backfilling and/or capping; 3) engineering controls; and 4) institutional controls. Appendix E provides a more detailed cost summary for these cleanup options. Combinations of the above options may also be performed.

One or more contaminants of concern were found in 11 of 12 surface sample locations collected at various locations throughout the site, therefore the extent of contamination is potentially the entire 8.8 acre property. The top two feet bgs is the primary area of concern for human exposure; soils below this depth are not recommended for further investigation due to the minimal exposure potential.

4.1 ORCHARD OPERATION

The Orchard property can continue to operate as an actively managed apple and cherry orchard. MTCA industrial standards apply to this use; none of the industrial standards were exceeded. This no-action alternative will be retained for further evaluation to serve as a baseline against which other remedial alternatives can be compared.

4.2 SOIL EXCAVATION AND BACKFILLING AND/OR CAPPING

The excavation of soil down to two feet bgs followed by backfilling with certified clean material would minimize the risk of human exposure to contaminated soils. Under this alternative, soil could be removed only at those areas with a potential human exposure threat. Apple tree, cherry tree, and waste pile debris removal would be required prior to associated soil removal and disposal. These materials would likely be disposed of as non-hazardous solid waste. The contaminated soil could then be excavated down to two feet bgs. Soil characterization and analysis, followed by appropriate disposal, could then be arranged. On-site treatment and removal of contaminated soils would not be practical or cost effective due to the loamy nature of the soils and the relatively low exceedances (less than one order of magnitude) above WDOE MTCA Method A cleanup levels of lead and arsenic in the orchard soils. The replacement of the removed soil with certified clean fill will minimize the exposure to contaminated soils. The START estimates that a maximum of 28,395 cubic yards of contaminated soils may require removal from the Orchard property. In order for the soils to be classified as a hazardous waste, it must meet the criteria outlined in 40 Code of Federal Regulations (CFR) Part 261. A solid waste exhibits the characteristic of toxicity if, using the toxicity characteristic leaching procedure (TCLP; Test Method 1311 in Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846), the representative sample of the waste contains any of the contaminants listed in Table 1 of 40 CFR Part 261.24 at a concentration equal to or greater than the respective value given in that table. Several samples indicated elevated lead levels in soil. These appear to be of concern based on the hazardous waste criteria. Although the TCLP was not performed on any of the samples, a correlation can be made between the expected TCLP concentrations and the actual total contaminant concentration detected. This correlation is obtained by dividing the total concentration by 20 to obtain the approximate TCLP concentration. Table 1 in 40 CFR Part 261.24 lists a maximum allowable TCLP concentration of 5 ug/L for lead. Given the correlation presented above, a total lead concentration of 100 ppm, or 20 times the maximum allowable TCLP concentration of 5 ug/L, may potentially indicate the presence of hazardous waste. Analytical results for the sampling event indicate a maximum total lead concentration of 622 ppm, with five additional lead results greater

than 100 ppm. Therefore, it is anticipated that six samples would exceed the maximum TCLP level for lead. For this reason, as a conservative measure, the START assumes that the majority of the excavated soil will likely be disposed of as hazardous solid waste. The START estimates the cost of disposal of hazardous waste to be \$120 per ton. If sample analyses indicate that the soils may be disposed as nonhazardous waste, the disposal costs will be lower. The estimated total cost for removing the trees and debris, excavating the entire Orchard property to 2 feet bgs, and backfilling is \$6,328,714.

A variation of this option involves the capping of native soils with two feet of certified clean fill in areas of potential human contact. This method also reduces the exposure to contaminated soils but does not involve soil excavation, thereby minimizing costs. The total estimated cost for the capping option is \$641,688 (items 1, 2, and 6 through 9 in the Soil Excavation and Backfill and/or Capping table in Appendix E). Detailed cost estimate information per unit of work is provided in Appendix E.

4.3 ENGINEERING CONTROLS

Engineering controls are physical measures that prevent or minimize exposure to hazardous substances or reduce the mobility or migration of hazardous substances. The only engineering control technology considered in this evaluation is soil capping, in which the contaminated soil is covered with certified clean fill material, thereby isolating the contaminated soil. This method eliminates the need for contaminated soil removal. A two feet thick cap is recommended at the potential city park. The estimated total cost for tree and debris removal and capping the exposed soil with fill material is \$641,688. Detailed cost estimate information per unit of work is provided in Appendix E.

4.4 INSTITUTIONAL CONTROLS

Institutional controls are legal or administrative measures or actions that reduce exposure to hazardous substances and include use and access restrictions such as health advisory signs, deed restrictions, and fencing. The installation of fencing around remaining exposed native soil would minimize human contact to the soils, and health advisory signs would further discourage soil contact. The estimated cost for fence and sign installation is \$44,600. Detailed cost estimate information per unit of work is provided in Appendix E.

5. CONCLUSIONS AND RECOMMENDATIONS

The City is interested in developing the current orchard property into a City park, possibly including picnic tables and playground equipment. The analytes that exceeded screening levels were detected at various locations and depths throughout the orchard, but the primary area of concern is the top two feet of soil due to the potential for exposure to humans. The chlorinated pesticides 4,4'-DDE and 4,4'-DDT exceeded the applicable residential standards at one and three locations, respectively, but arsenic and lead are the primary contaminants of concern due to their human health toxicity. It also appears that if excavation occurs, the soils may have to be disposed as hazardous waste based on the potential TCLP lead concentrations.

As listed in Section 4 and Appendix E, options for cleanup of the Orchard property vary from \$0 to over \$6,000,000, with a wide range of cost and cleanup options available between these amounts. The goal of each option is to minimize human exposure to contaminated soils at a potential city park.

6. REFERENCES

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APPENDIX A
PHOTOGRAPHIC DOCUMENTATION

PHOTOGRAPH IDENTIFICATION SHEET

Camera Serial #: Disposable Camera

TDD #: 99-06-0002

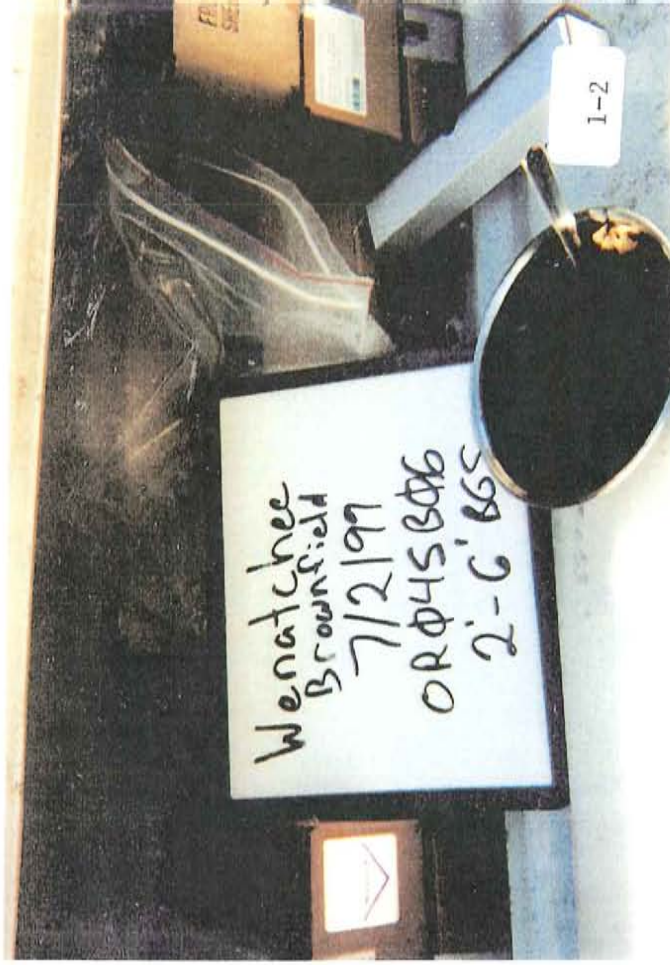
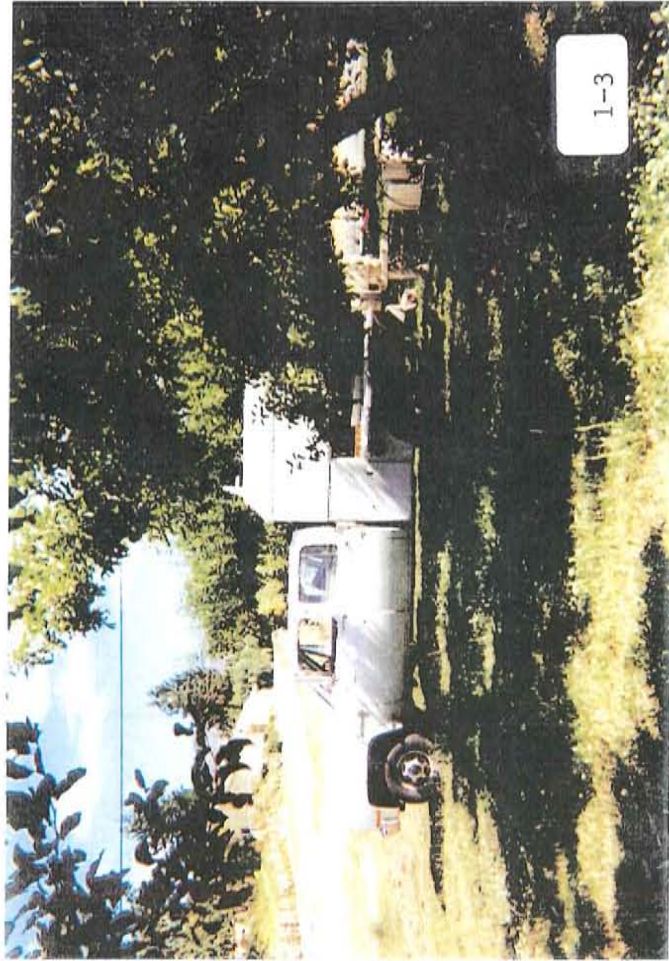
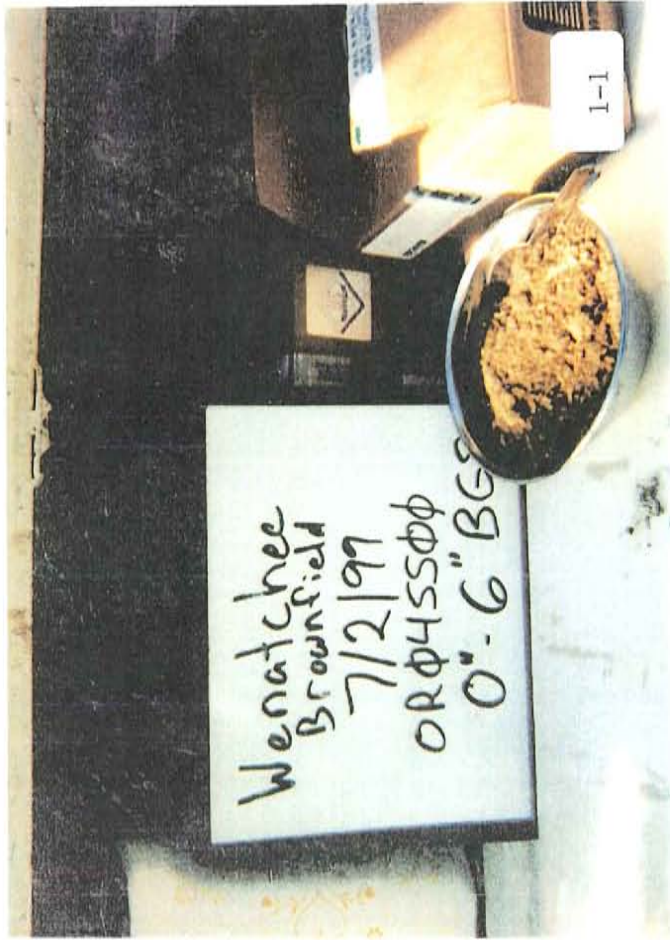
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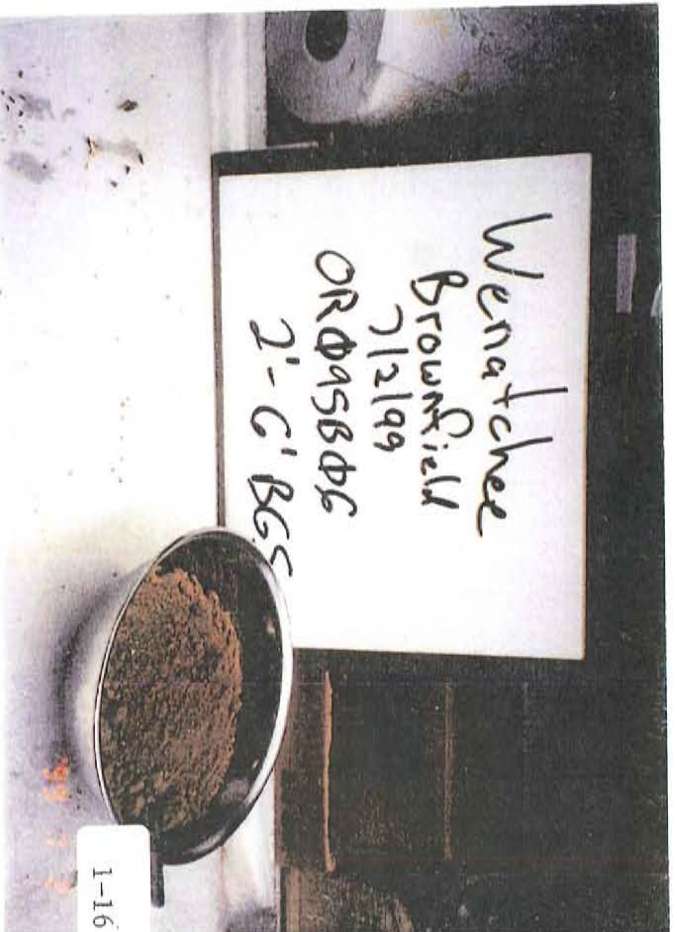
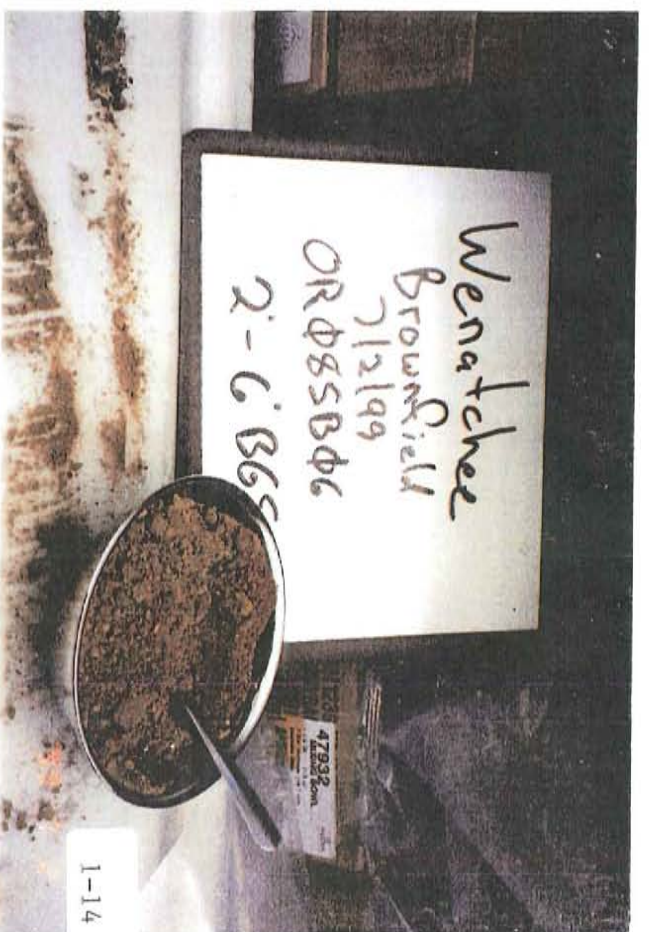
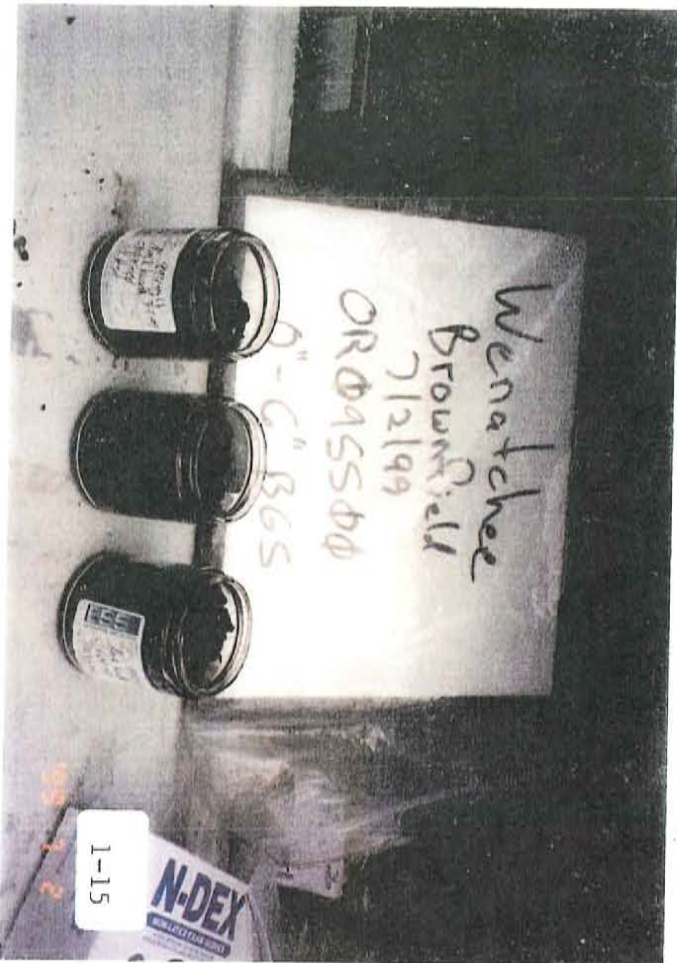
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1-3	7/2/99	0957	CG	Sample location OR04; facing East
1-4	7/2/99	1005	CG	Sample OR05SS00; facing South
1-5	7/2/99	1010	CG	Sample OR05SB06; facing South
1-6	7/2/99	1020	CG	Sample location OR05; facing Northeast
1-7	7/2/99	1035	CG	Sample OR06SS00; facing South
1-8	7/2/99	1045	CG	Sample OR06SB06; facing South
1-9	7/2/99	1055	CG	Sample location OR06; facing Northeast
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1-17	7/2/99	1225	CG	Sample location OR09; facing South
1-18	7/6/99	1305	SG	Sample OR10SS00; facing South
1-19	7/6/99	1310	SG	Sample location OR10; facing South
1-20	7/6/99	1325	SG	Sample OR11SS00; facing South
1-21	7/6/99	1330	SG	Sample OR11SB02; facing South
2-1	7/9/99	2030	DB	Waste pile area; facing West
2-2	7/9/99	2031	DB	Waste pile area; facing East
2-3	7/9/99	2035	DB	Location of former apartment/laboratory; facing West
2-4	7/9/99	2040	DB	Location of former apartment/laboratory; facing East
2-5	7/9/99	2045	DB	Location of former apartment/laboratory; facing West
2-6	7/9/99	2100	DB	Sample location OR03; facing South
2-7	7/9/99	2110	DB	Sample location OR03; facing Down

Key:

DB = Dave Brown
 CG = Charlie Gregory
 SG = Susan Gardner









1-21

Wendell
Brown, Jr.
OR 115802
P 2 BGS

Wendell Brown, Jr. OR 115802 P 2 BGS

Wendell Brown, Jr. OR 115802 P 2 BGS

Wendell Brown, Jr. OR 115802 P 2 BGS





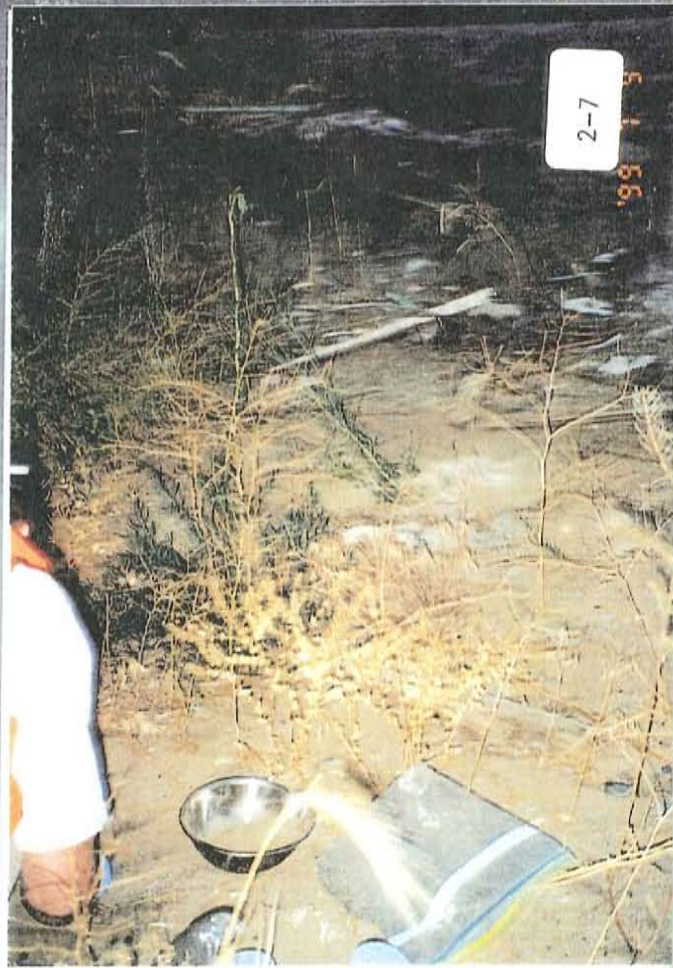
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'99 7 3



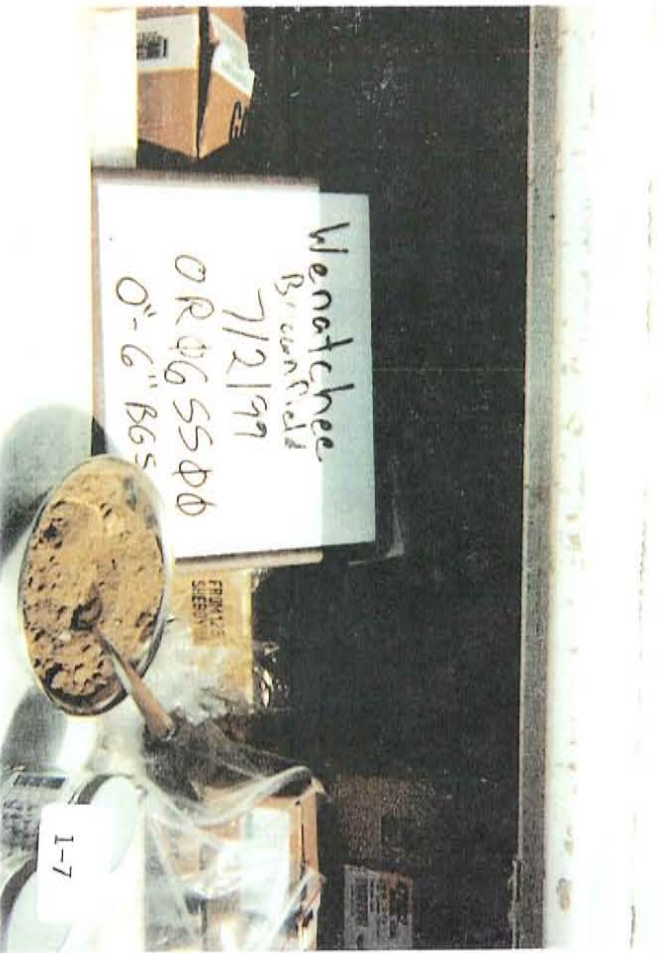
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1-8



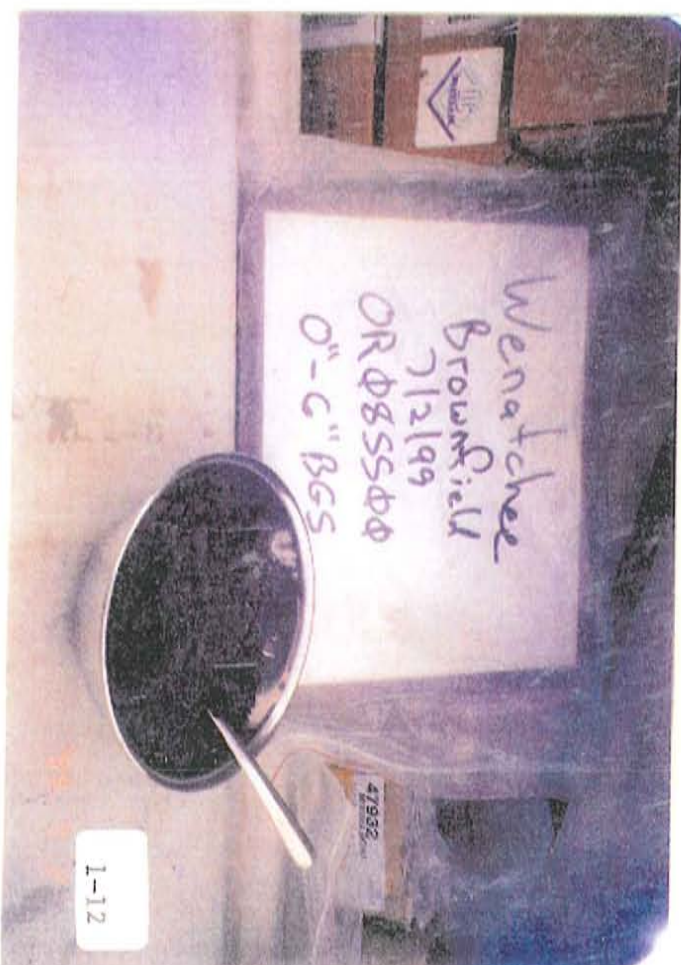
1-9



1-11



1-10



1-12

APPENDIX B

SAMPLE PLAN ALTERATION FORM

SAMPLE PLAN ALTERATION FORM

Project Name and Number: Wenatchee Orchard Targeted Brownfield Assessment TDD 99-06-0002

Material to be Sampled: Soil and/or sludge

Measurement Parameters: Volatile Organic Compounds, Semivolatile Organic Compounds, Chlorinated Pesticides/Polychlorinated Biphenyls, Target Analyte List Metals, Organophosphorus Pesticides

Standard Procedure for Field Collection & Laboratory Analysis (cite references): EPA SW-846
(laboratory analyses)

Reason for Change in Field Procedure or Analytical Variation: The former sump and former septic pool were not located. One waste pile was located on an adjacent property and was not sampled.

Variation from Field or Analytical Procedure: Not applicable

Special Equipment, Materials, or Personnel Required: None

CONTACT	APPROVED SIGNATURE	DATE
Initiator:		
START PL:		
EPA TM:		
EPA QA Officer:		

APPENDIX C

**QUALITY ASSURANCE/QUALITY CONTROL INFORMATION AND DATA VALIDATION
MEMORANDA**

DISCUSSION OF 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 analytical methods performed by the laboratory. Additional QC requirements are provided in the EPA *Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 1991a) and EPA *Contract Laboratory Program Statement of Work for Organic Analyses* (EPA 1991b). These QC requirements or equivalent requirements were followed for analytical work on the Wenatchee Orchard TBA.

QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

A minimum of one matrix spike (MS)/matrix spike duplicate (MSD) sample for VOC, SVOC, chlorinated pesticide/PCB, and OP pesticide analyses, and one MS/duplicate (DUP) for inorganic analyses, were designated per 20 samples collected for each matrix sample during the project.

Three trip blank samples (at a rate of one trip blank per cooler of VOC samples) were shipped to the laboratories. Two rinsate samples (at a rate of one per 20 samples collected from each piece of nondedicated sampling equipment) from the drill rig augers with acetate liners inserted were submitted for the project. Detected analytes in the trip blank and rinsate blank samples are included in the QA/QC analytical results summary table at the end of this Appendix.

The analytical laboratories analyzed several QC samples for QA purposes according to EPA methods. The analyzed QC samples included initial and continuing calibrations, trip and method blanks, MSs, DUPs, and laboratory control samples.

DATA VALIDATION

EPA chemists reviewed and validated data from analyses performed by Contract Laboratory Program (CLP) laboratories. These analyses consisted of VOCs, SVOCs, chlorinated pesticides/PCBs, and TAL metals. START chemists validated the OP pesticide data from the START-subcontracted laboratory and performed a validation check on the EPA-generated QA memoranda.

All samples were collected following the guidance of the SQAP (E & E 1999) for the field activities. All inorganic analyses were performed by CLP laboratories following the *Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 1991a); all VOC, SVOC, and chlorinated pesticide/PCB analyses were performed by CLP laboratories following the *Contract Laboratory Program Statement of Work for Organic Analyses* (EPA 1991b), and all OP pesticide analyses were performed by Sound Analytical Services, Tacoma, Washington, a commercial laboratory, following EPA SW-846 Method 8141.

Data qualifiers were applied as necessary according to the following guidance documents:

- *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994a); and
- *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1994b).

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

SATISFACTION OF DATA QUALITY OBJECTIVES

The following EPA (1993) guidance document was used to establish data quality objectives (DQOs) for this TBA:

- *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA 540-R-93-071.

The EPA TM determined that the definitive data without error and bias determination criteria would be used for the sampling and analyses conducted during the field activities. The data quality achieved during the fieldwork produced sufficient data that met the data objectives stated in the SQAP (E & E 1999).

A discussion of the objectives that were accomplished is presented in the following sections.

PROJECT-SPECIFIC DATA QUALITY OBJECTIVES

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

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 laboratory analyses. Approximately 0.9 percent of the data was qualified based on duplicate RPD QC outliers. Overall, the project DQO for accuracy of 90 percent was met.

Accuracy

Accuracy measures the reproducibility of the sampling and analytical methodology. Laboratory accuracy is defined as the surrogate spike percent recovery (%R) for each VOC, SVOC, chlorinated pesticide/PCB, or OP pesticide analysis or the matrix spike %Rs. The surrogate %R values were reviewed

for all appropriate sample analyses. None of the sample results were qualified based on surrogate QC outliers.

The matrix spike %R values were reviewed for all MS and MSD analyses. Approximately 1.7 percent of the data were qualified as estimated quantities (J or UJ), and approximately 0.8 percent of the data was rejected (R) based on MS/MSD recoveries. Overall, the project DQO for accuracy of 90 percent was met.

Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). All laboratory data were reviewed for data validation and usability. Approximately 99.2 percent of the Wenatchee Orchard TBA data were determined to be usable; therefore, the project DQO for completeness of 90 percent was met. Samples were not collected from the former laboratory sump, the second waste pile, or the former septic pond because these proposed locations are no longer on the site because this portion of the property was sold.

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 90 percent was met.

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 of 90 percent was met.

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PARAMETERS

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

Holding Times

All sample analyses met EPA, Region 10, and method-specific holding time criteria. None of the data were qualified based on holding time QC outliers.

Laboratory Blanks

All laboratory blanks met the frequency criteria. The following contaminants of concern were detected in the laboratory blanks:

Inorganics: barium, beryllium, manganese, and selenium;

SVOCs: bis(2-ethylhexyl)phthalate; and

VOCs: acetone and methylene chloride.

Any associated sample result less than five times the blank contamination (10 times for common laboratory contaminants) was qualified as not detected (U). See the data QA memoranda for sample results that were qualified based on blank contamination.

Trip Blanks

Trip blanks met the frequency criteria. The only contaminant detected in any of the trip blanks was methylene chloride at 25 $\mu\text{g/L}$ in sample 9928419. Sample results less than 10 times the associated trip blank contaminant concentration were qualified as not detected (U).

Rinsate Blanks

Rinsate blanks met the frequency criteria. The following contaminants were detected in the rinsate blanks:

Inorganics: lead, manganese, and zinc; and

SVOCs: bis(2-ethylhexyl)phthalate.

In order to attain the level of contamination detected in the rinsate blanks, gross contamination would need to be present on the field or laboratory equipment. Several of the contaminants detected in the rinsates also were present in the laboratory blanks and may be associated with laboratory contamination. Additionally, the rinsate water may have been contaminated. Sample results for the above-listed analytes should be viewed with caution.



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MEMORANDUM

DATE: August 9, 1999

TO: Mark Woodke, Project Manager, E & E, Seattle, WA

FROM: Alasdair Turner, START-Chemist, E & E, Seattle, WA *AT*

THRU: Leatta Dahlhoff, Chemist, E & E, Seattle, WA *LD*

SUBJ: Organic Data Quality Assurance Review, City of Wenatchee-Orchard Site,
Wenatchee, Washington

REF: TDD: 99-06-0002 PAN: DF-02-01-SI-DM

The data quality assurance review of four solid samples collected from the City of Wenatchee-Orchard site located in Wenatchee, Washington, has been completed. Analysis for Organophosphorus Pesticides (EPA Method 8141) was performed by Sound Analytical Services, Tacoma, Washington.

The samples were numbered: 99284150 99284151 99284152 99284153 *mw*

Data Qualifications:

1. Sample Holding Times: Acceptable.

The samples were received at 6°C which is within the QC limit of at 4°C ($\pm 2^\circ\text{C}$). The samples were collected on July 6, were extracted and analyzed on July 8, 1999, therefore meeting QC criteria of less than 14 days between collection and soil sample extraction and less than 40 days between extraction and analysis.

2. GC/MS Tuning Criteria: Acceptable.

Decafluorotriphenylphosphine (DFTPP) tuning of the mass spectrometer was conducted at the beginning of every 12-hour analytical sequence. All calculations were verified as correct, all results were normalized to m/z 198 and were within the required criteria.

3. Initial Calibration: Acceptable.

Peak resolution and retention time window results were acceptable. Calculations were verified as correct for at least one analyte per internal standard. All individual relative response factors (RRFs) and average RRFs were greater than 0.050. Most of the percent relative standard deviations (%RSDs) were greater than the 10 % limit listed in the validation guidance, however no qualifications were applied as all results were less than the quantitation limit.

15. Target Compound Quantitation and CRQLs: Acceptable.

Concentrations of all reported analytes were correctly calculated.

16. Laboratory Contact: Not Required.

Laboratory contact was not required.

17. Overall Assessment

The overall usefulness of the data is based on the criteria outlined in the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the applicable analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (EPA 540/R-94/012). Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The material was analyzed for but was not detected. The associated numerical value is the estimated sample quantitation limit.

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284150
Lab ID:	82435-16
Date Received:	7/7/99
Date Prepared:	7/8/99
Date Analyzed:	7/8/99
% Solids	89.25
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	115		48	122
Triphenyl Phosphate	101		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	37	8.6	✓ ↓ ✓
Mevinphos	ND	37	1	
Demeton, O-S	ND	37	3.5	
Ethoprop	ND	37	8.7	
Naled	ND	37	4.4	
Sulfotepp	ND	7.4	1	
Monocrotophos	ND	37	7.5	
Phorate	ND	7.4	4.9	
Dimethoate	ND	37	4	
Diazinon	ND	37	4.8	
Disulfoton	ND	37	4.3	
Parathion, methyl	ND	7.4	4.5	
Ronnel	ND	7.4	7.4	
Malathion	ND	7.4	6.2	
Chlorpyrifos	ND	37	6.2	
Fenthion	ND	7.4	6.9	
Parathion	ND	7.4	5.1	
Trichloronate	ND	7.4	4.5	
Tetrachlorvinphos	ND	37	3	
Fensulfothion	ND	7.4	16	
Tokuthion	ND	37	5.2	
Merphos	ND	37	4	
Bolstar	ND	7.4	5.8	
EPN	ND	37	1.9	
Azinphos, methyl		7.4	5.5	
Coumaphos	ND	7.4	5.4	

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284151
Lab ID:	82435-17
Date Received:	7/7/99
Date Prepared:	7/8/99
Date Analyzed:	7/8/99
% Solids	92.11
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	103		48	122
Triphenyl Phosphate	89.9		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	34	8	v
Mevinphos	ND	34	0.98	
Demeton, O-S	ND	34	3.2	
Ethoprop	ND	34	8.1	
Naled	ND	34	4.2	
Sulfotepp	ND	6.9	0.98	
Monocrotophos	ND	34	7	
Phorate	ND	6.9	4.5	
Dimethoate	ND	34	3.7	
Diazinon	ND	34	4.5	
Disulfoton	ND	34	4	
Parathion, methyl	ND	6.9	4.2	
Ronnel	ND	6.9	6.9	
Malathion	ND	6.9	5.8	
Chlorpyrifos	ND	34	5.8	
Fenthion	ND	6.9	6.5	
Parathion	ND	6.9	4.7	
Trichloronate	ND	6.9	4.2	
Tetrachlorvinphos	ND	34	2.8	
Fensulfothion	ND	6.9	15	
Tokuthion	ND	34	4.8	
Merphos	ND	34	3.7	
Bolstar	ND	6.9	5.4	
EPN	ND	34	1.8	
Azinphos, methyl	ND	6.9	5.1	
Coumaphos	ND	6.9	5	

8/2/99

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284152
Lab ID:	82435-18
Date Received:	7/7/99
Date Prepared:	7/8/99
Date Analyzed:	7/8/99
% Solids	88.55
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	121		48	122
Triphenyl Phosphate	101		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	37	8.7	↓
Mevinphos	ND	37	1.1	
Demeton, O-S	ND	37	3.5	
Ethoprop	ND	37	8.8	
Naled	ND	37	4.5	
Sulfotepp	ND	7.5	1.1	
Monocrotophos	ND	37	7.6	
Phorate	ND	7.5	4.9	
Dimethoate	ND	37	4.1	
Diazinon	ND	37	4.9	
Disulfoton	ND	37	4.3	
Parathion, methyl	ND	7.5	4.6	
Ronnel	ND	7.5	7.5	
Malathion	ND	7.5	6.3	
Chlorpyrifos	ND	37	6.3	
Fenthion	ND	7.5	7.1	
Parathion	ND	7.5	5.1	
Trichloronate	ND	7.5	4.6	
Tetrachlorvinphos	ND	37	3	
Fensulfothion	ND	7.5	16	
Tokuthion	ND	37	5.3	
Merphos	ND	37	4.1	
Bolstar	ND	7.5	5.9	
EPN	ND	37	2	
Azinphos, methyl		7.5	5.5	↓
Coumaphos	ND	7.5	5.4	

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284153
Lab ID:	82435-19
Date Received:	7/7/99
Date Prepared:	7/8/99
Date Analyzed:	7/8/99
% Solids	92.98
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	102		48	122
Triphenyl Phosphate	106		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.1	U
Mevinphos	ND	35	1	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.3	
Naled	ND	35	4.2	
Sulfotepp	ND	7	1	
Monocrotophos	ND	35	7.1	
Phorate	ND	7	4.6	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.6	
Disulfoton	ND	35	4.1	
Parathion, methyl	ND	7	4.3	
Ronnel	ND	7	7	
Malathion	ND	7	5.9	
Chlorpyrifos	ND	35	5.9	
Fenthion	ND	7	6.6	
Parathion	ND	7	4.8	
Trichloronate	ND	7	4.3	
Tetrachlorvinphos	ND	35	2.8	
Fensulfotion	ND	7	15	
Tokuthion	ND	35	4.9	
Merphos	ND	35	3.8	
Bolstar	ND	7	5.5	
EPN	ND	35	1.8	
Azinphos, methyl	ND	7	5.2	
Coumaphos	ND	7	5.1	

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MEMORANDUM

DATE: August 9, 1999

TO: Mark Woodke, Project Manager, E & E, Seattle, WA

FROM: Alasdair Turner, START-Chemist, E & E, Seattle, WA *AT*

THRU: Leatta Dahlhoff, Chemist, E & E, Seattle, WA *LD*

SUBJ: **Organic Data Quality Assurance Review, City of Wenatchee-Orchard Site, Wenatchee, Washington**

REF: TDD: 99-06-0002 PAN: DF-02-01-SI-DM

The data quality assurance review of sixteen solid samples and two liquid samples collected from the City of Wenatchee-Orchard site located in Wenatchee, Washington, has been completed. Analysis for Organophosphorus Pesticides (EPA Method 8141) was performed by Sound Analytical Services, Tacoma, Washington.

The samples were numbered:

Solid:

99284162	99284163	99284164	99284165	99284166	99284167
99284168	99284169	99284170	99284171	99284172	99284173
99284174	99284175	99284176	99284182		

Liquid:

99284193 99284194

Data Qualifications:

1. Sample Holding Times: Acceptable.

The samples were received at 4°C which is within the QC limit of 4°C ($\pm 2^\circ\text{C}$). The samples were collected on July 8 and July 9, 1999 were extracted and analyzed on July 14 and July 15, 1999, therefore meeting QC criteria of less than 14 days between collection and soil sample extraction, less than 7 days between collection and liquid sample extraction, and less than 40 days between extraction and analysis.

2. GC/MS Tuning Criteria: Acceptable.

Decafluorotriphenylphosphine (DFTPP) tuning of the mass spectrometer was conducted at the beginning of every 12-hour analytical sequence. All calculations were verified as correct, all results were normalized to m/z 198 and were within the required criteria.

% between the standard and sample spectrum. All ions present at greater than 10 % in the sample mass spectrum but not in the standard mass spectrum were accounted for.

14. Tentatively Identified Compounds (TICs): Not Requested.

TICs were not requested.

15. Target Compound Quantitation and CRQLs: Acceptable.

Concentrations of all reported analytes were correctly calculated.

16. Laboratory Contact: Not Required.

Laboratory contact was not required.

17. Overall Assessment

The overall usefulness of the data is based on the criteria outlined in the OSWER Directive "Quality Assurance/Quality Control Guidance for Removal Activities, Data Validation Procedures" (EPA/540/G-90/004), the applicable analytical method, and, when applicable, the Office of Emergency and Remedial Response Publication "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (EPA 540/R-94/012). Based upon the information provided, the data are acceptable for use with the above stated data qualifications.

Data Qualifiers and Definitions

U - The material was analyzed for but was not detected. The associated numerical value is the estimated sample quantitation limit.

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284162
Lab ID:	82524-01
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	99.78
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	84.2		48	122
Triphenyl Phosphate	79.5		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	32	7.4	↓ ✓
Mevinphos	ND	32	0.9	
Demeton, O-S	ND	32	3	
Ethoprop	ND	32	7.5	
Naled	ND	32	3.8	
Sulfotepp	ND	6.3	0.9	
Monocrotophos	ND	32	6.4	
Phorate	ND	6.3	4.2	
Dimethoate	ND	32	3.4	
Diazinon	ND	32	4.1	
Disulfoton	ND	32	3.7	
Parathion, methyl	ND	6.3	3.9	
Ronnel	ND	6.3	6.3	
Malathion	ND	6.3	5.4	
Chlorpyrifos	ND	32	5.4	
Fenthion	ND	6.3	6	
Parathion	ND	6.3	4.4	
Trichloronate	ND	6.3	3.9	
Tetrachlorvinphos	ND	32	2.5	
Fensulfothion	ND	6.3	14	
Tokuthion	ND	32	4.4	
Merphos	ND	32	3.4	
Bolstar	ND	6.3	5	
EPN	ND	32	1.7	
Azinphos, methyl	ND	6.3	4.7	
Coumaphos	ND	6.3	4.6	

7/16/99

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284163
Lab ID:	82524-02
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	99.49
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	61.4		48	122
Triphenyl Phosphate	79.1		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	32	7.4	
Mevinphos	ND	32	0.9	
Demeton, O-S	ND	32	3	
Ethoprop	ND	32	7.5	
Naled	ND	32	3.8	
Sulfotepp	ND	6.4	0.9	
Monocrotophos	ND	32	6.4	
Phorate	ND	6.4	4.2	
Dimethoate	ND	32	3.5	
Diazinon	ND	32	4.1	
Disulfoton	ND	32	3.7	
Parathion, methyl	ND	6.4	3.9	
Ronnel	ND	6.4	6.4	
Malathion	ND	6.4	5.4	
Chlorpyrifos	ND	32	5.4	
Fenthion	ND	6.4	6	
Parathion	ND	6.4	4.4	
Trichloronate	ND	6.4	3.9	
Tetrachlorvinphos	ND	32	2.6	
Fensulfothion	ND	6.4	14	
Tokuthion	ND	32	4.5	
Merphos	ND	32	3.5	
Bolstar	ND	6.4	5	
EPN	ND	32	1.7	
Azinphos, methyl	ND	6.4	4.7	
Coumaphos	ND	6.4	4.6	

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7/14/99

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284164
Lab ID:	82524-03
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	93.84
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	100		48	122
Triphenyl Phosphate	114		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.1	✓
Mevinphos	ND	35	0.99	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.2	
Naled	ND	35	4.2	
Sulfotepp	ND	6.9	0.99	
Monocrotophos	ND	35	7	
Phorate	ND	6.9	4.6	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.5	
Disulfoton	ND	35	4	
Parathion, methyl	ND	6.9	4.3	
Ronnel	ND	6.9	6.9	
Malathion	ND	6.9	5.9	
Chlorpyrifos	ND	35	5.9	
Fenthion	ND	6.9	6.5	
Parathion	ND	6.9	4.8	
Trichloronate	ND	6.9	4.3	
Tetrachlorvinphos	ND	35	2.8	
Fensulfothion	ND	6.9	15	
Tokuthion	ND	35	4.9	
Merphos	ND	35	3.8	
Bolstar	ND	6.9	5.5	
EPN	ND	35	1.8	
Azinphos, methyl	51	6.9	5.1	
Coumaphos	ND	6.9	5	

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284165
Lab ID:	82524-04
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	81.82
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	111		48	122
Triphenyl Phosphate	112		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	40	9.2	✓
Mevinphos	ND	40	1.1	
Demeton,O-S	ND	40	3.7	
Ethoprop	ND	40	9.3	
Naled	ND	40	4.8	
Sulfotepp	ND	7.9	1.1	
Monocrotophos	ND	40	8	
Phorate	ND	7.9	5.2	
Dimethoate	ND	40	4.3	
Diazinon	ND	40	5.2	
Disulfoton	ND	40	4.6	
Parathion,methyl	ND	7.9	4.9	
Ronnel	ND	7.9	7.9	
Malathion	ND	7.9	6.7	
Chlorpyrifos	ND	40	6.7	
Fenthion	ND	7.9	7.5	
Parathion	ND	7.9	5.4	
Trichloronate	ND	7.9	4.9	
Tetrachlorvinphos	ND	40	3.2	
Fensulfothion	ND	7.9	17	
Tokuthion	ND	40	5.6	
Merphos	ND	40	4.3	
Bolstar	ND	7.9	6.2	
EPN	ND	40	2.1	
Azinphos,methyl	ND	7.9	5.9	
Coumaphos	ND	7.9	5.8	✓

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284166
Lab ID:	82524-05
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	88.82
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	88.4		48	122
Triphenyl Phosphate	114		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.2	
Mevinphos	ND	35	1	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.3	
Naled	ND	35	4.3	
Sulfotepp	ND	7.1	1	
Monocrotophos	ND	35	7.2	
Phorate	ND	7.1	4.7	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.6	
Disulfoton	ND	35	4.1	
Parathion, methyl	ND	7.1	4.4	
Ronnel	ND	7.1	7.1	
Malathion	ND	7.1	6	
Chlorpyrifos	ND	35	6	
Fenthion	ND	7.1	6.7	
Parathion	ND	7.1	4.9	
Trichloronate	ND	7.1	4.4	
Tetrachlorvinphos	ND	35	2.8	
Fensulfothion	ND	7.1	15	
Tokuthion	ND	35	5	
Merphos	ND	35	3.8	
Bolstar	ND	7.1	5.6	
EPN	ND	35	1.9	
Azinphos, methyl	ND	7.1	5.2	
Coumaphos	ND	7.1	5.1	

SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284167
Lab ID:	82524-06
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	85.17
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	101		48	122
Triphenyl Phosphate	111		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	38	8.7	✓
Mevinphos	ND	38	1.1	
Demeton, O-S	ND	38	3.5	
Ethoprop	ND	38	8.8	
Naled	ND	38	4.5	
Sulfotepp	ND	7.5	1.1	
Monocrotophos	ND	38	7.6	
Phorate	ND	7.5	5	
Dimethoate	ND	38	4.1	
Diazinon	ND	38	4.9	
Disulfoton	ND	38	4.3	
Parathion, methyl	ND	7.5	4.6	
Ronnel	ND	7.5	7.5	
Malathion	ND	7.5	6.4	
Chlorpyrifos	ND	38	6.4	
Fenthion	ND	7.5	7.1	
Parathion	ND	7.5	5.2	
Trichloronate	ND	7.5	4.6	
Tetrachlorvinphos	ND	38	3	
Fensulfothion	ND	7.5	16	
Tokuthion	ND	38	5.3	
Merphos	ND	38	4.1	
Bolstar	ND	7.5	5.9	
EPN	ND	38	2	
Azinphos, methyl	ND	7.5	5.6	
Coumaphos	ND	7.5	5.5	

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Client Name	Ecology & Environment
Client ID:	99284168
Lab ID:	82524-07
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	94.56
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	105		48	122
Triphenyl Phosphate	118		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.1	✓
Mevinphos	ND	35	0.99	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.2	
Naled	ND	35	4.2	
Sulfotepp	ND	7	0.99	
Monocrotophos	ND	35	7.1	
Phorate	ND	7	4.6	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.5	
Disulfoton	ND	35	4	
Parathion, methyl	ND	7	4.3	
Ronnel	ND	7	7	
Malathion	ND	7	5.9	
Chlorpyrifos	ND	35	5.9	
Fenthion	ND	7	6.6	
Parathion	ND	7	4.8	
Trichloronate	ND	7	4.3	
Tetrachlorvinphos	ND	35	2.8	
Fensulfothion	ND	7	15	
Tokuthion	ND	35	4.9	
Merphos	ND	35	3.8	
Bolstar	ND	7	5.5	
EPN	ND	35	1.8	
Azinphos, methyl	ND	7	5.2	
Coumaphos	ND	7	5.1	

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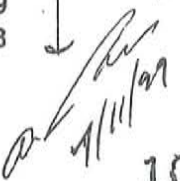
Client Name	Ecology & Environment
Client ID:	99284169
Lab ID:	82524-08
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	99.82
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	71.4		48	122
Triphenyl Phosphate	94.2		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	33	7.7	✓
Mevinphos	ND	33	0.94	
Demeton, O-S	ND	33	3.1	
Ethoprop	ND	33	7.8	
Naled	ND	33	4	
Sulfotepp	ND	6.6	0.94	
Monocrotophos	ND	33	6.7	
Phorate	ND	6.6	4.4	
Dimethoate	ND	33	3.6	
Diazinon	ND	33	4.3	
Disulfoton	ND	33	3.8	
Parathion, methyl	ND	6.6	4.1	
Ronnel	ND	6.6	6.6	
Malathion	ND	6.6	5.6	
Chlorpyrifos	ND	33	5.6	
Fenthion	ND	6.6	6.3	
Parathion	ND	6.6	4.6	
Trichloronate	ND	6.6	4.1	
Tetrachlorvinphos	ND	33	2.7	
Fensulfothion	ND	6.6	15	
Tokuthion	ND	33	4.7	
Merphos	ND	33	3.6	
Bolstar	ND	6.6	5.2	
EPN	ND	33	1.7	
Azinphos, methyl	ND	6.6	4.9	
Coumaphos	ND	6.6	4.8	


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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284170
Lab ID:	82524-09
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	95.47
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	94.5		48	122
Triphenyl Phosphate	112		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	34	7.8	✓
Mevinphos	ND	34	0.95	
Demeton, O-S	ND	34	3.2	
Ethoprop	ND	34	7.9	
Naled	ND	34	4	
Sulfotepp	ND	6.7	0.95	
Monocrotophos	ND	34	6.8	
Phorate	ND	6.7	4.4	
Dimethoate	ND	34	3.6	
Diazinon	ND	34	4.4	
Disulfoton	ND	34	3.9	
Parathion, methyl	ND	6.7	4.1	
Ronnel	ND	6.7	6.7	
Malathion	ND	6.7	5.7	
Chlorpyrifos	ND	34	5.7	
Fenthion	ND	6.7	6.3	
Parathion	ND	6.7	4.6	
Trichloronate	ND	6.7	4.1	
Tetrachlorvinphos	ND	34	2.7	
Fensulfothion	ND	6.7	15	
Tokuthion	ND	34	4.7	
Merphos	ND	34	3.6	
Bolstar	ND	6.7	5.3	
EPN	ND	34	1.8	
Azinphos, methyl	ND	6.7	5	
Coumaphos	ND	6.7	4.9	


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Client Name	Ecology & Environment
Client ID:	99284171
Lab ID:	82524-10
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	92.26
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits Low	High
Tributyl Phosphate	107		48	122
Triphenyl Phosphate	114		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	36	8.2	V
Mevinphos	ND	36	1	
Demeton, O-S	ND	36	3.3	
Ethoprop	ND	36	8.4	
Naled	ND	36	4.3	
Sulfotepp	ND	7.1	1	
Monocrotophos	ND	36	7.2	
Phorate	ND	7.1	4.7	
Dimethoate	ND	36	3.9	
Diazinon	ND	36	4.6	
Disulfoton	ND	36	4.1	
Parathion, methyl	ND	7.1	4.4	
Ronnel	ND	7.1	7.1	
Malathion	ND	7.1	6	
Chlorpyrifos	ND	36	6	
Fenthion	ND	7.1	6.7	
Parathion	ND	7.1	4.9	
Trichloronate	ND	7.1	4.4	
Tetrachlorvinphos	ND	36	2.9	
Fensulfothion	ND	7.1	16	
Tokuthion	ND	36	5	
Merphos	ND	36	3.9	
Bolstar	ND	7.1	5.6	
EPN	ND	36	1.9	
Azinphos, methyl	ND	7.1	5.3	
Coumaphos	ND	7.1	5.2	

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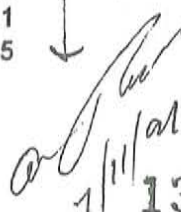
Client Name	Ecology & Environment
Client ID:	99284172
Lab ID:	82524-11
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	94.3
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	97.2		48	122
Triphenyl Phosphate	106		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.1	U ↓
Mevinphos	ND	35	0.99	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.2	
Naled	ND	35	4.2	
Sulfotepp	ND	6.9	0.99	
Monocrotophos	ND	35	7	
Phorate	ND	6.9	4.6	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.5	
Disulfoton	ND	35	4	
Parathion, methyl	ND	6.9	4.3	
Ronnel	ND	6.9	6.9	
Malathion	ND	6.9	5.9	
Chlorpyrifos	ND	35	5.9	
Fenthion	ND	6.9	6.5	
Parathion	ND	6.9	4.8	
Trichloronate	ND	6.9	4.3	
Tetrachlorvinphos	ND	35	2.8	
Fensulfothion	ND	6.9	15	
Tokuthion	ND	35	4.9	
Merphos	ND	35	3.8	
Bolstar	ND	6.9	5.5	
EPN	ND	35	1.8	
Azinphos, methyl	ND	6.9	5.1	
Coumaphos	ND	6.9	5	


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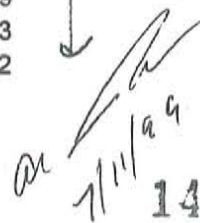
Client Name	Ecology & Environment
Client ID:	99284173
Lab ID:	82524-12
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	89.6
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	107		48	122
Triphenyl Phosphate	118		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	36	8.4	✓
Mevinphos	ND	36	1	
Demeton, O-S	ND	36	3.4	
Ethoprop	ND	36	8.5	
Naled	ND	36	4.3	
Sulfotepp	ND	7.2	1	
Monocrotophos	ND	36	7.3	
Phorate	ND	7.2	4.7	
Dimethoate	ND	36	3.9	
Diazinon	ND	36	4.7	
Disulfoton	ND	36	4.2	
Parathion, methyl	ND	7.2	4.4	
Ronnel	ND	7.2	7.2	
Malathion	ND	7.2	6.1	
Chlorpyrifos	ND	36	6.1	
Fenthion	ND	7.2	6.8	
Parathion	ND	7.2	4.9	
Trichloronate	ND	7.2	4.4	
Tetrachlorvinphos	ND	36	2.9	
Fensulfothion	ND	7.2	16	
Tokuthion	ND	36	5	
Merphos	ND	36	3.9	
Bolstar	ND	7.2	5.7	
EPN	ND	36	1.9	
Azinphos, methyl	ND	7.2	5.3	
Coumaphos	ND	7.2	5.2	


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Client Name	Ecology & Environment
Client ID:	99284174
Lab ID:	82524-13
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	93.79
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	97.7		48	122
Triphenyl Phosphate	112		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	34	8	✓ ↓
Mevinphos	ND	34	0.97	
Demeton, O-S	ND	34	3.2	
Ethoprop	ND	34	8.1	
Naled	ND	34	4.1	
Sulfotepp	ND	6.9	0.97	
Monocrotophos	ND	34	7	
Phorate	ND	6.9	4.5	
Dimethoate	ND	34	3.7	
Diazinon	ND	34	4.5	
Disulfoton	ND	34	4	
Parathion, methyl	ND	6.9	4.2	
Ronnel	ND	6.9	6.9	
Malathion	ND	6.9	5.8	
Chlorpyrifos	ND	34	5.8	
Fenthion	ND	6.9	6.5	
Parathion	ND	6.9	4.7	
Trichloronate	ND	6.9	4.2	
Tetrachlorvinphos	ND	34	2.8	
Fensulfothion	ND	6.9	15	
Tokuthion	ND	34	4.8	
Merphos	ND	34	3.7	
Bolstar	ND	6.9	5.4	
EPN	ND	34	1.8	
Azinphos, methyl	ND	6.9	5.1	
Coumaphos	ND	6.9	5	

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284175
Lab ID:	82524-14
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	87.57
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	100		48	122
Triphenyl Phosphate	110		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	36	8.4	✓
Mevinphos	ND	36	1	
Demeton, O-S	ND	36	3.4	
Ethoprop	ND	36	8.5	
Naled	ND	36	4.3	
Sulfotepp	ND	7.2	1	
Monocrotophos	ND	36	7.3	
Phorate	ND	7.2	4.8	
Dimethoate	ND	36	3.9	
Diazinon	ND	36	4.7	
Disulfoton	ND	36	4.2	
Parathion, methyl	ND	7.2	4.4	
Ronnel	ND	7.2	7.2	
Malathion	ND	7.2	6.1	
Chlorpyrifos	ND	36	6.1	
Fenthion	ND	7.2	6.8	
Parathion	ND	7.2	5	
Trichloronate	ND	7.2	4.4	
Tetrachlorvinphos	ND	36	2.9	
Fensulfothion	ND	7.2	16	
Tokuthion	ND	36	5.1	
Merphos	ND	36	3.9	
Bolstar	ND	7.2	5.7	
EPN	ND	36	1.9	
Azinphos, methyl	36	7.2	5.3	
Coumaphos	ND	7.2	5.2	✓

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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284176
Lab ID:	82524-15
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	93.31
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	108		48	122
Triphenyl Phosphate	120		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	35	8.1	✓
Mevinphos	ND	35	0.99	
Demeton, O-S	ND	35	3.3	
Ethoprop	ND	35	8.2	
Naled	ND	35	4.2	
Sulfotepp	ND	7	0.99	
Monocrotophos	ND	35	7.1	
Phorate	ND	7	4.6	
Dimethoate	ND	35	3.8	
Diazinon	ND	35	4.5	
Disulfoton	ND	35	4	
Parathion, methyl	ND	7	4.3	
Ronnel	ND	7	7	
Malathion	ND	7	5.9	
Chlorpyrifos	ND	35	5.9	
Fenthion	ND	7	6.6	
Parathion	ND	7	4.8	
Trichloronate	ND	7	4.3	
Tetrachlorvinphos	ND	35	2.8	
Fensulfthion	ND	7	15	
Tokuthion	ND	35	4.9	
Merphos	ND	35	3.8	
Bolstar	ND	7	5.5	
EPN	ND	35	1.8	
Azinphos, methyl	ND	7	5.2	
Coumaphos	ND	7	5.1	



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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284182
Lab ID:	82524-16
Date Received:	7/10/99
Date Prepared:	7/14/99
Date Analyzed:	7/15/99
% Solids	75.58
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	104		48	122
Triphenyl Phosphate	92.2		59	128

Sample results are on a dry weight basis.

Analyte	Result (ug/kg)	PQL	MDL	Flags
Dichlorvos	ND	66	15	✓
Mevinphos	ND	66	1.9	
Demeton, O-S	ND	66	6.2	
Ethoprop	ND	66	16	
Naled	ND	66	8	
Sulfotepp	ND	13	1.9	
Monocrotophos	ND	66	13	
Phorate	ND	13	8.7	
Dimethoate	ND	66	7.2	
Diazinon	ND	66	8.6	
Disulfoton	ND	66	7.7	
Parathion, methyl	ND	13	8.1	
Ronnel	ND	13	13	
Malathion	ND	13	11	
Chlorpyrifos	ND	66	11	
Fenthion	ND	13	12	
Parathion	ND	13	9.1	
Trichloronate	ND	13	8.1	
Tetrachlorvinphos	ND	66	5.3	
Fensulfthion	ND	13	29	
Tokuthion	ND	66	9.3	
Merphos	ND	66	7.2	
Bolstar	ND	13	10	
EPN	ND	66	3.5	
Azinphos, methyl	550	13	9.8	
Coumaphos	ND	13	9.6	✓


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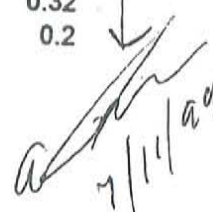
SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284193
Lab ID:	82524-17
Date Received:	7/10/99
Date Prepared:	7/15/99
Date Analyzed:	7/19/99
% Solids	-
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	103		49	128
Triphenyl Phosphate	109		65	119

Analyte	Result (ug/L)	PQL	MDL	Flags
Dichlorvos	ND	0.49	0.15	↓
Mevinphos	ND	0.49	0.14	
Ethoprop	ND	0.49	0.081	
Naled	ND	0.49	0.15	
Sulfotepp	ND	0.097	0.076	
Monocrotophos	ND	0.49	0.03	
Phorate	ND	0.097	0.085	
Dimethoate	ND	0.49	0.15	
Demeton, o-s	ND	0.49	0.16	
Diazinon	ND	0.49	0.067	
Disulfoton	ND	0.097	0.064	
Parathion, methyl	ND	0.097	0.096	
Ronnel	ND	0.49	0.12	
Chlorpyrifos	ND	0.49	0.17	
Malathion	ND	0.49	0.1	
Fenthion	ND	0.49	0.13	
Parathion	ND	0.097	0.066	
Trichloronate	ND	0.49	0.15	
Tetrachlorvinphos	ND	0.49	0.12	
Merphos	ND	0.49	0.19	
Tokuthion	ND	0.49	0.19	
Fensulfothion	ND	0.49	0.12	
Bolstar	ND	0.49	0.053	
EPN	ND	0.49	0.027	
Azinphos, methyl	ND	0.49	0.32	
Coumaphos	ND	0.49	0.2	


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SOUND ANALYTICAL SERVICES, INC.

Client Name	Ecology & Environment
Client ID:	99284194
Lab ID:	82524-18
Date Received:	7/10/99
Date Prepared:	7/15/99
Date Analyzed:	7/19/99
% Solids	-
Dilution Factor	10

Organophosphorus Pesticides by USEPA Method 8141 GC/MS Modified

Surrogate	% Recovery	Flags	Recovery Limits	
			Low	High
Tributyl Phosphate	101		49	128
Triphenyl Phosphate	104		65	119

Analyte	Result (ug/L)	PQL	MDL	Flags
Dichlorvos	ND	0.48	0.15	✓
Mevinphos	ND	0.48	0.14	
Ethoprop	ND	0.48	0.081	
Naled	ND	0.48	0.15	
Sulfotepp	ND	0.096	0.075	
Monocrotophos	ND	0.48	0.03	
Phorate	ND	0.096	0.084	
Dimethoate	ND	0.48	0.14	
Demeton, o-s	ND	0.48	0.15	
Diazinon	ND	0.48	0.067	
Disulfoton	ND	0.096	0.063	
Parathion, methyl	ND	0.096	0.095	
Ronnel	ND	0.48	0.12	
Chlorpyrifos	ND	0.48	0.17	
Malathion	ND	0.48	0.1	
Fenthion	ND	0.48	0.12	
Parathion	ND	0.096	0.065	
Trichloronate	ND	0.48	0.15	
Tetrachlorvinphos	ND	0.48	0.12	
Merphos	ND	0.48	0.19	
Tokuthion	ND	0.48	0.19	
Fensulfothion	ND	0.48	0.12	
Bolstar	ND	0.48	0.052	
EPN	ND	0.48	0.027	
Azinphos, methyl	ND	0.48	0.32	
Coumaphos	ND	0.48	0.19	

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ecology and environment, inc.

International Specialists in the Environment

1500 First Interstate Center, 999 Third Avenue
Seattle, Washington 98104
Tel: (206) 624-9537, Fax: (206) 621-9832

MEMORANDUM

DATE: September 3, 1999

TO: Mark Woodke, Project Manager, E & E, Seattle, WA

FROM: Leatta Dahlhoff, Chemist, E & E, Seattle, WA 20

SUBJ: Inorganic Data Quality Assurance Summary Check,
Wenatchee Brownfield, Wenatchee, Washington

REF: TDD: 98-11-0007 PAN: CK0701SIDM

The data quality assurance summary review of 12 water and 61 soil samples collected from the Wenatchee Brownfield site in Wenatchee, Washington, has been completed. Analysis for full inorganic target compounds (Total Metals) in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analyses (revision ILM04.0) was performed by Sentinel, Inc. of Huntsville, Alabama.

There were no discrepancies noted in the review.

Results qualified as "B" were crossed out and the qualifier "J" was added by the secondary reviewer.



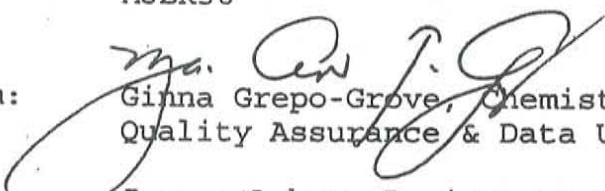
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Reply To
Attn Of: OEA-095

August 27, 1999

MEMORANDUM

Subject: Data Validation Report for the Total Inorganic Analyses
of Samples from Wenatchee Brownfields Site Assessment
Case: 27165 SDGs: MJBS22, MJBR73, MJBR65, MJBR43 and
MJBR36

From:  Ginna Grepo-Grove, Chemist
Quality Assurance & Data Unit, OEA

To: Joanne Labaw, Project Manager
Site Assessment Unit, ECL

CC: Bruce Woods, Region 10 CLP TPO
Tracy Trople, Ecology and Environment

The quality assurance (QA) review of 12 water and 61 soil samples collected from the above referenced site has been completed. These samples were analyzed for full inorganic target compounds in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analyses (revision ILMO4.0). The analyses were performed by Sentinel, Inc. of Huntsville, AL. The data validations were performed by the Environmental Services Assistance Team (ESAT) of the USEPA Manchester Environmental Laboratory, Port Orchard, WA.

There were no significant problems encountered with the data. Some of the antimony data had to be qualified as unusable due to low spike recoveries. All of the samples were analyzed in accordance with the technical requirements specified in the SOW. The data, as qualified, can be used for all purposes.

Attached are the validation memos for the above mentioned case and sample delivery groups (SDGs).

ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
TECHNOLOGY SERVICES GROUP



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DELIVERABLE NARRATIVE

DATE: August 17, 1999

To: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Wenatchee Brownfields Site. Case: 27165 SDG: MJBR43

DOC: ESW10-3-1355

PWO: ESW72017

TDF: 3635

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 5 water samples collected from the above referenced site has been completed. These samples were analyzed for total metals by SENTINEL, Inc. of Huntsville, Al. The following samples were reviewed in this validation report:

MJBR43
MJBR48
MJBR51
MJBR97
MJBS01

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.0) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The suggested holding time for mercury is 28 days from the date of sample collection and the holding time for the rest of the metals is 180 days. The samples were collected on 6/29, 6/30 and 7/7/99. The samples were analyzed for mercury within 23 days and all other metals within 34 days of the sample collection date. None of the data were qualified on this basis.

Sample Preparation - Acceptable

The samples were prepared in accordance with the methods used. None of the data were qualified on this basis.

Initial Calibration - Acceptable

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibrations for mercury met the frequency of analysis and the linearity criteria (correlation coefficients, $r \geq 0.995$).

The rest of the target analytes were analyzed using the Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for all ICP analyses met the frequency of analyses.

None of the data were qualified on this basis.

Calibration Verification - Acceptable

The initial and continuing calibration verification analyses met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 95-109% for ICP and from 103-111% for mercury analysis. None of the data were qualified on this basis.

Detection Limits - Acceptable

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria.

Blanks - Acceptable

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. None of the data were qualified on this basis.

DATA QUALIFIERS

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- N - There is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.

ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met by all of the ICS analyzed. The recoveries ranged from 89-119%. None of the data were qualified on this basis.

ICP-AES Serial Dilution Analysis

Sample MJBR43 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of barium, iron, lead, manganese, potassium, sodium, and zinc. Results for barium, iron, lead, manganese, potassium, sodium, and zinc in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory were crossed-out by the reviewer.

Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria for the laboratory control sample analysis were met. The recoveries ranged from 98-110%. None of the data were qualified on this basis.

Duplicate Sample Analysis - Acceptable

Sample MJBR43 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria for all target analytes. None of the data were qualified on this basis.

Matrix Spike Analysis

Sample MJBR43 was used for the spike analysis. The frequency of analysis and recovery criteria were met with the exception of antimony (49%), manganese (17%), selenium (63%) and silver (65%) in the spike sample MJBR43S. Due to possible bias, the detected manganese results in all samples were qualified as estimated, "J", and the non-detected results were qualified "R". Due to possible bias, the detected and non-detected antimony, selenium and silver results in all samples were qualified as estimated, "J/UJ". The "N" qualifiers applied by the laboratory were crossed-out by the reviewer. The recoveries for aluminum, iron and lead could not be accurately determined because the concentrations native to the sample were greater than 4 times the amount of spike added to the sample. All of the other spike recoveries were acceptable and ranged from 76-102%.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR43

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR43

Matrix (soil/water): WATER

Lab Sample ID: 22235S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	18200			P
7440-36-0	Antimony	6.8	B	J	P
7440-38-2	Arsenic	27.5			P
7440-39-3	Barium	1330		J	P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	2.4	B	J	P
7440-70-2	Calcium	500000	10		P
7440-47-3	Chromium	74.9			P
7440-48-4	Cobalt	38.9	B	J	P
7440-50-8	Copper	69.1	10		P
7439-89-6	Iron	46900		J	P
7439-92-1	Lead	130		J	P
7439-95-4	Magnesium	220000			P
7439-96-5	Manganese	1880		J	P
7439-97-6	Mercury	0.16	B	J	CV
7440-02-0	Nickel	73.3			P
7440-09-7	Potassium	273000	B	J	P
7782-49-2	Selenium	5.8		J	P
7440-22-4	Silver	1.4	U	J	P
7440-23-5	Sodium	501000		J	P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	66.2			P
7440-66-6	Zinc	551		J	P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture: CP 8-17-99

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR48

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR43

Matrix (soil/water): WATER

Lab Sample ID: 22236S

Level (low/med): LOW

Date Received: 07/02/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	60500	-		P
7440-36-0	Antimony	3.0	U	4UJ	P
7440-38-2	Arsenic	45.6			P
7440-39-3	Barium	1930		4J	P
7440-41-7	Beryllium	2.0	B	3	P
7440-43-9	Cadmium	5.2	#		P
7440-70-2	Calcium	242000			P
7440-47-3	Chromium	370			P
7440-48-4	Cobalt	64.8			P
7440-50-8	Copper	200			P
7439-89-6	Iron	227000		4J	P
7439-92-1	Lead	487		4J	P
7439-95-4	Magnesium	111000			P
7439-96-5	Manganese	2430		4J	P
7439-97-6	Mercury	0.45		4J	P
7440-02-0	Nickel	306			CV
7440-09-7	Potassium	137000		4J	P
7782-49-2	Selenium	19.7		4J	P
7440-22-4	Silver	4.2	B	4J	P
7440-23-5	Sodium	281000		4J	P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	192			P
7440-66-6	Zinc	2600		4J	P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

8-17-99
Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR51

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR43

Matrix (soil/water): WATER

Lab Sample ID: 22237S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	88700			P
7440-36-0	Antimony	3.0	U	U J	P
7440-38-2	Arsenic	28.4			P
7440-39-3	Barium	1390		E J	P
7440-41-7	Beryllium	2.8	E J		P
7440-43-9	Cadmium	2.1	E J		P
7440-70-2	Calcium	220000			P
7440-47-3	Chromium	762			P
7440-48-4	Cobalt	83.7			P
7440-50-8	Copper	324			P
7439-89-6	Iron	200000		E J	P
7439-92-1	Lead	86.3		E J	P
7439-95-4	Magnesium	95500			P
7439-96-5	Manganese	5190		M J	P
7439-97-6	Mercury	0.24			CV
7440-02-0	Nickel	565			P
7440-09-7	Potassium	17400		E J	P
7782-49-2	Selenium	16.6		E J	P
7440-22-4	Silver	4.6	E J		P
7440-23-5	Sodium	86000		E J	P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	222			P
7440-66-6	Zinc	1160		E J	P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture: 8-17-99

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR97

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR43

Matrix (soil/water): WATER

Lab Sample ID: 22432S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	66600			P
7440-36-0	Antimony	3.0	U	HUJ	P
7440-38-2	Arsenic	18.3			P
7440-39-3	Barium	1930		HJ	P
7440-41-7	Beryllium	2.8		HJ	P
7440-43-9	Cadmium	2.0		HJ	P
7440-70-2	Calcium	216000			P
7440-47-3	Chromium	234			P
7440-48-4	Cobalt	90.0			P
7440-50-8	Copper	238			P
7439-89-6	Iron	84800		HJ	P
7439-92-1	Lead	45.1		HJ	P
7439-95-4	Magnesium	113000			P
7439-96-5	Manganese	6240		HJ	P
7439-97-6	Mercury	0.16		HJ	CV
7440-02-0	Nickel	283			P
7440-09-7	Potassium	13800		HJ	P
7782-49-2	Selenium	7.5		HJ	P
7440-22-4	Silver	3.3		HJ	P
7440-23-5	Sodium	77100		HJ	P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	155			P
7440-66-6	Zinc	333		HJ	P
	Cyanide				NR

CP 8-17-99
Texture:

Color Before: COLORLESS

Clarity Before: CLEAR

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS01

Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR43

Matrix (soil/water): WATER

Lab Sample ID: 22433S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	35000			P
7440-36-0	Antimony	3.0	U	NUJ	P
7440-38-2	Arsenic	7.1	B	J	P
7440-39-3	Barium	621	B	J	P
7440-41-7	Beryllium	0.82	B	J	P
7440-43-9	Cadmium	1.1	B	J	P
7440-70-2	Calcium	296000			P
7440-47-3	Chromium	541			P
7440-48-4	Cobalt	30.8	B	J	P
7440-50-8	Copper	92.1			P
7439-89-6	Iron	49200		J	P
7439-92-1	Lead	16.5		J	P
7439-95-4	Magnesium	117000			P
7439-96-5	Manganese	2470		NUJ	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	363			P
7440-09-7	Potassium	14400		J	P
7782-49-2	Selenium	5.8		J	P
7440-22-4	Silver	1.4	U	NUJ	P
7440-23-5	Sodium	74700		J	P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	96.9			P
7440-66-6	Zinc	140		J	P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

CP 8-17-99

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
TECHNOLOGY SERVICES GROUP



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Phone (360) 871-8723

DELIVERABLE NARRATIVE

DATE: August 17, 1999

To: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Wenatchee Brownfields Site. Case: 27165 SDG: MJBR65

DOC: ESW10-3-1356

PWO: ESW72017

TDF: 3635

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 18 soil and 2 water samples collected from the above referenced site has been completed. These samples were analyzed for total metals by SENTINEL, Inc. of Huntsville, Al. The following samples were reviewed in this validation report:

MJBR65	MJBR89	MJBR94	MJBS25
MJBR66	MJBR90	MJBS06	MJBS26
MJBR67	MJBR91	MJBS07	MJBS27
MJBR85	MJBR92	MJBS23	MJBS28
MJBR86	MJBR93	MJBS24	MJBS29

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.0) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The suggested holding time for mercury is 28 days from the date of sample collection and the holding time for the rest of the metals is 180 days. The samples were collected on 7/1, 7/2, 7/6, 7/8 and 7/9/99. The samples were analyzed for mercury within 18 days and all other metals within 34 days of the sample collection date. None of the data were qualified on this basis.

Sample Preparation - Acceptable

The samples were prepared in accordance with the methods used. None of the data were qualified on this basis.

Initial Calibration - Acceptable

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibrations for mercury met the frequency of analysis and the linearity criteria (correlation coefficients, $r > 0.995$).

The rest of the target analytes were analyzed using the Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for all ICP analyses met the frequency of analyses.

None of the data were qualified on this basis.

Calibration Verification - Acceptable

The initial and continuing calibration verification analyses met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 92-106% for ICP and from 102-105% for mercury analysis. None of the data were qualified on this basis.

Detection Limits - Acceptable

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria.

Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

Analyte	Associated Samples
aluminum	MJBR89, MJBR90
barium	MJBR89, MJBR90
calcium	MJBR90
iron	MJBR89, MJBR90
magnesium	MJBR89, MJBR90

manganese	MJBR89, MJBR90
potassium	MJBR89, MJBR90
sodium	MJBR89

Aluminum yielded a negative response in the preparation blank and/or continuing calibration blank(s). Due to possible low bias, the aluminum results in the associated samples at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ". The following sample was qualified: MJBR90.

ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met by all of the ICS analyzed. The recoveries ranged from 92-112%. None of the data were qualified on this basis.

ICP-AES Serial Dilution Analysis - Acceptable

Sample MJBR65 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference.

Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria for the laboratory control sample analysis were met. The water recoveries ranged from 97-110% and the soil recoveries ranged from 83-171%. None of the data were qualified on this basis.

Duplicate Sample Analysis

Sample MJBR65 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria for all target analytes with the exception of nickel. Results for nickel in the associated samples were qualified as estimated, "J". The "*" qualifiers applied by the laboratory were crossed-out by the reviewer.

Matrix Spike Analysis

Sample MJBR65 was used for the spike analysis. The frequency of analysis and recovery criteria were met with the exception of antimony (29%), arsenic (49%) and silver (69%) in the spike sample MJBR65S. Due to possible bias, the detected antimony results in the associated samples were qualified as estimated, "J", and the non-detected results were qualified "R". Due to possible bias, the detected and non-detected arsenic and silver results in the associated samples were qualified as estimated, "J/UJ". The "N" qualifiers applied by the laboratory were crossed-out by the reviewer. The recovery for lead could not be accurately determined because the concentration native to the sample was greater than 4 times the amount of spike added to the sample. All of the other spike recoveries were acceptable and ranged from 75-103%.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

DATA QUALIFIERS

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- N - There is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR65

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22270S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 94.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10300			P
7440-36-0	Antimony	0.64	U	N R	P
7440-38-2	Arsenic	28.9		N J	P
7440-39-3	Barium	94.2			P
7440-41-7	Beryllium	0.30	N J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7400			P
7440-47-3	Chromium	17.3			P
7440-48-4	Cobalt	6.8	N J		P
7440-50-8	Copper	13.0			P
7439-89-6	Iron	17200			P
7439-92-1	Lead	132			P
7439-95-4	Magnesium	6210			P
7439-96-5	Manganese	352			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	26.8		J	P
7440-09-7	Potassium	2540			P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.69	N J		P
7440-23-5	Sodium	390	N J		P
7440-28-0	Thallium	0.70	U		P
7440-62-2	Vanadium	33.4			P
7440-66-6	Zinc	78.3			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR66

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22271S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 93.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9790			P
7440-36-0	Antimony	1.7	B	J	P
7440-38-2	Arsenic	12.1		J	P
7440-39-3	Barium	99.5			P
7440-41-7	Beryllium	0.28	B	S	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7170			P
7440-47-3	Chromium	19.4			P
7440-48-4	Cobalt	6.7	B	S	P
7440-50-8	Copper	17.1			P
7439-89-6	Iron	17100			P
7439-92-1	Lead	35.6			P
7439-95-4	Magnesium	5050			P
7439-96-5	Manganese	325			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	22.6		J	P
7440-09-7	Potassium	2210			P
7782-49-2	Selenium	1.1			P
7440-22-4	Silver	0.84	B	J	P
7440-23-5	Sodium	432	B	S	P
7440-28-0	Thallium	0.71	U		P
7440-62-2	Vanadium	34.8			P
7440-66-6	Zinc	160			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99 Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR67

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22272S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 81.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11200			P
7440-36-0	Antimony	2.9	B	M J	P
7440-38-2	Arsenic	13.4		M J	P
7440-39-3	Barium	284			P
7440-41-7	Beryllium	0.33	B	S	P
7440-43-9	Cadmium	1.2			P
7440-70-2	Calcium	11800			P
7440-47-3	Chromium	28.2			P
7440-48-4	Cobalt	8.7	B	S	P
7440-50-8	Copper	85.7			P
7439-89-6	Iron	26400			P
7439-92-1	Lead	437			P
7439-95-4	Magnesium	5720			P
7439-96-5	Manganese	477			P
7439-97-6	Mercury	0.08	B	S J	CV
7440-02-0	Nickel	30.5		J	P
7440-09-7	Potassium	2380			P
7782-49-2	Selenium	2.2	B	J	P
7440-22-4	Silver	1.6	B	J	P
7440-23-5	Sodium	564	B	S	P
7440-28-0	Thallium	1.0	B	J	P
7440-62-2	Vanadium	43.8			P
7440-66-6	Zinc	505			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR85

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22273S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 93.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9350	-		P
7440-36-0	Antimony	0.64	U	MR	P
7440-38-2	Arsenic	7.1		J	P
7440-39-3	Barium	93.5			P
7440-41-7	Beryllium	0.32	U		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6490			P
7440-47-3	Chromium	21.6			P
7440-48-4	Cobalt	6.8			P
7440-50-8	Copper	16.1			P
7439-89-6	Iron	16200			P
7439-92-1	Lead	92.3			P
7439-95-4	Magnesium	4990			P
7439-96-5	Manganese	313			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	14.5		J	P
7440-09-7	Potassium	2300			P
7782-49-2	Selenium	1.6			P
7440-22-4	Silver	0.87	U	J	P
7440-23-5	Sodium	508			P
7440-28-0	Thallium	0.98	U	J	P
7440-62-2	Vanadium	32.7			P
7440-66-6	Zinc	59.4			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR86

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22274S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 90.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11900			P
7440-36-0	Antimony	0.65	U	R	P
7440-38-2	Arsenic	7.4		J	P
7440-39-3	Barium	394			P
7440-41-7	Beryllium	0.48	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6270			P
7440-47-3	Chromium	34.9			P
7440-48-4	Cobalt	8.6	B	J	P
7440-50-8	Copper	42.7			P
7439-89-6	Iron	21600			P
7439-92-1	Lead	164			P
7439-95-4	Magnesium	5650			P
7439-96-5	Manganese	353			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	26.2		J	P
7440-09-7	Potassium	2300			P
7782-49-2	Selenium	1.9			P
7440-22-4	Silver	1.1	B	J	P
7440-23-5	Sodium	635	B	J	P
7440-28-0	Thallium	1.6	B	J	P
7440-62-2	Vanadium	41.2			P
7440-66-6	Zinc	151			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR89

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): WATER

Lab Sample ID: 22275S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	57.8	12	US	P
7440-36-0	Antimony	4.1	10	J	P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	2.5	10	US	P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.72	10	J	P
7440-70-2	Calcium	350	10	J	P
7440-47-3	Chromium	1.7	10	J	P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	98.2	10	US	P
7439-92-1	Lead	3.7	10		P
7439-95-4	Magnesium	43.5	10	US	P
7439-96-5	Manganese	3.4	10	US	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	9.4	10	J	P
7440-09-7	Potassium	127	10	US	P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	311	10	US	P
7440-28-0	Thallium	3.7	10	J	P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	13.4	10	J	P
	Cyanide				NR

CP8-17-99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FIELD BLANK

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR90

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): WATER

Lab Sample ID: 222765

Level (low/med): LOW

Date Received: 07/03/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12.4	UB	US	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	1.1	UB	US	P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	109	UB	US	P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	58.5	UB	US	P
7439-92-1	Lead	1.8	UB	US	P
7439-95-4	Magnesium	28.0	UB	US	P
7439-96-5	Manganese	2.1	UB	US	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	52.3	UB	US	P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	2.8	UB	J	P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

CP 8-17-99
Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FIELD BLANK

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR91

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22343S

Level (low/med): LOW

Date Received: 07/07/99

Solids: 88.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13200			P
7440-36-0	Antimony	0.68	U	M R	P
7440-38-2	Arsenic	74.9		M J	P
7440-39-3	Barium	163			P
7440-41-7	Beryllium	0.56	2 J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3900			P
7440-47-3	Chromium	35.8			P
7440-48-4	Cobalt	9.2	2 J		P
7440-50-8	Copper	19.7			P
7439-89-6	Iron	19800			P
7439-92-1	Lead	557			P
7439-95-4	Magnesium	5130			P
7439-96-5	Manganese	348			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	20.8		1 J	P
7440-09-7	Potassium	4090			P
7782-49-2	Selenium	2.1			P
7440-22-4	Silver	0.83	2 J	M J	P
7440-23-5	Sodium	337	2 J		P
7440-28-0	Thallium	1.2	2 J		P
7440-62-2	Vanadium	43.8			P
7440-66-6	Zinc	160			P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR92

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22344S

Level (low/med): LOW

Date Received: 07/07/99

Solids: 90.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	18600			P
7440-36-0	Antimony	0.66	U	R	P
7440-38-2	Arsenic	24.8		J	P
7440-39-3	Barium	211			P
7440-41-7	Beryllium	0.86	J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3040			P
7440-47-3	Chromium	57.4			P
7440-48-4	Cobalt	13.0			P
7440-50-8	Copper	29.5			P
7439-89-6	Iron	31000			P
7439-92-1	Lead	38.2			P
7439-95-4	Magnesium	8190			P
7439-96-5	Manganese	416			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	32.4		J	P
7440-09-7	Potassium	4420			P
7782-49-2	Selenium	2.6			P
7440-22-4	Silver	1.3	J	J	P
7440-23-5	Sodium	428	J	J	P
7440-28-0	Thallium	2.0	J	J	P
7440-62-2	Vanadium	72.8			P
7440-66-6	Zinc	79.1			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR93

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22345S

Level (low/med): LOW

Date Received: 07/07/99

Solids: 87.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17000			P
7440-36-0	Antimony	0.68	U	M R	P
7440-38-2	Arsenic	104		M J	P
7440-39-3	Barium	177			P
7440-41-7	Beryllium	0.69	U J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3210			P
7440-47-3	Chromium	40.4			P
7440-48-4	Cobalt	9.7	U J		P
7440-50-8	Copper	19.2			P
7439-89-6	Iron	23900			P
7439-92-1	Lead	622			P
7439-95-4	Magnesium	5380			P
7439-96-5	Manganese	496			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	21.6		M J	P
7440-09-7	Potassium	4890			P
7782-49-2	Selenium	2.1			P
7440-22-4	Silver	1.1	U J		P
7440-23-5	Sodium	382	U J		P
7440-28-0	Thallium	1.5	U J		P
7440-62-2	Vanadium	54.0			P
7440-66-6	Zinc	133			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR94

b Name: SENTINEL INC.

Contract: 68-D6-0001

b Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22346S

Level (low/med): LOW

Date Received: 07/07/99.

Solids: 92.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11200			P
7440-36-0	Antimony	0.63	U	R	P
7440-38-2	Arsenic	10.1		J	P
7440-39-3	Barium	108			P
7440-41-7	Beryllium	0.49		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6840			P
7440-47-3	Chromium	22.8		3	P
7440-48-4	Cobalt	8.3			P
7440-50-8	Copper	17.8			P
7439-89-6	Iron	19100			P
7439-92-1	Lead	30.8			P
7439-95-4	Magnesium	5450			P
7439-96-5	Manganese	324			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	17.2		J	P
7440-09-7	Potassium	2120			P
7782-49-2	Selenium	1.6			P
7440-22-4	Silver	0.81		J	P
7440-23-5	Sodium	433			P
7440-28-0	Thallium	0.73			P
7440-62-2	Vanadium	37.0			P
7440-66-6	Zinc	60.5			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBS06

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22444S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 80.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8870			P
7440-36-0	Antimony	0.74	U	R	P
7440-38-2	Arsenic	41.6		J	P
7440-39-3	Barium	103			P
7440-41-7	Beryllium	0.40	B	J	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	3450			P
7440-47-3	Chromium	20.1			P
7440-48-4	Cobalt	6.3	B	J	P
7440-50-8	Copper	14.0			P
7439-89-6	Iron	13900			P
7439-92-1	Lead	546			P
7439-95-4	Magnesium	3810			P
7439-96-5	Manganese	292			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	15.4		J	P
7440-09-7	Potassium	2550			P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.62	B	J	P
7440-23-5	Sodium	269	B	J	P
7440-28-0	Thallium	1.1	B	J	P
7440-62-2	Vanadium	27.6			P
7440-66-6	Zinc	115			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS07

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22445S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 88.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15600			P
7440-36-0	Antimony	0.68	U	R	P
7440-38-2	Arsenic	25.6		J	P
7440-39-3	Barium	173			P
7440-41-7	Beryllium	0.65	P	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	2720			P
7440-47-3	Chromium	46.9			P
7440-48-4	Cobalt	13.3			P
7440-50-8	Copper	28.0			P
7439-89-6	Iron	26600			P
7439-92-1	Lead	11.2			P
7439-95-4	Magnesium	7420			P
7439-96-5	Manganese	383			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	28.7		J	P
7440-09-7	Potassium	3650			P
7782-49-2	Selenium	3.2			P
7440-22-4	Silver	1.2	P	J	P
7440-23-5	Sodium	369	P	J	P
7440-28-0	Thallium	1.6	P	J	P
7440-62-2	Vanadium	59.3			P
7440-66-6	Zinc	67.2			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS23

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22446S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 92.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17200			P
7440-36-0	Antimony	1.8	YB	J	P
7440-38-2	Arsenic	41.4		J	P
7440-39-3	Barium	194			P
7440-41-7	Beryllium	0.68	YB	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	2840			P
7440-47-3	Chromium	45.8			P
7440-48-4	Cobalt	7.5	YB	J	P
7440-50-8	Copper	21.4			P
7439-89-6	Iron	26300			P
7439-92-1	Lead	39.6			P
7439-95-4	Magnesium	6290			P
7439-96-5	Manganese	401			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	26.2		J	P
7440-09-7	Potassium	4530			P
7782-49-2	Selenium	2.0			P
7440-22-4	Silver	0.99	YB	J	P
7440-23-5	Sodium	326	YB	J	P
7440-28-0	Thallium	1.5	YB	J	P
7440-62-2	Vanadium	60.0			P
7440-66-6	Zinc	72.7			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS24

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22447S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 90.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11400			P
7440-36-0	Antimony	0.65	U	R	P
7440-38-2	Arsenic	6.1		J	P
7440-39-3	Barium	130			P
7440-41-7	Beryllium	0.53		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	4490			P
7440-47-3	Chromium	31.6			P
7440-48-4	Cobalt	8.3		J	P
7440-50-8	Copper	15.8			P
7439-89-6	Iron	20500			P
7439-92-1	Lead	8.7			P
7439-95-4	Magnesium	5490			P
7439-96-5	Manganese	251			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	18.1		J	P
7440-09-7	Potassium	2110			P
7782-49-2	Selenium	1.9			P
7440-22-4	Silver	0.81		J	P
7440-23-5	Sodium	631		J	P
7440-28-0	Thallium	1.2		J	P
7440-62-2	Vanadium	46.3			P
7440-66-6	Zinc	53.6			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS25

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22448S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 87.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11200			P
7440-36-0	Antimony	1.3	1.3	J	P
7440-38-2	Arsenic	7.0		J	P
7440-39-3	Barium	93.0			P
7440-41-7	Beryllium	0.43	0.43	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	13600			P
7440-47-3	Chromium	24.8			P
7440-48-4	Cobalt	7.5	7.5	J	P
7440-50-8	Copper	16.5			P
7439-89-6	Iron	17300			P
7439-92-1	Lead	18.7			P
7439-95-4	Magnesium	5960			P
7439-96-5	Manganese	283			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	26.6		J	P
7440-09-7	Potassium	1770			P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.71	0.71	J	P
7440-23-5	Sodium	470	470	J	P
7440-28-0	Thallium	1.0	1.0	J	P
7440-62-2	Vanadium	33.5			P
7440-66-6	Zinc	77.2			P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS26

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22449S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 86.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10500			P
7440-36-0	Antimony	0.69	U	NR	P
7440-38-2	Arsenic	0.69	U	NR	P
7440-39-3	Barium	80.6			P
7440-41-7	Beryllium	0.30	NR	J	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	2270			P
7440-47-3	Chromium	30.2			P
7440-48-4	Cobalt	6.5	NR	J	P
7440-50-8	Copper	9.4			P
7439-89-6	Iron	15700			P
7439-92-1	Lead	3.5			P
7439-95-4	Magnesium	5610			P
7439-96-5	Manganese	242			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	17.1		J	P
7440-09-7	Potassium	2250			P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.71	NR	J	P
7440-23-5	Sodium	390	NR	J	P
7440-28-0	Thallium	1.0	NR	J	P
7440-62-2	Vanadium	40.0			P
7440-66-6	Zinc	39.7			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBS27

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22450S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 93.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8140			P
7440-36-0	Antimony	0.63	U	A	P
7440-38-2	Arsenic	2.7		J	P
7440-39-3	Barium	106			P
7440-41-7	Beryllium	0.31	J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3730			P
7440-47-3	Chromium	17.0			P
7440-48-4	Cobalt	6.6	J		P
7440-50-8	Copper	15.1			P
7439-89-6	Iron	12700			P
7439-92-1	Lead	23.4			P
7439-95-4	Magnesium	4590			P
7439-96-5	Manganese	284			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	23.5		J	P
7440-09-7	Potassium	2230			P
7782-49-2	Selenium	1.1			P
7440-22-4	Silver	0.60	J	J	P
7440-23-5	Sodium	329	J		P
7440-28-0	Thallium	0.70	U		P
7440-62-2	Vanadium	24.7			P
7440-66-6	Zinc	50.8			P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS28

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22451S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 89.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12200			P
7440-36-0	Antimony	0.88	B	N J	P
7440-38-2	Arsenic	8.0		N J	P
7440-39-3	Barium	141			P
7440-41-7	Beryllium	0.41	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	5030			P
7440-47-3	Chromium	28.9			P
7440-48-4	Cobalt	8.2	B	J	P
7440-50-8	Copper	34.4			P
7439-89-6	Iron	20200			P
7439-92-1	Lead	81.5			P
7439-95-4	Magnesium	6820			P
7439-96-5	Manganese	315			P
7439-97-6	Mercury	0.08	B	J	CV
7440-02-0	Nickel	25.2		J	P
7440-09-7	Potassium	3080			P
7782-49-2	Selenium	1.7	B		P
7440-22-4	Silver	1.1	B	N J	P
7440-23-5	Sodium	413	B	J	P
7440-28-0	Thallium	1.3	B	J	P
7440-62-2	Vanadium	43.7			P
7440-66-6	Zinc	163			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBS29

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR65

Matrix (soil/water): SOIL

Lab Sample ID: 22452S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 95.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12100			P
7440-36-0	Antimony	0.63	U	R	P
7440-38-2	Arsenic	1.9	U	J	P
7440-39-3	Barium	152			P
7440-41-7	Beryllium	0.35	U	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	4240			P
7440-47-3	Chromium	40.5			P
7440-48-4	Cobalt	6.4	U	J	P
7440-50-8	Copper	15.3			P
7439-89-6	Iron	19400			P
7439-92-1	Lead	5.3			P
7439-95-4	Magnesium	7440			P
7439-96-5	Manganese	306			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	34.8		J	P
7440-09-7	Potassium	982	U	J	P
7782-49-2	Selenium	1.7	U		P
7440-22-4	Silver	0.89	U	J	P
7440-23-5	Sodium	508	U	J	P
7440-28-0	Thallium	0.89	U	J	P
7440-62-2	Vanadium	43.8			P
7440-66-6	Zinc	41.5			P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

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ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
TECHNOLOGY SERVICES GROUP



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DELIVERABLE NARRATIVE

DATE: August 17, 1999

To: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Wenatchee Brownfields Site. Case: 27165 SDG: MJBR73

DOC: ESW10-3-1357

PWO: ESW72017

TDF: 3635

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 20 soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by SENTINEL, Inc. of Huntsville, AL. The following samples were reviewed in this validation report:

MJBR73	MJBS00	MJBS12	MJBS17
MJBR95	MJBS08	MJBS13	MJBS18
MJBR96	MJBS09	MJBS14	MJBS19
MJBR98	MJBS10	MJBS15	MJBS20
MJBR99	MJBS11	MJBS16	MJBS21

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.0) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The suggested holding time for mercury is 28 days from the date of sample collection and the holding time for the rest of the metals is 180 days. The samples were collected on 7/6, 7/7 and 7/8/99. The samples were analyzed for mercury within 23 days and all other metals within 28 days of the sample collection date. None of the data were qualified on this basis.

Sample Preparation - Acceptable

The samples were prepared in accordance with the methods used. None of the data were qualified on this basis.

Initial Calibration - Acceptable

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibrations for mercury met the frequency of analysis and the linearity criteria (correlation coefficients, $r > 0.995$).

The rest of the target analytes were analyzed using the Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for all ICP analyses met the frequency of analyses.

None of the data were qualified on this basis.

Calibration Verification - Acceptable

The initial and continuing calibration verification analyses met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-107% for ICP and from 101-109% for mercury analysis. None of the data were qualified on this basis.

Detection Limits - Acceptable

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria.

Blanks - Acceptable

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. None of the data were qualified on this basis.

ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met by all of the ICS analyzed. The recoveries ranged from 87-110%. None of the data were qualified on this basis.

ICP-AES Serial Dilution Analysis

Sample MJBR95 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of calcium, chromium, lead, magnesium, potassium and zinc. Results for calcium, chromium, lead, magnesium, potassium and zinc in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory were crossed-out by the reviewer.

Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria for the laboratory control sample analysis were met. The recoveries ranged from 85-169%. None of the data were qualified on this basis.

Duplicate Sample Analysis - Acceptable

Sample MJBR95 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria for all target analytes. None of the data were qualified on this basis.

Matrix Spike Analysis

Sample MJBR95 was used for the spike analysis. The frequency of analysis and recovery criteria were met with the exception of antimony (23%), arsenic (180%) and silver (65%) in the spike sample MJBR95S. Due to possible bias, the detected antimony results in all samples were qualified as estimated, "J", and the non-detected results were qualified "R". Due to possible bias, the detected arsenic results in all samples were qualified as estimated, "J". Due to possible bias, the detected and non-detected silver results in all samples were qualified as estimated, "J/UF". The "N" qualifiers applied by the laboratory were crossed-out by the reviewer. The recovery for lead could not be accurately determined because the concentration native to the sample was greater than 4 times the amount of spike added to the sample. All of the other spike recoveries were acceptable and ranged from 87-99%.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

DATA QUALIFIERS

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- N - There is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR73

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22443S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 99.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6750			P
7440-36-0	Antimony	1.2		J	P
7440-38-2	Arsenic	8.5		J	P
7440-39-3	Barium	75.7			P
7440-41-7	Beryllium	0.26		S	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	3010		J	P
7440-47-3	Chromium	13.2		J	P
7440-48-4	Cobalt	5.2		S	P
7440-50-8	Copper	13.0			P
7439-89-6	Iron	11000			P
7439-92-1	Lead	29.7		J	P
7439-95-4	Magnesium	3240		J	P
7439-96-5	Manganese	245			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	13.4			P
7440-09-7	Potassium	1710		J	P
7782-49-2	Selenium	1.2			P
7440-22-4	Silver	0.53		J	P
7440-23-5	Sodium	241		S	P
7440-28-0	Thallium	0.66	U		P
7440-62-2	Vanadium	21.5			P
7440-66-6	Zinc	44.5		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR95

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22434S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 93.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	15000			P
7440-36-0	Antimony	0.65	U	R	P
7440-38-2	Arsenic	17.4		J	P
7440-39-3	Barium	149			P
7440-41-7	Beryllium	0.36		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7250		J	P
7440-47-3	Chromium	25.3		J	P
7440-48-4	Cobalt	8.9		J	P
7440-50-8	Copper	18.1			P
7439-89-6	Iron	21500			P
7439-92-1	Lead	71.2		J	P
7439-95-4	Magnesium	7180		J	P
7439-96-5	Manganese	410			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	15.6			P
7440-09-7	Potassium	2980		J	P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.86		J	P
7440-23-5	Sodium	477		J	P
7440-28-0	Thallium	0.98		J	P
7440-62-2	Vanadium	47.7			P
7440-66-6	Zinc	63.7		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR96

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22435S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 95.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10700			P
7440-36-0	Antimony	0.60	U	N A	P
7440-38-2	Arsenic	4.2		N J	P
7440-39-3	Barium	78.5			P
7440-41-7	Beryllium	0.35	J		P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	4560		J	P
7440-47-3	Chromium	20.7		J	P
7440-48-4	Cobalt	6.2	J		P
7440-50-8	Copper	13.8			P
7439-89-6	Iron	21000			P
7439-92-1	Lead	17.0		J	P
7439-95-4	Magnesium	5170		J	P
7439-96-5	Manganese	343			P
7439-97-6	Mercury	0.43			CV
7440-02-0	Nickel	13.7			P
7440-09-7	Potassium	2300		J	P
7782-49-2	Selenium	1.9			P
7440-22-4	Silver	0.77	J	J	P
7440-23-5	Sodium	287	J		P
7440-28-0	Thallium	1.3	J		P
7440-62-2	Vanadium	33.7			P
7440-66-6	Zinc	90.3		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR98

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22436S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 91.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8920			P
7440-36-0	Antimony	0.66	U	R	P
7440-38-2	Arsenic	6.5		J	P
7440-39-3	Barium	102			P
7440-41-7	Beryllium	0.25	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7150		J	P
7440-47-3	Chromium	21.6		J	P
7440-48-4	Cobalt	6.8	A	J	P
7440-50-8	Copper	26.3			P
7439-89-6	Iron	18300			P
7439-92-1	Lead	230		J	P
7439-95-4	Magnesium	5000		J	P
7439-96-5	Manganese	310			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	18.2			P
7440-09-7	Potassium	2270		J	P
7782-49-2	Selenium	1.6			P
7440-22-4	Silver	0.76	B	J	P
7440-23-5	Sodium	347	B	J	P
7440-28-0	Thallium	1.1	B	J	P
7440-62-2	Vanadium	31.8			P
7440-66-6	Zinc	96.8		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR99

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 224375

Level (low/med): LOW

Date Received: 07/09/99

Solids: 87.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8550			P
7440-36-0	Antimony	1.0	AB	J	P
7440-38-2	Arsenic	7.1		J	P
7440-39-3	Barium	120			P
7440-41-7	Beryllium	0.23	AB	J	P
7440-43-9	Cadmium	0.24	AB	J	P
7440-70-2	Calcium	8170		J	P
7440-47-3	Chromium	21.4		J	P
7440-48-4	Cobalt	6.6	AB	J	P
7440-50-8	Copper	42.9			P
7439-89-6	Iron	16800			P
7439-92-1	Lead	104		J	P
7439-95-4	Magnesium	5020		J	P
7439-96-5	Manganese	299			P
7439-97-6	Mercury	0.90			CV
7440-02-0	Nickel	27.6			P
7440-09-7	Potassium	2110		J	P
7782-49-2	Selenium	1.7			P
7440-22-4	Silver	1.3	AB	J	P
7440-23-5	Sodium	360	AB	J	P
7440-28-0	Thallium	1.0	AB	J	P
7440-62-2	Vanadium	37.4			P
7440-66-6	Zinc	269		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS00

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22438S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 92.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8010			P
7440-36-0	Antimony	1.5		J	P
7440-38-2	Arsenic	4.6		J	P
7440-39-3	Barium	96.1			P
7440-41-7	Beryllium	0.21		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	4740		J	P
7440-47-3	Chromium	18.3		J	P
7440-48-4	Cobalt	6.7		J	P
7440-50-8	Copper	23.2			P
7439-89-6	Iron	14200			P
7439-92-1	Lead	20.2		J	P
7439-95-4	Magnesium	4540		J	P
7439-96-5	Manganese	201			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	19.8			P
7440-09-7	Potassium	1220		J	P
7782-49-2	Selenium	1.4			P
7440-22-4	Silver	0.77		J	P
7440-23-5	Sodium	349		J	P
7440-28-0	Thallium	0.70	U		P
7440-62-2	Vanadium	34.1			P
7440-66-6	Zinc	80.7		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS08

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22453S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 86.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7370			P
7440-36-0	Antimony	0.67	U	R	P
7440-38-2	Arsenic	14.1		J	P
7440-39-3	Barium	71.8			P
7440-41-7	Beryllium	0.26		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3270		J	P
7440-47-3	Chromium	17.3		J	P
7440-48-4	Cobalt	4.9		J	P
7440-50-8	Copper	11.6			P
7439-89-6	Iron	12000		J	P
7439-92-1	Lead	151		J	P
7439-95-4	Magnesium	3370		J	P
7439-96-5	Manganese	250			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	13.5			P
7440-09-7	Potassium	1610		J	P
7782-49-2	Selenium	1.1		J	P
7440-22-4	Silver	0.47		J	P
7440-23-5	Sodium	259		J	P
7440-28-0	Thallium	0.90		J	P
7440-62-2	Vanadium	23.7		J	P
7440-66-6	Zinc	103		J	P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS09

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22454S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 94.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7990			P
7440-36-0	Antimony	0.63	U	R	P
7440-38-2	Arsenic	18.4		J	P
7440-39-3	Barium	79.9			P
7440-41-7	Beryllium	0.28	U	S	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	2970		J	P
7440-47-3	Chromium	15.6		J	P
7440-48-4	Cobalt	5.4		J	P
7440-50-8	Copper	12.4			P
7439-89-6	Iron	12000			P
7439-92-1	Lead	5.0		J	P
7439-95-4	Magnesium	3480		J	P
7439-96-5	Manganese	243			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	16.2			P
7440-09-7	Potassium	1740		J	P
7782-49-2	Selenium	1.3			P
7440-22-4	Silver	0.54	U	J	P
7440-23-5	Sodium	293		J	P
7440-28-0	Thallium	0.69	U		P
7440-62-2	Vanadium	24.5			P
7440-66-6	Zinc	33.9		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS10

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22455S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 99.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7250			P
7440-36-0	Antimony	0.60	U	R	P
7440-38-2	Arsenic	8.6		J	P
7440-39-3	Barium	75.3			P
7440-41-7	Beryllium	0.27	U	S	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	3040		H	P
7440-47-3	Chromium	14.3		J	P
7440-48-4	Cobalt	5.6		J	P
7440-50-8	Copper	12.9			P
7439-89-6	Iron	11900			P
7439-92-1	Lead	28.7		H	P
7439-95-4	Magnesium	3460			P
7439-96-5	Manganese	249			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	15.9			P
7440-09-7	Potassium	1720		J	P
7782-49-2	Selenium	1.0			P
7440-22-4	Silver	0.56		J	P
7440-23-5	Sodium	304		S	P
7440-28-0	Thallium	0.65	U		P
7440-62-2	Vanadium	24.0			P
7440-66-6	Zinc	56.0		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS11

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22456S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 96.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5690			P
7440-36-0	Antimony	0.61	U	R	P
7440-38-2	Arsenic	2.0		J	P
7440-39-3	Barium	58.9			P
7440-41-7	Beryllium	0.24		S	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	2660		J	P
7440-47-3	Chromium	12.2		J	P
7440-48-4	Cobalt	4.8		S	P
7440-50-8	Copper	11.7			P
7439-89-6	Iron	9770			P
7439-92-1	Lead	4.5		J	P
7439-95-4	Magnesium	3120		J	P
7439-96-5	Manganese	218			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	13.1			P
7440-09-7	Potassium	1420		J	P
7782-49-2	Selenium	0.61		J	P
7440-22-4	Silver	0.52		J	P
7440-23-5	Sodium	267		S	P
7440-28-0	Thallium	0.73		S	P
7440-62-2	Vanadium	19.0			P
7440-66-6	Zinc	42.6		J	P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS12

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22457S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 93.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13500			P
7440-36-0	Antimony	0.62	U	R	P
7440-38-2	Arsenic	29.8		J	P
7440-39-3	Barium	152			P
7440-41-7	Beryllium	0.54	U	S	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	2940		J	P
7440-47-3	Chromium	35.8		J	P
7440-48-4	Cobalt	9.7	U	J	P
7440-50-8	Copper	22.5			P
7439-89-6	Iron	20100		J	P
7439-92-1	Lead	242		J	P
7439-95-4	Magnesium	5030		J	P
7439-96-5	Manganese	352			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	19.1			P
7440-09-7	Potassium	4560		J	P
7782-49-2	Selenium	1.8		J	P
7440-22-4	Silver	0.82	U	J	P
7440-23-5	Sodium	329		J	P
7440-28-0	Thallium	0.95	U	J	P
7440-62-2	Vanadium	46.1		J	P
7440-66-6	Zinc	115		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBS13

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22458S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 93.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12400			P
7440-36-0	Antimony	0.64	U	R	P
7440-38-2	Arsenic	2.5		J	P
7440-39-3	Barium	131			P
7440-41-7	Beryllium	0.59	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	2170		J	P
7440-47-3	Chromium	39.3		J	P
7440-48-4	Cobalt	10.5	B	J	P
7440-50-8	Copper	19.8			P
7439-89-6	Iron	22000		J	P
7439-92-1	Lead	8.7		J	P
7439-95-4	Magnesium	5800		J	P
7439-96-5	Manganese	287			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	22.3			P
7440-09-7	Potassium	2800		J	P
7782-49-2	Selenium	2.0			P
7440-22-4	Silver	0.91	B	J	P
7440-23-5	Sodium	348	B	J	P
7440-28-0	Thallium	1.4	B	J	P
7440-62-2	Vanadium	49.9			P
7440-66-6	Zinc	55.2		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS14

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22459S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 89.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16300			P
7440-36-0	Antimony	0.64	U	N R	P
7440-38-2	Arsenic	26.0		N J	P
7440-39-3	Barium	188			P
7440-41-7	Beryllium	0.66		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	4250		E J	P
7440-47-3	Chromium	41.0		E J	P
7440-48-4	Cobalt	10.5		S	P
7440-50-8	Copper	26.9			P
7439-89-6	Iron	22600			P
7439-92-1	Lead	200		E J	P
7439-95-4	Magnesium	5610		E J	P
7439-96-5	Manganese	380			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	22.7			P
7440-09-7	Potassium	4920		E J	P
7782-49-2	Selenium	1.9			P
7440-22-4	Silver	0.86		N J	P
7440-23-5	Sodium	362		N J	P
7440-28-0	Thallium	1.3		N J	P
7440-62-2	Vanadium	51.3			P
7440-66-6	Zinc	144		E J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS15

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22460S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 94.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13400			P
7440-36-0	Antimony	0.63	U	N R	P
7440-38-2	Arsenic	2.2		N J	P
7440-39-3	Barium	147			P
7440-41-7	Beryllium	0.61	U J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	2330		E J	P
7440-47-3	Chromium	42.0		E J	P
7440-48-4	Cobalt	10.9			P
7440-50-8	Copper	21.2			P
7439-89-6	Iron	23400			P
7439-92-1	Lead	9.3		E J	P
7439-95-4	Magnesium	5960		E J	P
7439-96-5	Manganese	309			P
7439-97-6	Mercury	0.04	U		CV
7440-02-0	Nickel	24.0			P
7440-09-7	Potassium	3390		E J	P
7782-49-2	Selenium	2.1			P
7440-22-4	Silver	1.0	U J		P
7440-23-5	Sodium	317	U J		P
7440-28-0	Thallium	1.4	U J		P
7440-62-2	Vanadium	54.1			P
7440-66-6	Zinc	57.8		E J	P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

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U.S. EPA - CLP

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EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS16

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22461S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 87.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13000			P
7440-36-0	Antimony	0.67	U	N R	P
7440-38-2	Arsenic	33.2		N J	P
7440-39-3	Barium	173			P
7440-41-7	Beryllium	0.53	N	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3990		E J	P
7440-47-3	Chromium	37.7		E J	P
7440-48-4	Cobalt	9.6	N	J	P
7440-50-8	Copper	23.3			P
7439-89-6	Iron	20600			P
7439-92-1	Lead	267		E J	P
7439-95-4	Magnesium	5300		E J	P
7439-96-5	Manganese	335			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	20.4			P
7440-09-7	Potassium	4480		E J	P
7782-49-2	Selenium	2.3			P
7440-22-4	Silver	0.96	N	J	P
7440-23-5	Sodium	334	N	J	P
7440-28-0	Thallium	1.2	N	J	P
7440-62-2	Vanadium	47.1			P
7440-66-6	Zinc	154		E J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS17

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22462S

Level (low/med): LOW

Date Received: 07/10/99

% Solids: 94.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13300			P
7440-36-0	Antimony	0.62	U	R	P
7440-38-2	Arsenic	2.7		J	P
7440-39-3	Barium	133			P
7440-41-7	Beryllium	0.58		J	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	2050		E	P
7440-47-3	Chromium	39.5		E	P
7440-48-4	Cobalt	9.8		J	P
7440-50-8	Copper	20.8			P
7439-89-6	Iron	22400			P
7439-92-1	Lead	8.8		E	P
7439-95-4	Magnesium	5920		E	P
7439-96-5	Manganese	282			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	22.1			P
7440-09-7	Potassium	2790		E	P
7782-49-2	Selenium	2.3			P
7440-22-4	Silver	0.82		J	P
7440-23-5	Sodium	305		J	P
7440-28-0	Thallium	0.94		J	P
7440-62-2	Vanadium	50.4			P
7440-66-6	Zinc	54.0		E	P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS18

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22439S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 91.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9790			P
7440-36-0	Antimony	0.63	U	N R	P
7440-38-2	Arsenic	9.3		N J	P
7440-39-3	Barium	92.8			P
7440-41-7	Beryllium	0.36	Q S		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	8310		E J	P
7440-47-3	Chromium	18.7		E J	P
7440-48-4	Cobalt	6.7	Q S		P
7440-50-8	Copper	15.5			P
7439-89-6	Iron	15900			P
7439-92-1	Lead	35.5		E J	P
7439-95-4	Magnesium	4990		E J	P
7439-96-5	Manganese	260			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	14.3			P
7440-09-7	Potassium	2420		E J	P
7782-49-2	Selenium	1.5			P
7440-22-4	Silver	0.75	Q S	E J	P
7440-23-5	Sodium	299	Q S		P
7440-28-0	Thallium	0.99	Q S		P
7440-62-2	Vanadium	34.1			P
7440-66-6	Zinc	50.5		E J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS19

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22440S

Level (low/med): LOW

Date Received: 07/09/99

% Solids: 81.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11000			P
7440-36-0	Antimony	0.70	U	R	P
7440-38-2	Arsenic	13.6		J	P
7440-39-3	Barium	107			P
7440-41-7	Beryllium	0.46	U	J	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	5940		J	P
7440-47-3	Chromium	18.2		J	P
7440-48-4	Cobalt	7.1	U	J	P
7440-50-8	Copper	22.9			P
7439-89-6	Iron	18400			P
7439-92-1	Lead	121		J	P
7439-95-4	Magnesium	4760		J	P
7439-96-5	Manganese	284			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	15.4			P
7440-09-7	Potassium	2480		J	P
7782-49-2	Selenium	1.7			P
7440-22-4	Silver	1.0	U	J	P
7440-23-5	Sodium	368		J	P
7440-28-0	Thallium	0.77	U		P
7440-62-2	Vanadium	32.8			P
7440-66-6	Zinc	134		J	P
	Cyanide				NR

CP 8-17-99

Texture: MEDIUM

Color Before: BROWN

Clarity Before:

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS20

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22441S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 91.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6050			P
7440-36-0	Antimony	0.63	U	NR	P
7440-38-2	Arsenic	3.2		J	P
7440-39-3	Barium	70.4			P
7440-41-7	Beryllium	0.20		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	3090		J	P
7440-47-3	Chromium	8.8		J	P
7440-48-4	Cobalt	4.5		J	P
7440-50-8	Copper	10.0			P
7439-89-6	Iron	10400			P
7439-92-1	Lead	18.3		J	P
7439-95-4	Magnesium	3040		J	P
7439-96-5	Manganese	220			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	11.4			P
7440-09-7	Potassium	966		J	P
7782-49-2	Selenium	0.90		J	P
7440-22-4	Silver	0.43		J	P
7440-23-5	Sodium	354		J	P
7440-28-0	Thallium	0.69	U		P
7440-62-2	Vanadium	23.8			P
7440-66-6	Zinc	43.3		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBS21

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR73

Matrix (soil/water): SOIL

Lab Sample ID: 22442S

Level (low/med): LOW

Date Received: 07/09/99

Solids: 88.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	6820			P
7440-36-0	Antimony	0.68	U	R	P
7440-38-2	Arsenic	0.68	U	R	P
7440-39-3	Barium	52.8			P
7440-41-7	Beryllium	0.22	J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	2200		J	P
7440-47-3	Chromium	16.8		J	P
7440-48-4	Cobalt	6.6	J		P
7440-50-8	Copper	22.7			P
7439-89-6	Iron	14100			P
7439-92-1	Lead	4.5		J	P
7439-95-4	Magnesium	5370		J	P
7439-96-5	Manganese	217			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	11.3			P
7440-09-7	Potassium	1570		J	P
7782-49-2	Selenium	1.3			P
7440-22-4	Silver	0.72	J	J	P
7440-23-5	Sodium	270	J		P
7440-28-0	Thallium	0.74	U		P
7440-62-2	Vanadium	34.1			P
7440-66-6	Zinc	44.0		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

UP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
TECHNOLOGY SERVICES GROUP



ESAT Region 10
Lockheed Martin
7411 Beach Drive East
Port Orchard, WA 98366
Phone (360) 871-8723

DELIVERABLE NARRATIVE

DATE: August 17, 1999

To: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Wenatchee Brownfields Site. Case: 27165 SDG: MJBS22

DOC: ESW10-3-1358

PWO: ESW72017

TDF: 3635

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 3 soil and 5 water samples collected from the above referenced site has been completed. These samples were analyzed for total metals by SENTINEL, Inc. of Huntsville, AL. The following samples were reviewed in this validation report:

MJBS22	MJBS34
MJBS30	MJBS35
MJBS31	
MJBS32	
MJBS33	

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.0) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The suggested holding time for mercury is 28 days from the date of sample collection and the holding time for the rest of the metals is 180 days. The samples were collected on 7/8 and 7/9/99. The samples were analyzed for mercury within 28 days and all other metals within 27 days of the sample collection date. None of the data were qualified on this basis.

Sample Preparation - Acceptable

The samples were prepared in accordance with the methods used. None of the data were qualified on this basis.

Initial Calibration - Acceptable

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibrations for mercury met the frequency of analysis and the linearity criteria (correlation coefficients, $r \geq 0.995$).

The rest of the target analytes were analyzed using the Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for all ICP analyses met the frequency of analyses.

None of the data were qualified on this basis.

Calibration Verification - Acceptable

The initial and continuing calibration verification analyses met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 94-110% for ICP and from 91-110% for mercury analysis. None of the data were qualified on this basis.

Detection Limits - Acceptable

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria.

Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

Analyte	Associated Samples
aluminum	MJBS32
barium	MJBS30
calcium	MJBS32
selenium recycled paper	MJBS22, MJBS30, MJBS33, MJBS34, MJBS35, technology and environment

ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met by all of the ICS analyzed. The recoveries ranged from 90-109%. None of the data were qualified on this basis.

ICP-AES Serial Dilution Analysis

Sample MJBS33 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of lead and zinc. Results for lead and zinc in the associated samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory were crossed-out by the reviewer.

Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria for the laboratory control sample analysis were met. The water recoveries ranged from 99-107% and the soil recoveries ranged from 74-178%. None of the data were qualified on this basis.

Duplicate Sample Analysis

Sample MJBS33 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria for all target analytes with the exception of chromium and magnesium. Magnesium only slightly exceeded the control limit criteria and therefore, was not qualified on this basis. Results for chromium in the associated samples were qualified as estimated, "J". The "*" qualifiers applied by the laboratory were crossed-out by the reviewer.

Matrix Spike Analysis

Sample MJBS33 was used for the spike analysis. The frequency of analysis and recovery criteria were met with the exception of antimony (19%), manganese (47%), selenium (63%) and silver (64%) in the spike sample MJBS33S. Due to possible bias, the detected antimony results in the associated samples were qualified as estimated, "J", and the non-detected results were qualified "R". Due to possible bias, the detected and non-detected manganese, selenium and silver results in the associated samples were qualified as estimated, "J/UJ". The "N" qualifiers applied by the laboratory were crossed-out by the reviewer. The recovery for lead could not be accurately determined because the concentration native to the sample was greater than 4 times the amount of spike added to the sample. All of the other spike recoveries were acceptable and ranged from 79-111%.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

DATA QUALIFIERS

- U - The analyte was not detected at or above the reported result.
- J - The analyte was positively identified. The associated numerical result is an estimate.
- R - The data are unusable for all purposes.
- N - There is evidence the analyte is present in this sample.
- NJ - There is evidence that the analyte is present. The associated numerical result is an estimate.
- UJ - The analyte was not detected at or above the reported estimated result. The associated numerical value is an estimate of the quantitation limit of the analyte in this sample.

U.S. EPA - CLP

1

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS22

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): SOIL

Lab Sample ID: 22472S

Level (low/med): LOW

Date Received: 07/10/99

Solids: 73.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9100			P
7440-36-0	Antimony	0.80	U	NR	P
7440-38-2	Arsenic	13.5			P
7440-39-3	Barium	212			P
7440-41-7	Beryllium	0.23		J	P
7440-43-9	Cadmium	0.17		J	P
7440-70-2	Calcium	23100			P
7440-47-3	Chromium	21.3		J	P
7440-48-4	Cobalt	5.9		J	P
7440-50-8	Copper	35.2			P
7439-89-6	Iron	12300			P
7439-92-1	Lead	160		J	P
7439-95-4	Magnesium	4070		J	P
7439-96-5	Manganese	286		J	P
7439-97-6	Mercury	0.07	U		CV
7440-02-0	Nickel	13.7			P
7440-09-7	Potassium	3610			P
7782-49-2	Selenium	2.7		MUS	P
7440-22-4	Silver	0.46		J	P
7440-23-5	Sodium	406		J	P
7440-28-0	Thallium	0.88	U		P
7440-62-2	Vanadium	28.5			P
7440-66-6	Zinc	191		J	P
	Cyanide				NR

CP 8.17.99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS30

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): WATER

Lab Sample ID: 22558S

Level (low/med): LOW

Date Received: 07/14/99

% Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12.0	U		P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	0.84	U	UJ	P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	145	U	J	P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	21.4	U	J	P
7439-92-1	Lead	3.7	U		P
7439-95-4	Magnesium	14.4	U		P
7439-96-5	Manganese	7.6	U	J	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	101	U	J	P
7782-49-2	Selenium	2.6	U	UJ	P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	5.8	U	J	P
	Cyanide				NR

CP 8.17-99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FIELD BLANK

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS31

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): WATER

Lab Sample ID: 22559S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12.0	U		P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	0.70	U		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	143	U	J	P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	18.8	U		P
7439-92-1	Lead	1.7	U		P
7439-95-4	Magnesium	14.4	U		P
7439-96-5	Manganese	1.6	U	J	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	58.1	U	J	P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	4.6	U	J	P
	Cyanide				NR

CP 8.17.99

Texture:

Artifacts:

Color Before: COLORLESS

Clarity Before: CLEAR

Color After: COLORLESS

Clarity After: CLEAR

Comments:

FIELD BLANK

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS32

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): WATER

Lab Sample ID: 22560S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	23.1	U	45	P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	3.0	U		P
7440-39-3	Barium	0.70	U		P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.50	U		P
7440-70-2	Calcium	51.7	U	45	P
7440-47-3	Chromium	1.0	U		P
7440-48-4	Cobalt	2.2	U		P
7440-50-8	Copper	2.5	U		P
7439-89-6	Iron	24.5	U	5	P
7439-92-1	Lead	2.2	U	5	P
7439-95-4	Magnesium	14.4	U	5	P
7439-96-5	Manganese	0.61	U	5	P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	2.5	U		P
7440-09-7	Potassium	63.4	U	5	P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	153	U		P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	1.4	U		P
7440-66-6	Zinc	2.4	U		P
	Cyanide				NR

CP 8.17.99

Color Before: COLORLESS

Clarity Before: CLEAR

Texture:

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FIELD BLANK

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS33

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): SOIL

Lab Sample ID: 22561S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 93.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9820			P
7440-36-0	Antimony	0.64	U	NR	P
7440-38-2	Arsenic	5.3			P
7440-39-3	Barium	94.5			P
7440-41-7	Beryllium	0.19	U	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	11800			P
7440-47-3	Chromium	24.6		J	P
7440-48-4	Cobalt	7.5		J	P
7440-50-8	Copper	16.5			P
7439-89-6	Iron	17800			P
7439-92-1	Lead	33.8		J	P
7439-95-4	Magnesium	7070			P
7439-96-5	Manganese	320		J	P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	19.2			P
7440-09-7	Potassium	2340			P
7782-49-2	Selenium	1.9		J	P
7440-22-4	Silver	0.72		J	P
7440-23-5	Sodium	356		J	P
7440-28-0	Thallium	0.90		J	P
7440-62-2	Vanadium	38.2			P
7440-66-6	Zinc	48.6		J	P
	Cyanide				NR

CP 8.17.99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS34

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): SOIL

Lab Sample ID: 22562S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 87.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10700			P
7440-36-0	Antimony	4.3	PA	J	P
7440-38-2	Arsenic	9.1			P
7440-39-3	Barium	106			P
7440-41-7	Beryllium	0.30	PA	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6800			P
7440-47-3	Chromium	22.4		J	P
7440-48-4	Cobalt	7.0	PA	J	P
7440-50-8	Copper	19.1			P
7439-89-6	Iron	16900			P
7439-92-1	Lead	97.6		J	P
7439-95-4	Magnesium	5030		J	P
7439-96-5	Manganese	388		J	P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	17.6			P
7440-09-7	Potassium	2870			P
7782-49-2	Selenium	1.6		MUJ	P
7440-22-4	Silver	1.3	PA	J	P
7440-23-5	Sodium	436	PA	J	P
7440-28-0	Thallium	0.99	PA	J	P
7440-62-2	Vanadium	38.7			P
7440-66-6	Zinc	68.7		J	P
	Cyanide				NR

CP 8.17.99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS35

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): WATER

Lab Sample ID: 22563S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17900			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	35.5			P
7440-39-3	Barium	208			P
7440-41-7	Beryllium	3.5	AB		P
7440-43-9	Cadmium	1.2	AB		P
7440-70-2	Calcium	44600			P
7440-47-3	Chromium	102			P
7440-48-4	Cobalt	9.4	AB		P
7440-50-8	Copper	81.8			P
7439-89-6	Iron	30100			P
7439-92-1	Lead	165			P
7439-95-4	Magnesium	15800			P
7439-96-5	Manganese	664			P
7439-97-6	Mercury	0.13	AB		CV
7440-02-0	Nickel	50.8			P
7440-09-7	Potassium	6880			P
7782-49-2	Selenium	5.8		U	P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	129000			P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	29.5	AB		P
7440-66-6	Zinc	471			P
	Cyanide				NR

Color Before: COLORLESS

Clarity Before: CLEAR

Texture: CP 8.17-99

Color After: COLORLESS

Clarity After: CLEAR

Artifacts:

Comments:

FIELD BLANK

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBS36

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBS22

Matrix (soil/water): WATER

Lab Sample ID: 22564S

Level (low/med): LOW

Date Received: 07/14/99

Solids: 0.0

Concentration Units (ug/L or mg/Kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	1080			P
7440-36-0	Antimony	3.0	U		P
7440-38-2	Arsenic	9.6	DB	J	P
7440-39-3	Barium	8.5	DB	J	P
7440-41-7	Beryllium	0.40	U		P
7440-43-9	Cadmium	0.87	DB	J	P
7440-70-2	Calcium	5540			P
7440-47-3	Chromium	5.4	DB	J	P
7440-48-4	Cobalt	3.0	DB	J	P
7440-50-8	Copper	8.2	DB	J	P
7439-89-6	Iron	2280			P
7439-92-1	Lead	8.0			P
7439-95-4	Magnesium	2460	DB	J	P
7439-96-5	Manganese	127			P
7439-97-6	Mercury	0.10	U		CV
7440-02-0	Nickel	8.7	DB	J	P
7440-09-7	Potassium	3170	DB	J	P
7782-49-2	Selenium	2.3	U		P
7440-22-4	Silver	1.4	U		P
7440-23-5	Sodium	110000			P
7440-28-0	Thallium	3.3	U		P
7440-62-2	Vanadium	3.0	DB	J	P
7440-66-6	Zinc	82.4			P
	Cyanide				NR

CP 8.17.99
Texture:

Artifacts:

Comments:

FIELD BLANK

ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
TECHNOLOGY SERVICES GROUP



ESAT Region 10
Lockheed Martin
7411 Beach Drive East
Port Orchard, WA 98366
Phone (360) 871-8723

DELIVERABLE NARRATIVE

DATE: August 16, 1999

To: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data Validation Report for the Inorganic Analysis of Samples from the Wenatchee Brownfields Site. Case: 27165 SDG: MJBR36

DOC: ESW10-3-1354

PWO: ESW72017

TDF: 3635

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 20 soil samples collected from the above referenced site has been completed. These samples were analyzed for total metals by SENTINEL, Inc. of Huntsville, Al. The following samples were reviewed in this validation report:

MJBR36	MJBR41	MJBR47	MJBR59
MJBR37	MJBR42	MJBR49	MJBR60
MJBR38	MJBR44	MJBR50	MJBR61
MJBR39	MJBR45	MJBR52	MJBR63
MJBR40	MJBR46	MJBR53	MJBR64

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganic Analysis (ILM04.0) and the USEPA CLP Functional Guidelines for Inorganic Data Review, 2/94.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

The suggested holding time for mercury is 28 days from the date of sample collection and the holding time for the rest of the metals is 180 days. The samples were collected on 6/29, 6/30 and 7/1/99. The samples were analyzed for mercury within 22 days and all other metals within 33 days of the sample collection date. None of the data were qualified on this basis.

Sample Preparation - Acceptable

The samples were prepared in accordance with the methods used. None of the data were qualified on this basis.

Initial Calibration - Acceptable

All of the samples were analyzed for total mercury using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The initial calibrations for mercury met the frequency of analysis and the linearity criteria (correlation coefficients, $r \geq 0.995$).

The rest of the target analytes were analyzed using the Inductively Coupled Plasma-Atomic Emission Spectroscopy (ICP-AES). The initial calibration for all ICP analyses met the frequency of analyses.

None of the data were qualified on this basis.

Calibration Verification - Acceptable

The initial and continuing calibration verification analyses met the criteria for frequency of analysis and recovery criteria of 90-110% and 80-120% for mercury. The recoveries ranged from 93-109% for ICP and from 94-110% for mercury analysis. None of the data were qualified on this basis.

Detection Limits - Acceptable

All of the target analytes met the project required quantitation limits. All of the Contract Required Detection Limit (CRDL) checks met the frequency of analysis and recovery criteria.

Blanks

Procedural blanks were prepared with the samples to indicate potential contamination from the digestion or analytical procedure. If an analyte was found in the associated blank, the sample results were qualified as non-detects, "U", if the analyte concentration is less than five times the analytical value in the blank.

The frequency of analysis of blanks was met. Based on the target analytes detected in the procedural, initial and continuing calibration blanks, the following results were qualified as non-detects, "U":

Analyte	Associated Samples
selenium	All except MJBR41, MJBR42

Beryllium yielded a negative response in the preparation blank and/or continuing calibration blank(s). Due to possible low bias, the beryllium results in the associated samples at concentrations comparable to or less than the absolute value of the blank(s) were qualified as estimated, "J/UJ". The following samples were qualified: MJBR44, MJBR46, MJBR47, MJBR50, MJBR59, MJBR60, MJBR61.

ICP-AES Interference Check Sample - Acceptable

The ICP-AES interference check samples (ICS) were analyzed to verify inter-element and background correction factors. The frequency of analysis (beginning and end of sequence) and recovery criteria (80-120%) were met by all of the ICS analyzed. The recoveries ranged from 86-113%. None of the data were qualified on this basis.

ICP-AES Serial Dilution Analysis

Sample MJBR44 was analyzed for serial dilution. All of the analytes which exceeded the minimum concentration criterion (50 times the IDL) agreed within 10% difference with the exception of calcium, magnesium and zinc. Zinc only slightly exceeded the 10% difference criteria and therefore, was not qualified on this basis. Results for calcium and magnesium in all samples were qualified as estimated, "J". The "E" qualifiers applied by the laboratory were crossed-out by the reviewer.

Laboratory Control Sample - Acceptable

The frequency of analysis and the recovery criteria for the laboratory control sample analysis were met. The recoveries ranged from 74-129%. None of the data were qualified on this basis.

Duplicate Sample Analysis

Sample MJBR44 was utilized for duplicate analysis. The duplicate results met the frequency of analysis and control limit criteria for all target analytes with the exception of aluminum, arsenic, calcium, chromium, lead and zinc. Chromium only slightly exceeded the control limit criteria and therefore, was not qualified on this basis. Results for aluminum, arsenic, calcium, lead and zinc in all samples were qualified as estimated, "J". The "*" qualifiers applied by the laboratory were crossed-out by the reviewer.

Matrix Spike Analysis

Sample MJBR44 was used for the spike analysis. The frequency of analysis and recovery criteria were met with the exception of antimony (25%) and silver (64%) in the spike sample MJBR44S. Due to possible bias, the detected antimony results in all samples were qualified as estimated, "J", and the non-detected results were qualified "R". Due to possible bias, the detected and non-detected silver results in all samples were qualified as estimated, "J/UJ". The "N" qualifiers applied by the laboratory were crossed-out by the reviewer. The recovery for lead could not be accurately determined because the concentration native to the sample was greater than 4 times the amount of spike added to the sample. All of the other spike recoveries were acceptable and ranged from 82-104%.

Laboratory Contact

The laboratory was not contacted for this review.

Overall Assessment

All of the samples were analyzed in accordance with technical specifications outlined in the SOW. The data, as qualified, are acceptable and can be used for all purposes.

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR37

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22221S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 83.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11100		J	P
7440-36-0	Antimony	0.71	U	J	P
7440-38-2	Arsenic	17.3		J	P
7440-39-3	Barium	112		J	P
7440-41-7	Beryllium	0.24		J	P
7440-43-9	Cadmium	0.27		J	P
7440-70-2	Calcium	11600		J	P
7440-47-3	Chromium	22.8		J	P
7440-48-4	Cobalt	6.4		J	P
7440-50-8	Copper	20.2		J	P
7439-89-6	Iron	17900		J	P
7439-92-1	Lead	103		J	P
7439-95-4	Magnesium	5280		J	P
7439-96-5	Manganese	344		J	P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	15.0		J	P
7440-09-7	Potassium	3060		J	P
7782-49-2	Selenium	1.7		J	P
7440-22-4	Silver	0.69		J	P
7440-23-5	Sodium	707		J	P
7440-28-0	Thallium	1.1		J	P
7440-62-2	Vanadium	37.4		J	P
7440-66-6	Zinc	93.2		J	P
	Cyanide				NR

R

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR38

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22222S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 83.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	21000		J	P
7440-36-0	Antimony	0.70	U	J	P
7440-38-2	Arsenic	7.1		J	P
7440-39-3	Barium	202			P
7440-41-7	Beryllium	0.34	U	J	P
7440-43-9	Cadmium	0.12	U		P
7440-70-2	Calcium	7170		J	P
7440-47-3	Chromium	62.5			P
7440-48-4	Cobalt	13.7			P
7440-50-8	Copper	40.3			P
7439-89-6	Iron	31400			P
7439-92-1	Lead	39.3		J	P
7439-95-4	Magnesium	12500		J	P
7439-96-5	Manganese	462			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	61.9			P
7440-09-7	Potassium	2070			P
7782-49-2	Selenium	2.5		J	P
7440-22-4	Silver	1.2		J	P
7440-23-5	Sodium	736		J	P
7440-28-0	Thallium	1.7		J	P
7440-62-2	Vanadium	71.8			P
7440-66-6	Zinc	120		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR39

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22223S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 92.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12400		J	P
7440-36-0	Antimony	0.65	U	J	P
7440-38-2	Arsenic	11.9		J	P
7440-39-3	Barium	94.8			P
7440-41-7	Beryllium	0.29	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	9410		J	P
7440-47-3	Chromium	18.4		J	P
7440-48-4	Cobalt	6.9	B	J	P
7440-50-8	Copper	15.4			P
7439-89-6	Iron	17800			P
7439-92-1	Lead	62.2		J	P
7439-95-4	Magnesium	5020		J	P
7439-96-5	Manganese	349			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	13.7			P
7440-09-7	Potassium	2730			P
7782-49-2	Selenium	1.5	B	J	P
7440-22-4	Silver	0.64	B	J	P
7440-23-5	Sodium	337	B	J	P
7440-28-0	Thallium	1.0	B	J	P
7440-62-2	Vanadium	35.8			P
7440-66-6	Zinc	59.9		J	P
	Cyanide				NR

R

MP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR40

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22224S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 91.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	9940		J	P
7440-36-0	Antimony	0.64	U	J	P
7440-38-2	Arsenic	6.6		J	P
7440-39-3	Barium	92.9			P
7440-41-7	Beryllium	0.24	J		P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	10600		J	P
7440-47-3	Chromium	19.1		J	P
7440-48-4	Cobalt	6.7	J		P
7440-50-8	Copper	14.5			P
7439-89-6	Iron	17200			P
7439-92-1	Lead	29.8		J	P
7439-95-4	Magnesium	4970		J	P
7439-96-5	Manganese	308			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	12.0			P
7440-09-7	Potassium	2610			P
7782-49-2	Selenium	1.4		J	P
7440-22-4	Silver	0.62	J	J	P
7440-23-5	Sodium	311	J		P
7440-28-0	Thallium	0.96	J		P
7440-62-2	Vanadium	35.6			P
7440-66-6	Zinc	54.7		J	P
	Cyanide				NR

R

CP 8-17-99
Texture: MEDIUM

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR41

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22225S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 74.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12200		J	P
7440-36-0	Antimony	0.77	U	J	P
7440-38-2	Arsenic	19.4		J	P
7440-39-3	Barium	137			P
7440-41-7	Beryllium	0.27	U	J	P
7440-43-9	Cadmium	0.13	U		P
7440-70-2	Calcium	11900		J	P
7440-47-3	Chromium	26.0		J	P
7440-48-4	Cobalt	7.9		J	P
7440-50-8	Copper	24.2			P
7439-89-6	Iron	21200			P
7439-92-1	Lead	127		J	P
7439-95-4	Magnesium	5700		J	P
7439-96-5	Manganese	420			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	23.6			P
7440-09-7	Potassium	3580			P
7782-49-2	Selenium	2.3			P
7440-22-4	Silver	1.1		J	P
7440-23-5	Sodium	609		J	P
7440-28-0	Thallium	0.93		J	P
7440-62-2	Vanadium	41.2			P
7440-66-6	Zinc	186		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-97

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR42

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22226S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 75.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	16100		J	P
7440-36-0	Antimony	0.76	U	R	P
7440-38-2	Arsenic	3.9		J	P
7440-39-3	Barium	169			P
7440-41-7	Beryllium	0.49		J	P
7440-43-9	Cadmium	0.13	U		P
7440-70-2	Calcium	10100		J	P
7440-47-3	Chromium	29.7			P
7440-48-4	Cobalt	14.7			P
7440-50-8	Copper	26.2			P
7439-89-6	Iron	31000			P
7439-92-1	Lead	24.3		J	P
7439-95-4	Magnesium	7580		J	P
7439-96-5	Manganese	1780			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	31.5			P
7440-09-7	Potassium	2440			P
7782-49-2	Selenium	2.2			P
7440-22-4	Silver	1.3		J	P
7440-23-5	Sodium	672		J	P
7440-28-0	Thallium	2.1		J	P
7440-62-2	Vanadium	74.1			P
7440-66-6	Zinc	73.0		J	P
	Cyanide				NR

CP 8-17-99

Texture: MEDIUM

Artifacts:

Clarity Before:

Clarity After:

Color Before: BROWN

Color After: COLORLESS

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR44

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22227S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 92.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	10700		J	P
7440-36-0	Antimony	0.64	U	R	P
7440-38-2	Arsenic	20.7		J	P
7440-39-3	Barium	89.6			P
7440-41-7	Beryllium	0.23		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6440		J	P
7440-47-3	Chromium	17.4		J	P
7440-48-4	Cobalt	6.6		J	P
7440-50-8	Copper	15.1			P
7439-89-6	Iron	16900			P
7439-92-1	Lead	88.8		J	P
7439-95-4	Magnesium	4680		J	P
7439-96-5	Manganese	395			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	13.0			P
7440-09-7	Potassium	2690			P
7782-49-2	Selenium	1.5		U	P
7440-22-4	Silver	0.79		J	P
7440-23-5	Sodium	371		J	P
7440-28-0	Thallium	0.71	U		P
7440-62-2	Vanadium	35.6			P
7440-66-6	Zinc	57.1		J	P
	Cyanide				NR

CP 8-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR45

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22228S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 86.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11900		J	P
7440-36-0	Antimony	0.69	U	J	P
7440-38-2	Arsenic	43.9		J	P
7440-39-3	Barium	126			P
7440-41-7	Beryllium	0.36	B	J	P
7440-43-9	Cadmium	0.44	B	J	P
7440-70-2	Calcium	9530		J	P
7440-47-3	Chromium	17.5		J	P
7440-48-4	Cobalt	6.6	B	J	P
7440-50-8	Copper	15.3			P
7439-89-6	Iron	18900			P
7439-92-1	Lead	385		J	P
7439-95-4	Magnesium	4620		J	P
7439-96-5	Manganese	420			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	12.8			P
7440-09-7	Potassium	2910			P
7782-49-2	Selenium	1.7		U	P
7440-22-4	Silver	0.71	B	J	P
7440-23-5	Sodium	335	B	J	P
7440-28-0	Thallium	1.2	B	J	P
7440-62-2	Vanadium	36.4			P
7440-66-6	Zinc	227		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR46

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22265S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 76.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11100		J	P
7440-36-0	Antimony	2.5	J	J	P
7440-38-2	Arsenic	9.3	J	J	P
7440-39-3	Barium	182			P
7440-41-7	Beryllium	0.16	J	J	P
7440-43-9	Cadmium	0.24	J	J	P
7440-70-2	Calcium	10600		J	P
7440-47-3	Chromium	28.8		J	P
7440-48-4	Cobalt	8.8	J	J	P
7440-50-8	Copper	35.8			P
7439-89-6	Iron	30400			P
7439-92-1	Lead	165		J	P
7439-95-4	Magnesium	5900		J	P
7439-96-5	Manganese	377			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	23.3			P
7440-09-7	Potassium	3030			P
7782-49-2	Selenium	2.6	U		P
7440-22-4	Silver	1.3	J	J	P
7440-23-5	Sodium	483	J	J	P
7440-28-0	Thallium	2.2	J	J	P
7440-62-2	Vanadium	37.4			P
7440-66-6	Zinc	248		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

UP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR47

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22229S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 78.4

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11800		J	P
7440-36-0	Antimony	0.76	U	R	P
7440-38-2	Arsenic	1.6	B	J	P
7440-39-3	Barium	137			P
7440-41-7	Beryllium	0.32	B	J	P
7440-43-9	Cadmium	0.13	U		P
7440-70-2	Calcium	5230		J	P
7440-47-3	Chromium	19.1			P
7440-48-4	Cobalt	11.0	B	J	P
7440-50-8	Copper	18.3			P
7439-89-6	Iron	24500			P
7439-92-1	Lead	13.2		J	P
7439-95-4	Magnesium	6160		J	P
7439-96-5	Manganese	547			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	26.4			P
7440-09-7	Potassium	2160			P
7782-49-2	Selenium	1.8		U	P
7440-22-4	Silver	0.93	B	J	P
7440-23-5	Sodium	545	B	J	P
7440-28-0	Thallium	1.4	B	J	P
7440-62-2	Vanadium	60.6			P
7440-66-6	Zinc	69.0		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

13

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR49

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22230S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 88.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11200		J	P
7440-36-0	Antimony	0.66	U	J	P
7440-38-2	Arsenic	28.7		J	P
7440-39-3	Barium	85.5			P
7440-41-7	Beryllium	0.34		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	5280		J	P
7440-47-3	Chromium	15.2		J	P
7440-48-4	Cobalt	6.8		J	P
7440-50-8	Copper	14.7			P
7439-89-6	Iron	18400			P
7439-92-1	Lead	134		J	P
7439-95-4	Magnesium	4470		J	P
7439-96-5	Manganese	337			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	11.7			P
7440-09-7	Potassium	2520			P
7782-49-2	Selenium	1.5		J	P
7440-22-4	Silver	0.73		J	P
7440-23-5	Sodium	347		J	P
7440-28-0	Thallium	1.1		J	P
7440-62-2	Vanadium	37.0			P
7440-66-6	Zinc	58.6		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR50

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22231S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 92.0

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11800		J	P
7440-36-0	Antimony	0.63	U	NR	P
7440-38-2	Arsenic	5.0		J	P
7440-39-3	Barium	82.2			P
7440-41-7	Beryllium	0.27	U	J	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	6270		J	P
7440-47-3	Chromium	17.2		J	P
7440-48-4	Cobalt	6.5	U	J	P
7440-50-8	Copper	17.0			P
7439-89-6	Iron	17400			P
7439-92-1	Lead	23.0		J	P
7439-95-4	Magnesium	4900		J	P
7439-96-5	Manganese	345			P
7439-97-6	Mercury	0.16			CV
7440-02-0	Nickel	12.7			P
7440-09-7	Potassium	2240			P
7782-49-2	Selenium	1.5		U	P
7440-22-4	Silver	0.74	U	J	P
7440-23-5	Sodium	337	U	J	P
7440-28-0	Thallium	1.2	U	J	P
7440-62-2	Vanadium	36.2			P
7440-66-6	Zinc	79.0		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR52

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22266S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 92.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	14700		J	P
7440-36-0	Antimony	0.64	U	NR	P
7440-38-2	Arsenic	3.4		J	P
7440-39-3	Barium	105			P
7440-41-7	Beryllium	0.29	B	J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	6320		J	P
7440-47-3	Chromium	31.6		J	P
7440-48-4	Cobalt	9.2	B	J	P
7440-50-8	Copper	20.8			P
7439-89-6	Iron	20600			P
7439-92-1	Lead	10.2		J	P
7439-95-4	Magnesium	7540		J	P
7439-96-5	Manganese	360			P
7439-97-6	Mercury	0.05	B	J	CV
7440-02-0	Nickel	23.3			P
7440-09-7	Potassium	3290			P
7782-49-2	Selenium	2.0		U	P
7440-22-4	Silver	0.77	B	J	P
7440-23-5	Sodium	1780			P
7440-28-0	Thallium	1.1	B	J	P
7440-62-2	Vanadium	45.6			P
7440-66-6	Zinc	59.5		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR53

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22267S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 94.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	13300		J	P
7440-36-0	Antimony	0.63	U	R	P
7440-38-2	Arsenic	2.9		J	P
7440-39-3	Barium	119			P
7440-41-7	Beryllium	0.25		J	P
7440-43-9	Cadmium	0.10	U		P
7440-70-2	Calcium	4810		J	P
7440-47-3	Chromium	28.5		J	P
7440-48-4	Cobalt	8.1		J	P
7440-50-8	Copper	19.7			P
7439-89-6	Iron	18600			P
7439-92-1	Lead	8.9		J	P
7439-95-4	Magnesium	6610		J	P
7439-96-5	Manganese	340			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	23.3			P
7440-09-7	Potassium	3490			P
7782-49-2	Selenium	1.9		J	P
7440-22-4	Silver	0.70		J	P
7440-23-5	Sodium	424		J	P
7440-28-0	Thallium	1.1		J	P
7440-62-2	Vanadium	40.7			P
7440-66-6	Zinc	53.1		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR59

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22232S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 76.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	7920		J	P
7440-36-0	Antimony	0.94	B	J	P
7440-38-2	Arsenic	13.4		J	P
7440-39-3	Barium	91.2			P
7440-41-7	Beryllium	0.16	B	J	P
7440-43-9	Cadmium	0.13	U		P
7440-70-2	Calcium	3320		J	P
7440-47-3	Chromium	16.1			P
7440-48-4	Cobalt	5.1	B	S	P
7440-50-8	Copper	20.8			P
7439-89-6	Iron	12800			P
7439-92-1	Lead	210		J	P
7439-95-4	Magnesium	3670		J	P
7439-96-5	Manganese	265			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	14.8			P
7440-09-7	Potassium	1720			P
7782-49-2	Selenium	1.1	B	45	P
7440-22-4	Silver	0.55	B	J	P
7440-23-5	Sodium	242	B	S	P
7440-28-0	Thallium	0.85	U		P
7440-62-2	Vanadium	25.3			P
7440-66-6	Zinc	111		J	P
	Cyanide				NR

UP 8-17-99

Texture: MEDIUM

Color Before: BROWN

Clarity Before:

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR60

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22233S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 97.8

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8250		J	P
7440-36-0	Antimony	0.61	U	R	P
7440-38-2	Arsenic	9.8		J	P
7440-39-3	Barium	253			P
7440-41-7	Beryllium	0.18	P	J	P
7440-43-9	Cadmium	1.1			P
7440-70-2	Calcium	9860		J	P
7440-47-3	Chromium	18.8		J	P
7440-48-4	Cobalt	5.6	P	J	P
7440-50-8	Copper	32.0			P
7439-89-6	Iron	14800			P
7439-92-1	Lead	271		J	P
7439-95-4	Magnesium	4040		J	P
7439-96-5	Manganese	367			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	16.1			P
7440-09-7	Potassium	2460			P
7782-49-2	Selenium	1.5		U	P
7440-22-4	Silver	0.63	P	J	P
7440-23-5	Sodium	221	P	J	P
7440-28-0	Thallium	0.75	P	J	P
7440-62-2	Vanadium	28.1			P
7440-66-6	Zinc	289		J	P
	Cyanide				NR

CP 8-1799

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MJBR61

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22234S

Level (low/med): LOW

Date Received: 07/02/99

Solids: 66.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	17200		J	P
7440-36-0	Antimony	0.88	U	R	P
7440-38-2	Arsenic	22.7		J	P
7440-39-3	Barium	228			P
7440-41-7	Beryllium	0.39	B	J	P
7440-43-9	Cadmium	0.16	B	J	P
7440-70-2	Calcium	8590		J	P
7440-47-3	Chromium	36.9		J	P
7440-48-4	Cobalt	8.9	B	J	P
7440-50-8	Copper	41.1		J	P
7439-89-6	Iron	20200		J	P
7439-92-1	Lead	333		J	P
7439-95-4	Magnesium	5480		J	P
7439-96-5	Manganese	390			P
7439-97-6	Mercury	0.16	B	J	CV
7440-02-0	Nickel	22.0		J	P
7440-09-7	Potassium	5170			P
7782-49-2	Selenium	1.7		J	P
7440-22-4	Silver	0.86	B	J	P
7440-23-5	Sodium	342	B	J	P
7440-28-0	Thallium	1.2	B	J	P
7440-62-2	Vanadium	44.4		J	P
7440-66-6	Zinc	287		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

CP 8-17-99
Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

MJBR63

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22268S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 91.5

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	11700		J	P
7440-36-0	Antimony	0.64	U	R	P
7440-38-2	Arsenic	15.9		J	P
7440-39-3	Barium	99.7			P
7440-41-7	Beryllium	0.25		J	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7050		J	P
7440-47-3	Chromium	19.8		J	P
7440-48-4	Cobalt	8.1		J	P
7440-50-8	Copper	30.2			P
7439-89-6	Iron	18600			P
7439-92-1	Lead	130		J	P
7439-95-4	Magnesium	5940		J	P
7439-96-5	Manganese	348			P
7439-97-6	Mercury	0.05	U		CV
7440-02-0	Nickel	19.7			P
7440-09-7	Potassium	2360			P
7782-49-2	Selenium	1.6		J	P
7440-22-4	Silver	0.70		J	P
7440-23-5	Sodium	397		J	P
7440-28-0	Thallium	0.72		J	P
7440-62-2	Vanadium	39.4		J	P
7440-66-6	Zinc	76.9		J	P
	Cyanide				NR

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:

EPA SAMPLE NO.

INORGANIC ANALYSIS DATA SHEET

MJBR64

Lab Name: SENTINEL INC.

Contract: 68-D6-0001

Lab Code: SENTIN

Case No.: 27165

SAS No.:

SDG No.: MJBR36

Matrix (soil/water): SOIL

Lab Sample ID: 22269S

Level (low/med): LOW

Date Received: 07/03/99

Solids: 89.2

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	12600		J	P
7440-36-0	Antimony	0.66	U	R	P
7440-38-2	Arsenic	18.8		J	P
7440-39-3	Barium	92.9			P
7440-41-7	Beryllium	0.36		S	P
7440-43-9	Cadmium	0.11	U		P
7440-70-2	Calcium	7430		J	P
7440-47-3	Chromium	19.5		J	P
7440-48-4	Cobalt	6.6		S	P
7440-50-8	Copper	17.0			P
7439-89-6	Iron	17500			P
7439-92-1	Lead	162		J	P
7439-95-4	Magnesium	4790		J	P
7439-96-5	Manganese	333			P
7439-97-6	Mercury	0.06	U		CV
7440-02-0	Nickel	14.1			P
7440-09-7	Potassium	2420			P
7782-49-2	Selenium	1.5		U	P
7440-22-4	Silver	0.78		J	P
7440-23-5	Sodium	353		J	P
7440-28-0	Thallium	1.4		J	P
7440-62-2	Vanadium	36.5			P
7440-66-6	Zinc	84.0		J	P
	Cyanide				NR

CP 5-17-99

Color Before: BROWN

Clarity Before:

Texture: MEDIUM

Color After: COLORLESS

Clarity After:

Artifacts:

Comments:



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International Specialists in the Environment

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MEMORANDUM

DATE: September 24, 1999

TO: Mark Woodke, Project Manager, E & E, Seattle, WA

FROM: Alasdair Turner, START-Chemist, E & E, Seattle, WA 

SUBJ: Inorganic Data Quality Assurance Summary Review, Wenatchee Brownfields Site, Wenatchee, Washington.

REF: TDD: 98-11-0007 PAN: CK0701SIDM

The data quality assurance summary review of 20 soil samples collected from the Wenatchee Brownfields Site in Wenatchee, Washington has been completed. Analysis for VOCs, SVOC, and Pest/PCBs (EPA CLP SOW for organic analysis OLM03.2) has been completed, and was performed by COMPUCHEM, of Cary, NC.

No discrepancies were noted.

ENVIRONMENTAL SERVICES ASSISTANCE TEAMS - WESTERN ZONE

LOCKHEED MARTIN
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ESAT Region 10
Lockheed Martin
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DELIVERABLE NARRATIVE

DATE: September 3, 1999

TO: Ginna Grepo-Grove, WAM, USEPA, Region 10

THROUGH: Dave Dobb, Team Manager, ESAT Region 10 *DD*

FROM: Chris Pace, Task Lead, ESAT Region 10 *CP*

SUBJECT: Data validation report for the volatile organic (VOA), semi-volatile organic (SVOA) and pesticide/polychlorinated biphenyl (Pest/PCB) analysis of samples from the Wenatchee Brownfields Site. Case: 27165 SDG: JW542

DOC: ESW10-3-1379

PWO: ESW72020

TDF: 3641

WA: 10-99-3-10

CC: Gerald Dodo, RPO, USEPA, Region 10
Project File

The quality assurance (QA) review of 20 soil samples collected from the above referenced site has been completed. These samples were analyzed for VOA (16), SVOA (16) and Pest/PCB (20) in accordance with the USEPA Contract Laboratory Program (CLP) Statement of Work (SOW) for Organic Analyses (OLM03.2) by COMPUCHEM of Cary, NC.

DATA QUALIFICATIONS

The following comments refer to the laboratory performance in meeting the Quality Control Specifications outlined in the USEPA CLP SOW for Organic Analysis (OLM03.2), the USEPA CLP National Functional Guidelines for Organic Data Review (2/94) and the Region 10 Guidelines for CLP Data Review.

The conclusions presented herein are based on the information provided for the review.

Holding Time - Acceptable

All samples were preserved with ice prior to shipment. All of the samples met the method and technical (40 CFR 136) required holding times for all analyses. The Holding Times Summary listing the pertinent collection, extraction, and analysis dates is attached at the end of this validation report.

Instrument Performance - Acceptable

All of the GC and GC/MS systems met the SOW specified technical acceptance criteria prior to sample analyses, i.e., GC/MS performance checks, GC performance checks, retention times, response factors, and calibrations. The systems remained stable throughout the course of analyses. Instrument blanks were all clean and there were no indications of carry-over.

Initial Calibrations - Acceptable

One VOA, two SVOA and three Pest/PCB initial calibrations were performed. The initial calibrations met the SOW technical acceptance criteria.

Continuing Calibration Verification (CCVs) Standards

All of the CCVs met the criteria for frequency of analysis, the minimum response factor, the retention time and the percent differences (%Ds) criteria with the following exceptions:

- The %Ds for the following VOA compounds exceeded the QC limits and the associated results were qualified accordingly:

Date /Time of Analysis	Inst. i.d.	Compound	%D	Qualifier Detect/Non-detect
7/13/99 (08:31)	51	chloromethane	-42.8	J/UJ
		1,2-dichloroethane	29.2	J/none
		1,2-dichloroethane-d4 (surr.)	42.4	none
7/15/99 (10:10)	51	1,2-dichloroethane	26.3	J/none
		1,1,1-trichloroethane	25.3	none
		1,2-dichloroethane-d4 (surr.)	56.6	none

- The %Ds for the following SVOA compounds exceeded the QC limits and the associated results were qualified accordingly:

Date /Time of Analysis	Inst. i.d.	Compound	%D	Qualifier Detect/Non-detect
7/12/99 (08:06)	66	hexachlorobenzene	27.5	J/none
		3,3'-dichlorobenzidine	-35.5	J/UJ
		2,4,6-tribromophenol (surr.)	32.1	none
7/12/99 (22:01)	66	4-nitrophenol	-37.4	J/UJ
		4-bromophenyl-phenylether	27.7	J/none
		hexachlorobenzene	30.1	J/none
		terphenyl-d14 (surr.)	25.8	none
		2,4,6-tribromophenol (surr.)	36.6	none
7/13/99 (11:13)	66	pentachlorophenol	-28.8	J/UJ
		3,3'-dichlorobenzidine	48.4	J/none
		2,4,6-tribromophenol (surr.)	33.0	none
7/14/99 (10:50)	66	2,4-dinitrophenol	34.6	J/none
		3,3'-dichlorobenzidine	28.2	J/none
7/15/99 (09:49)	66	2,4-dinitrophenol	31.6	J/none
		2,4-dinitrotoluene	28.4	J/none
		4,6-dinitro-2-methylphenol	25.5	none
		2,4,6-tribromophenol (surr.)	34.8	none
7/14/99 (23:38)	70	pentachlorophenol	-27.5	J/UJ
		2,4,6-tribromophenol (surr.)	-28.8	none
7/15/99 (18:08)	70	pentachlorophenol	-38.3	J/UJ