SUPPLEMENTAL SITE INVESTIGATION REPORT

AMMUNITION STORAGE MAGAZINES AND PESTICIDE STORAGE AREA

Camp Bonneville
Washington

Prepared for

U.S. Army Corps of Engineers
Seattle District
4735 East Marginal Way South
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CONSENSUS STATEMENT

The enclosed report is entitled "Supplemental Site Investigation Report, Ammunition Storage Magazines and Pesticide Storage Area, Camp Bonneville, Washington." The undersigned agree with the information presented in this report, including the results and conclusions.

_____ _____

Eric Waehling — Date
BRAC Environmental Coordinator

_____ _____

Christopher Maurer — Date
Washington State Department of Ecology

_____ _____

Harry Craig — Date
U.S. EPA Region 10

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Figures

Appendices

2,4,5-T	trichlorophenoxy acetic acid
2,4-D	dichlorophenoxy acetic acid
ACM	asbestos-containing material
AFP	artillery firing point
APP	accident prevention plan
ARI	Analytical Resources, Inc.
BCT	BRAC Cleanup Team
BCP	BRAC Cleanup Plan
bgs	below ground surface
BRAC	Base Realignment and Closure
ca	carcinogen
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CLP	contract laboratory program
COPC	chemical of potential concern
CSM	Conceptual Site Model
DDT	dichloro diphenyl trichloroethane
DNR	Washington State Department of Natural Resources
DOD	Department of Defense
DQO	data quality objective
EBS	environmental baseline survey
Ecology	Washington State Department of Ecology
EDF	electronic data format
EO	exploded ordnance
EPA	U.S. Environmental Protection Agency
FBI	Federal Bureau of Investigation
FORSCOM	U.S. Army Forces Command
FSP	field sampling plan
GIS	graphic information system
HE	high explosive
HFA	Human Factors Analysis
HMX	octhydro-1,3,5,7-tetranitro-1,3,5,7 tetrazocine
HQ	hazard quotient
LBP	lead-base paint
MDL	method detection limit
mg/kg	milligrams per kilogram

Acronyms

mm	millimeter
MRL	method reporting limit
msl	mean sea level
MS/MSD	matrix spike and matrix spike duplicate
MTCA	Model Toxics Control Act
NC	nitrocellulose
nc	noncarcinogen
NCEA	National Center for Environmental Assessment
NG	nitroguanadine
NQ	nitroglycerine
NTU	nephelometric turbidity unit
PCBS	polychlorinated biphenyls
PETN	pentaerythritol tetranitrate
PID	Photoionization Detectors
PRG	preliminary remediation goal
Pt	Troutdale Formation
Qa	Quaternary alluvium
QA/QC	quality assurance/quality control
Qls	Quaternary landslide deposit
RBCs	Risk-Based Concentrations
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
SAP	sampling and analysis plan
SOW	scope of work
SPT	Standard Penetration Test
SSI	Supplemental Site Investigation
SVOCs	Semi-volatile organic compounds
TNT	2,4,6-trinitrotoluene
TPH	total petroleum hydrocarbons
Tv	volcanic bedrock
µg/L	micrograms per liter
USACE	U.S. Army Corps of Engineers
USAMC	U.S. Army Material Command
UST	underground storage tank
UXO	unexploded ordnance

Camp Bonneville is a 3,840-acre military installation, located 12 miles east of the City of Vancouver, in Clark County, Washington. The installation covers a large portion of the Lacamas Creek Valley and consists mostly of forested areas. The majority of structures on the property are located in the Bonneville and Killpack cantonment areas near the installation's main entrance. Camp Bonneville was established as a drill field and rifle range in 1909 and has historically been used for military training. In recent years, the Federal Bureau of Investigation (FBI) has used some of the post firing ranges. In 1995 the camp was selected for closure under the Base Realignment and Closure (BRAC) process.

The U. S. Army Corps of Engineers (USACE), Seattle District is managing environmental investigation and cleanup activities at Camp Bonneville in accordance with the BRAC environmental restoration program, which includes investigation and potential remediation of sites with contaminated soil and/or groundwater. As part of the investigation effort at Camp Bonneville, the USACE retained URS to perform a Supplemental Site Investigation (SSI) at the Ammunition Storage Magazines and former Pesticide Storage Area.

The primary objectives of the SSI were to:

- Evaluate chemicals of potential concern (COPCs) in surface soil and in flooring material of Building 4126 at the Pesticide Storage Area.
- Evaluate COPCs in surface and subsurface soil and groundwater at the largest Ammunition Storage Magazine (Building 2953).
- Evaluate potential exposure to human and ecological receptors based on a conceptual site model.

The SSI included the collection of two surface soil samples adjacent to the Pesticide Storage Area (Building 4126) and a floor material sample from inside Building 4126. The samples were submitted for analysis of petroleum hydrocarbons, organochlorine pesticides, polychlorinated biphenyls (PCBs), metals, and herbicides. Unexploded ordnance (UXO) avoidance activities were conducted to provide safe access to sampling locations.

The SSI also included the collection of three surface soil samples near the doorway of the largest Ammunition Storage Magazine (Building 2953). In addition, one boring was drilled downgradient of the Building 2953, and one subsurface soil sample was collected from the soil boring. Two soil borings were originally planned (including installation of groundwater monitoring wells); however, groundwater was not encountered in the downgradient boring. Therefore, the planned upgradient boring was not drilled.

Based on data gathered for the Pesticide Storage area, COPCs are present in the flooring material in Building 4126 and in surface soil adjacent to the building in concentrations exceeding one or more regulatory screening criteria.

The following conclusions for the Ammunition Storage Magazines are based on data gathered during the SSI and on data gathered by Shannon and Wilson (1999) during a previous investigation:

- Soil and residues inside the storage magazines contain explosives compounds and metals (Shannon and Wilson, 1999).

- Surface soils up to 2 feet below ground surface contain metals at concentrations exceeding regulatory screening criteria (Shannon and Wilson, 1999) at all three Ammunition Storage Magazines (Buildings 2950, 2951, and 2953).
- Concentrations of metals decrease significantly with increasing depth.
- Surface soil along the footpath leading to the largest magazine (Building 2953) contains 2,4-dinitrotoluene at concentrations exceeding the cleanup level.

The most likely exposure pathway for these COPCs is direct contact with contaminated surface soil and surface water. The most likely human receptors include current and future on-site workers, and future on-site recreational users. The most likely ecological receptors include terrestrial animals, benthic invertebrates, fish, and waterfowl.

Camp Bonneville is a 3,840-acre military installation, located 12 miles east of the city of Vancouver, in Clark County, Washington. The installation covers a large portion of the Lacamas Creek Valley and consists mostly of forested areas. The majority of structures on the property are located in the Bonneville and Killpack cantonment areas within a few thousand feet of the installation's main entrance. Camp Bonneville was established as a drill field and rifle range in 1909 and has historically been used for military training. In recent years, the Federal Bureau of Investigation (FBI) has used some of the post firing ranges. In 1995, the camp was selected for closure under the Base Realignment and Closure (BRAC) process.

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The scope of work (SOW) for Delivery Order number 0035 of Contract Number DACA67-98-1005 (dated July 23, 1999), originally included an investigation of Demolition Areas 2 and 3 as well as the Ammunition Storage Magazines. However, discussions between Fort Lewis, USACE, URS, the U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) resulted in removal of Demolition Areas 2 and 3 from the SSI. In addition, Modification number 1 to Delivery Order number 0035 (dated November 23, 1999) included investigation of the Pesticide Storage Area.

As specified in the original SOW and Modification Number 1, the objectives of the SSI were to evaluate the floor of and surface soil around the Pesticide Storage Building (4126), and evaluate the surface and subsurface soil in the vicinity of the Ammunition Storage Magazines for potential contaminants related to historic activities. These results were compared to regulatory screening criteria to evaluate the potential exposure to human and ecological receptors. In addition, potential groundwater impacts were also included in the SSI at the Ammunition Storage Magazines. However, groundwater was not encountered in the soil boring drilled there. These data will aid the BRAC Cleanup Team (BCT) to determine follow-up action for the site, if necessary.

The Scope of Work for the SSI included the following tasks:

Prepare Management Plan – URS prepared a draft and final Management Plan to describe the procedures and methods employed to complete the SSI at the Pesticide Storage Area and Ammunition Storage Magazines. The Management Plan included a detailed Work Plan, Sampling and Analysis Plan (including a Field Sampling Plan and Quality Assurance Project Plan), Accident Prevention Plan, and Investigation-Derived Waste Plan (URS 2000). URS and the USACE conducted a project kickoff meeting and a meeting to discuss the draft Management Plan to discuss the project objectives, schedule, and comments on the draft Management Plan.

Conduct Site Survey and Reconnaissance – Prior to field activities, URS and the USACE performed a site survey and reconnaissance to review site conditions, locate soil boring and surface soil sample locations, and refine the field program to reflect site conditions.

Conduct UXO Avoidance Activities – Unexploded ordnance (UXO) may exist near the study areas because Camp Bonneville had been used for nearly 80 years as a military firing range. Therefore, because the most important safety precaution when dealing with potential UXO is to minimize exposure of personnel, UXO avoidance measures were conducted before workers were allowed to begin site activities. This was accomplished by employing a team of UXO specialists to perform the following UXO avoidance activities in areas where the investigation was performed:

- Visual inspection of all investigation areas except those that are used on a regular basis for routine operations (i.e., roadways)
- Magnetometer surface surveys of foot or vehicular traverses off of established roadways and walkways
- Borehole magnetometry measurements during drilling

Conduct Surface Soil Sampling and Analysis – URS collected surface soil samples at the Pesticide Storage Area and Ammunition Storage Magazines to evaluate potential surface soil contamination. Samples collected from the Pesticide Storage Area (including the floor sample) were analyzed for the following constituents:

- Chlorinated pesticides
- Chlorinated herbicides
- Polychlorinated biphenyls (PCBs)
- Priority pollutant metals (plus barium)
- Petroleum hydrocarbons (NWTPH HCID with follow-up analysis of gasoline and diesel, as required)

Samples collected at the Ammunition Storage Magazines were analyzed for the following constituents:

- Nitroaromatic and nitramine explosives, nitroglycerine, nitroguanidine, and ammonium perchlorate
- Semi-volatile organic compounds (SVOCs)
- Priority pollutant metals (plus barium)

- Grain size
- Total organic carbon
- Petroleum hydrocarbons (NWTPH HCID with follow-up analysis of gasoline and diesel, as required)

Soil Boring – URS drilled one soil boring at the Ammunition Storage Magazine to evaluate potential soil contamination in the estimated downgradient direction. The boring was drilled to a depth of approximately 22 feet below ground surface (bgs), where the drilling rig met refusal. Groundwater was not encountered during drilling. Therefore a monitoring well was not installed. Since no groundwater was encountered in the downgradient boring, the USACE field representative determined that the planned upgradient boring would not be drilled.

Supplemental Site Investigation Report – This draft SSI Report describes fieldwork and includes an interpretation of the data gathered during the SSI. Data are compared to existing regulatory cleanup levels and conclusions are presented summarizing the results of this comparison.

3.1 SITE LOCATION

Camp Bonneville is located in Clark County, Washington, near the town of Proebstel, approximately 12 miles east of the city of Vancouver (Figure 3-1). It consists of 3,840 acres, 840 acres of which are leased from Washington State (Woodward-Clyde 1997). Camp Bonneville occupies the following location:

- Section 35, and a portion of Sections 34 and 36 (Section 36 is leased) of Township 3 North, Range 3 East
- Sections 1 and 2, and portions of Section 3, 10, and 11 (Sections 10 and 11 are leased) of Township 2 North and Range 3 East

The areas of interest for this investigation include the former Ammunition Storage Magazines and Pesticide Storage Area. These locations are identified in Figure 3-2. The Pesticide Storage Area (Building 4126) is located just west of the Camp Bonneville cantonment. Building 4126 was constructed in approximately 1958 and is a wood structure with a wooden floor. Other than doors and windows, the building has no ventilation system. This building was used to store 55-gallon drums of 2,4,5-trichlorophenoxy acetic acid (2,4,5-T); 2,4-dichlorophenoxy acetic acid (2,4-D); and an unknown amount of dichloro diphenyl trichloroethane (DDT) until 1977 when these materials were moved to Building 1864. The Ammunition Storage Magazines are located east of the Camp Bonneville cantonment and southwest of the existing sewage treatment lagoon. The three magazines are designated as Buildings 2950, 2951, and 2953. The magazines were constructed in 1976 and used to store munitions of various types that were brought to Camp Bonneville for training purposes. The three structures are sub-surface concrete buildings with concrete floors.

3.2 SITE HISTORY

Camp Bonneville is a sub-installation of Fort Lewis. In 1909, Camp Bonneville was established with 309 leased acres as a drill field and rifle range for Vancouver Barracks. The creation of this drill field and target range was due in part to the near-level range floor, which is protected from wind by the foothills of the Cascade Mountains. The plateau and valley, which is 350 yards wide and 2,000 yards long, contained the Army's 14 short-range and seven long-range targets.

In 1912, an appropriation was made to expand the facilities at Camp Bonneville to include a target range and a road leading to the post. However, after the option expired in 1915, the Army began to conduct its target practice at an Oregon National Guard range near Clackamas, Oregon. When the Army resumed activities at Camp Bonneville in 1918, the valley contained 24 targets. A machine-gun range was also added to the training facilities at some point prior to 1929.

In 1919, 2,711 acres were purchased upon which Camp Bonneville was established. The Camp Bonneville and Camp Killpack Cantonments were established during the late 1920s and the early 1930s, and contain a total of 46 buildings. The U.S. Army leased 840 acres, in two separate parcels, from Washington in State 1955. In 1957, the lease on 20 acres was terminated and the land was returned to the Washington State Department of Natural Resources (DNR). This transaction marks the last significant real estate action at Camp Bonneville. The U.S. Army's lease on the remaining 820 acres was in effect until September 30, 1996 (Woodward-Clyde

1997). The USACE, under the direction of the U.S. Army Forces Command (FORSCOM), is currently pursuing a lease extension with the DNR.

The mission at Camp Bonneville was to provide a training camp for active U.S. Army, U.S. Army Reserve, U.S. National Guard, U.S. Marine Corps Reserve, U.S. Navy Reserve, U.S. Coast Guard Reserve units, and other Department of Defense (DOD) Reserve personnel. The past use of Camp Bonneville has varied and has been mostly dependent on the type and level of demand for trained personnel. It was also used as an internment camp during World War II. The type of use of this training camp varied depending upon the unit using the facility but generally included the use of the firing ranges and training areas. When not required for military training activities, Camp Bonneville was used until the late 1980s by local civic and nonprofit organizations for religious retreats and picnics, as a camp for Boy Scouts, as a location for high school environmental studies, and for State Highway Patrol pistol training. The one tenant at Camp Bonneville is the FBI, who owns and manages small arms training facilities they constructed at Camp Bonneville in 1995.

The U.S. Army has been managing forestland at Camp Bonneville since 1957. Management activities have consisted of scarification and replacement of lands burned during the fires of 1902, 1938, and 1951, and timber sales.

3.3 PHYSICAL SETTING

Camp Bonneville is located on the western slope of the Cascade Mountains in the Lacamas Creek valley. The terrain is generally rolling, typical of foothills in the Cascade Mountains, covered with undergrowth and large stands of coniferous timber. The west quarter of the installation consists generally of low hills and the low plain of the Lacamas Creek valley, while the remainder of the post is comprised of the well-dissected hills of the westernmost Cascade Mountains foothills. Elevations range from 289 feet in Lacamas Creek at the southwest corner of the installation to 1,000 feet at the northwest, 1,350 feet at the southeast, and 1,450 feet at the south-central boundary of the installation. The topography is erosional except for shallow deposition in the Lacamas Creek valley.

3.4 GEOLOGY AND HYDROGEOLOGY

3.4.1 Regional Geology and Physiography

Camp Bonneville is situated on the margin of the western foothills of the southern Cascades in the transition zone between the Puget Trough and the Willamette Trough Provinces. The geology of this area generally consists of Eocene and Miocene volcanic and sedimentary rock types overlain by unconsolidated clays, silts, sands, and gravels of the Troutdale Formation (Phillips 1987).

The area surrounding the camp is sparsely populated with scattered residences and is used primarily for agriculture and livestock grazing. The nearest town is Proebstel, an unincorporated community southwest of the western entrance to the camp. The two cantonments, Camp Killpack and Camp Bonneville, are located on the valley floor. The remainder of the property consists of moderately steep, heavily vegetated slopes that have been used primarily as firing

ranges. The valley floor is a relatively narrow floodplain, which ranges from an elevation of about 290 feet above mean sea level (msl) on the western end of the property to about 360 feet above msl on the east. The adjoining slopes rise moderately steeply to elevations of between 1,000 and 1,500 feet along ridge tops within the property boundaries.

3.4.2 Surface Hydrology

The principal surface water feature in this area is Lacamas Creek, which flows southward from the coalescence of two branch streams in the north-central part of Camp Bonneville, exiting the installation at its southwest corner. From the southwestern property boundary, Lacamas Creek flows southwestward to Proebstel, where it turns toward the southeast and continues to its confluence with the Columbia River at the town of Camas.

Numerous minor tributaries draining adjacent uplands flow into Lacamas Creek. Buck Creek and David Creek, the largest of these streams, drain the southeastern hills of the property. Two artificial impoundments of Lacamas Creek, with a total surface area of less than 4,600 square feet, have been created to support a trout sports fishery (USACE 1987).

3.4.3 Geology and Soils

Camp Bonneville is situated along the structural and physiographic boundary between the western flank of the southern Cascade Mountains and the Portland-Vancouver Basin. The geology of the Camp Bonneville vicinity is known primarily from geologic mapping by Mundorff (1964) and Phillips (1987), a limited number of well logs available from the general area, and an investigation conducted by Shannon & Wilson (1999).

The geology at Camp Bonneville can be divided into three general areas that correspond approximately to topographic divisions. The area west of Lacamas Creek is composed of a series of predominately gravel and semi-consolidated conglomerate layers with scattered lenses and stringers of sand (Upper Troutdale Formation). Underlying the Troutdale Formation and comprising the area to the north and east of Lacamas Creek are predominantly basalt flows and flow breccia, with some pyroclastic and andesitic rocks, which are folded and faulted. The bottomland along Lacamas Creek is comprised of unconsolidated silt, sand, and gravel valley fill, with some clay. Because of the thick soil and dense vegetation, no faults have been identified within Camp Bonneville (Environmental Science and Engineering, Inc. [ESE] 1983). A Quaternary landslide has been identified in the uplands near David Creek (Phillips 1987).

Soils of Camp Bonneville are mainly low-permeability clays, so there is considerable runoff after each storm and occasional minor flooding of Lacamas Creek. Upland soils have mainly developed from basalt and are generally gravelly or stony and fairly shallow. Bottomland soils along Lacamas Creek tend to be clayey (Geo Recon International 1981).

Shannon & Wilson (1999) described the four distinctive stratigraphic units that underlie the camp area:

- Quaternary floodplain and stream channel alluvium and lacustrine deposits, which mantle the Lacamas Creek valley floor (Qa)
- A Quaternary landslide deposit (Qls) of surface soils and bedrock displaced from the steep slope along David Creek

- A thick sequence of Quaternary to Pliocene-age gravel, fine-grained sand, and cobbly and bouldery sand known as the Troutdale Formation (Pt), which underlies areas to the west of the Bonneville cantonment
- Oligocene-age volcanic bedrock (Tv), which is exposed at the surface in the eastern part of the camp

The Quaternary alluvium deposits that make up the shallow surface soils of the Lacamas Creek valley floor are composed of stream channel, floodplain, and alluvial fan sediments. These deposits consist of a thin layer of clay and silt, underlain by silty sand and some gravel. During drilling and excavation activities associated with the removal of an underground storage tank (UST) in Camp Killpack (Hart Crowser 1996), at least 25 feet of silty clay was encountered and interpreted to be older alluvium. Borings for a recent study (Shannon & Wilson 1999) also encountered alluvial clays and silts overlying a relatively thick silty clay deposit in the Camp Bonneville cantonment. These clayey soils probably originated as water deposits that were deposited on the valley floor in Quaternary time as a result of catastrophic flooding along the Columbia River (Shannon & Wilson 1999).

Phillips (1987) mapped a large landslide deposit on the steep northwest-facing slope of Lacamas Creek above the Camp Bonneville cantonment. The age of the landslide is unknown; however, the topographic expression suggests that it is not recent. The slide displaced surface soils and bedrock over about 100 acres of land adjacent to David Creek to the northeast. The landslide deposits extended from an elevation of about 1,000 feet at the headwall of the slide to an elevation of about 500 feet at its toe along David Creek.

The Troutdale Formation, which reportedly underlies a portion of the western part of the camp, ranges from a poorly consolidated sand and gravel to a well-indurated conglomerate in its upper part. Based on regional logs, the Upper Troutdale Formation is locally about 150 feet thick and consists of cemented sand, gravel, sandy clay, and boulders. It is underlain by up to 150 feet of the Lower Troutdale Formation, which contains considerably more clay interspersed with sandy and gravelly layers. There is considerable variation in the lithology and thickness of the Troutdale Formation. In general, the formation thins eastward against the underlying bedrock. The lower part of the formation reportedly is typically coarser grained toward the east (Mundorff 1964).

The bedrock that underlies the alluvial deposits and Troutdale Formation is exposed at the surface in the eastern part of Camp Bonneville. The bedrock consists of Oligocene-age andesite and basaltic andesite flows, minor flow breccias, tuffs, and volcaniclastic sandstones. The uppermost bedrock has been reported to be severely weathered (Shannon & Wilson 1999). This weathered bedrock tends to form surface soils that contain gravel of basalt lithology. During drilling for the 1999 investigation (Shannon & Wilson 1999), bedrock was encountered in 10 soil borings, at depths ranging from approximately 6 to 37 feet below ground surface (bgs).

3.4.4 Hydrogeology

Little information is available about the hydrogeology of Camp Bonneville, despite Mundorff's (1964) extensive study of groundwater resources in Clark County. There are two drinking water wells at Camp Bonneville: a 385-foot-deep well at the Bonneville cantonment, and a 193-foot-deep well at the Killpack cantonment (ESE 1993). The latter well is apparently different from

the 516-foot-deep well at the Killpack cantonment described by Mundorff (1964). In addition, a well was drilled at the FBI range during 1998, which extends to a depth of 105 feet bgs (Shannon & Wilson 1999). Several groundwater monitoring wells associated with the sewage lagoon are located east of the Camp Bonneville Cantonment. Based on regional information from Mundorff (1964) and the reported depths of the wells at the camp, water supply wells in the area generally extend into the Troutdale Formation or underlying bedrock. Most of the nearby wells apparently obtain groundwater from depths of 150 to as much as 500 feet bgs.

The water table is typically within a few feet of the surface in areas underlain by alluvium and appears to fluctuate seasonally several feet. A rising water table occurs in the early fall through spring during the rainy season, and a falling water table occurs throughout the summer months. The localized groundwater flow generally follows local topography toward tributaries and creeks. Generally, groundwater flows from the uplands west toward Lacamas Creek, and east toward the creek from the cantonments. The elevation of the water table at upland areas of the site has not been established. However, it may be fairly shallow (less than 50 feet bgs) on the eastern valley walls, which are marked by shallow bedrock, multiple creeks, and tributaries.

3.5 PREVIOUS INVESTIGATIONS

3.5.1 Environmental Baseline Survey

Camp Bonneville Military Reservation was selected for closure under the 1995 BRAC process. The purpose of the environmental baseline survey (EBS) was to classify discrete areas of real property associated with Camp Bonneville subject to transfer or lease into one of the seven standard environmental condition of property area types. The categories are defined by the Community Environmental Response Facilitation Act (CERFA) guidance and the DOD BRAC *Cleanup Plan (BCP) Guidebook* (DOD 1993). Property classification was achieved by identifying, characterizing, and documenting the presence or likely presence of a release or threatened release of hazardous substances or petroleum products associated with the historical and current use of Camp Bonneville. Releases at Camp Bonneville that could affect the environmental condition of the installation property were also identified, characterized, and documented. Additionally, areas containing or suspected of containing non-Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) contamination substances (i.e., asbestos, lead-based paint), that may limit or preclude the transfer or lease of the property for unrestricted use were delineated separately as being qualified.

The survey and parcel evaluation of Camp Bonneville identified 25 BRAC parcels based on environmental condition of the property. Of the total 3,840 acres at Camp Bonneville, 3,826.26 acres were designated as Categories 1 and 2. The remaining 13.74 acres of BRAC property were designated as Categories 5 and 7. Additionally, 1.31 acres were designated as qualified for asbestos-containing material (ACM) and lead-based paint (LBP), and the entire installation (3,840 acres) was qualified for UXO and/or ordnance fragments.

The Pesticide Storage Area (Building 4126) was designated as a category 7 parcel (areas that are not evaluated or need additional evaluation) and given parcel number 16(7)HR(P). The building was historically used to store 55-gallon drums of 2,4,5-T; 2,4-D; and an unknown amount of DDT until 1977. The year storage began is unknown. The Ammunition Storage Magazines

(Building 2950, 2951, and 2953) together comprise Parcel 7Q-X(P), and were qualified for potential UXO.

3.5.2 BRAC '95 Cleanup Plan

The BCP for Camp Bonneville was prepared under the BRAC '95 program. The BRAC process includes preparing an EBS, CERFA reports, Sampling and Analysis Recommendations, and a BCP. The goal of the BCP process under the BRAC '95 program is to expedite and improve environmental response actions in order to facilitate the disposal and reuse of Camp Bonneville while protecting human health and the environment.

The BCP provided the status, management, and response strategy, and action items related to the ongoing environmental restoration and associated programs at Camp Bonneville. These programs support full restoration of the base property, where feasible, which is necessary to meet the requirements for property disposal and reuse activities associated with closure of the installation.

3.5.3 Soil and Groundwater

Hazardous Waste Investigations

Soil and groundwater investigations have been conducted to support restoration activities at Camp Bonneville. Past investigations have addressed petroleum storage (Hart Crowser 1996), asbestos (Hart Crowser 1996), and gas training facilities (Hart Crowser 1998).

Site Investigations were conducted (Shannon & Wilson 1999) between October 1997 and August 1998. The objectives were to identify areas that are contaminated and to determine the appropriate step(s) toward site restoration. The 1999 multi-sites report documents the results of environmental investigations of 17 known or suspected contaminated areas at Camp Bonneville.

Investigated sites included three former landfills, two suspected disposal areas, a former burn area, two burned buildings, two grease pit locations, a former maintenance pit, two former wash racks, a pesticide mixing/storage building, a former sewage pond, a former training building, three ammunition storage magazines, a hazardous materials accumulation point, and 26 aboveground storage tanks.

When compared to appropriate regulatory criteria, the analytical results obtained from soil and groundwater samples indicated the following (Shannon & Wilson 1999):

No Further Action:

- No evidence of soil or groundwater contamination was detected in environmental samples from Landfills No. 2 and 3, former Buildings 1962 and 1983, the Paint and Solvent Disposal Area, 18 of the aboveground storage tanks, the Hazardous Material Accumulation Point, or Wash Rack No. 2.
- No evidence of the existence of Landfill No. 1 was found.
- At the former Burn Area, the grease pits at the Camp Bonneville and Camp Killpack cantonments, and the former sewage pond, contamination was detected at levels slightly

above background and in subsurface soils, but was concluded to pose no exposure hazard under normal use scenarios.

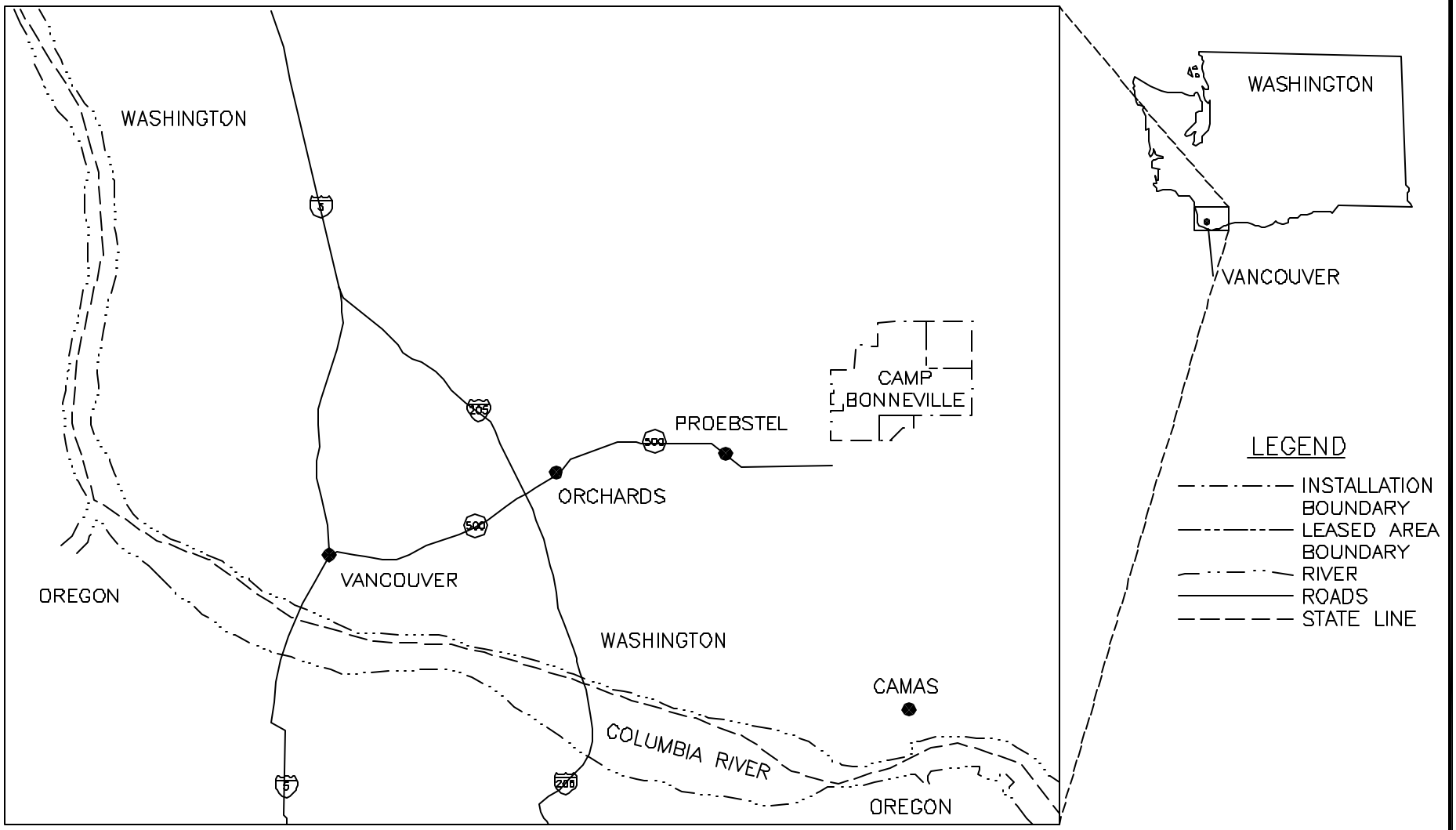
Limited Potential Risk:

- The areas of limited potential risk included the Drum Disposal Area (metals), Wash Rack No. 1 (total petroleum hydrocarbon [TPH] and metals), the Pesticide Mixing/Storage Building (TPH, hexachlorobenzene, pesticides, and metals), eight aboveground storage tanks (diesel-range TPH), the Former CS Training Building (lead, polyaromatic hydrocarbons), the Maintenance Pit (TPH, metals, volatiles), and the outside of the ammunition storage magazines (metals). The interiors of the ammunition storage magazines also contain soil with explosives; hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) in one magazine and metals in both the smaller magazines above risk-based cleanup criteria.

The Shannon & Wilson report (1999) concluded that the extent of contamination at most of these sites is limited in lateral extent, and appears to be confined to surface and near-surface soils. Groundwater conditions were investigated on a local, site-specific basis. Evaluation of installation-wide groundwater conditions was beyond the scope of the investigations. Investigation activities have not been conducted at the Pesticide Storage Area (Building 4126).

3.5.4 Surface Water

Surface water sampling of the Lacamas Creek watershed was conducted in 1998 (Hart Crowser 1998). Chemical analysis of water samples included testing for munitions and metals. The only significant results were slight exceedances of arsenic, which may be attributable to background concentrations.



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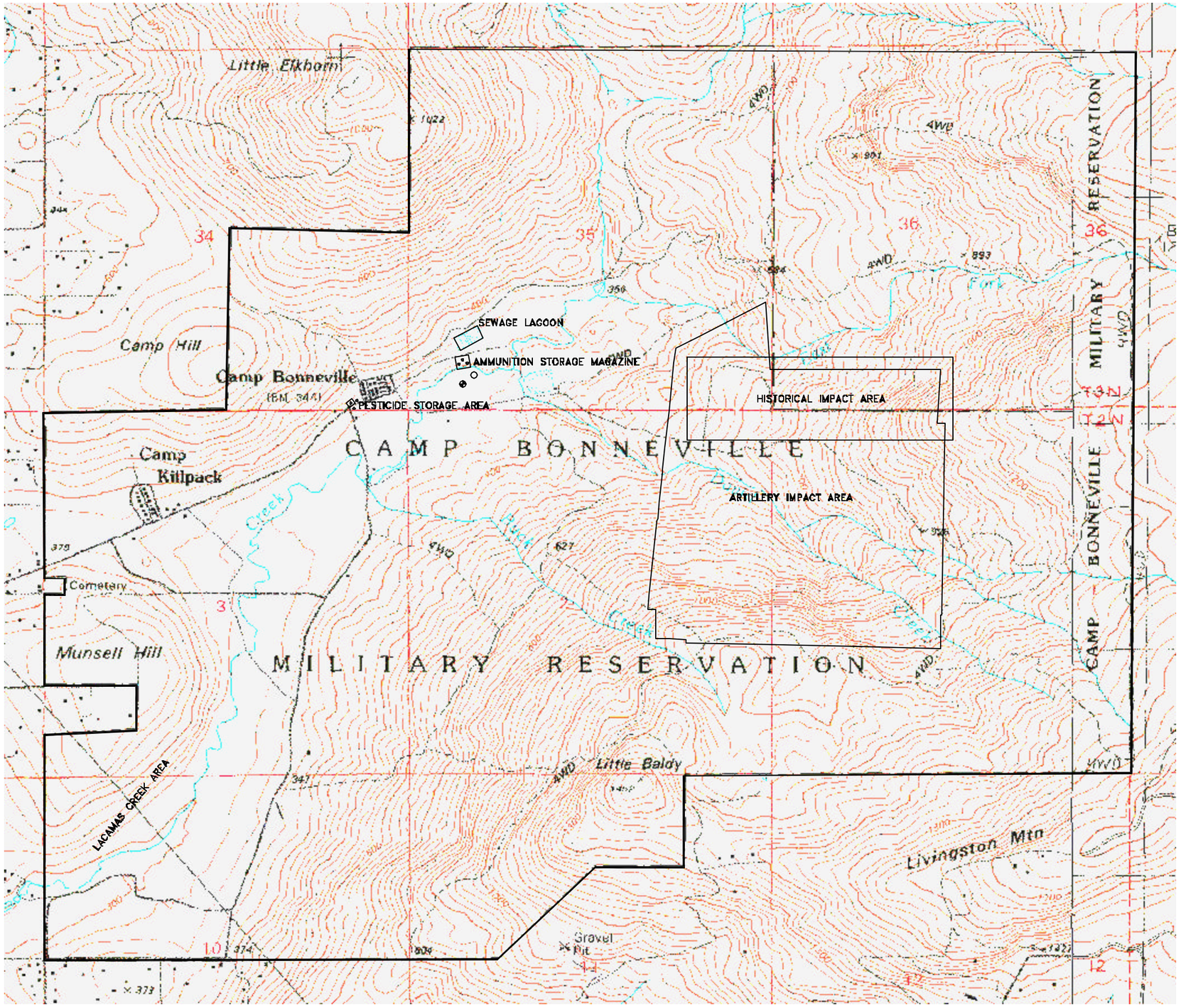
URS

U.S. ARMY
CORPS OF ENGINEERS
SEATTLE DISTRICT
SEATTLE,WASHINGTON

Location of Camp Bonneville
Military Installation

CAMP BONNEVILLE PN 53F0072207 WASHINGTON

FIGURE 3-1



LEGEND

- ROADS
- CREEKS
- SITE BOUNDARY
- APPROXIMATE SOIL SAMPLE LOCATION
- BORINGS/MONITORING WELLS (FIELD LOCATE)

N

0 375 750 1500 2250
SCALE IN FEET

REVISION	DATE	DESCRIPTION	BY
0	4/28/1999	PRE DRAFT	PW
1	9/1/2000	FINAL	BH

URS

CAMP BONNEVILLE, WA

LOCATION OF PESTICIDE STORAGE AREA AND AMMUNITION MAGAZINE CAMP BONNEVILLE

FIGURE 3-2

FILENAME: Q:\COE\Camp Bonneville\fig4-1.dwg
EDIT DATE: 09/01/00 AT: 08:40

This section describes the field activities conducted on July 26 and 27, 2000. The chemicals of potential concern (COPCs), UXO avoidance techniques, and field sampling techniques are described for each area.

4.1 PESTICIDE STORAGE AREA

4.1.1 Chemical of Potential Concern

The Pesticide Storage Area may contain herbicides, pesticides, hydrocarbons, PCBs, and metals. As stated above the objective of the SSI was to evaluate the potential presence of these contaminants in Building 4126 flooring materials and in surface soil (0 to 6 inches bgs) around the building. A summary of these chemicals is included in Table 4-1.

4.1.2 UXO Avoidance

Human Factors Analysis (HFA), of Gaithersburg Maryland, conducted UXO avoidance activities and marked safe access and sampling areas before URS collected surface soil samples near the pesticide storage building (Building 4126). UXO avoidance was conducted in accordance with the USACE Safety and Health Requirements Manual (EM385-12-1), Safety Concepts and Basic Considerations for Unexploded Ordnance Operations (ETL-385-1-1), and the U.S. Army Material Command (USAMC) Safety Manual (AMC-R 385-100).

HFA searched sample locations and personnel access routes with a hand-held magnetometer. The type of magnetometer used is capable of detecting metallic objects, with high resolution, up to a depth of approximately 6 feet bgs. Based on search results, HFA inserted red pin-flags along safe area perimeters. All locations where magnetic anomalies were encountered were identified with orange markers and sampling personnel did not approach the anomaly locations. Only one magnetic anomaly, most likely due to a piece of cable on the ground surface, was evident near the pesticide storage building. A Schonstedt Model GA-72CV magnetometer was used for UXO avoidance on the ground surface and a Mk26 Mod 0 Ordnance Locator (Forster Ferex 4.021) magnetometer was used for down-hole UXO avoidance.

4.1.3 Surface Soil Sampling Procedures

URS collected surface soil samples from two areas adjacent to Building 4126. These included a 4-square-foot area just outside the building entrance and a 4-square-foot area adjacent to the building's south wall. Just outside the building entrance, only a 4-foot wide strip of exposed soil was available for sampling due to the presence of an 8-foot by 8-foot concrete pad, located approximately 4 feet west of the building. The exposed strip of soil below the building entrance was selected for obtaining sample SS04 (Figure 4-1) because it was considered to be the most likely location where spills may have occurred when the building was used. The south side of the building was selected for sample SS05 because thick vegetation on all other sides of the building prevented access for UXO clearance and sampling.

In each location, as much vegetation as possible was removed and a grid was placed on the ground to ensure collection of an unbiased composite sample. The grid consisted of two cloth measuring tapes laid perpendicular to each other to form four, 1-foot squares. Subsamples of

approximately equal volume were then collected from each grid square and homogenized to form one composite sample.

The subsamples were collected from each grid section by removing soil with a clean, stainless steel spoon and transferring it to a clean, stainless steel bowl. Approximately equal volumes of soil were removed from each grid square by scraping the soil surface and digging to 6 inches bgs. The loosened soil was then placed in the bowl; gravel, vegetation, and other debris were carefully removed; and the finer grained soil was thoroughly mixed and broken apart. The soil was then transferred from the bowl to laboratory-provided, certified clean, glass jars with Teflon™-lined lids. The jars were individually sealed in ziploc bags and placed into a cooler together with chipped ice.

Sample SS04 included a quality assurance/quality control (QA/QC) blind duplicate, a matrix spike and matrix spike duplicate (MS/MSD), and a duplicate sample for the USACE laboratory. The primary, USACE duplicate, and MS/MSD samples were identified as SS04 and marked with the correct sampling time. The blind duplicate sample for the contract laboratory was labeled with the fictitious identification SS504 and a fictitious sampling time. The samples were logged on chain of custody forms designated for each laboratory. Blind duplicate samples were not identified as such on the chain of custody forms.

4.1.4 Flooring Material Sampling Procedures

Because Building 4126 was historically used as a pesticide storage and mixing facility, pesticides may have spilled on the floor. The approximately 80-square-foot floor is constructed of 2-inch by 12-inch, clear, Douglas Fir planks spaced less than 1/16 of an inch apart. Dry rot or other signs of degradation of the floor were not present. Because the floor was in good condition, it is likely that material spilled on the floor would not easily go through the floor and onto underlying soil. Some spilled material may have penetrated the wood and/or remained on the wood surface; therefore, one sample of floor material was collected inside the building.

A wipe sample was originally planned for the floor; however, wipe samples are not appropriate for porous materials, such as wood. Therefore, it was concluded that a chip sample of the floor would be a more representative type of sample. Prior to collecting the sample, the analytical laboratory provided information regarding the volume of material needed and the proper method to collect and submit the sample. Sample collection was first attempted by chipping the floor surface with a stainless steel chisel and mallet. However, because the fir planks were old and hard, this method proved impractical considering the volume of sample needed for analysis. In addition, the variously sized chips were not easily placed into jars for transport to the laboratory. Because of this situation an alternate method was necessary.

The alternate method included augering holes in the wood using a new, clean, stainless steel auger bit attached to a brace. Several holes were dilled using the brace and bit, to depths of approximately 0.5 to 1 inch below the floor surface. As the auger penetrated the wood, it produced thin shavings between 10 and 15 millimeters (mm) long by approximately 1 mm thick. The shavings from approximately 20 holes were placed into a stainless steel bowl and thoroughly homogenized to create a composite sample designated as FS01. Each sample jar wood shavings was immediately labeled, placed into a ziploc bag, and packaged in a cooler along with sufficient

ice to maintain the sample at approximately 4° Celsius. The sample was identified as FS01 and this identification was recorded together with the sampling time on a chain of custody form.

4.1.5 Sample Laboratory Analyses

All of the surface soil and flooring material samples were submitted for analysis of the following COPCs:

- Chlorinated herbicides – EPA Method 8151
- Chlorinated pesticides – EPA Method 8081
- PCBs – EPA Method 8082
- Priority pollutant metals, plus barium – EPA Method 6000/7000 Series
- Petroleum hydrocarbons – NWTPH HCID with appropriate follow-up for Gx and/or Dx

The primary and QA/QC samples were hand-delivered to Analytical Resources, Inc. (ARI) on June 28, 2000. Duplicate samples were shipped to the USACE laboratory via priority-overnight Federal Express on June 27, 2000**.** Table 4-1 summarizes the soil sample identifiers, requested analyses, analytical methods, and laboratory quantitation limits used by ARI.

4.2 AMMUNITION STORAGE MAGAZINE

4.2.1 Chemicals of Potential Concern

The Ammunition Storage Magazines may contain exploded ordnance (EO) and UXO. Although EO and UXO are not expected to have leached into the subsurface soil, it is possible that explosives constituents, petroleum hydrocarbons, and metals may have leached into subsurface soil. A summary of COPCs is provided in Table 4-2.

4.2.2 UXO Avoidance

UXO avoidance activities at the Ammunition Storage Magazine included delineating safe access routes to the sample locations, searching surface soil sampling areas, and conducting a downhole search at the boring location. The access routes that were cleared included the driveway extending from the main road to the front door of the Ammunition Storage Magazine bunker, and the area around the boring location, next to the main road (Figure 4-2). All of the surface soil sample locations and the one boring location were on or next to the road in front of the bunker. A second boring was to be located along the main road, uphill from the bunker; but due to the absence of groundwater encountered in the first boring, the second boring was not drilled. However, the second boring location was evaluated for the presence of UXO as described below (prior to drilling the first boring).

HFA evaluated the access road with a magnetometer to search for magnetic anomalies. The road and approximately 5-foot wide strips of land adjacent to the road were searched and deemed safe for access. HFA placed red pin flags along the perimeter of the cleared route and instructed all personnel to enter and leave only by the approved access route. Two magnetic anomalies encountered in the roadway were concluded to be due to large nails on the ground surface. The

5-foot-wide strips adjacent to the road included the surface soil sample locations in front of the bunker door and provided safe work areas for the drilling crew.

In addition to evaluating the boring location with a magnetometer, HFA conducted downhole clearance at the boring location prior to mobilization of the drilling rig. Downhole clearance consisted of advancing hand auger borings to 4 feet bgs and searching for subsurface magnetic anomalies using a Schoenstadt Mark 26 downhole magnetometer. Native soil consisting of stiff red clay was encountered in both boring locations at less than 1 foot bgs. Although it is unlikely that UXO would be present in native soil, HFA advanced each boring to 4 feet bgs for added safety. When the hand auger boring was complete, HFA inserted the Mark 26 probe and slowly lowered it to the bottom. As the probe descended, an analog meter was observed to detect the presence of any metallic objects. No anomalies were noted in either boring location.

The small area encompassing the surface soil sample locations was checked twice for quality assurance of the UXO evaluating process. The one boring location (Figure 4-2) was also evaluated twice for additional QA/QC. During QA/QC activities, HFA noted that several false positive magnetometer measurements were attributable to the presence of imported road cover gravel. The gravel was composed of basalt from unknown sources and was described by HFA as "hot rock" in that the gravel contained a large enough mass of ferrous minerals to activate the magnetometer. To ensure that gravel, and not UXO, was causing the false positive detections, several pieces of gravel were placed on bare soil and measured with the magnetometer. With the gravel present, an anomaly was detected. When the gravel was removed, no anomaly was detected. HFA observed the signal that was characteristic of the gravel, adjusted the sensitivity of the magnetometer, and repeated the access route evaluation.

4.2.3 Surface Soil Sampling Methods

Three discrete grab soil samples were collected from a small area in front of the Ammunition Storage Magazine door (Building 2953). The purpose of sampling in this area was to evaluate potential surface soil contamination associated with black powder that was recently removed from the building. The sample locations were located along the short footpath leading away from the door (Figure 4-2). The samples were designated as SS01, SS02, and SS03 and were approximately 1 foot, 3 feet, and 6 feet away from the threshold of the magazine, respectively.

In each discrete sample location, vegetation including grasses and blackberry vine tendrils were cut away or removed to reveal the soil surface. A clean stainless steel spoon was then used to scrape and loosen the heavily compacted, gravelly soil. The loosened soil was placed into a clean stainless steel bowl and gravel, vegetation, and other debris were removed. The resultant fine-grained soil component was homogenized. The soil was then transferred to laboratory-provided, certified clean, glass sample jars. Each jar was labeled with the sample identification and other pertinent information, sealed the jar in a ziploc bag and placed it in a cooler with sufficient ice to maintain the sample at 4^{o} Celsius.

4.2.4 Drilling and Subsurface Soil Sampling Methods

Drilling and subsurface soil sampling at the Ammunition Storage Magazine were performed by Tacoma Pump and Drill of Graham, Washington under direct supervision of a URS geologist. Tacoma Pump and Drill used a Mobile B-61, hollow-stem auger, drilling rig to drill and sample

one soil boring (SB-01). The URS geologist observed and logged soil samples collected continuously from the surface to approximately 22 feet bgs, where the drilling rig met refusal. One sample was collected and submitted for laboratory analysis.

Tacoma Pump and Drill used the hollow-stem auger method to advance soil boring SB-01. The hollow-stem auger method consists of rotating and pushing a leading auger fitted with teeth, which is attached to helical auger flights that lift soil to the ground surface. In this case, a 9-inch-diameter finger bit and 5-foot-long, 8.5-inch outer diameter, 4-inch inner diameter continuous auger flights were used. The finger bit is a steel collar fitted with four, 2-inch-long carbide teeth, that loosens and pushes through soil and gravel as it is rotated. Soil loosened by the bit was captured on the auger flights and lifted toward the ground surface where it was shoveled into drums. Additional auger flights were attached to the leading bit in a "string" as the boring deepened.

Sampling tools were lowered to the bottom of the boring through the 4-inch-diameter opening in the center of the auger flight string. The sampler, attached to a threaded steel rod, was driven with a hammer so that it penetrated soil below the drill bit and retrieved a relatively undisturbed sample. At the Ammunition Storage Magazine, the augers were advanced 18 inches at a time and an 18-inch-long, 1.5-inch-diameter, standard penetration test (SPT) split spoon was used to retrieve the soil sample. The sampler was driven with an automated hydraulic hammer designed to mimic a 140-pound cat-head hammer with a 30-inch drop. Each sampling event included driving the SPT 18 inches and recording the number of hammer blows for each 6 inches of penetration.

Lubricants were neither necessary nor used during the drilling and sampling process. Tacoma Pump and Drill connected the auger flights with bolts and used clean, threaded drill rod for lowering and retrieving sampling tools. All equipment was steam-cleaned prior to mobilization of the drilling rig.

URS collected samples continuously from 4 feet bgs (bottom of UXO avoidance boring) to the bottom of the hollow-stem auger boring at approximately 22 feet bgs. Each split spoon was opened, photographed, and observed for visual and olfactory evidence of contamination. The URS geologist recorded all sample observations including drilling rates and sample blow counts on a soil boring log (Appendix A). One sample (SB01-4.5), consisting of soil collected between 4 and 7 feet bgs, was retained for laboratory analysis.

The sample collected for laboratory analysis was composited from two SPTs driven between 4 and 7 feet bgs. Soil from each split spoon was observed and logged as described above and then transferred to a clean stainless steel bowl. The URS geologist used a clean stainless steel spoon to thoroughly mix the soil and transfer it into certified clean, laboratory provided, glass jars. Sample jars were labeled, placed into ziploc bags and then packaged in a cooler along with enough ice to maintain them at or below 4^{o} Celsius. Soil from two split spoons was necessary to collect a sufficient volume of soil for both primary and QA/QC samples. The primary sample was identified as SB01-4.5.

After the boring was completed and analytical samples were securely packaged, Tacoma Pump and Drill abandoned the soil boring in accordance with Ecology Minimum Standards for Construction and Maintenance of Wells (WAC 173-160). Abandonment procedures included slowly withdrawing the auger string while pouring 3/8-inch bentonite chips through the hollow stem opening. Approximately 2 gallons of potable water were poured into the boring to hydrate

the bentonite hole plug each time an auger flight was withdrawn from the boring. This process was continued until all of the auger flights were removed and the bentonite seal was flush with the ground surface.

4.2.5 Sample Analyses

Surface and subsurface soil samples from the Ammunition Storage Magazine were submitted to ARI Laboratories, GPL Laboratories, and the USACE QC laboratory for analysis of the following compounds:

- Priority pollutant metals, plus barium
- SVOCs
- Ordnance compounds
- Ammonium Perchlorate

In addition to the above analyses, subsurface soil sample SB01-4.5 was analyzed for grain size, total organic carbon, and petroleum hydrocarbons. Soil sample identifiers, QA/QC samples, and the requested analyses are described in Table 4-1.

4.3 DEVIATIONS FROM THE WORK PLAN

The number of borings and the drilling methods used were different than described in the sampling and analysis plan because of changes in the scope of work and conditions encountered in the field. The original sampling and analysis plan included drilling and sampling two borings and installing two monitoring wells using the air-rotary drilling method. After completion of the original plan, URS and the USACE concluded that the hollow-stem auger method would be sufficient for drilling because bedrock was not anticipated to be encountered at the time the management plan was written. Monitoring wells were not installed and only one boring was completed because groundwater was not encountered between the ground surface and approximately 22 feet bgs while drilling soil boring SB-01 (Figure 4-2). The USACE field representative decided that if shallow groundwater was not encountered and a monitoring well was not installed in the presumed downgradient direction from the Ammunition Storage Magazine, then an upgradient boring and well would not provide useful data. Based on this decision, only SB-01 was drilled and only one subsurface soil sample was collected.

Table 4-1

SOIL SAMPLE IDENTIFICATION AND REQUESTED ANALYSES

AMMUNITION STORAGE MAGAZINE AND PESTICIDE STORAGE AREA

Sample Identification	Sample Type	Requested Analyses											
		Prior. Poll. Metals* 6000/7000 Series	Chlorinated Herbicides EPA 8151	Chlorinated Pesticides EPA 8081	PCBs EPA-8082	Diesel NWTPH-Dx	Gasoline NWTPH-Gx	SVOC EPA-8270	Ordnance Compounds EPA-8330	Ammonium Perchlorate EPA-314	Grain Size ASTM D-63	TOC Walkley-Black	TPH WTPH-HCID
Ammunition Storage Magazine													
SS01	primary	X						X	X	X			
SS02	primary	X						X	X	X			
SS02	USACE dup								X	X			
SS502	blind dup	X						X	X	X			
SS03	primary	X						X	X	X			
SS03	USACE dup	X						X					
SS1003	rinse blank	X	X	X	X	X	X	X	X	X		X	X
SB01-4.5	primary	X						X	X	X	X	X	X
SB01-504.5	blind dup										X	X	X
Pesticide Storage Area													
SS04	primary	X	X	X	X	X	X						
SS04	USACE dup		X	X	X	X	X						
SS05	primary	X	X	X									
SS504	blind dup		X	X	X	X	X						
FS01 (wood floor sample)	primary	X	X	X	X	X	X						

Notes:

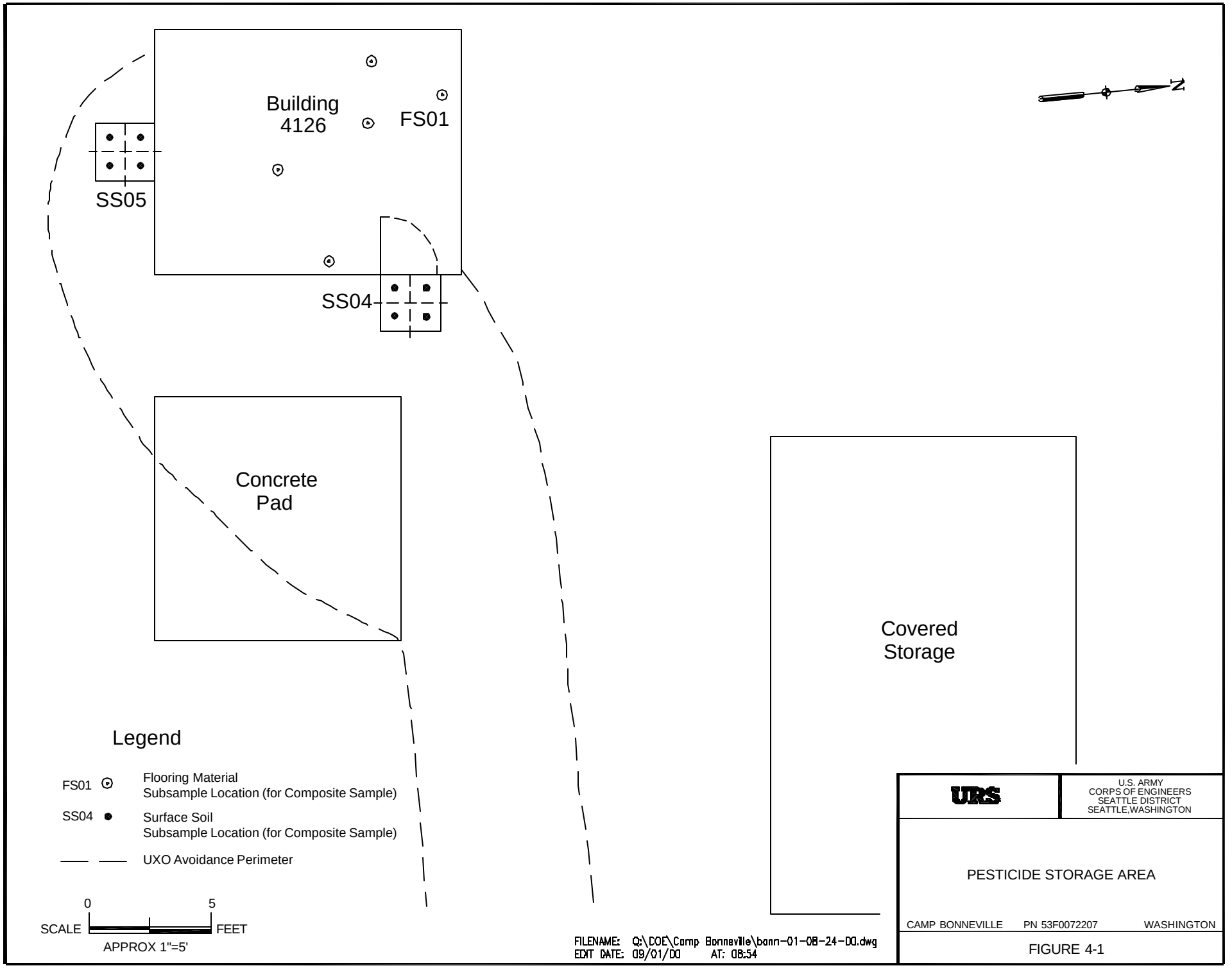
* - metals analysis includes barium

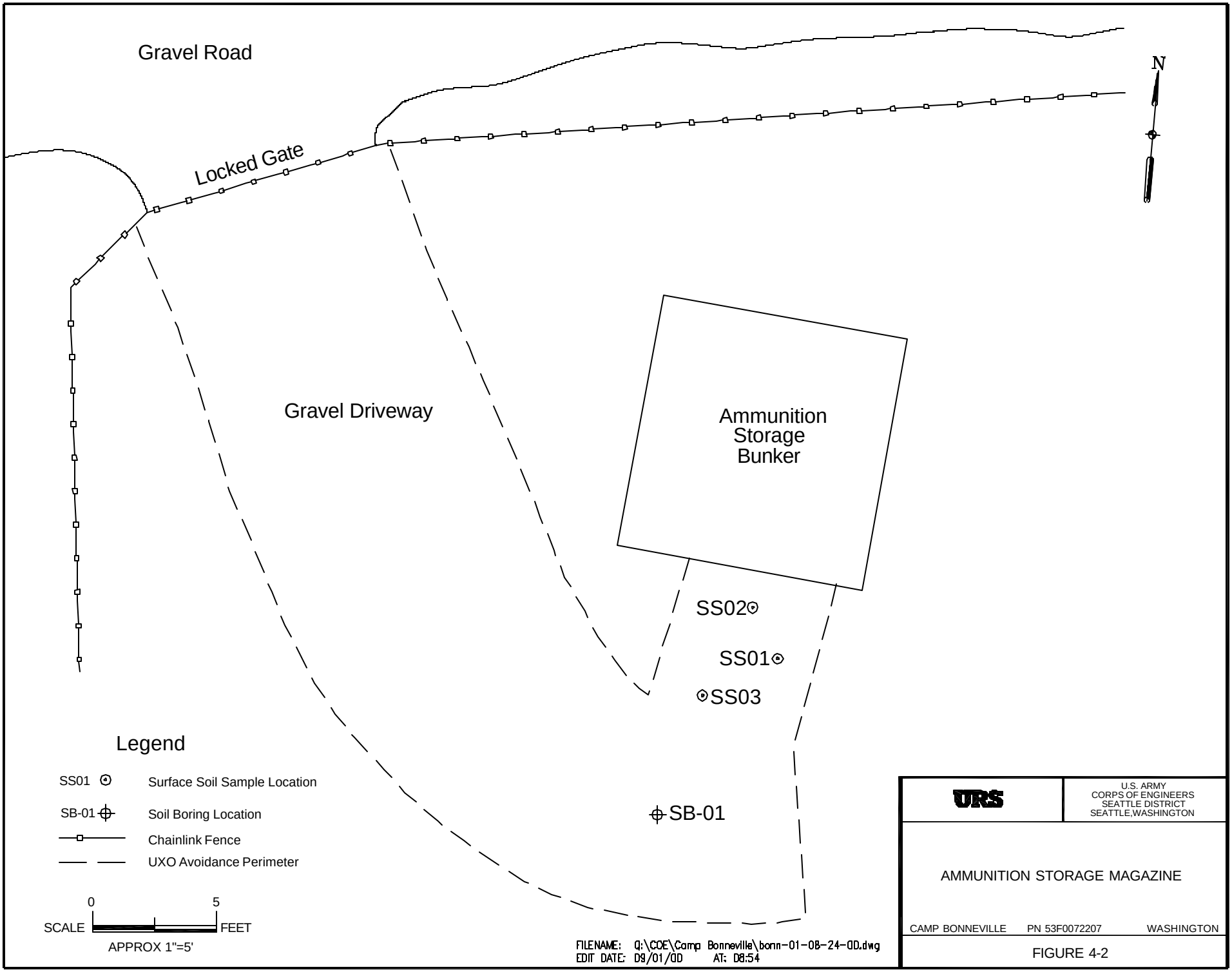
Follow-up analysis of NWTPH-Dx and NWTPH-Gx based on initial results of WTPH-HCID

TABLE 4-2
CHEMICALS OF POTENTIAL CONCERN
IN SOIL AND GROUNDWATER

SAMPLING AREAS	MUNITION COMPOUND CLASSES	CONTAMINANTS OF POTENTIAL CONCERN		
		High Explosives and Organic Compounds	Artillery Propellants	Other
Ammunition Storage Magazines	Artillery Propellants, HE	TNT, RDX, PETN, Picric Acid	Black Powder (nitrate), NC, NG, NQ, Plasticizers, Stabilizers	Priority Pollutant Metals plus Barium, TPH, SVOCs
Pesticide Storage Area	N/A	N/A	N/A	Priority Pollutant Metals plus Barium, Pesticides, Herbicides, PCBs, TPH

Notes:
Black powder is a mixture of potassium or sodium nitrate, charcoal, and sulfur.
Plasticizers = dibutylphthalate, diethylphthalate
Stabilizers = diphenylamine, N-nitrosodiphenylamine
HE = high explosive
N/A = Not applicable
NC = nitrocellulose
NG = nitroguanidine
NQ = nitroglycerine
PCB = polychlorinated biphenyl
PETN = pentaerythritol tetranitrate
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine
SVOC = semivolatile organic compound
TNT = 2,4,6-trinitrotoluene
TPH = Total Petroleum Hydrocarbons
Priority pollutant metals include antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc.


Building
4126
FS01
SS05
SS04
Concrete
Pad
Covered
Storage
N
Legend
FS01
Flooring Material
Subsample Location (for Composite Sample)
SS04
Surface Soil
Subsample Location (for Composite Sample)
UXO Avoidance Perimeter
0
5
SCALE
FEET
APPROX 1"=5'
FILENAME: Q:\COE\Camp Bonneville\bonn-01-08-24-00.dwg
EDIT DATE: 09/01/00 AT: 08:54
URS
U.S. ARMY
CORPS OF ENGINEERS
SEATTLE DISTRICT
SEATTLE,WASHINGTON
PESTICIDE STORAGE AREA
CAMP BONNEVILLE
PN 53F0072207
WASHINGTON
FIGURE 4-1


Gravel Road
Locked Gate
N
Gravel Driveway
Ammunition
Storage
Bunker
SS02
SS01
SS03
SB-01
Legend
SS01 Surface Soil Sample Location
SB-01 Soil Boring Location
Chainlink Fence
UXO Avoidance Perimeter
0
5
SCALE FEET
APPROX 1"=5'
FILENAME: Q:\COE\Camp Bonneville\bonn-01-08-24-00.dwg
EDIT DATE: 09/01/00 AT: 08:54
URS
U.S. ARMY
CORPS OF ENGINEERS
SEATTLE DISTRICT
SEATTLE,WASHINGTON
AMMUNITION STORAGE MAGAZINE
CAMP BONNEVILLE PN 53F0072207 WASHINGTON
FIGURE 4-2

The following summarizes field observations made by URS during sampling activities and the results of laboratory analysis for soil samples.

5.1 PESTICIDE STORAGE AREA

5.1.1 Field Observations

The Pesticide Storage Area is located on the edge of a small, flat, grassy field approximately 75 feet south of the gravel road in front of the Camp Killpack cantonment. Overall, the ground surface in this area slopes very gently to the south, away from the road. Building 4126 rests directly on the ground surface, without foundational support. It contains a doorway, with the door removed, and two large windows without panes. The walls and roof are moderately weathered but the 2- inch by 12-inch fir boards that comprise the floor are sound and show no signs of rot. A light-duty workbench and some paper debris (fast-food packaging) were the only items observed inside the building on June 26, 2000. A small amount of gray, coarse powder and a few milliliters of dried tar were present on the floor at the time of sampling.

The building is approximately 4 feet west of an approximately 8-foot by 8-foot concrete pad. There is a small grassy area 20 feet to the east and a covered storage area approximately 30 feet to the northeast. A few pieces of wood and sheet metal are scattered on the ground surface. Several evergreen trees are located immediately west and southwest of the building.

According to USACE and Camp Bonneville personnel, previous uses of the pesticide building included towing it to various locations throughout the cantonment. Wooden skids attached to the underside of the floor further suggest this type of use. Vines and bushes growing up against the building walls suggest that it has not been moved and has been in its current location for a considerable amount of time.

Topsoil in the pesticide storage area consists of brown, sandy silt and some fine gravel. A substantial amount of organic matter in the soil includes mostly live roots from grass, Oregon grape, and blackberry vines. Based on observations made while collecting the soil samples, the topsoil is well compacted and fairly dense. URS did not observe visual or olfactory evidence of soil contamination such as stains and/or dead vegetation.

5.1.2 Laboratory Analytical Results

As described in Section 4, surface soil samples were collected from just outside the doorway and adjacent to the south side of the building. A flooring material sample was collected inside the building. The surface soil sample from the doorway was identified as SS04, the sample from the south side of the building was identified as SS05, and the flooring material sample was labeled FS01. A blind duplicate sample (SS504) was also collected from the surface soil sampling location outside the doorway. The primary and blind duplicate samples were analyzed by ARI. All of the samples were analyzed for organochlorine pesticides, PCBs, herbicides, petroleum hydrocarbons, and priority pollutant metals plus barium. Analytical results for detected analytes are summarized in Tables 5-1 through 5-3. The complete laboratory analytical data sheets (Form 1s) are provided in Appendix B.

Organochlorine Pesticides and PCBs

DDT and its analogues 4,4-DDD and 4,4-DDE, beta-BHC, lindane, and endrin aldehyde were detected in the pesticide storage area (Table 5-1). 4,4-DDD (estimated concentration of 76 µg/kg in primary soil sample), 4,4-DDE (estimated concentration of 230 µg/kg in primary soil sample), 4,4-DDT (estimated concentration of 2,700 µg/kg in primary soil sample), lindane (estimated concentration of 2 µg/kg in primary soil sample), and endrin aldehyde (estimated concentration of 9.5 µg/kg in duplicate soil sample) were detected in soil collected from the doorway (SS04). 4,4-DDE (concentration of 7.7 µg/kg), 4,4-DDT (concentration of 42 µg/kg), and beta-BHC (concentration of 4.2 µg/kg) were detected next to the south side of the building. The flooring material sample (FS01) contained only 4,4,-DDT (2,600 µg/kg).

Overall, analyte concentrations were highest in the soil sample collected from the doorway (SS04). Concentrations of DDE and DDT from the south side of the building were approximately 30 times lower than the doorway sample. The DDT concentration in the flooring material was similar to the doorway surface soil sample. However, it was the only analyte detected inside the building.

PCBs were not detected at concentrations exceeding laboratory reporting limits in any of the samples.

Herbicides

The only herbicide detected in the soil samples from the Pesticide Storage Area was 2,4,5-T (Table 5-1). Sample SS504 had an estimated concentration of 230 µg/kg and sample SS05 had an estimated concentration of 160 µg/kg. The herbicides detected in the floor sample (FS01) included 2,4-D (estimated concentration of 500 µg/kg); 2,4-DB (estimated concentration of 3,000 µg/kg); 2,4,5-T (estimated concentration of 92,000 µg/kg); and MCPP (estimated concentration of 42,000 mg/kg).

Petroleum Hydrocarbons

Diesel and motor oil-range hydrocarbons were detected in all three samples collected from the Pesticide Storage Area (plus the duplicate sample) (Table 5-2). The concentrations in the soil samples were similar. The diesel-range hydrocarbon concentrations were 42 mg/kg (primary sample SS04) and 43 mg/kg (SS05). Concentrations of motor oil-range hydrocarbons were 200 mg/kg (SS05) and 230 mg/kg (primary sample SS04 and duplicate). The concentrations detected in flooring material were significantly higher (diesel – 3,900 mg/kg and motor oil – 1,800 mg/kg).

Gasoline range hydrocarbons were only detected in the flooring material sample at an estimated concentration of 460 mg/kg. Gasoline was not detected in the soil samples.

Metals

Analyses for 13 priority pollutant metals plus barium were conducted for all three samples collected from the Pesticide Storage Area (Table 5-3). All of the metals analyzed except antimony, thallium, and selenium were detected in the soil samples. Only eight metals were detected in the flooring material as beryllium, nickel, selenium, silver, and thallium were not detected above the laboratory reporting limit. Unlike most other analytes, the lead concentration in the soil from the south side of the building (SS05 – 970 mg/kg) was significantly higher than

the concentration in the doorway sample (SS04 – 270 mg/kg). Overall, metal concentrations in the floor sample were lower than concentrations in the soil.

5.2 AMMUNITION STORAGE MAGAZINES

5.2.1 Field Observations

URS recorded field observations at the Ammunition Storage Magazines (Building 2953) while collecting surface soil samples and drilling a soil boring. Surface soil samples were collected in three locations in front of the bunker door. Subsurface soil samples were collected from soil boring SB-01 approximately 15 feet south of the bunker.

The Ammunition Storage Magazines are located approximately 2,000 feet northeast of the Pesticide Storage Area on the south side of the road leading into the facility from the Camp Killpack cantonment. They are positioned on a flat, graded terrace approximately 10 feet below the elevation of the road. An approximately 10-foot-wide by 50-foot-long access road descends from the main gravel road on the west side of the largest magazine (Building 2953) and ends in front of the magazine entrance on the south side. Overall, the ground surface in this area slopes away from the road and continues to descend toward the south away from the terrace.

Building 2953 is a small concrete bunker that is covered with several feet of soil on all sides except the south side. A locked steel door and a secondary, protective steel grate protect a three-foot-wide doorway on the south side of the bunker. The concrete building covers approximately 100 square feet. The protective soil cover that slopes away from the north, west, and east sides of the building covers most of the remaining graded area. A chain-link and barbed wire fence extends around the entire perimeter of the storage area. A locked gate is positioned at the intersection of the main gravel road and the magazine access road.

The access road and portions of the area around the bunker are covered with coarse, basaltic gravel. Most of the area, including the access road, is overgrown with Himalayan blackberry vines, Scotch Broom, small red alder trees, and grass.

Surface soil adjacent to the bunker consists of an approximately 6-inch to 1-foot-thick layer of fill composed of silty, gravelly sand. Along a narrow foot path extending from the door of the bunker to the access road, the soil is very compact and contains a high percentage of basalt gravel derived from the nearby road cover. In one surface soil sample location, URS encountered approximately 6-inch-diameter cobbles. A dense network of roots was encountered in all surface soil sample locations from the surface to approximately 1-foot bgs.

Soil, as encountered in the boring location, consists of fill (as described above) to approximately 1 foot bgs, silty clay and clayey silt to approximately 7 feet bgs, and a heterogeneous mixture of silt, clay, and weathered bedrock from 7 feet bgs to the bottom of the boring (22 feet bgs). The upper 6 feet of native soil, from approximately 1 foot to 7 feet bgs, is fairly uniform, red-brown, silty clay with a small percentage of fine to medium sand. Beginning at 7 feet bgs, the soil consists of multiple thin layers of black, red, and/or gray silty clay or clayey silt. With increasing depth, the soil is increasingly heterogeneous with fewer visible layers and an increasing amount of what appears to be extremely weathered bedrock material from an andesitic parent rock. During drilling, refusal was met at 21 feet bgs. Based on the material observed

immediately above this depth, it is likely that refusal was due to the upper surface of intact or only slightly weathered bedrock. A log of the soil boring is presented in Appendix A.

Groundwater was not encountered during drilling. Soil collected in the split spoon sampler was dry to moist. When the boring was complete, URS verified the absence of groundwater between the surface and 22 feet bgs by raising the drill stem 5 feet and allowing the boring to remain open for approximately 15 minutes as directed by the USACE site representative. No groundwater entered the boring.

The on-site URS geologist did not observe visual or olfactory evidence of contamination in any of the soil samples collected. Results of photoionization detector (PID) screening also indicated an absence of volatile organic compounds.

5.2.2 Laboratory Analytical Results

As described in Section 4, surface soil samples were collected from the front of the largest Ammunition Storage Magazine (Building 2953) along the footpath leading away from the door. The samples were designated as SS01, SS02, and SS03 and were approximately 1 foot, 3 feet, and 6 feet away from the threshold of the magazine, respectively. A blind duplicate sample (SS502) was also collected from at Building 2953. The primary and blind duplicate samples were analyzed by ARI, except for analysis of explosives and propellants, which was performed by GPL Laboratories. All of the samples were analyzed for priority pollutant metals plus barium, SVOCs, and explosives and propellants. Analytical results for detected analytes are summarized in Tables 5-2 through 5-5. The complete laboratory analytical data sheets (Form 1s) are provided in Appendix B. In addition to surface soil samples, one subsurface sample designated as SB01-4.5 was also collected from the soil boring drilled at the Ammunition Storage Magazine. This sample was analyzed for the same parameters as the surface sample, plus TPH identification, grain size, and total organic carbon.

Petroleum Hydrocarbons

One primary subsurface soil sample (SB01-4.5) and one duplicate sample (SB01-504.5) from boring SB-01 were collected and analyzed for petroleum hydrocarbons. Neither sample contained detectable concentrations of gasoline-range, diesel-range, or motor-oil range petroleum hydrocarbons (Table 5-2).

Semivolatile Organic Compounds

The only surface or subsurface sample collected from the Ammunition Storage Magazines with detectable concentrations of SVOCs was primary sample SS02 and duplicate sample SS502 (Table 5-4). 2,4-dinitrotoluene was detected at a concentration of 750 µg/kg, although this compound was not detected in the duplicate sample. In addition, bis(2-ethylhexyl) phthalate was detected in the primary sample at a concentration of 220 µg/kg and in the duplicate sample at a concentration of 380 µg/kg. No other SVOCs were detected above the laboratory reporting limit.

Ordnance and Explosives

The only ordnance compound detected in the surface soil samples collected from the Ammunition Storage Magazines was 2,4-dinitrotoluene, which was detected in all three surface soil samples and the duplicate sample (Table 5-5). The concentrations ranged from an estimated

value of 53.7 µg/kg in SS03 to 17,200 µg/kg in primary sample SS02. However, duplicate sample SS502 was reported by the laboratory to contain an estimated concentration of 92.5 µg/kg. No ordnance compounds were detected in subsurface soil sample SB01-4.5.

Primary surface soil sample SS02 was the only sample collected from the Ammunition Storage Magazines that contained detectable concentrations of propellants (Table 5-5). PETN was detected at a concentration of 2,280 µg/kg and picric acid was detected at a concentration of 1,100 µg/kg. Duplicate sample SS502 did not contain detected concentrations of these two propellant compounds. No propellant compounds were detected in subsurface soil sample SB01-4.5.

Apparent discrepancies in the concentrations of propellant compounds and the semivolatile, ordnance compound 2,4-dinitrotoluene are likely due to sample heterogeneity and not to laboratory error. Preferential adsorption of these compounds, in small discrete intervals in the soil, makes it difficult to adequately homogenize the compound within each sample. During extraction and analysis, several aliquots from any one sample may indicate several different results. This condition precludes obtaining reproducible analytical results that represent an average concentration in each sample.

Metals

Analyses for 13 priority pollutant metals plus barium were conducted for all three surface samples (and duplicate sample) collected from the Ammunition Storage Magazines (Table 5-3). These same metals were also analyzed for the subsurface sample collected from the soil boring. All of the metals analyzed except thallium and selenium were detected in one or more of the surface soil samples. Only eight metals were detected in the subsurface soil sample as arsenic, cadmium, mercury, selenium, silver, and thallium were not detected above the laboratory reporting limit. Unlike most other analytes, the lead concentrations in the soil from primary sample SS02 (280 mg/kg) and duplicate sample SS502 (210 mg/kg) were significantly higher than the concentration in the surface sample SS03 (72 mg/kg) and subsurface sample SB01-4.5 (7 mg/kg).

5.3 COMPARISON TO REGULATORY CRITERIA

A screening level assessment of concentrations of chemicals detected in surface soil samples, soil boring samples, and floor material samples was performed to identify compounds that may pose a threat to human health and the environment. A screening level assessment compares concentrations of detected compounds to applicable regulatory (screening) criteria. The screening criteria considered for this investigation include:

- MTCA Methods A and B cleanup levels for soil (Chapter 173-340 WAC, 1997)
- MTCA Proposed Amendments to Methods A and B cleanup levels for soil (Chapter 173-340 WAC, 1999)
- Natural Background Soil Metals Concentrations in Washington State – 90th Percentile Values (Ecology Publication #94-115, October 1994).
- Background Soil Metal Concentrations for Camp Bonneville (Shannon & Wilson 1999)

- EPA Region 9 Preliminary Remediation Goals (PRGs). Values based on a default residential soil use scenario and a 10^{-6} cancer risk or a hazard quotient of 1 (EPA Region 9, 2000). However, Risk-Based Concentrations (RBCs) were calculated for five compounds (2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, PETN, picric acid, and 2,4-dinitrotoluene/2,6-dinitrotoluene mixture) using EPA Region 9 PRGs and toxity criteria from the National Center for Environmental Assessment (NCEA).
- EPA Region 10 RBCs. Adopted from the table prepared by Region 9 with a hazard quotient of 0.1 and a 10^{-6} cancer risk (EPA Region 10, 2000).

If the site concentration exceeded the selected screening level, then the chemical was considered to be of potential concern. If the site concentration is less than the selected screening level, the chemical was excluded as a COPC. Selection and application of specific screening levels are discussed in the following sections. A comparison of screening criteria and the criterion selected for comparison for the COPCs are presented in Tables 5-6 through 5-10.

5.3.1 Petroleum Hydrocarbons

Based on agreement with Ecology, petroleum hydrocarbon results for soil were screened for COPCs using the proposed MTCA Method A cleanup values, which are based on the type of hydrocarbon detected (Table 5-6).

5.3.2 Pesticides, Herbicides, and PCBs

Organo-chlorinated pesticides, herbicides, and PCBs were screened against MTCA Method B cleanup levels and EPA Region 9 and 10 preliminary remediation goals (PRGs) (Table 5-7).

5.3.3 Metals

Metals results for soil were screened against a combination of MTCA Methods A and B cleanup levels, EPA Region 9 PRGs, EPA Region 10 RBCs, natural background concentrations for Clark County (Ecology 1994), and background values specifically obtained for Camp Bonneville (Shannon and Wilson 1999). In general, the lowest concentration of established values (i.e., MTCA Methods A and B, EPA Region 9 PRGs, and Region 10 RBCs) was selected as the appropriate screening level (Table 5-8). However, arsenic concentrations were compared to natural background values for Clark County since this background value is higher than the Method B cleanup level of 2 mg/kg. Although higher than the MTCA Method B carcinogenic criteria, the background value of 6 mg/kg (Ecology 1994) is still more conservative than all of the other criteria. In accordance with WAC Chapter 173-340-7407(e), if background values are used as cleanup levels, no single sample concentration may be greater than two times the 90th percentile value, and less than 10 percent of the sample concentrations may exceed the 90th percentile value.

As part of the Multi-Sites Investigation (Shannon & Wilson 1999), background soil samples were collected to statistically evaluate and establish background metal concentrations representative for Camp Bonneville. These background values were considered when selecting an appropriate screening level for metals detected during this investigation. However, based on review of potential screening values, the Camp Bonneville-specific background concentrations

were not selected as screening criteria for any of the metals since the other potential screening levels were lower than the specific Camp Bonneville background metal concentrations.

5.3.4 Ordnance

Ordnance, explosives, and propellants results were screened against MTCA Method B cleanup levels, Region 9 and 10 PRGs, and RBCs (Table 5-9).

5.3.5 Semivolatile Organics

Semivolatile organic compounds were screened against MTCA Method B cleanup levels and Region 9 and 10 PRGs (Table 5-10).

5.4 SOIL RESULTS EXCEEDING REGULATORY SCREENING CRITERIA

Soil results are summarized in Tables 5-1 Through 5-10. Results exceeding screening levels are shown in bold and underlined.

5.4.1 Pesticide Storage Area

Petroleum Hydrocarbons

The diesel result of the Pesticide Storage Area floor sample (FS01 – 3,900 mg/kg) was greater than the proposed MTCA cleanup level of 2,000 mg/kg for diesel-range hydrocarbons. In addition, gasoline was detected in sample FS01 at a concentration of 460 mg/kg, which exceeds the MTCA Method A cleanup level of 100 mg/kg.

Metals

Lead was detected in two surface soil samples from the Pesticide Storage Area (SS04 – 270 mg/kg and SS05 – 970 mg/kg) at concentrations that exceed the MTCA Method A value of 250 mg/kg. Other metals detected in the surface soil and floor samples were below their respective cleanup levels.

Pesticides/Herbicides/PCBs

4,4-DDT was detected in two soil samples collected from the Pesticide Storage Area (SS04 – 2,700 µg/kg [1,400 µg/kg duplicate] and SS05 – 42 µg/kg) at concentrations greater than the MTCA Method B protection of groundwater value of 25.7 µg/kg, and EPA Region 9 and 10 carcinogenic PRG of 1,700 µg/kg. Sample SS04 also had detections of 4,4-DDD (76 µg/kg – 48 µg/kg duplicate) and 4,4-DDE (230 µg/kg – 190 µg/kg duplicate) greater than the MTCA Method B Protection of Groundwater values of 36.5 µg/kg and 25.7 µg/kg, respectively. Other organo-chlorinated pesticides detected in the surface soil and floor samples were below their respective cleanup levels. The herbicide 2,4,5-T was detected in the floor sample (FS01 – 92,000 µg/kg) at a concentration exceeding the EPA Region 10 PRG HQ value of 61,000 µg/kg. In additions, MCPP in FS01 (estimated value of 42,000 µg/kg) exceeded the EPA region 10 PRG HQ value of 6,100 mg/kg. Other herbicides detected in the surface soil and floor samples were below their respective cleanup levels.

5.4.2 Ammunition Storage Magazine

Petroleum Hydrocarbons

Only the subsurface soil sample (and a duplicate) from soil boring SB01 was submitted for hydrocarbon identification analysis. The sample did not contain detectable concentrations of gasoline-range, diesel-range, or motor-oil range hydrocarbons.

Metals

Antimony was detected in two locations in the Ammunition Storage Area. The surface soil sample [SS502 (duplicate of SS02) – 8 mg/kg] was detected at a concentration just greater than the Clark County background concentration for antimony of 6 mg/kg (Table 5-3). The boring sample (SB01-4.5 – 20 mg/kg) was also detected at a concentration greater than the background concentration, and also greater than the MTCA B non-carcinogenic value range of 0.64-1.44 mg/kg. Cadmium was detected at two locations in the Ammunition Storage Area (SS02 – 5.6 mg/kg [5.5 mg/kg duplicate] and SS03 - 1.4 mg/kg) at concentrations greater than the EPA Region 10 HQ screening level of 3.7 mg/kg. Lead was detected at one location in the Ammunition Storage Area, SS02 at a concentration of 280 mg/kg, which is greater the MTCA Method A value of 250 mg/kg. Other metals detected were below their respective cleanup levels.

Semivolatile Organic Compounds

Although SVOCs were detected in two samples, the results were below the applicable screening criteria.

Ordnance

The 2,4-Dinitrotoluene result for one sample collected from the Ammunition Storage Area (SS02 - 17,200 µg/kg [92.5 µg/kg duplicate]) was greater than the Region 10 PRG HQ value of 12000 µg/kg. Other ordnance compounds detected were below their respective cleanup level.

As described above, the tendency of these compounds to preferentially adsorb to soil makes it difficult obtain repeatable analytical results for some ordnance compounds. The data do suggest, however, that there are a few localized points where the concentration of 2,4-dinitrotoluene exceeds the cleanup level.

Table 5-1

SUMMARY OF PESTICIDES, HERBICIDES AND PCBs IN SOIL
PESTICIDE STORAGE AREA
CAMP BONNEVILLE, WASHINGTON

Sample ID	FS01	SS04	SS504	SS05	
Sample location	FS01	SS04		SS05	
QAQC Type			duplicate		Screening
Date Sampled	6/26/00	6/27/00	6/27/00	6/27/00	Level[a]
Pesticides (µg/kg dry)					
4,4´-DDD	150 U	**76**	**48**	4.7 U	2,400
4,4´-DDE	80 U	**230**	**190**	**7.7**	1700
4,4´-DDT	**2600**	**2700J**	**1400J**	**42**	1700
Aldrin	40 U	2 U	2.1 U	2.4 U	29
alpha-BHC	40 U	4.8 U	2.7 U	2.4 U	90
beta-BHC	40 U	2 U	2.1 U	**4.2**	320
delta-BHC	40 UJ	R	R	R	NA
gamma-BHC (Lindane)	40 U	**2**	2.1 U	2.4 U	440
alpha-Chlordane	40 U	2 U	2.1 U	2.4 U	769
gamma-Chlordane	40 U	2 U	2.1 U	2.4 U	769
Dieldrin	80 U	4 U	4.3 U	4.7 U	30
Endosulfan I	40 U	2 U	2.1 U	2.4 U	37000
Endosulfan II	80 U	4 U	4.3 U	4.7 U	37000
Endosulfan sulfate	80 U	4 U	4.3 U	4.7 U	NA
Endrin	290 U	39 U	35 U	4.7 U	1800
Endrin aldehyde	80 U	R	R	R	NA
Endrin ketone	80 U	4 U	4.3 U	4.7 U	NA
Heptachlor	40 U	2 U	2.1 U	2.4 U	110
Heptachlor epoxide	40 U	2 U	2.1 U	2.4 U	53
Methoxychlor	400 U	20 U	21 U	24 U	31000
Toxaphene	11000 U	200 U	210 U	240 U	440
PCBs (µg/kg dry)					
Aroclor 1016	800 U	40 U	42 U	47 U	390
Aroclor 1221	1600 U	80 U	85 U	94 U	130
Aroclor 1232	800 U	40 U	42 U	110 U	130
Aroclor 1242	800 U	40 U	42 U	47 U	130
Aroclor 1248	800 U	40 U	42 U	47 U	130
Aroclor 1254	800 U	40 U	42 U	80 U	220
Aroclor 1260	800 U	40 U	42 U	96 U	130
Herbicides (µg/kg dry)					
2,4-D	**500** J	40 UJ	42 UJ	47 UJ	69000
2,4-DB	**3000** J	200 UJ	220 UJ	240 UJ	49000
2,4,5-TP (Silvex)	23 UJ	10 UJ	11 UJ	12 UJ	640000
2,4,5-T	**92000** J	**170** J	**230** J	**160** J	61000
Dalapon	90 UJ	110 UJ	120 UJ	130 UJ	180000
Dicamba	20 UJ	24 UJ	26 UJ	28 UJ	180000
Dinoseb	73 UJ	20 UJ	22 UJ	24 UJ	610
Dichloroprop	37 UJ	40 UJ	42 UJ	47 UJ	NA
MCPA	42000 UJ	51000 UJ	54000 UJ	59000 UJ	31000
MCPP	**42000** J	50000 UJ	53000 UJ	59000 UJ	6100

Notes:

[a]See Table 5-1 For complete list of screening levels

ug/kg - micrograms per killogram

NA - not applicable

U - not detected above stated detection limit

J - Value is estimated

R - Rejected data

Bold values indicate detections

Bold and **underlined** values indicate an exceedance of the screening levels.

Table 5-2

SUMMARY OF TPH IN SOIL
PESTICIDE STORAGE AREA AND AMMUNITION STORAGE MAGAZINES
CAMP BONNEVILLE, WASHINGTON

Sample ID	FS01	SS04	SS504	SS05	SB01-4.5	SB01-504.5	
Sample location	FS01	SS04		SS05	SB01-4.5		
QAQC Type			duplicate			duplicate	Screening
Date Sampled	6/26/00	6/27/00	6/27/00	6/27/00	6/27/00	6/27/00	Level[a]
TPH-HCID (mg/kg dry)							
Gx Range Hydrocarbons	--	--	--	--	20 U	20 U	100
Diesel Range Hydrocarbons	--	--	--	--	50 U	50 U	2,000
Motor Oil Range Hydrocarbons	--	--	--	--	100 U	100 U	4,000
TPH-Diesel (mg/kg dry)							
Diesel Range Hydrocarbons	**3900**	**42**	**59**	**43**	--	--	2,000
Motor Oil Range Hydrocarbons	**1800**	**230**	**230**	**200**	--	--	4,000
TPH-Gasoline (mg/kg dry)							
Gasoline Range Hydrocarbons	**460** J	6.4 U	6.2 U	6.9 U	--	--	100

Notes:

[a]See table 5-6 For complete list of screening levels

--': not analyzed

U - not detected above stated detection limit

J - Value is estimated

Bold values indicate detections

Bold and **underlined** values indicate an exceedance of the screening levels.

Samples FS01, SS04, SS504, SS05 were collected from the Pesticide Storage Area
Samples SB01-4.5 and SB01-504.5 were collected from the Ammunition Storage Magazines

Table 5-3

SUMMARY OF METALS AND CONVENTIONALS IN SOIL
PESTICIDE STORAGE AREA AND AMMUNITION STORAGE MAGAZINES
CAMP BONNEVILLE, WASHINGTON

	PESTICIDE STORAGE AREA			AMMUNITION STORAGE MAGAZINE						
Sample ID	**FS01**	**SS04**	**SS05**	**SS01**	**SS02**	**SS502**	**SS03**	**SB01-4.5**	**SB01-504.5**	
Sample location	**FS01**	**SS04**	**SS05**	**SS01**	**SS02**		**SS03**	**SB01-4.5**		
QAQC Type						**duplicate**			**duplicate**	**Screening**
Date Sampled	**6/26/00**	**6/27/00**	**6/27/00**	**6/27/00**	**6/27/00**	**6/27/00**	**6/27/00**	**6/27/00**	**6/27/00**	**Level[a]**
Metals (mg/kg dry)										
Antimony	5 U	6 U	**7**	6 U	6 U	**8**	5 U	**20**	--	3
Arsenic	**0.11**	**1.7**	**1.8**	**2**	**3.1**	**2.9**	**3**	0.6 U	--	6
Barium	**7.2**	**197**	**250**	**119**	**181**	**174**	**149**	**151**	--	257
Beryllium	0.1 U	**1**	**0.9**	**0.5**	**0.5**	**0.5**	**0.5**	**0.6**	--	15
Cadmium	**1**	**0.8**	**0.9**	**1**	**5.6**	**5.5**	**1.4**	0.6 U	--	2
Chromium	**0.8**	**30.2**	**28.2**	**28.1**	**25.1**	**33.6**	**20.4**	**36**	--	100
Copper	**1.2**	**85.8**	**83.2**	**77.2**	**102**	**89.6**	**65**	**123**	--	290
Lead	**29**	**270**	**970**	**43**	**280**	**210**	**72**	**7**	--	250
Mercury	**0.46**	**0.09**	**0.12**	0.05 U	0.05 U	**0.05**	0.05 U	0.05 U	--	1
Nickel	1 U	**15**	**18**	**18**	**16**	**19**	**14**	**21**	--	160
Selenium	0.2 U	0.3 U	0.6 U	0.6 U	0.6 U	0.5 U	0.2 U	0.6 U	--	39
Silver	0.3 U	**0.7**	**0.6**	**0.9**	**0.6**	**0.6**	**0.6**	0.9 U	--	39
Thallium	0.1 U	0.1 U	0.3 U	0.1 U	0.3 U	0.3 U	0.3 U	0.1 U	--	6
Zinc	**255**	**214**	**330**	**78.3**	**141**	**165**	**86.5**	**76**	--	2,300
Conventionals (mg/kg dry)										
Total Organic Carbon	--	--	--	--	--	--	--	**0.13** J	**0.28** J	NA
Total Solids	--	--	--	--	--	--	--	**73.4**	**75.8**	NA

Notes:

[a]See Table 5-8 For complete list of screening levels

mg/kg - milligrams per killogram

--': not analyzed

NA - not applicable

U - not detected above stated detection limit

J - Value is estimated

Bold values indicate detections

Bold and **underlined** values indicate an exceedance of the screening levels.

Table 5-4

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL
AMMUNITION STORAGE MAGAZINES
CAMP BONNEVILLE, WASHINGTON

Sample ID	SS01	SS02	SS502	SS03	SB01-4.5	
Sample location		SS02				
QAQC Type			duplicate			Screening'
Date Sampled	6/27/00	6/27/00	6/27/00	6/27/00	6/27/00	Level[a]
SVOC (µg/kg dry)						
1,2,4-Trichlorobenzene	81 U	74 U	75 U	77 U	90 U	65,000
1,2-Dichlorobenzene	81 U	74 U	75 U	77 U	90 U	90,000
1,3-Dichlorobenzene	81 U	74 U	75 U	77 U	90 U	1,300
1,4-Dichlorobenzene	81 U	74 U	75 U	77 U	90 U	41,700
2,4,5-Trichlorophenol	410 U	370 U	370 U	380 U	450 U	610,000
2,4,6-Trichlorophenol	410 U	370 U	370 U	380 U	450 U	44,000
2,4-Dichlorophenol	240 U	220 U	220 U	230 U	270 U	18,000
2,4-Dimethylphenol	240 U	220 U	220 U	230 U	270 U	120,000
2,4-Dinitrophenol	810 U	740 U	750 U	770 U	900 U	12,000
2,4-Dinitrotoluene	410 U	**750**	370 U	380 U	450 U	12,000
2,6-Dinitrotoluene	410 U	370 U	370 U	380 U	450 U	6,100
2-Chloronaphthalene	81 U	74 U	75 U	77 U	90 U	NA
2-Chlorophenol	81 U	74 U	75 U	77 U	90 U	6,300
2-Methylnaphthalene	81 U	74 U	75 U	77 U	90 U	NA
2-Methylphenol	160 U	150 U	150 U	150 U	180 U	310,000
2-Nitroaniline	410 U	370 U	370 U	380 U	450 U	350
2-Nitrophenol	410 U	370 U	370 U	380 U	450 U	NA
2,2' -Oxybis (1-chloropropan	81 U	74 U	75 U	77 U	90 U	NA
3,3´-Dichlorobenzidine	410 U	370 U	370 U	380 U	450 U	1,100
3-Nitroaniline	490 U	440 U	450 U	460 U	540 U	NA
4,6-Dinitro-2-methylphenol	810 U	740 U	750 U	770 U	900 U	NA
4-Bromophenyl phenyl ether	81 U	74 U	75 U	77 U	90 U	NA
4-Chloro-3-methylphenol	160 U	150 U	150 U	150 U	180 U	NA
4-Chloroaniline	240 U	220 U	220 U	230 U	270 U	24,000
4-Chlorophenyl phenyl ether	81 U	74 U	75 U	77 U	90 U	NA
4-Methylphenol	81 U	74 U	75 U	77 U	90 U	31,000
4-Nitroaniline	410 U	370 U	370 U	380 U	450 U	NA
4-Nitrophenol	410 U	370 U	370 U	380 U	450 U	49,000
Acenaphthene	81 U	74 U	75 U	77 U	90 U	370,000
Acenaphthylene	81 U	74 U	75 U	77 U	90 U	NA
Anthracene	81 U	74 U	75 U	77 U	90 U	2,200,000
Benzo (a) anthracene	81 U	74 U	75 U	77 U	90 U	137
Benzo (a) pyrene	81 U	74 U	75 U	77 U	90 U	62
Benzo (b) fluoranthene	81 U	74 U	75 U	77 U	90 U	137
Benzo (ghi) perylene	81 U	74 U	75 U	77 U	90 U	NA
Benzo (k) fluoranthene	81 U	74 U	75 U	77 U	90 U	137
Benzoic Acid	810 U	740 U	750 U	770 U	900 U	24,000,000
Benzyl Alcohol	410 U	370 U	370 U	380 U	450 U	1,800,000
Bis(2-chloroethoxy)methane	81 U	74 U	75 U	77 U	90 U	NA
Bis(2-chloroethyl)ether	160 U	150 U	150 U	150 U	180 U	210
Bis(2-ethylhexyl)phthalate	81 U	**220**	**380**	77 U	90 U	35,000
Butyl benzyl phthalate	81 U	74 U	75 U	77 U	90 U	1,200,000
Carbazole	81 U	74 U	75 U	77 U	90 U	24,000
Chrysene	81 U	74 U	75 U	77 U	90 U	137
Di-n-butyl phthalate	81 U	74 U	75 U	77 U	90 U	610,000
Di-n-octyl phthalate	81 U	74 U	75 U	77 U	90 U	120,000
Dibenz (a,h) anthracene	81 U	74 U	75 U	77 U	90 U	62
Dibenzofuran	81 U	74 U	75 U	77 U	90 U	29,000
Diethyl phthalate	81 U	74 U	75 U	77 U	90 U	4,900,000
Dimethyl phthalate	81 U	74 U	75 U	77 U	90 U	61,000,000
Fluoranthene	81 U	74 U	75 U	77 U	90 U	230,000
Fluorene	81 U	74 U	75 U	77 U	90 U	260,000
Hexachlorobenzene	81 U	74 U	75 U	77 U	90 U	300
Hexachlorobutadiene	160 U	150 U	150 U	150 U	180 U	6,200
Hexachlorocyclopentadiene	410 U	370 U	370 U	380 U	450 U	42,000
Hexachloroethane	160 U	150 U	150 U	150 U	180 U	35,000
Indeno (1,2,3-cd) pyrene	81 U	74 U	75 U	77 U	90 U	137
Isophorone	81 U	74 U	75 U	77 U	90 U	510,000
N-Nitrosodi-n-propylamine	160 U	150 U	150 U	150 U	180 U	69
N-Nitrosodiphenylamine	81 U	74 U	75 U	77 U	90 U	99,000
Naphthalene	81 U	74 U	75 U	77 U	90 U	5,600
Nitrobenzene	81 U	74 U	75 U	77 U	90 U	2,000
Pentachlorophenol	410 U	370 U	370 U	380 U	450 U	3,000
Phenanthrene	81 U	74 U	75 U	77 U	90 U	NA
Phenol	160 U	150 U	150 U	150 U	180 U	3,700,000
Pyrene	81 U	74 U	75 U	77 U	90 U	230,000

Notes:

[a]See Table 5-10 For complete list of screening levels

µg/kg - micrograms per killogram

NA - not applicable

U - not detected above stated detection limit

J - Value is estimated

Bold values indicate detections

Table 5-5

SUMMARY OF ORDNANCE AND EXPLOSIVES
AMMUNITION STORAGE AREA
CAMP BONNEVILLE, WASHINGTON

Sample ID	SS01	SS02	SS502	SS03	SB01-4.5	
Sample location	SS01	SS02		SS03	SB01-4.5	
QAQC Type			duplicate			Screening
Date Sampled	6/27/00	6/27/00	6/27/00	6/27/00	6/27/00	Level[a]
Ordnance (µg/kg dry)						
1,3,5-Trinitrobenzene	120 U	120 U	114 U	120 U	120 U	4,000
1,3-DNB	120 U	120 U	114 U	120 U	120 U	610
2,4,6-Trinitrotoluene	120 U	120 U	114 U	120 U	120 U	16,000
2,4-Dinitrotoluene	**8,420**	**17,200**	**93 J**	**54 J**	120 U	12,000
2,6-Dinitrotoluene	120 U	120 U	114 U	120 U	120 U	16,200
2-Amino-4,6-Dinitrotoluene	120 U	120 U	114 U	120 U	120 U	16,200
4-Amino-2,6-Dinitrotoluene	120 U	120 U	114 U	120 U	120 U	NA
HMX	250 U	250 U	238 U	250 U	250 U	NA
Nitrobenzene	120 U	120 U	114 U	120 U	120 U	2,000
RDX	250 U	250 U	238 U	250 U	250 U	4,400
Tetryl	250 UJ	250 UJ	238 UJ	250 UJ	250 UJ	61,000
m-Nitrotoluene	250 U	250 U	238 U	250 U	250 U	37,000
o-Nitrotoluene	250 U	250 U	238 U	250 U	250 U	37,000
p-Nitrotoluene	120 U	120 U	114 U	120 U	120 U	37,000
Propellants (µg/kg dry)						
Ammonium Perchlorate	48 U	50 U	51 U	51 U	45 U	39
Nitroglycerin	5,780 U	5,510 U	5,450 U	5,520 U	6,010 U	35
Nitroguanidine	125 U	125 U	125 U	123 U	123 U	610,000
PETN	500 U	**2,280**	476 U	500 U	500 U	208×10^6
Picric Acid	1,000 U	**1,100**	952 U	1,000 U	1,000 U	624,000

Notes:

[a]See Table 5-9 for complete list of screening levels.

NA - not applicable

U - not detected above stated detection limit

J - Value is estimated

Bold values indicate detections

Bold and Underlined values indicateand exceedance of the screening level.

Table 5-6

TPH Screening Levels for Soil (mg/kg)
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville, Washington

	MTCA Method A	
	current	proposed
TPH-Diesel		
Diesel Range Hydrocarbons	200	2,000
Motor Oil Range Hydrocarbons	200	4,000
TPH-Gasoline		
Gasoline Range Hydrocarbons	100	100

Notes:

MTCA - Washington State Model Toxics Control Act

mg/kg - milligrams per killogram

BRAC Cleanup Team has agreed to use the current MTCA Method A cleanup values for Camp Bonneville

Proposed MTCA Method A (Ecology 1999)

Table 5-7

Pesticides, Herbicides and PCBs Screening Levels for Soil (ug/kg)
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville, Washington

	MTCA Method B		EPA Region 9 Residential Soil	EPA Region 10 Risk-Based Concentration		Selected Screening Level[c]
	carninogen	non-carcinogen	PRG	HQ = 0.1	10^{-6}	
Pesticides						
4,4´-DDD	4,170	NA	2,400 ca	NA	2,400	2,400
4,4´-DDE	2,940	NA	1,700 ca	NA	1,700	1,700
4,4´-DDT	2,940	40,000	1,700 ca	NA	1,700	1,700
Aldrin	59	2,400	29 ca	180	29	29
alpha-BHC	159	NA	90 ca	NA	90	90
beta-BHC	556	NA	320	NA	NA	320
delta-BHC	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)	769	24,000	440 ca	2,100	440	440
alpha-Chlordane[a]	769	4,800	1,600 ca	3,500	1,600	769
gamma-Chlordane[a]	769	4,800	1,600 ca	3,500	1,600	769
Dieldrin	63	4,000	30 ca	310	30	30
Endosulfan I[b]	NA	480,000	370,000 nc	37,000	NA	37,000
Endosulfan II[b]	NA	480,000	370,000 nc	37,000	NA	37,000
Endosulfan sulfate	NA	NA	NA	NA	NA	NA
Endrin	NA	24,000	18,000 nc	1,800	NA	1,800
Endrin Aldehyde	NA	NA	NA	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA
Heptachlor	222	40,000	110 ca	3,100	110	110
Heptachlor epoxide	110	1,040	53 ca	79	53	53
Methoxychlor	NA	40,000	310,000 nc	31,000	NA	31,000
Toxaphene	NA	909	440	NA	440	440
PCBs						
Aroclor 1016	NA	5,600	3,900 nc	390	6,300	390
Aroclor 1221	130	NA	220 ca	NA	220	130
Aroclor 1232	130	NA	220 ca	NA	220	130
Aroclor 1242	130	NA	220 ca	NA	220	130
Aroclor 1248	130	NA	220 ca	NA	220	130
Aroclor 1254	NA	1,600	220 ca	110	220	220
Aroclor 1260	130	NA	220 ca	NA	220	130
Herbicides						
2,4-D	NA	800,000	690,000 nc	69,000	NA	69,000
2,4-DB	NA	640,000	490,000 nc	49,000	NA	49,000
2,4,5-TP (Silvex)	NA	640,000	NA	NA	NA	64,000
2,4,5-T	NA	800,000	610,000 nc	61,000	NA	61,000
Dalapon	NA	2,400,000	1,800,000 nc	180,000	NA	180,000
Dicamba	NA	2,400,000	1,800,000 nc	180,000	NA	180,000
Dinoseb	NA	80,000	6,100 nc	610	NA	610
Dichloroprop	NA	NA	NA	NA	NA	NA
MCPA	NA	NA	131,000 nc	31,000	NA	31,000
MCPP	NA	NA	61,000 nc	6,100	NA	6,100

Notes:

[a]total chlordane

[b]endosulfan

[c]Selected screening level is the most conservative (i.e. the lowest value) of all screening levels presented.

MTCA - Washington State Model Toxics Control Act

EPA - U.S. Environmental Protection Agency

HQ - hazard quotient

µg/kg - micrograms per killogram

PRG - preliminary remediation goal

EPA Region 10 risk-based concentration derived from EPA Region 9 PRG. HQ = 0.1X noncarcinogenic value. 10^{-6} = carcinogenic value.

ca - carcinogen; nc - noncarcinogen

NA - not applicable

Table 5-8

Metals Screening Levels for Soil (mg/kg)
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville, Washington

Metal	MTCA Method A	MTCA Method B		Clark County Background 90th Percentile[a]	Camp Bonneville Background[h]	EPA Region 9 Residential soil PRG	EPA Region 10 Risk-Based Concentration		Selected Screening Level
		carcinogen	non-carcinogen				HQ=0.1	10^{-6}	
Antimony	NA	NA	32-72[b]	NA	0.12	31 nc	3	NA	3
Arsenic	20	2	60	6	NC	0.39 ca	22	0	6[i]
Barium	NA	NA	5,600	NA	257	5,400 nc	540	NA	540
Beryllium	NA	0	400	2	NC	150 nc	15	1,100	15
Cadmium	2[c]	NA	80	1	NC	37 nc	4	1,400	2
Chromium	100[d]	NA	80,000	27	NC	210 ca	NA	210	100
Copper	NA	NA	2,960	34	114	2,900 nc	290	NA	290
Lead	250	NA	NA	17	NC	400[f]	NA	NA	250
Mercury	1[e]	NA	24	0	NC	23 nc	2	NA	1
Nickel	NA	NA	1,600	21	NC	1,600 nc	160	NA	160
Selenium	NA	NA	400	NA	NC	390 nc	39	NA	39
Silver	NA	NA	400	NA	NC	390 nc	39	NA	39
Thallium	NA	NA	6	NA	0.27	6.3-7[g]	NA	NA	6
Zinc	NA	NA	24,000	96	NC	23,000 nc	2,300	NA	2,300

Notes:

NA = Not Available, NC = Not Calculated

[a]Natural background soil metals concentrations in Clark County, Washington State, per Ecology Publication #94-115.

[b]Varies with the form of antimony

[c]The MTCA Method A cleanup level for cadmium is for plant protection.

[d]The MTCA Method A cleanup level for chromium is for protection from inhalation of suspended dusts.

[e]Cleanup level base on protection of groundwater

[f]RBC for residential soil

[g]Varies with the form of thallium

[h]Background values developed by Shannon & Wilson (1999)

[i]If screening levels are less then the background level, the background level is used (i.e. arsenic)

MTCA - Washington State Model Toxics Control Act

EPA - U.S. Environmental Protection Agency

HQ - hazard quotient

mg/kg - milligrams per killogram

PRG - preliminary remediation goal

EPA Region 10 risk-based concentration derived from EPA Region 9 PRG. HQ = 0.1X noncarcinogenic value. 10^{-6} = carcinogenic value.

ca - carcinogen; nc - noncarcinogen

Table 5-9

Ordnance Screening Levels for Soil (µg/kg)
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville, Washington

	MTCA Method B		EPA Region 9 Residential Soil	EPA Region 10 Risk-Based Concentration		Selected Screening Level[a]
	carninogen	non-carcinogen	PRG	HQ = 0.1	10^{-6}	
Ordnance						
1,3,5-Trinitrobenzene	NA	4,000	1,800,000 nc	180,000	NA	4,000
1,3-DNB	NA	8,000	6,100 nc	610	NA	610
2,4,6-Trinitrotoluene	33,300	40,000	16,000 ca		16,000	16,000
2,4-Dinitrotoluene	NA	160,000	120,000 nc	12,000	NA	12,000
2,6-Dinitrotoluene	NA	80,000	61,000 nc	6,110	NA	6,110
Explosives						
2-Amino-4,6-Dinitrotoluene*	NA	NA	16,200 ca	NA	NA	16,200
4-Amino-2,6-Dinitrotoluene*	NA	NA	16,200 ca	NA	NA	16,200
2,4-DNT/2,6-DNT*	NA	NA	710 ca	NA	NA	710
HMX	NA	NA	NA	NA	NA	NA
Nitrobenzene	NA	40,000	20,000 nc	2,000	NA	2,000
RDX	9,090	240,000	4,400 ca	NA	4,400	4,400
Tetryl	NA	800,000	610,000 nc	61,000	NA	61,000
m-Nitrotoluene	NA	800,000	370,000 nc	37,000	NA	37,000
o-Nitrotoluene	NA	800,000	370,000 nc	37,000	NA	37,000
p-Nitrotoluene	NA	800,000	370,000 nc	37,000	NA	37,000
Propellants						
Ammonium Perchlorate	NA	NA	39[b]	NA	NA	39
Nitroglycerin	NA	NA	35,000 nc	NA	35	35
Nitroguanidine	NA	8,000,000	6,100,000 nc	610,000	NA	610,000
Explosives						
PETN*	NA	NA	208 x 10^6 nc	NA	NA	208 x 10^6
Picric Acid*	NA	NA	624,000 nc	NA	NA	624,000

Notes:

[a]Selected screening level is the most conservative (I.e. the lowest value) of all screening levels presented

[b]as perchlordane

MTCA = Washington State Model Toxics Control Act

EPA = U.S. Environmental Protection Agency

NCEA = National Center for Environmental Assessment

HQ = hazard quotient

µg/kg = micrograms per killogram

PRG = preliminary remediation goal

EPA Region 10 risk-based concentration derived from EPA Region 9 PRG. HQ = 0.1X noncarcinogenic value. 10^{-6} = carcinogenic value

ca = carcinogen; nc = noncarcinogen

NA = not applicable

RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine

HMX = octahydro-1,3,5,7-tetrnitro-1,3,5,7-tetraocine

PETN = pentaerythritol tetranitrate

*Screening levels for these compounds were calculated using EPA Region 9 PRGs and toxicity criteria from the NCEA

Table 5-10

Semivolatile Organic Compounds Screening Levels for Soil (µg/kg)
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville, Washington

	MTCA Method B		EPA Region 9 Residential Soil	EPA Region 10 Risk-Based Concentration		Selected Screening Level[a]
	carninogen	non-carcinogen	PRG	HQ = 0.1	10^{-6}	
SVOCs						
1,2,4-Trichlorobenzene	NA	800,000	650,000 nc	65,000	NA	65,000
1,2-Dichlorobenzene	NA	7,200,000	900,000 nc	90,000	NA	90,000
1,3-Dichlorobenzene	NA	NA	13,000 nc	1,300	NA	1,300
1,4-Dichlorobenzene	41,700	NA	480,000 nc	48,000	NA	41,700
2,4,5-Trichlorophenol	NA	8,000,000	6,100,000 nc	610,000	NA	610,000
2,4,6-Trichlorophenol	90,900	NA	44,000 ca	NA	44,000	44,000
2,4-Dichlorophenol	NA	240,000	180,000 nc	18,000	NA	18,000
2,4-Dimethylphenol	NA	1,600,000	1,200,000 nc	120,000	NA	120,000
2,4-Dinitrophenol	NA	160,000	120,000 nc	12,000	NA	12,000
2,4-Dinitrotoluene	NA	160,000	120,000 nc	12,000	NA	12,000
2,6-Dinitrotoluene	NA	80,000	61,000 nc	6,100	NA	6,100
2-Chloronaphthalene	NA	NA	NA	NA	NA	NA
2-Chlorophenol	NA	400,000	63,000 nc	6,300	NA	6,300
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA
2-Methylphenol	NA	NA	3,100,000 nc	310,000	NA	310,000
2-Nitroaniline	NA	NA	3,500 nc	350	NA	350
2-Nitrophenol	NA	NA	NA	NA	NA	NA
2,2' -Oxybis (1-chloropropane)	NA	NA	NA	NA	NA	NA
3,3´-Dichlorobenzidine	2,220	NA	1,100 ca	NA	1,100	1,100
3-Nitroaniline	NA	NA	NA	NA	NA	NA
4,6-Dinitro-2-methylphenol	NA	NA	NA	NA	NA	NA
4-Bromophenyl phenyl ether	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	NA	NA	NA	NA	NA	NA
4-Chloroaniline	NA	320,000	240,000 nc	24,000	NA	24,000
4-Chlorophenyl phenyl ether	NA	NA	NA	NA	NA	NA
4-Methylphenol	NA	NA	310,000 nc	31,000	NA	31,000
4-Nitroaniline	NA	NA	NA	NA	NA	NA
4-Nitrophenol	NA	NA	490,000 nc	49,000	NA	49,000
Acenaphthene	NA	4,800,000	3,700,000 nc	370,000	NA	370,000
Acenaphthylene	NA	NA	NA	NA	NA	NA
Anthracene	NA	24,000,000	22,000,000 nc	2,200,000	NA	2,200,000
Benzo (a) anthracene	137	NA	620 ca	NA	620	137
Benzo (a) pyrene	137	NA	62 ca	NA	62	62
Benzo (b) fluoranthene	137	NA	620 ca	NA	620	137
Benzo (ghi) perylene	NA	NA	NA	NA	NA	NA
Benzo (k) fluoranthene	137	NA	6,200 ca	NA	6,200	137
Benzoic Acid	NA	320,000,000	240,000,000 nc	24,000,000	NA	24,000,000
Benzyl Alcohol	NA	24,000,000	18,000,000 nc	1,800,000	NA	1,800,000
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	NA	NA
Bis(2-chloroethyl)ether	909	NA	210 ca	NA	210	210
Bis(2-ethylhexyl)phthalate	71,400	1,600,000	35,000 ca	NA	35,000	35,000
Butyl benzyl phthalate	NA	16,000,000	12,000,000 nc	1,200,000	NA	1,200,000
Carbazole	50,000	NA	24,000ca	NA	24,000	24,000
Chrysene	137	NA	62,000 ca	NA	62,000	137
Di-n-butyl phthalate	NA	8,000,000	6,100,000 nc	610,000	NA	610,000
Di-n-octyl phthalate	NA	1,600,000	1,200,000 nc	120,000	NA	120,000
Dibenz (a,h) anthracene	137	NA	62 ca	NA	62	62
Dibenzofuran	NA	NA	290,000 nc	29,000	NA	29,000
Diethyl phthalate	NA	64,000,000	49,000,000 nc	4,900,000	NA	4,900,000
Dimethyl phthalate	NA	80,000,000	610,000,000 nc	61,000,000	NA	61,000,000
Fluoranthene	NA	3,200,000	2,300,000 nc	230,000	NA	230,000
Fluorene	NA	3,200,000	2,600,000 nc	260,000	NA	260,000
Hexachlorobenzene	625	64,000	300 ca	NA	300	300
Hexachlorobutadiene	12,800	16,000	6,200 ca	NA	6,200	6,200
Hexachlorocyclopentadiene	NA	560,000	420,000 nc	42,000	NA	42,000
Hexachloroethane	71,400	80,000	35,000 ca	NA	35,000	35,000
Indeno (1,2,3-cd) pyrene	137	NA	620 ca	NA	620	137
Isophorone	1,050,000	16,000,000	510,000 ca	NA	510,000	510,000
N-Nitrosodi-n-propylamine	143	NA	69 ca	NA	69	69
N-Nitrosodiphenylamine	204,000	NA	99,000 ca	NA	99,000	99,000
Naphthalene	NA	3,200,000	56,000 nc	5,600	NA	5,600
Nitrobenzene	NA	40,000	20,000 nc	2,000	NA	2,000
Pentachlorophenol	8,330	2,400,000	3,000 ca	NA	3,000	3,000
Phenanthrene	NA	NA	NA	NA	NA	NA
Phenol	NA	48,000,000	37,000,000 nc	3,700,000	NA	3,700,000
Pyrene	NA	2,400,000	2,300,000 nc	230,000	NA	230,000

Notes:

[a]Selected screening level is the most conservative (I.e. the lowest value) of all screening levels presented.

MTCA - Washington State Model Toxics Control Act

EPA - U.S. Environmental Protection Agency

HQ - Hazard Quotient

µg/kg - micrograms per kilogram

PRG - preliminary remediation goal

EPA Region 10 risk-based concentration derived from Epa Region 9 PRG. HQ = 0.1 X noncarcinogenic value.

ca - carcinogen; nc - noncarcinogen

A conceptual site model (CSM) is a schematic representation of potential pathways by which receptors (humans or other ecological endpoint species) may be exposed to chemicals at or released from a source. The purposes of the CSM for the investigation at the Pesticide Storage Area and Ammunition Storage Magazine were to provide a framework for problem definition, to identify exposure pathways that may result in adverse effects to human health or other ecological receptors, and to aid in identifying effective cleanup measures targeted at significant contaminant sources and exposure pathways, if necessary.

An exposure pathway describes a specific environmental pathway by which chemicals may be transported to human or other ecological receptors. A complete exposure pathway requires each of the following six elements:

- Source of chemicals
- Mechanism of chemical release
- Environmental transport medium
- Exposure point
- Intake route
- Human or other ecological endpoints

If one of these elements is absent, the pathway is incomplete and exposure cannot occur. Incomplete pathways, as well as negligible pathways that would not contribute to overall risk estimates, are not expected to result in adverse effects to human health or the environment.

6.1 Potential Release and Transport Mechanisms

The likely sources of COPCs at the Pesticide Storage Area is the storage of pesticides and herbicides in Building Number 4126, as well as application to the surrounding soil and potential spills. Materials such as 2,4,5-T; 2,4-D; and DDT were stored there until approximately 1977 after which they were moved to Building 1864. The source of COPCs at the Ammunition Storage Magazines is the ammunition historically stored inside the magazines. In addition, smokeless powder and/or black powder residue was reportedly present outside the magazine at Building Number 2953 (Shannon & Wilson 1999).

The principal chemical release mechanisms for COPCs from undisturbed soil to the environment include:

- Historic releases of contaminants to surface soil
- Leaching to subsurface soils

Mobile contaminants leaching from the surface may enter and contaminate subsurface soil. Exposure pathways would most likely be related to direct contact with contaminated surface and subsurface soil. The groundwater pathway is considered negligible or incomplete because of the absence of contaminants found in the subsurface soils, their relatively low mobility, and the absence of groundwater (at the Ammunition Storage Magazines). As a result of the negligible or incomplete groundwater pathway, the contamination of surface water from groundwater seeps is also considered negligible or incomplete. The distance to Lacamas Creek from the centers of the

Pesticide Storage Area and Ammunition Storage Magazines is estimated to be approximately 750 feet to the south and 100 feet to the south, respectively.

6.2 POTENTIAL HUMAN RECEPTORS

As discussed in Section 5, the floor sample from the Pesticide Storage Area contained concentrations of diesel-range and gasoline-range petroleum hydrocarbons greater than the screening criteria. Other COPCs detected above their respective screening criteria at the Pesticide Storage Area include lead, 4,4-DDT, 4,4-DDD, and 4,4-DDE from surface soil samples. In addition, the floor sample from the Pesticide Storage Area also contained concentrations of 2,4,5-T above the screening criteria.

The only COPCs detected at concentrations exceeding the screening criteria at the Ammunition Storage Magazines included cadmium in two surface soil sample locations, lead in one surface soil sample location, and 2,4-dinitrotoluene in one surface soil sample location. The subsurface sample collected from soil boring SB01 did not contain COPCs above their respective screening criteria.

Potential human exposure pathways are presented on Figure 6-1. Based on stormwater runoff from soil containing COPCs above the screening criteria into Lacamas Creek, potentially complete ingestion and dermal exposure pathway receptors include current on-site workers, future on-site recreational users, and future on-site workers. Incomplete exposure pathways for human receptors include current off-site recreational site users, current off-site residents and workers, due their unlikely contact with stormwater runoff into Lacamas Creek. Trespasser exposure is considered negligible due to the limited amount of time (and therefore exposure) that they may be on-site.

Potentially complete inhalation exposure pathway to COPCs is considered to be restricted to current on-site workers, future on-site recreational users, and future on-site workers. Exposure to current and future off-site residents, workers, recreational users, and trespassers is considered to be negligible due to their unlikely exposure to air containing COPCs. Similarly, direct contact though ingestion or dermal contact with soil containing COPCs is likely limited to current on-site workers, future on-site recreational users, and future on-site workers.

6.3 POTENTIAL ECOLOGICAL RECEPTORS

Camp Bonneville is a heavily wooded area and the dominant tree species are Douglas fir, western red cedar, western hemlock, and red alder. Depending primarily on moisture gradients, the understory is composed of salal, Oregon grape, vine maple, and sword fern (Larson 1980). Several species of small mammals and birds reside on the site including rock doves, cottontail rabbits, ground squirrels, mice, and shrews. There are also several Special Status Species present at or near Camp Bonneville (USACE 1999). Species confirmed at or near Camp Bonneville include:

Plants

- Hairy-stemmed checker-mallow: state-endangered species
- Small-flowered trillium: state-sensitive species

Amphibians

- Northern red-legged frog: federal species of concern

Birds

- Vaux's swift: state candidate species
- Pileated woodpecker: state candidate species

Mammals

- Brush Prairie (Northern) pocket gopher: state candidate species

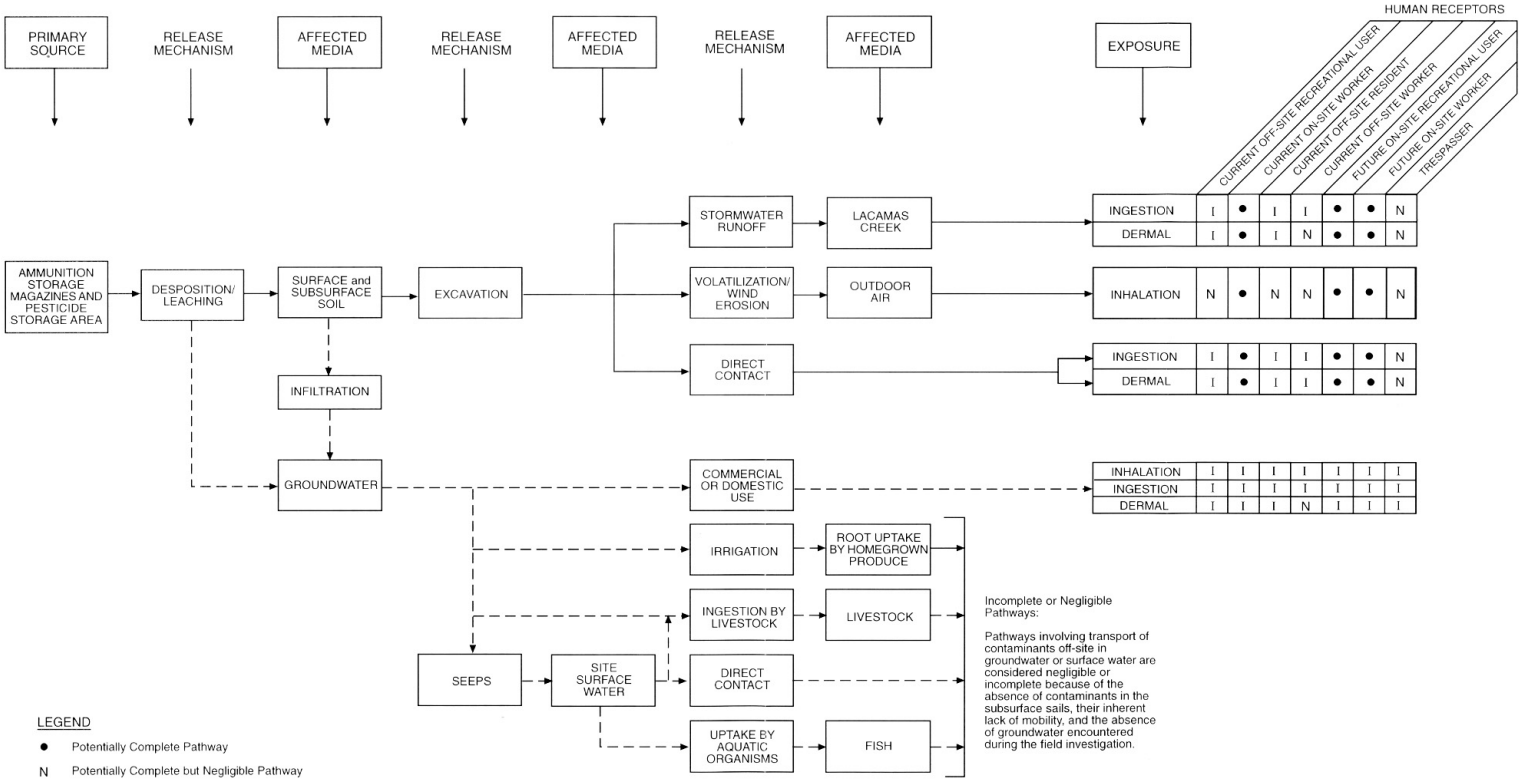
Fish

- Coastal Cutthroat Trout: federal species of concern

Potential ecological receptors on-site include terrestrial animals, benthic invertebrates, fish, and waterfowl that may be exposed to COPCs in undisturbed surface soil or surface water (Figure 6-2). Terrestrial and aquatic plants could also be exposed to COPCs in surface soil or surface water. A hypothetical future excavation scenario in which subsurface soil is exposed and brought to the surface was also included in the exposure pathway model to account for possible future use of the site. In this scenario, terrestrial animals, plants, and possibly waterfowl are assumed to have direct exposure to subsurface soil on-site, and terrestrial animals and waterfowl are assumed to have inhalation exposure to airborne particulates from subsurface soil.

Potential exposure of ecological receptors to groundwater is considered negligible or incomplete because of the concentration of contaminants found in the subsurface soils, their relatively low mobility, and the absence of groundwater encountered during drilling activities to a depth of 23 feet bgs (at the Ammunition Storage Magazines). As a result of the negligible or incomplete groundwater pathway, the contamination of surface water from groundwater seeps is also considered negligible or incomplete.

EXPOSURE PATHWAYS

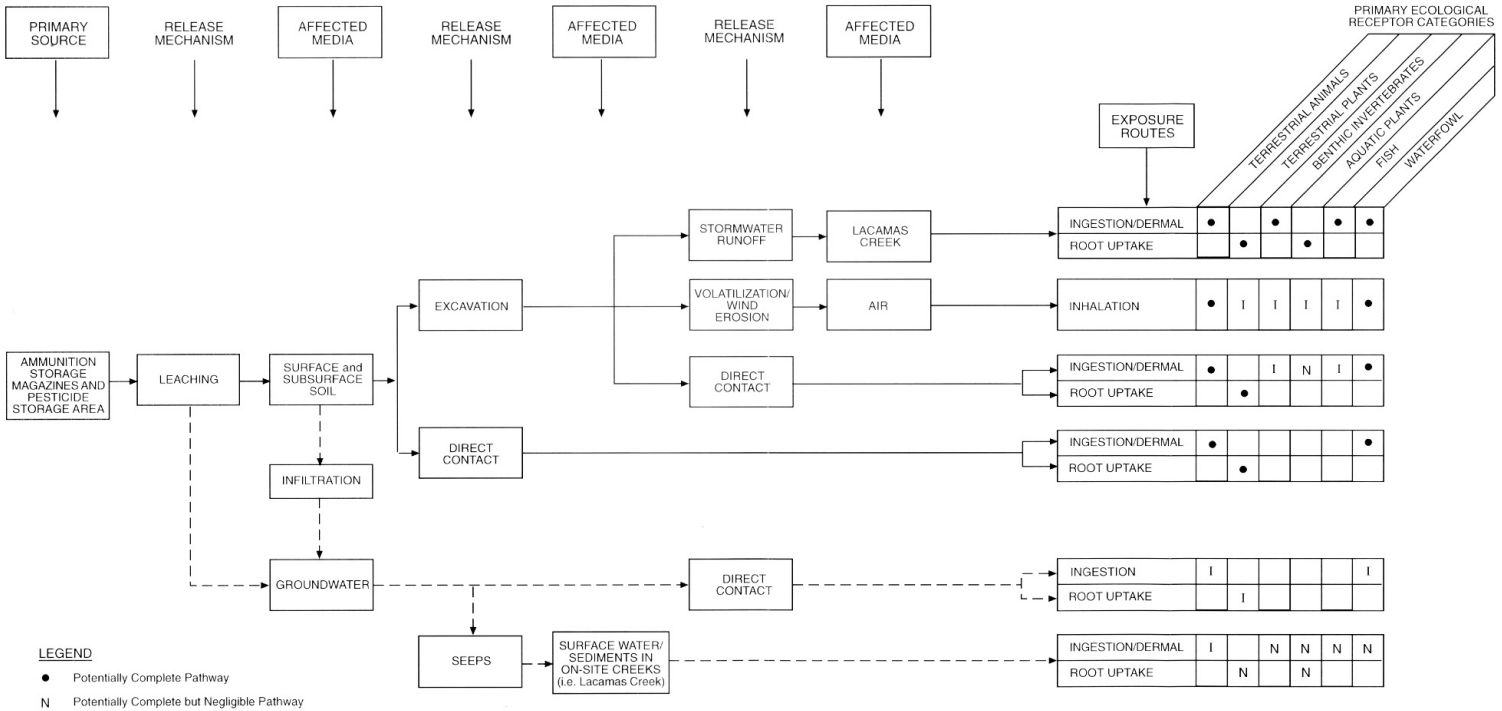


Camp Bonneville	Project No. 53F007220700.5
URS	

Conceptual Site Model Potential Human Exposure Pathways
Pesticide Storage Area and Ammunition Storage Magazines
Camp Bonneville

Figure 6-1

EXPOSURE PATHWAYS



Note: Pathways involving transport of contaminants off-site in groundwater or surface water are considered negligible or incomplete because of the absence of contaminants in the subsurface soils, their inherent lack of mobility, and the absence of groundwater encountered during the field investigation.

Camp Bonneville	Project No. 53F007220700.5	Conceptual Site Model Potential Ecological Exposure Pathways Pesticide Storage Area and Ammunition Storage Magazines Camp Bonneville	Figure 6-2
URS			

The primary objectives of this investigation included the following:

- Evaluation of COPCs in surface soil and in flooring material of Building 4126 at the Pesticide Storage Area
- Evaluation of COPCs in surface and subsurface soil and groundwater at the Ammunition Storage Magazine
- Evaluation of potential exposure to human and ecological receptors based on a conceptual site model

The following two sections present summaries of the conclusions and recommendations for each investigation area followed by more detailed discussions regarding the rationale for the recommendations.

7.1 PESTICIDE STORAGE AREA

Conclusions

The following conclusions are based on data gathered during the SSI at the Pesticide Storage Area:

- COPCs are present in the flooring material in Building 4126 and in surface soil adjacent to the building.
- Based on the CSM, there are potentially complete exposure pathways for current and future on-site human and ecological receptors.

Recommendations

Based on these conclusions URS recommends the following remedial actions are recommended for the Pesticide Storage Area:

- Conduct a TCLP analysis for Building 4126 construction materials.
- Demolish Building 4126. Dispose of demolition debris based on TCLP analysis.
- Excavate and dispose of surface soil to approximately 1 foot bgs beneath the footprint of the building and to a distance of approximately 4 feet outside the footprint of the building.
- Collect and analyze confirmation soil samples.
- Based on results of confirmation soil sample analysis, continue excavation or backfill excavation with clean soil.
- Conduct UXO avoidance activities prior to remedial work.

7.1.1 Rationale for Recommendations

Analytical results suggest that pesticides and petroleum hydrocarbons are localized in and immediately adjacent to Building 4126. COPC concentrations were highest inside the building, moderate in soil in front of the building door, and lowest along the south side of the building.

This suggests that COPCs are concentrated in the areas where they may have been mixed or transported out of the building.

The chlorinated herbicides 2,4,5-T, 2,4-D, and 2,4-DB were detected in the flooring material sample. Of these three, only 2,4,5-T was detected in soil. In the flooring material sample the 2,4,5-T concentration exceeded the EPA Region 10 Risk-based screening level. In the soil samples 2,4,5-T concentrations were significantly lower than inside the building and were below regulatory screening criteria.

The organochlorine pesticide DDT was detected at concentrations greater than the MTCA Method B cleanup level in the flooring material sample and in both soil samples. The concentrations detected inside the building and in soil next to the building door were higher than the concentration detected in the soil sample next to the south side of the building. The doorway soil sample (SS04) also contained DDD and DDE at concentrations exceeding MTCA Method B criteria, while the south wall soil sample contained only DDE at a concentration lower than the cleanup level. These data support the hypothesis that COPCs are concentrated in a small area around the building.

Gasoline and diesel-range hydrocarbons were detected inside the building at concentrations exceeding proposed MTCA Method A cleanup levels. In the soil samples, only diesel and motor oil were detected. The diesel concentrations detected in soil were below regulatory criteria. The motor oil concentrations in soil were below the proposed MTCA A cleanup level of 2,000 mg/kg.

Metals concentrations were generally higher in soil samples than in the flooring material sample. None of the metals in the flooring material sample exceeded the regulatory criteria. In soil, only lead exceeded the MTCA Method A screening level of 250 mg/kg. Unlike the pesticides, the lead concentration in the sample collected next to the south wall of the building was much higher than the concentration detected next to the doorway. These data suggest that lead detected in the soil may be unrelated to former pesticide storage activities in this area.

COPCs at the Pesticide Storage Area, including petroleum hydrocarbons, organochlorine pesticides, and the herbicide 2,4,5-T, are likely due to limited historic releases immediately around Building 4126. Exposure pathways would most likely be related to direct contact with contaminated surface soil. Potential human receptors include on-site workers. Similarly, ecological receptors are likely limited to on-site species that contact surface soil in the Pesticide Storage Area.

7.2 AMMUNITION STORAGE MAGAZINE

Conclusions

The following conclusions are based on data gathered during the SSI and on data gathered by Shannon & Wilson (1999) during the multi-sites investigation at the Ammunition Storage Magazine:

- Soil and residues inside the storage magazines contain explosives compounds and metals (Shannon & Wilson, 1999).

- Surface soils up to 2 feet bgs, contain metals at concentrations exceeding regulatory screening criteria (Shannon & Wilson, 1999).
- Concentrations of metals decrease significantly with increasing depth (Shannon & Wilson, 1999).
- Surface soil along the footpath leading to the largest magazine contains 2,4-dinitrotoluene at concentrations exceeding the cleanup level.

Recommendations

The following recommendations for the Ammunition Storage Magazines are based on the above conclusions and on the data presented in the CSM:

- Remove and dispose soil and residues that are present inside the storage magazines.
- Clean the interiors of the storage magazines and collect and dispose all cleaning solutions.
- Excavate and dispose soil (0-inches to 1-foot bgs) along the short foot path leading to the door of building 2953 (the magazine investigated during the SSI). This includes an approximately 4-foot-wide area along the approximately 6 foot-long path. In addition, excavate and dispose soil (0 inches to 1-foot bgs) in areas at Buildings 2950 and 2951 where metals concentrations exceeded screening values (Shannon & Wilson 1999).
- Conduct additional UXO avoidance activities prior to remedial activity.
- Collect confirmation soil samples at the excavated areas.
- Analyze confirmation samples for metals, explosives, and propellants.

7.2.1 Rationale for Recommendations

COPCs exceeding regulatory criteria in samples collected at Building 2953 (as part of this SSI) included 2,4-dinitrotoluene, cadmium, and lead. Based on the apparent distribution of the detected COPCs, it appears that surface soil in a small area in front of the Building 2953 door contains COPCs at concentrations greater than cleanup levels. Based on the soil types observed in the soil boring and on the analytical results for the subsurface sample, is not likely that 2,4-dinitrotoluene, lead, or cadmium have migrated beyond the footpath or to a depth greater than a few inches bgs.

Based on data gathered by Shannon & Wilson in 1999, metals are also present above cleanup levels in soil at the two smaller magazines (Building 2950 and 2951). The highest concentrations are present in the surface soil with significant reduction in concentrations with depth. The metals most commonly found in concentrations exceeding screening criteria were arsenic, beryllium, cadmium, chromium, copper, and nickels which exceeded background values and/or regulatory or risk-based criteria. However, only arsenic and beryllium exceeded human health, risk-based screening criteria.

Potential exposure rates includes dermal contact with contaminated soil and surface water. Potential human receptors current and future on-site workers and future on-site recreational users. Potential ecological receptors include terrestrial animals, benthic invertebrates, fish, and waterfowl that may be exposed to COPCs in undisturbed surface soil or surface water.

Department of Defense. 1993. BRAC Cleanup Plan (BCP) Handbook.

Environmental Science and Engineering, Inc. 1983. Installation Assessment of the HQ, I Corps and Ft. Lewis, Washington and the Subinstallations Yakima Firing Center, Camp Bonneville, and Vancouver Barracks.

Geo Recon International. 1981. Cultural Resources Survey, Forest Management Project, Ft. Lewis and Camp Bonneville, Washington, for U.S. Army, Ft. Lewis.

Hart Crowser. 1996. Petroleum Contaminated Soil Investigation, Former Tank No. 7-CMBPN, Building No. 4475, Camp Bonneville Washington. Contract No. DACA67-93-D-1004. September 1996.

———. 1998. Draft Project Evaluation Report Surface Water Investigation of Lacamas Creek and Tributaries Camp Bonneville Vancouver, Washington. Contract No. DACA67-98-D-1008. December 1998.

Larson, Lynn L. 1980. *Cultural Resource Reconnaissance of Forest Management Tracts on Fort Lewis and Camp Bonneville.* Office of Public Archaeology, Institute for Environmental Studies, University of Washington, Reconnaissance Report No. 34.

Mundorff, M.J. 1964. Geology and groundwater conditions of Clark County, Washington, with a description of major alluvial aquifer supply along the Columbia River: U.S. Geological Survey Water Supply Paper 1600, 268 p.

Phillips, W.M.. 1987. Geologic map of the Vancouver quadrangle, Washington and Oregon: Washington Division of Geology and Earth Resources Open File Report 87-10, scale 1:100,000.

Shannon & Wilson. 1999. Final Report Volume 1 Multi-Sites Investigations, Camp Bonneville, Washington. Contract No. DACA 67-94-D-1014. July 1999.

U.S. Army Corps of Engineers (USACE). 1987. Environmental Assessment, Modifications to Training Facilities, Camp Bonneville, Clark County, Washington.

_____. 1999. *Draft Environmental Assessment for Disposal and Reuse of Camp Bonneville, Washington.* Prepared for U.S. Army Forces Command. September 1999.

URS Greiner Woodward Clyde. 2000. Management Plan for Ammunition Storage Magazines and Pesticide Storage Area, Site Investigation, Camp Bonneville, Washington. June 2000.

Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State. Publication No. 94-115. October.

_____. 1997. Interim Interpretive and Policy Statement – Cleanup of Total Petroleum Hydrocarbons. Publication No. ECY 97-600. January.

_____. 1999. Proposed Amendments Model Toxics Control Act, Cleanup Regulation. WAC 173-340. Publication No. ECT 99-060. November.

Woodward-Clyde Federal Services. 1996. Final Environmental Baseline Survey, Camp Bonneville Washington. March 1997.

Appendix A
Soil Boring Log

Project: Camp Bonneville
Project Location: Ammunition Storage Magazine
Project Number: 53F0072207.50

Log of Boring SB-01

Sheet 1 of 1

Date(s) Drilled	6/27/00 - 6/27/00	Logged By	Galen Davis	Checked By	Steven Wolfe
Drilling Method	8" OD Hollow Stem Auger	Drill Bit Size/Type	8"	Total Depth Drilled (feet)	21.0
Drill Rig Type	Mobile B-80	Drilling Contractor	Tacoma Pump & Drill	Sampler Type(s)	1.5" OD SPT
Groundwater Level and Date Measured	Not encountered.	Hammer Data	140 lbs, 30"	Approximate Surface Elevation	
Comments	0' to 4' bgs hand augered for UXO avoidance.			Borehole Backfill	3/8" Bentonite chips

Elevation feet / Depth, feet	SAMPLES: Type / Number	SAMPLES: Percent Recovery	SAMPLES: Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
0					(Dense) medium SAND, some Gravel (road fill).			No odor. No visible black powder or other residues.
					(Stiff) moist brown clayey SILT/silty CLAY, some fine to medium Sand (ML,CL).			
5			4-5-7		Stiff moist gray silty CLAY/clayey SILT, little fine to medium Sand, trace coarse Sand. Iron oxide staining (CL,ML).		0	
			6-8-12		Very stiff to hard moist red, white, black silty CLAY. Vertical streaks of iron oxide/ other minerals (weathered rock) (CL).		0	
			8-14-18				0	
			6-11-18				0	
10			9-15-19				0	
			8-11-19				0	
			7-8-12				0	
15			8-12-12				0	
			18-19-25				0	
					Very stiff to hard moist mottled gray/white silty CLAY. Vertical streaks of iron oxide/ other minerals (weathered rock) (CL).			
20			50 for 3"					Sample refusal at 21'.
					BORING TERMINATED AT 21 FEET BGS			
25								
30								

Appendix B
Laboratory Data Sheets [Forms 1s]

Summary of Analytical Results

Client ID SS01
GPL ID: 6173-001-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-08-2000
Time Analyzed 07:48
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	120	ug/kg	U	1
1,3-DNB	BQL	120	ug/kg	U	1
2,4,6-Trinitrotoluene	BQL	120	ug/kg	U	1
2,4-Dinitrotoluene	8420	120	ug/kg		1
2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
2-Amino-4,6-Dinitrotoluene	BQL	120	ug/kg	U	1
4-Amino-2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
HMX	BQL	250	ug/kg	U	1
Nitrobenzene	BQL	120	ug/kg	U	1
RDX	BQL	250	ug/kg	U	1
Tetryl	BQL	250	ug/kg	U	1
m-Nitrotoluene	BQL	250	ug/kg	U	1
o-Nitrotoluene	BQL	250	ug/kg	U	1
p-Nitrotoluene	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID SS01	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-001-01-I	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-24-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 15:05**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	BQL	1000	ug/kg	U	1

Summary of Analytical Results

Client ID SS01	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-001-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Aug-04-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 20:03**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	BQL	500	ug/kg	U	1

Summary of Analytical Results

Client ID SS01
GPL ID: 6173-001-01-I
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 00:00
Prep Chemist: Rekha Patel

Analytical Method: SW8330NG
Date Analyzed: Jul-29-2000
Time Analyzed 17:47
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	125	ug/kg	U	1

Summary of Analytical Results

Client ID SS01	Prep Method: EXT_8332	Analytical Method: SW8332
GPL ID: 6173-001-01-1	Prep Date: Jul-06-2000	Date Analyzed: Jul-27-2000
Matrix: Soil	Prep Time: 16:43	Time Analyzed 16:57
Date Collected: Jun-27-2000	Prep Chemist: Rekha Patel	Analyst: Shukla Sarker
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	5780	ug/kg	U	1

Summary of Analytical Results

Client ID SS01	**Prep Method:**	**Analytical Method: CLP_SOLIDS**
GPL ID: 6173-001-02-1	**Prep Date:**	**Date Analyzed: Jul-13-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 00:00**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Roya Sabouri**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	85.6	1	%		1

Summary of Analytical Results

Client ID SS01	Prep Method:	Analytical Method: E314.0
GPL ID: 6173-001-02-1	Prep Date:	Date Analyzed: Jul-19-2000
Matrix: Soil	Prep Time:	Time Analyzed 00:16
Date Collected: Jun-27-2000	Prep Chemist:	Analyst: Virginia Markowitz
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Ammonium Perchlorate	BQL	47.8	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5
GPL ID: 6173-002-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-08-2000
Time Analyzed 09:14
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	120	ug/kg	U	1
1,3-DNB	BQL	120	ug/kg	U	1
2,4,6-Trinitrotoluene	BQL	120	ug/kg	U	1
2,4-Dinitrotoluene	BQL	120	ug/kg	U	1
2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
2-Amino-4,6-Dinitrotoluene	BQL	120	ug/kg	U	1
4-Amino-2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
HMX	BQL	250	ug/kg	U	1
Nitrobenzene	BQL	120	ug/kg	U	1
RDX	BQL	250	ug/kg	U	1
Tetryl	BQL	250	ug/kg	U	1
m-Nitrotoluene	BQL	250	ug/kg	U	1
o-Nitrotoluene	BQL	250	ug/kg	U	1
p-Nitrotoluene	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-002-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-24-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 15:16**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	BQL	1000	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5
GPL ID: 6173-002-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-04-2000
Time Analyzed 21:07
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	BQL	500	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5
GPL ID: 6173-002-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 00:00
Prep Chemist: Rekha Patel

Analytical Method: SW8330NG
Date Analyzed: Jul-29-2000
Time Analyzed 18:32
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	123	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5	**Prep Method: EXT_8332**	**Analytical Method: SW8332**
GPL ID: 6173-002-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-27-2000**
Matrix: Soil	**Prep Time: 16:43**	**Time Analyzed 17:08**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Shukla Sarker**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	6010	ug/kg	U	1

Summary of Analytical Results

Client ID SB01-4.5	**Prep Method:**	**Analytical Method: CLP_SOLIDS**
GPL ID: 6173-002-02-1	**Prep Date:**	**Date Analyzed: Jul-13-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 00:00**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Roya Sabouri**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	82.2	1	%		1

Summary of Analytical Results

Client ID SB01-4.5	**Prep Method:**	**Analytical Method: E314.0**
GPL ID: 6173-002-02-1	**Prep Date:**	**Date Analyzed: Jul-19-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 01:09**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Virginia Markowitz**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Ammonium Perchlorate	BQL	45	ug/kg	U	1

Summary of Analytical Results

Client ID SS02
GPL ID: 6173-003-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-08-2000
Time Analyzed 09:42
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	120	ug/kg	U	1
1,3-DNB	BQL	120	ug/kg	U	1
2,4,6-Trinitrotoluene	BQL	120	ug/kg	U	1
2,4-Dinitrotoluene	17200	120	ug/kg		1
2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
2-Amino-4,6-Dinitrotoluene	BQL	120	ug/kg	U	1
4-Amino-2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
HMX	BQL	250	ug/kg	U	1
Nitrobenzene	BQL	120	ug/kg	U	1
RDX	BQL	250	ug/kg	U	1
Tetryl	BQL	250	ug/kg	U	1
m-Nitrotoluene	BQL	250	ug/kg	U	1
o-Nitrotoluene	BQL	250	ug/kg	U	1
p-Nitrotoluene	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID SS02	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-003-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-24-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 15:27**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	1100	1000	ug/kg		1

Summary of Analytical Results

Client ID SS02
GPL ID: 6173-003-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-04-2000
Time Analyzed 21:49
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	2280	500	ug/kg		1

Summary of Analytical Results

Client ID SS02	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330NG**
GPL ID: 6173-003-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-29-2000**
Matrix: Soil	**Prep Time: 00:00**	**Time Analyzed 18:43**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	125	ug/kg	U	1

Summary of Analytical Results

Client ID SS02	**Prep Method: EXT_8332**	**Analytical Method: SW8332**
GPL ID: 6173-003-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-27-2000**
Matrix: Soil	**Prep Time: 16:43**	**Time Analyzed 17:19**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Shukla Sarker**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	5510	ug/kg	U	1

Summary of Analytical Results

Client ID SS02	**Prep Method:**	**Analytical Method: CLP_SOLIDS**
GPL ID: 6173-003-02-1	**Prep Date:**	**Date Analyzed: Jul-13-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 00:00**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Roya Sabouri**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	90.3	1	%		1

Summary of Analytical Results

Client ID SS02	Prep Method:	Analytical Method: E314.0
GPL ID: 6173-003-02-1	Prep Date:	Date Analyzed: Jul-19-2000
Matrix: Soil	Prep Time:	Time Analyzed 01:26
Date Collected: Jun-27-2000	Prep Chemist:	Analyst: Virginia Markowitz
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Ammonium Perchlorate	BQL	49.5	ug/kg	U	1

Summary of Analytical Results

Client ID SS502
GPL ID: 6173-004-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-08-2000
Time Analyzed 10:11
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	114	ug/kg	U	1
1,3-DNB	BQL	114	ug/kg	U	1
2,4,6-Trinitrotoluene	BQL	114	ug/kg	U	1
2,4-Dinitrotoluene	92.5	114	ug/kg	J	1
2,6-Dinitrotoluene	BQL	114	ug/kg	U	1
2-Amino-4,6-Dinitrotoluene	BQL	114	ug/kg	U	1
4-Amino-2,6-Dinitrotoluene	BQL	114	ug/kg	U	1
HMX	BQL	238	ug/kg	U	1
Nitrobenzene	BQL	114	ug/kg	U	1
RDX	BQL	238	ug/kg	U	1
Tetryl	BQL	238	ug/kg	U	1
m-Nitrotoluene	BQL	238	ug/kg	U	1
o-Nitrotoluene	BQL	238	ug/kg	U	1
p-Nitrotoluene	BQL	114	ug/kg	U	1

Summary of Analytical Results

Client ID SS502
GPL ID: 6173-004-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Jul-24-2000
Time Analyzed 15:38
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	BQL	952	ug/kg	U	1

Summary of Analytical Results

Client ID SS502	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-004-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Aug-04-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 22:10**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	BQL	476	ug/kg	U	1

Summary of Analytical Results

Client ID SS502	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330NG**
GPL ID: 6173-004-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-29-2000**
Matrix: Soil	**Prep Time: 00:00**	**Time Analyzed 18:54**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	125	ug/kg	U	1

Summary of Analytical Results

Client ID SS502	**Prep Method: EXT_8332**	**Analytical Method: SW8332**
GPL ID: 6173-004-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-27-2000**
Matrix: Soil	**Prep Time: 16:43**	**Time Analyzed 18:13**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Shukla Sarker**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	5450	ug/kg	U	1

Summary of Analytical Results

Client ID SS502	Prep Method:	Analytical Method: CLP_SOLIDS
GPL ID: 6173-004-02-1	Prep Date:	Date Analyzed: Jul-13-2000
Matrix: Soil	Prep Time:	Time Analyzed 00:00
Date Collected: Jun-27-2000	Prep Chemist:	Analyst: Roya Sabouri
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	91.7	1	%		1

Summary of Analytical Results

Client ID SS502	**Prep Method:**	**Analytical Method: E314.0**
GPL ID: 6173-004-02-1	**Prep Date:**	**Date Analyzed: Jul-19-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 01:44**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Virginia Markowitz**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Ammonium Perchlorate	BQL	50.9	ug/kg	U	1

Summary of Analytical Results

Client ID SS03
GPL ID: 6173-005-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Aug-08-2000
Time Analyzed 10:39
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	120	ug/kg	U	1
1,3-DNB	BQL	120	ug/kg	U	1
2,4,6-Trinitrotoluene	BQL	120	ug/kg	U	1
2,4-Dinitrotoluene	53.7	120	ug/kg	J	1
2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
2-Amino-4,6-Dinitrotoluene	BQL	120	ug/kg	U	1
4-Amino-2,6-Dinitrotoluene	BQL	120	ug/kg	U	1
HMX	BQL	250	ug/kg	U	1
Nitrobenzene	BQL	120	ug/kg	U	1
RDX	BQL	250	ug/kg	U	1
Tetryl	BQL	250	ug/kg	U	1
m-Nitrotoluene	BQL	250	ug/kg	U	1
o-Nitrotoluene	BQL	250	ug/kg	U	1
p-Nitrotoluene	BQL	120	ug/kg	U	1

Summary of Analytical Results

Client ID SS03
GPL ID: 6173-005-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-06-2000
Prep Time: 14:48
Prep Chemist: Rekha Patel

Analytical Method: SW8330
Date Analyzed: Jul-24-2000
Time Analyzed 15:49
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	BQL	1000	ug/kg	U	1

Summary of Analytical Results

Client ID SS03	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330**
GPL ID: 6173-005-01-I	**Prep Date: Jul-06-2000**	**Date Analyzed: Aug-04-2000**
Matrix: Soil	**Prep Time: 14:48**	**Time Analyzed 22:31**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	BQL	500	ug/kg	U	1

Summary of Analytical Results

Client ID SS03	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330NG**
GPL ID: 6173-005-01-1	**Prep Date: Jul-06-2000**	**Date Analyzed: Jul-29-2000**
Matrix: Soil	**Prep Time: 00:00**	**Time Analyzed 19:05**
Date Collected: Jun-27-2000	**Prep Chemist: Rekha Patel**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	123	ug/kg	U	1

Summary of Analytical Results

Client ID SS03
GPL ID: 6173-005-01-1
Matrix: Soil
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_8332
Prep Date: Jul-06-2000
Prep Time: 16:43
Prep Chemist: Rekha Patel

Analytical Method: SW8332
Date Analyzed: Jul-27-2000
Time Analyzed 18:24
Analyst: Shukla Sarker

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	5520	ug/kg	U	1

Summary of Analytical Results

Client ID SS03	**Prep Method:**	**Analytical Method: CLP_SOLIDS**
GPL ID: 6173-005-03-1	**Prep Date:**	**Date Analyzed: Jul-13-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 00:00**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Roya Sabouri**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Percent Solids	90.3	1	%		1

Summary of Analytical Results

Client ID SS03	**Prep Method:**	**Analytical Method: E314.0**
GPL ID: 6173-005-03-I	**Prep Date:**	**Date Analyzed: Jul-19-2000**
Matrix: Soil	**Prep Time:**	**Time Analyzed 02:01**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Virginia Markowitz**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Ammonium Perchlorate	BQL	51.3	ug/kg	U	1

Summary of Analytical Results

Client ID SS1003	**Prep Method:**	**Analytical Method: SW8330**
GPL ID: 6173-006-01-1	**Prep Date:**	**Date Analyzed: Jul-29-2000**
Matrix: Water	**Prep Time:**	**Time Analyzed 17:02**
Date Collected: Jun-27-2000	**Prep Chemist:**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroguanidine	BQL	10	ug/L	U	1

Summary of Analytical Results

Client ID SS1003
GPL ID: 6173-006-01-1
Matrix: Water
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-03-2000
Prep Time: 17:26
Prep Chemist: Reynaldo Caraan

Analytical Method: SW8330PICRIC
Date Analyzed: Aug-07-2000
Time Analyzed 20:23
Analyst: Dayuan Han

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.52	ug/L	U	1
1,3-DNB	BQL	0.52	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.52	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.52	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.52	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.52	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.52	ug/L	U	1
HMX	BQL	1.04	ug/L	U	1
Nitrobenzene	BQL	0.52	ug/L	U	1
RDX	BQL	1.04	ug/L	U	1
Tetryl	BQL	1.04	ug/L	U	1
m-Nitrotoluene	BQL	1.04	ug/L	U	1
o-Nitrotoluene	BQL	1.04	ug/L	U	1
p-Nitrotoluene	BQL	1.04	ug/L	U	1

Summary of Analytical Results

Client ID SS1003	**Prep Method: EXT_SW8330**	**Analytical Method: SW8330PICRIC**
GPL ID: 6173-006-01-1	**Prep Date: Jul-03-2000**	**Date Analyzed: Jul-24-2000**
Matrix: Water	**Prep Time: 17:26**	**Time Analyzed 17:05**
Date Collected: Jun-27-2000	**Prep Chemist: Reynaldo Caraan**	**Analyst: Mulugeta Wondwossen**
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Picric Acid	BQL	2.6	ug/L	U	1

Summary of Analytical Results

Client ID SS1003
GPL ID: 6173-006-01-1
Matrix: Water
Date Collected: Jun-27-2000
Date Received: Jun-28-2000

Prep Method: EXT_SW8330
Prep Date: Jul-03-2000
Prep Time: 17:26
Prep Chemist: Reynaldo Caraan

Analytical Method: SW8330PICRIC
Date Analyzed: Aug-04-2000
Time Analyzed 18:59
Analyst: Mulugeta Wondwossen

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Pentaerythritol Tetranitrate	BQL	1.3	ug/L	U	1

Summary of Analytical Results

Client ID SS1003	Prep Method:	Analytical Method: SW8332
GPL ID: 6173-006-01-1	Prep Date:	Date Analyzed: Jul-27-2000
Matrix: Water	Prep Time:	Time Analyzed 18:35
Date Collected: Jun-27-2000	Prep Chemist:	Analyst: Shukla Sarker
Date Received: Jun-28-2000		

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Nitroglycerin	BQL	2000	ug/L	U	1

GPL LABORATORIES, LLP
ANALYTICAL RESULTS

Project Name : Camp Bonneville

GPL ID	Client ID
6173-001-01-1	SS01
6173-001-01-1	SS01
6173-001-01-1	SS01
6173-001-01-1	SS01
6173-001-01-1	SS01
6173-001-02-1	SS01
6173-001-02-1	SS01
6173-002-01-1	SB01-4.5
6173-002-01-1	SB01-4.5
6173-002-01-1	SB01-4.5
6173-002-01-1	SB01-4.5
6173-002-01-1	SB01-4.5
6173-002-02-1	SB01-4.5
6173-002-02-1	SB01-4.5
6173-003-01-1	SS02
6173-003-01-1	SS02
6173-003-01-1	SS02
6173-003-01-1	SS02
6173-003-01-1	SS02
6173-003-02-1	SS02
6173-003-02-1	SS02
6173-004-01-1	SS502
6173-004-01-1	SS502
6173-004-01-1	SS502
6173-004-01-1	SS502
6173-004-01-1	SS502
6173-004-02-1	SS502
6173-004-02-1	SS502
6173-005-01-1	SS03
6173-005-01-1	SS03
6173-005-01-1	SS03
6173-005-01-1	SS03
6173-005-01-1	SS03
6173-005-03-1	SS03
6173-005-03-1	SS03
6173-006-01-1	SS1003
6173-006-01-1	SS1003
6173-006-01-1	SS1003
6173-006-01-1	SS1003
6173-006-01-1	SS1003

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS

Sample No: SS1003

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water
Data Release Authorized: MW
Reported: 07/17/00

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/04/00
Date analyzed: 07/07/00 00:13
Instrument: FINN4

Sample Amount: 500 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/L
108-95-2	Phenol	2.0 U
111-44-4	Bis-(2-Chloroethyl) Ether	2.0 U
95-57-8	2-Chlorophenol	1.0 U
541-73-1	1,3-Dichlorobenzene	1.0 U
106-46-7	1,4-Dichlorobenzene	1.0 U
100-51-6	Benzyl Alcohol	5.0 U
95-50-1	1,2-Dichlorobenzene	1.0 U
95-48-7	2-Methylphenol	2.0 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	1.0 U
106-44-5	4-Methylphenol	1.0 U
621-64-7	N-Nitroso-Di-N-Propylamine	2.0 U
67-72-1	Hexachloroethane	2.0 U
98-95-3	Nitrobenzene	1.0 U
78-59-1	Isophorone	1.0 U
88-75-5	2-Nitrophenol	5.0 U
105-67-9	2,4-Dimethylphenol	3.0 U
65-85-0	Benzoic Acid	10 U
111-91-1	bis(2-Chloroethoxy) Methane	1.0 U
120-83-2	2,4-Dichlorophenol	3.0 U
120-82-1	1,2,4-Trichlorobenzene	1.0 U
91-20-3	Naphthalene	1.0 U
106-47-8	4-Chloroaniline	3.0 U
87-68-3	Hexachlorobutadiene	2.0 U
59-50-7	4-Chloro-3-methylphenol	2.0 U
91-57-6	2-Methylnaphthalene	1.0 U
77-47-4	Hexachlorocyclopentadiene	5.0 U
88-06-2	2,4,6-Trichlorophenol	5.0 U
95-95-4	2,4,5-Trichlorophenol	5.0 U
91-58-7	2-Chloronaphthalene	1.0 U
88-74-4	2-Nitroaniline	5.0 U
131-11-3	Dimethylphthalate	1.0 U
208-96-8	Acenaphthylene	1.0 U
99-09-2	3-Nitroaniline	6.0 U
83-32-9	Acenaphthene	1.0 U
51-28-5	2,4-Dinitrophenol	10 U
100-02-7	4-Nitrophenol	5.0 U
132-64-9	Dibenzofuran	1.0 U
606-20-2	2,6-Dinitrotoluene	5.0 U
121-14-2	2,4-Dinitrotoluene	5.0 U
84-66-2	Diethylphthalate	1.0 U

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS

Sample No: SS1003

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water
Data Release Authorized: MW
Reported: 07/17/00

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/04/00
Date analyzed: 07/07/00 00:13
Instrument: FINN4

Sample Amount: 500 mL
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/L
7005-72-3	4-Chlorophenyl-phenylether	1.0 U
86-73-7	Fluorene	1.0 U
100-01-6	4-Nitroaniline	5.0 U
534-52-1	4,6-Dinitro-2-Methylphenol	10 U
86-30-6	N-Nitrosodiphenylamine	1.0 U
101-55-3	4-Bromophenyl-phenylether	1.0 U
118-74-1	Hexachlorobenzene	1.0 U
87-86-5	Pentachlorophenol	5.0 U
85-01-8	Phenanthrene	1.0 U
86-74-8	Carbazole	1.0 U
120-12-7	Anthracene	1.0 U
84-74-2	Di-n-Butylphthalate	1.0 U
206-44-0	Fluoranthene	1.0 U
129-00-0	Pyrene	1.0 U
85-68-7	Butylbenzylphthalate	1.0 U
91-94-1	3,3'-Dichlorobenzidine	5.0 U
56-55-3	Benzo(a)anthracene	1.0 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**2.9**
218-01-9	Chrysene	1.0 U
117-84-0	Di-n-Octyl phthalate	1.0 U
205-99-2	Benzo(b)fluoranthene	1.0 U
207-08-9	Benzo(k)fluoranthene	1.0 U
50-32-8	Benzo(a)pyrene	1.0 U
193-39-5	Indeno(1,2,3-cd)pyrene	1.0 U
53-70-3	Dibenz(a,h)anthracene	1.0 U
191-24-2	Benzo(g,h,i)perylene	1.0 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	81.5%	d5-Phenol	65.1%
2-Fluorobiphenyl	77.8%	2-Fluorophenol	71.4%
d14-p-Terphenyl	96.4%	2,4,6-Tribromophenol	73.9%
d4-1,2-Dichlorobenzene	80.0%	d4-2-Chlorophenol	76.5%

ORGANICS ANALYSIS DATA SHEET **Sample No: SS01**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83B
LIMS ID: 00-10491
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 01:01
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.15 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 18.2%
pH: 5.6

CAS Number	Analyte	ug/kg
108-95-2	Phenol	160 U
111-44-4	Bis-(2-Chloroethyl) Ether	160 U
95-57-8	2-Chlorophenol	81 U
541-73-1	1,3-Dichlorobenzene	81 U
106-46-7	1,4-Dichlorobenzene	81 U
100-51-6	Benzyl Alcohol	410 U
95-50-1	1,2-Dichlorobenzene	81 U
95-48-7	2-Methylphenol	160 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	81 U
106-44-5	4-Methylphenol	81 U
621-64-7	N-Nitroso-Di-N-Propylamine	160 U
67-72-1	Hexachloroethane	160 U
98-95-3	Nitrobenzene	81 U
78-59-1	Isophorone	81 U
88-75-5	2-Nitrophenol	410 U
105-67-9	2,4-Dimethylphenol	240 U
65-85-0	Benzoic Acid	810 U
111-91-1	bis(2-Chloroethoxy) Methane	81 U
120-83-2	2,4-Dichlorophenol	240 U
120-82-1	1,2,4-Trichlorobenzene	81 U
91-20-3	Naphthalene	81 U
106-47-8	4-Chloroaniline	240 U
87-68-3	Hexachlorobutadiene	160 U
59-50-7	4-Chloro-3-methylphenol	160 U
91-57-6	2-Methylnaphthalene	81 U
77-47-4	Hexachlorocyclopentadiene	410 U
88-06-2	2,4,6-Trichlorophenol	410 U
95-95-4	2,4,5-Trichlorophenol	410 U
91-58-7	2-Chloronaphthalene	81 U
88-74-4	2-Nitroaniline	410 U
131-11-3	Dimethylphthalate	81 U
208-96-8	Acenaphthylene	81 U
99-09-2	3-Nitroaniline	490 U
83-32-9	Acenaphthene	81 U
51-28-5	2,4-Dinitrophenol	810 U
100-02-7	4-Nitrophenol	410 U
132-64-9	Dibenzofuran	81 U
606-20-2	2,6-Dinitrotoluene	410 U

ORGANICS ANALYSIS DATA SHEET **Sample No: SS01**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83B
LIMS ID: 00-10491
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 01:01
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.15 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 18.2%
pH: 5.6

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	410 U
84-66-2	Diethylphthalate	81 U
7005-72-3	4-Chlorophenyl-phenylether	81 U
86-73-7	Fluorene	81 U
100-01-6	4-Nitroaniline	410 U
534-52-1	4,6-Dinitro-2-Methylphenol	810 U
86-30-6	N-Nitrosodiphenylamine	81 U
101-55-3	4-Bromophenyl-phenylether	81 U
118-74-1	Hexachlorobenzene	81 U
87-86-5	Pentachlorophenol	410 U
85-01-8	Phenanthrene	81 U
86-74-8	Carbazole	81 U
120-12-7	Anthracene	81 U
84-74-2	Di-n-Butylphthalate	81 U
206-44-0	Fluoranthene	81 U
129-00-0	Pyrene	81 U
85-68-7	Butylbenzylphthalate	81 U
91-94-1	3,3'-Dichlorobenzidine	410 U
56-55-3	Benzo(a)anthracene	81 U
117-81-7	bis(2-Ethylhexyl)phthalate	81 U
218-01-9	Chrysene	81 U
117-84-0	Di-n-Octyl phthalate	81 U
205-99-2	Benzo(b)fluoranthene	81 U
207-08-9	Benzo(k)fluoranthene	81 U
50-32-8	Benzo(a)pyrene	81 U
193-39-5	Indeno(1,2,3-cd)pyrene	81 U
53-70-3	Dibenz(a,h)anthracene	81 U
191-24-2	Benzo(g,h,i)perylene	81 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	42.0%	d5-Phenol	53.3%
2-Fluorobiphenyl	54.0%	2-Fluorophenol	51.7%
d14-p-Terphenyl	58.9%	2,4,6-Tribromophenol	51.1%
d4-1,2-Dichlorobenzene	36.9%	d4-2-Chlorophenol	49.6%

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS
Page 1 of 2
Lab Sample ID: BU83B
LIMS ID: 00-10491
Matrix: Soil
Data Release Authorized:
Reported: 07/21/00

Sample No: SS01
REEXTRACTION

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

ANALYTICAL RESOURCES INCORPORATED

Date extracted: 07/11/00
Date analyzed: 07/12/00
Instrument: finn4
GPC Cleanup: NO

Sample Amount: 6.14 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 18.2%
pH: 5.6

CAS Number	Analyte	ug/kg
108-95-2	Phenol	160 U
111-44-4	Bis-(2-Chloroethyl) Ether	160 U
95-57-8	2-Chlorophenol	81 U
541-73-1	1,3-Dichlorobenzene	81 U
106-46-7	1,4-Dichlorobenzene	81 U
100-51-6	Benzyl Alcohol	410 U
95-50-1	1,2-Dichlorobenzene	81 U
95-48-7	2-Methylphenol	160 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	81 U
106-44-5	4-Methylphenol	81 U
621-64-7	N-Nitroso-Di-N-Propylamine	160 U
67-72-1	Hexachloroethane	160 U
98-95-3	Nitrobenzene	81 U
78-59-1	Isophorone	81 U
88-75-5	2-Nitrophenol	410 U
105-67-9	2,4-Dimethylphenol	240 U
65-85-0	Benzoic Acid	810 U
111-91-1	bis(2-Chloroethoxy) Methane	81 U
120-83-2	2,4-Dichlorophenol	240 U
120-82-1	1,2,4-Trichlorobenzene	81 U
91-20-3	Naphthalene	81 U
106-47-8	4-Chloroaniline	240 U
87-68-3	Hexachlorobutadiene	160 U
59-50-7	4-Chloro-3-methylphenol	160 U
91-57-6	2-Methylnaphthalene	81 U
77-47-4	Hexachlorocyclopentadiene	410 U
88-06-2	2,4,6-Trichlorophenol	410 U
95-95-4	2,4,5-Trichlorophenol	410 U
91-58-7	2-Chloronaphthalene	81 U
88-74-4	2-Nitroaniline	410 U
131-11-3	Dimethylphthalate	81 U
208-96-8	Acenaphthylene	81 U
99-09-2	3-Nitroaniline	490 U
83-32-9	Acenaphthene	81 U
51-28-5	2,4-Dinitrophenol	810 U
100-02-7	4-Nitrophenol	410 U
132-64-9	Dibenzofuran	81 U
606-20-2	2,6-Dinitrotoluene	410 U

ORGANICS ANALYSIS DATA SHEET | **Sample No:** SS01
Semivolatiles by GC/MS | REEXTRACTION
Page 2 of 2
Lab Sample ID: BU83B | QC Report No: BU83-URS Corp.
LIMS ID: 00-10491 | Project: Camp Bonneville
Matrix: Soil | 53F0072207
Data Release Authorized: | Date Sampled: 06/27/00
Reported: 07/21/00 | Date Received: 06/28/00

ANALYTICAL RESOURCES INCORPORATED

Date extracted: 07/11/00 | Sample Amount: 6.14 g-dry-wt
Date analyzed: 07/12/00 | Final Extract Volume: 0.5 mL
Instrument: finn4 | Dilution Factor: 1:1
GPC Cleanup: NO | Percent Moisture: 18.2%
pH: 5.6

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	410 U
84-66-2	Diethylphthalate	81 U
7005-72-3	4-Chlorophenyl-phenylether	81 U
86-73-7	Fluorene	81 U
100-01-6	4-Nitroaniline	410 U
534-52-1	4,6-Dinitro-2-Methylphenol	810 U
86-30-6	N-Nitrosodiphenylamine	81 U
101-55-3	4-Bromophenyl-phenylether	81 U
118-74-1	Hexachlorobenzene	81 U
87-86-5	Pentachlorophenol	410 U
85-01-8	Phenanthrene	81 U
86-74-8	Carbazole	81 U
120-12-7	Anthracene	81 U
84-74-2	Di-n-Butylphthalate	81 U
206-44-0	Fluoranthene	81 U
129-00-0	Pyrene	81 U
85-68-7	Butylbenzylphthalate	81 U
91-94-1	3,3'-Dichlorobenzidine	410 U
56-55-3	Benzo(a)anthracene	81 U
117-81-7	bis(2-Ethylhexyl)phthalate	81 U
218-01-9	Chrysene	81 U
117-84-0	Di-n-Octyl phthalate	81 U
205-99-2	Benzo(b)fluoranthene	81 U
207-08-9	Benzo(k)fluoranthene	81 U
50-32-8	Benzo(a)pyrene	81 U
193-39-5	Indeno(1,2,3-cd)pyrene	81 U
53-70-3	Dibenz(a,h)anthracene	81 U
191-24-2	Benzo(g,h,i)perylene	81 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	45.7%	d5-Phenol	52.3%
2-Fluorobiphenyl	55.3%	2-Fluorophenol	54.9%
d14-p-Terphenyl	64.4%	2,4,6-Tribromophenol	60.8%
d4-1,2-Dichlorobenzene	40.4%	d4-2-Chlorophenol	50.4%

ORGANICS ANALYSIS DATA SHEET **Sample No: SS02**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83C
LIMS ID: 00-10492
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 01:48
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.75 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 10.4%
pH: 5.6

CAS Number	Analyte	ug/kg
108-95-2	Phenol	150 U
111-44-4	Bis-(2-Chloroethyl) Ether	150 U
95-57-8	2-Chlorophenol	74 U
541-73-1	1,3-Dichlorobenzene	74 U
106-46-7	1,4-Dichlorobenzene	74 U
100-51-6	Benzyl Alcohol	370 U
95-50-1	1,2-Dichlorobenzene	74 U
95-48-7	2-Methylphenol	150 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	74 U
106-44-5	4-Methylphenol	74 U
621-64-7	N-Nitroso-Di-N-Propylamine	150 U
67-72-1	Hexachloroethane	150 U
98-95-3	Nitrobenzene	74 U
78-59-1	Isophorone	74 U
88-75-5	2-Nitrophenol	370 U
105-67-9	2,4-Dimethylphenol	220 U
65-85-0	Benzoic Acid	740 U
111-91-1	bis(2-Chloroethoxy) Methane	74 U
120-83-2	2,4-Dichlorophenol	220 U
120-82-1	1,2,4-Trichlorobenzene	74 U
91-20-3	Naphthalene	74 U
106-47-8	4-Chloroaniline	220 U
87-68-3	Hexachlorobutadiene	150 U
59-50-7	4-Chloro-3-methylphenol	150 U
91-57-6	2-Methylnaphthalene	74 U
77-47-4	Hexachlorocyclopentadiene	370 U
88-06-2	2,4,6-Trichlorophenol	370 U
95-95-4	2,4,5-Trichlorophenol	370 U
91-58-7	2-Chloronaphthalene	74 U
88-74-4	2-Nitroaniline	370 U
131-11-3	Dimethylphthalate	74 U
208-96-8	Acenaphthylene	74 U
99-09-2	3-Nitroaniline	440 U
83-32-9	Acenaphthene	74 U
51-28-5	2,4-Dinitrophenol	740 U
100-02-7	4-Nitrophenol	370 U
132-64-9	Dibenzofuran	74 U
606-20-2	2,6-Dinitrotoluene	370 U

ORGANICS ANALYSIS DATA SHEET **Sample No: SS02**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83C
LIMS ID: 00-10492
Matrix: Soil
Data Release Authorized: MW
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 01:48
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.75 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 10.4%
pH: 5.6

CAS Number	Analyte	ug/kg
121-14-2	**2,4-Dinitrotoluene**	**750**
84-66-2	Diethylphthalate	74 U
7005-72-3	4-Chlorophenyl-phenylether	74 U
86-73-7	Fluorene	74 U
100-01-6	4-Nitroaniline	370 U
534-52-1	4,6-Dinitro-2-Methylphenol	740 U
86-30-6	N-Nitrosodiphenylamine	74 U
101-55-3	4-Bromophenyl-phenylether	74 U
118-74-1	Hexachlorobenzene	74 U
87-86-5	Pentachlorophenol	370 U
85-01-8	Phenanthrene	74 U
86-74-8	Carbazole	74 U
120-12-7	Anthracene	74 U
84-74-2	Di-n-Butylphthalate	74 U
206-44-0	Fluoranthene	74 U
129-00-0	Pyrene	74 U
85-68-7	Butylbenzylphthalate	74 U
91-94-1	3,3'-Dichlorobenzidine	370 U
56-55-3	Benzo(a)anthracene	74 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**220**
218-01-9	Chrysene	74 U
117-84-0	Di-n-Octyl phthalate	74 U
205-99-2	Benzo(b)fluoranthene	74 U
207-08-9	Benzo(k)fluoranthene	74 U
50-32-8	Benzo(a)pyrene	74 U
193-39-5	Indeno(1,2,3-cd)pyrene	74 U
53-70-3	Dibenz(a,h)anthracene	74 U
191-24-2	Benzo(g,h,i)perylene	74 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	69.4%	d5-Phenol	74.0%
2-Fluorobiphenyl	70.2%	2-Fluorophenol	72.8%
d14-p-Terphenyl	75.0%	2,4,6-Tribromophenol	49.5%
d4-1,2-Dichlorobenzene	59.5%	d4-2-Chlorophenol	66.9%

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS
Page 1 of 2
Lab Sample ID: BU83D
LIMS ID: 00-10493
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

Sample No: SS03

ANALYTICAL RESOURCES INCORPORATED

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 17:13
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.49 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 13.5%
pH: 5.8

CAS Number	Analyte	ug/kg
108-95-2	Phenol	150 U
111-44-4	Bis-(2-Chloroethyl) Ether	150 U
95-57-8	2-Chlorophenol	77 U
541-73-1	1,3-Dichlorobenzene	77 U
106-46-7	1,4-Dichlorobenzene	77 U
100-51-6	Benzyl Alcohol	390 U
95-50-1	1,2-Dichlorobenzene	77 U
95-48-7	2-Methylphenol	150 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	77 U
106-44-5	4-Methylphenol	77 U
621-64-7	N-Nitroso-Di-N-Propylamine	150 U
67-72-1	Hexachloroethane	150 U
98-95-3	Nitrobenzene	77 U
78-59-1	Isophorone	77 U
88-75-5	2-Nitrophenol	390 U
105-67-9	2,4-Dimethylphenol	230 U
65-85-0	**Benzoic Acid**	**780**
111-91-1	bis(2-Chloroethoxy) Methane	77 U
120-83-2	2,4-Dichlorophenol	230 U
120-82-1	1,2,4-Trichlorobenzene	77 U
91-20-3	Naphthalene	77 U
106-47-8	4-Chloroaniline	230 U
87-68-3	Hexachlorobutadiene	150 U
59-50-7	4-Chloro-3-methylphenol	150 U
91-57-6	2-Methylnaphthalene	77 U
77-47-4	Hexachlorocyclopentadiene	390 U
88-06-2	2,4,6-Trichlorophenol	390 U
95-95-4	2,4,5-Trichlorophenol	390 U
91-58-7	2-Chloronaphthalene	77 U
88-74-4	2-Nitroaniline	390 U
131-11-3	Dimethylphthalate	77 U
208-96-8	Acenaphthylene	77 U
99-09-2	3-Nitroaniline	460 U
83-32-9	Acenaphthene	77 U
51-28-5	2,4-Dinitrophenol	770 U
100-02-7	4-Nitrophenol	390 U
132-64-9	Dibenzofuran	77 U
606-20-2	2,6-Dinitrotoluene	390 U

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS

Sample No: SS03

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83D
LIMS ID: 00-10493
Matrix: Soil
Data Release Authorized: MW
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 17:13
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.49 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 13.5%
pH: 5.8

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	390 U
84-66-2	Diethylphthalate	77 U
7005-72-3	4-Chlorophenyl-phenylether	77 U
86-73-7	Fluorene	77 U
100-01-6	4-Nitroaniline	390 U
534-52-1	4,6-Dinitro-2-Methylphenol	770 U
86-30-6	N-Nitrosodiphenylamine	77 U
101-55-3	4-Bromophenyl-phenylether	77 U
118-74-1	Hexachlorobenzene	77 U
87-86-5	Pentachlorophenol	390 U
85-01-8	Phenanthrene	77 U
86-74-8	Carbazole	77 U
120-12-7	Anthracene	77 U
84-74-2	Di-n-Butylphthalate	77 U
206-44-0	Fluoranthene	77 U
129-00-0	Pyrene	77 U
85-68-7	Butylbenzylphthalate	77 U
91-94-1	3,3'-Dichlorobenzidine	390 U
56-55-3	Benzo(a)anthracene	77 U
117-81-7	bis(2-Ethylhexyl)phthalate	77 U
218-01-9	Chrysene	77 U
117-84-0	Di-n-Octyl phthalate	77 U
205-99-2	Benzo(b)fluoranthene	77 U
207-08-9	Benzo(k)fluoranthene	77 U
50-32-8	Benzo(a)pyrene	77 U
193-39-5	Indeno(1,2,3-cd)pyrene	77 U
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	77 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	42.4%	d5-Phenol	51.5%
2-Fluorobiphenyl	51.9%	2-Fluorophenol	41.2%
d14-p-Terphenyl	61.2%	2,4,6-Tribromophenol	33.7%
d4-1,2-Dichlorobenzene	39.8%	d4-2-Chlorophenol	41.5%

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS
Page 1 of 2
Lab Sample ID: BU83D
LIMS ID: 00-10493
Matrix: Soil
Data Release Authorized: MW
Reported: 07/21/00

Sample No: SS03
REEXTRACTION

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

ANALYTICAL RESOURCES INCORPORATED

Date extracted: 07/11/00
Date analyzed: 07/12/00
Instrument: finn4
GPC Cleanup: NO

Sample Amount: 6.50 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 13.5%
pH: 5.8

CAS Number	Analyte	ug/kg
108-95-2	Phenol	150 U
111-44-4	Bis-(2-Chloroethyl) Ether	150 U
95-57-8	2-Chlorophenol	77 U
541-73-1	1,3-Dichlorobenzene	77 U
106-46-7	1,4-Dichlorobenzene	77 U
100-51-6	Benzyl Alcohol	380 U
95-50-1	1,2-Dichlorobenzene	77 U
95-48-7	2-Methylphenol	150 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	77 U
106-44-5	4-Methylphenol	77 U
621-64-7	N-Nitroso-Di-N-Propylamine	150 U
67-72-1	Hexachloroethane	150 U
98-95-3	Nitrobenzene	77 U
78-59-1	Isophorone	77 U
88-75-5	2-Nitrophenol	380 U
105-67-9	2,4-Dimethylphenol	230 U
65-85-0	Benzoic Acid	770 U
111-91-1	bis(2-Chloroethoxy) Methane	77 U
120-83-2	2,4-Dichlorophenol	230 U
120-82-1	1,2,4-Trichlorobenzene	77 U
91-20-3	Naphthalene	77 U
106-47-8	4-Chloroaniline	230 U
87-68-3	Hexachlorobutadiene	150 U
59-50-7	4-Chloro-3-methylphenol	150 U
91-57-6	2-Methylnaphthalene	77 U
77-47-4	Hexachlorocyclopentadiene	380 U
88-06-2	2,4,6-Trichlorophenol	380 U
95-95-4	2,4,5-Trichlorophenol	380 U
91-58-7	2-Chloronaphthalene	77 U
88-74-4	2-Nitroaniline	380 U
131-11-3	Dimethylphthalate	77 U
208-96-8	Acenaphthylene	77 U
99-09-2	3-Nitroaniline	460 U
83-32-9	Acenaphthene	77 U
51-28-5	2,4-Dinitrophenol	770 U
100-02-7	4-Nitrophenol	380 U
132-64-9	Dibenzofuran	77 U
606-20-2	2,6-Dinitrotoluene	380 U

ORGANICS ANALYSIS DATA SHEET | **Sample No:** SS03
Semivolatiles by GC/MS | REEXTRACTION
Page 2 of 2
Lab Sample ID: BU83D | QC Report No: BU83-URS Corp.
LIMS ID: 00-10493 | Project: Camp Bonneville
Matrix: Soil | 53F0072207
Data Release Authorized: | Date Sampled: 06/27/00
Reported: 07/21/00 | Date Received: 06/28/00

ANALYTICAL RESOURCES INCORPORATED

Date extracted: 07/11/00 | Sample Amount: 6.50 g-dry-wt
Date analyzed: 07/12/00 | Final Extract Volume: 0.5 mL
Instrument: finn4 | Dilution Factor: 1:1
GPC Cleanup: NO | Percent Moisture: 13.5%
pH: 5.8

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	380 U
84-66-2	Diethylphthalate	77 U
7005-72-3	4-Chlorophenyl-phenylether	77 U
86-73-7	Fluorene	77 U
100-01-6	4-Nitroaniline	380 U
534-52-1	4,6-Dinitro-2-Methylphenol	770 U
86-30-6	N-Nitrosodiphenylamine	77 U
101-55-3	4-Bromophenyl-phenylether	77 U
118-74-1	Hexachlorobenzene	77 U
87-86-5	Pentachlorophenol	380 U
85-01-8	Phenanthrene	77 U
86-74-8	Carbazole	77 U
120-12-7	Anthracene	77 U
84-74-2	Di-n-Butylphthalate	77 U
206-44-0	Fluoranthene	77 U
129-00-0	Pyrene	77 U
85-68-7	Butylbenzylphthalate	77 U
91-94-1	3,3'-Dichlorobenzidine	380 U
56-55-3	Benzo(a)anthracene	77 U
117-81-7	bis(2-Ethylhexyl)phthalate	77 U
218-01-9	Chrysene	77 U
117-84-0	Di-n-Octyl phthalate	77 U
205-99-2	Benzo(b)fluoranthene	77 U
207-08-9	Benzo(k)fluoranthene	77 U
50-32-8	Benzo(a)pyrene	77 U
193-39-5	Indeno(1,2,3-cd)pyrene	77 U
53-70-3	Dibenz(a,h)anthracene	77 U
191-24-2	Benzo(g,h,i)perylene	77 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	55.8%	d5-Phenol	58.6%
2-Fluorobiphenyl	58.8%	2-Fluorophenol	64.6%
d14-p-Terphenyl	63.4%	2,4,6-Tribromophenol	61.8%
d4-1,2-Dichlorobenzene	53.8%	d4-2-Chlorophenol	61.3%

ORGANICS ANALYSIS DATA SHEET
Semivolatiles by GC/MS
Page 1 of 2

Sample No: SS502

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83H
LIMS ID: 00-10497
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 18:49
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.68 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 11.0%
pH: 5.7

CAS Number	Analyte	ug/kg
108-95-2	Phenol	150 U
111-44-4	Bis-(2-Chloroethyl) Ether	150 U
95-57-8	2-Chlorophenol	75 U
541-73-1	1,3-Dichlorobenzene	75 U
106-46-7	1,4-Dichlorobenzene	75 U
100-51-6	Benzyl Alcohol	370 U
95-50-1	1,2-Dichlorobenzene	75 U
95-48-7	2-Methylphenol	150 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	75 U
106-44-5	4-Methylphenol	75 U
621-64-7	N-Nitroso-Di-N-Propylamine	150 U
67-72-1	Hexachloroethane	150 U
98-95-3	Nitrobenzene	75 U
78-59-1	Isophorone	75 U
88-75-5	2-Nitrophenol	370 U
105-67-9	2,4-Dimethylphenol	220 U
65-85-0	Benzoic Acid	750 U
111-91-1	bis(2-Chloroethoxy) Methane	75 U
120-83-2	2,4-Dichlorophenol	220 U
120-82-1	1,2,4-Trichlorobenzene	75 U
91-20-3	Naphthalene	75 U
106-47-8	4-Chloroaniline	220 U
87-68-3	Hexachlorobutadiene	150 U
59-50-7	4-Chloro-3-methylphenol	150 U
91-57-6	2-Methylnaphthalene	75 U
77-47-4	Hexachlorocyclopentadiene	370 U
88-06-2	2,4,6-Trichlorophenol	370 U
95-95-4	2,4,5-Trichlorophenol	370 U
91-58-7	2-Chloronaphthalene	75 U
88-74-4	2-Nitroaniline	370 U
131-11-3	Dimethylphthalate	75 U
208-96-8	Acenaphthylene	75 U
99-09-2	3-Nitroaniline	450 U
83-32-9	Acenaphthene	75 U
51-28-5	2,4-Dinitrophenol	750 U
100-02-7	4-Nitrophenol	370 U
132-64-9	Dibenzofuran	75 U
606-20-2	2,6-Dinitrotoluene	370 U

ORGANICS ANALYSIS DATA SHEET **Sample No: SS502**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83H
LIMS ID: 00-10497
Matrix: Soil
Data Release Authorized: MW
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 18:49
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 6.68 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 11.0%
pH: 5.7

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	370 U
84-66-2	Diethylphthalate	75 U
7005-72-3	4-Chlorophenyl-phenylether	75 U
86-73-7	Fluorene	75 U
100-01-6	4-Nitroaniline	370 U
534-52-1	4,6-Dinitro-2-Methylphenol	750 U
86-30-6	N-Nitrosodiphenylamine	75 U
101-55-3	4-Bromophenyl-phenylether	75 U
118-74-1	Hexachlorobenzene	75 U
87-86-5	Pentachlorophenol	370 U
85-01-8	Phenanthrene	75 U
86-74-8	Carbazole	75 U
120-12-7	Anthracene	75 U
84-74-2	Di-n-Butylphthalate	75 U
206-44-0	Fluoranthene	75 U
129-00-0	Pyrene	75 U
85-68-7	Butylbenzylphthalate	75 U
91-94-1	3,3'-Dichlorobenzidine	370 U
56-55-3	Benzo(a)anthracene	75 U
117-81-7	**bis(2-Ethylhexyl)phthalate**	**380**
218-01-9	Chrysene	75 U
117-84-0	Di-n-Octyl phthalate	75 U
205-99-2	Benzo(b)fluoranthene	75 U
207-08-9	Benzo(k)fluoranthene	75 U
50-32-8	Benzo(a)pyrene	75 U
193-39-5	Indeno(1,2,3-cd)pyrene	75 U
53-70-3	Dibenz(a,h)anthracene	75 U
191-24-2	Benzo(g,h,i)perylene	75 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	61.7%	d5-Phenol	67.9%
2-Fluorobiphenyl	67.7%	2-Fluorophenol	55.2%
d14-p-Terphenyl	78.9%	2,4,6-Tribromophenol	42.3%
d4-1,2-Dichlorobenzene	54.3%	d4-2-Chlorophenol	58.2%

ORGANICS ANALYSIS DATA SHEET **Sample No: SB01-4.5**

ANALYTICAL RESOURCES INCORPORATED

Semivolatiles by GC/MS

Lab Sample ID: BU83I
LIMS ID: 00-10498
Matrix: Soil
Data Release Authorized: [signature]
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 16:32
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 5.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 26.7%
pH: 6.1

CAS Number	Analyte	ug/kg
108-95-2	Phenol	180 U
111-44-4	Bis-(2-Chloroethyl) Ether	180 U
95-57-8	2-Chlorophenol	90 U
541-73-1	1,3-Dichlorobenzene	90 U
106-46-7	1,4-Dichlorobenzene	90 U
100-51-6	Benzyl Alcohol	450 U
95-50-1	1,2-Dichlorobenzene	90 U
95-48-7	2-Methylphenol	180 U
108-60-1	2,2'-Oxybis(1-Chloropropane)	90 U
106-44-5	4-Methylphenol	90 U
621-64-7	N-Nitroso-Di-N-Propylamine	180 U
67-72-1	Hexachloroethane	180 U
98-95-3	Nitrobenzene	90 U
78-59-1	Isophorone	90 U
88-75-5	2-Nitrophenol	450 U
105-67-9	2,4-Dimethylphenol	270 U
65-85-0	Benzoic Acid	900 U
111-91-1	bis(2-Chloroethoxy) Methane	90 U
120-83-2	2,4-Dichlorophenol	270 U
120-82-1	1,2,4-Trichlorobenzene	90 U
91-20-3	Naphthalene	90 U
106-47-8	4-Chloroaniline	270 U
87-68-3	Hexachlorobutadiene	180 U
59-50-7	4-Chloro-3-methylphenol	180 U
91-57-6	2-Methylnaphthalene	90 U
77-47-4	Hexachlorocyclopentadiene	450 U
88-06-2	2,4,6-Trichlorophenol	450 U
95-95-4	2,4,5-Trichlorophenol	450 U
91-58-7	2-Chloronaphthalene	90 U
88-74-4	2-Nitroaniline	450 U
131-11-3	Dimethylphthalate	90 U
208-96-8	Acenaphthylene	90 U
99-09-2	3-Nitroaniline	540 U
83-32-9	Acenaphthene	90 U
51-28-5	2,4-Dinitrophenol	900 U
100-02-7	4-Nitrophenol	450 U
132-64-9	Dibenzofuran	90 U
606-20-2	2,6-Dinitrotoluene	450 U

ORGANICS ANALYSIS DATA SHEET **Sample No: SB01-4.5**

Semivolatiles by GC/MS

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU83I
LIMS ID: 00-10498
Matrix: Soil
Data Release Authorized:
Reported: 07/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/05/00
Date analyzed: 07/07/00 16:32
Instrument: FINN4
GPC Cleanup: NO

Sample Amount: 5.53 g-dry-wt
Final Extract Volume: 0.5 mL
Dilution Factor: 1:1
Percent Moisture: 26.7%
pH: 6.1

CAS Number	Analyte	ug/kg
121-14-2	2,4-Dinitrotoluene	450 U
84-66-2	Diethylphthalate	90 U
7005-72-3	4-Chlorophenyl-phenylether	90 U
86-73-7	Fluorene	90 U
100-01-6	4-Nitroaniline	450 U
534-52-1	4,6-Dinitro-2-Methylphenol	900 U
86-30-6	N-Nitrosodiphenylamine	90 U
101-55-3	4-Bromophenyl-phenylether	90 U
118-74-1	Hexachlorobenzene	90 U
87-86-5	Pentachlorophenol	450 U
85-01-8	Phenanthrene	90 U
86-74-8	Carbazole	90 U
120-12-7	Anthracene	90 U
84-74-2	Di-n-Butylphthalate	90 U
206-44-0	Fluoranthene	90 U
129-00-0	Pyrene	90 U
85-68-7	Butylbenzylphthalate	90 U
91-94-1	3,3'-Dichlorobenzidine	450 U
56-55-3	Benzo(a)anthracene	90 U
117-81-7	bis(2-Ethylhexyl)phthalate	90 U
218-01-9	Chrysene	90 U
117-84-0	Di-n-Octyl phthalate	90 U
205-99-2	Benzo(b)fluoranthene	90 U
207-08-9	Benzo(k)fluoranthene	90 U
50-32-8	Benzo(a)pyrene	90 U
193-39-5	Indeno(1,2,3-cd)pyrene	90 U
53-70-3	Dibenz(a,h)anthracene	90 U
191-24-2	Benzo(g,h,i)perylene	90 U

Semivolatiles Surrogate Recovery

d5-Nitrobenzene	59.9%	d5-Phenol	61.0%
2-Fluorobiphenyl	63.0%	2-Fluorophenol	51.5%
d14-p-Terphenyl	71.3%	2,4,6-Tribromophenol	51.0%
d4-1,2-Dichlorobenzene	59.9%	d4-2-Chlorophenol	58.6%

ORGANICS ANALYSIS DATA SHEET
Pesticides/PCB by GC/ECD Method 8081 **Sample No: SS1003**

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CH
Reported: 07/17/00 7/17/00

Date extracted: 06/30/00
Date analyzed: 07/05/00 15:51
GPC Cleanup: NO
Florisil: YES
Instrument ID: ECD4

Sample Amount: 500 mL
Final Extract Volume: 5.0 mL
Dilution Factor: 1:1
pH: 7.1
Sulfur Cleanup: YES

CAS Number	Analyte	ug/L
319-84-6	alpha-BHC	0.050 U
319-85-7	beta-BHC	0.050 U
319-86-8	delta-BHC	0.050 U
58-89-9	gamma-BHC (Lindane)	0.050 U
76-44-8	Heptachlor	0.050 U
309-00-2	Aldrin	0.050 U
1024-57-3	Heptachlor Epoxide	0.050 U
959-98-8	Endosulfan I	0.050 U
60-57-1	Dieldrin	0.10 U
72-55-9	4,4'-DDE	0.10 U
72-20-8	Endrin	0.10 U
33213-65-9	Endosulfan II	0.10 U
72-54-8	4,4'-DDD	0.10 U
1031-07-8	Endosulfan Sulfate	0.10 U
50-29-3	4,4'-DDT	0.10 U
72-43-5	Methoxychlor	0.50 U
53494-70-5	Endrin Ketone	0.10 U
7421-93-4	Endrin Aldehyde	0.10 U
57-74-9	gamma Chlordane	0.050 U
5103-71-9	alpha Chlordane	0.050 U
8001-35-2	Toxaphene	5.0 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	77.5%
Tetrachlorometaxylene	70.5%

ORGANICS ANALYSIS DATA SHEET
Pesticides/PCB by GC/ECD Method 8081

Sample No: SS1003

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: BU90A
LIMS ID: 00-11056
Matrix: Water

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CH
Reported: 07/17/00 7/17/00

Date extracted: 07/06/00
Date analyzed: 07/07/00 16:58
GPC Cleanup: NO
Florisil: YES
Instrument ID: ECD4

Sample Amount: 500 mL
Final Extract Volume: 5.0 mL
Dilution Factor: 1:1
pH: 7.4
Sulfur Cleanup: YES

CAS Number	Analyte	ug/L
319-84-6	alpha-BHC	0.050 U
319-85-7	beta-BHC	0.050 U
319-86-8	delta-BHC	0.050 U
58-89-9	gamma-BHC (Lindane)	0.050 U
76-44-8	Heptachlor	0.050 U
309-00-2	Aldrin	0.050 U
1024-57-3	Heptachlor Epoxide	0.050 U
959-98-8	Endosulfan I	0.050 U
60-57-1	Dieldrin	0.10 U
72-55-9	4,4'-DDE	0.10 U
72-20-8	Endrin	0.10 U
33213-65-9	Endosulfan II	0.10 U
72-54-8	4,4'-DDD	0.10 U
1031-07-8	Endosulfan Sulfate	0.10 U
50-29-3	4,4'-DDT	0.10 U
72-43-5	Methoxychlor	0.50 U
53494-70-5	Endrin Ketone	0.10 U
7421-93-4	Endrin Aldehyde	0.10 U
57-74-9	gamma Chlordane	0.050 U
5103-71-9	alpha Chlordane	0.050 U
8001-35-2	Toxaphene	5.0 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	86.0%
Tetrachlorometaxylene	75.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83A
LIMS ID: 00-10490
Matrix: Wood
Data Release Authorized: CH
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/08/00 05:45
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 5.01 g-as-rec
Final Extract Volume: 40 mL
Dilution Factor: 1:1

pH: 5.3

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	40 U
319-85-7	beta-BHC	40 U
319-86-8	delta-BHC	40 U
58-89-9	gamma-BHC (Lindane)	40 U
76-44-8	Heptachlor	40 U
309-00-2	Aldrin	40 U
1024-57-3	Heptachlor Epoxide	40 U
959-98-8	Endosulfan I	40 U
60-57-1	Dieldrin	80 U
72-55-9	4,4'-DDE	80 U
72-20-8	Endrin	140 Y
33213-65-9	Endosulfan II	80 U
72-54-8	4,4'-DDD	96 Y
1031-07-8	Endosulfan Sulfate	80 U
50-29-3	**4,4'-DDT**	**1,300 E**
72-43-5	Methoxychlor	400 U
53494-70-5	Endrin Ketone	80 U
7421-93-4	Endrin Aldehyde	130 Y
57-74-9	gamma Chlordane	54 Y
5103-71-9	alpha Chlordane	40 U
8001-35-2	Toxaphene	4,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	55.5%
Tetrachlorometaxylene	36.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No:** **FS01**
Pesticides/PCB by GC/ECD **DILUTION**

Lab Sample ID: BU83ADL
LIMS ID: 00-10490
Matrix: Wood
Data Release Authorized: CA
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/08/00 03:26
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 5.01 g-as-rec
Final Extract Volume: 40 mL
Dilution Factor: 1:10

pH: 5.3

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	400 U
319-85-7	beta-BHC	400 U
319-86-8	delta-BHC	400 U
58-89-9	gamma-BHC (Lindane)	400 U
76-44-8	Heptachlor	400 U
309-00-2	Aldrin	400 U
1024-57-3	Heptachlor Epoxide	400 U
959-98-8	Endosulfan I	400 U
60-57-1	Dieldrin	800 U
72-55-9	4,4'-DDE	800 U
72-20-8	Endrin	800 U
33213-65-9	Endosulfan II	800 U
72-54-8	4,4'-DDD	800 U
1031-07-8	Endosulfan Sulfate	800 U
50-29-3	**4,4'-DDT**	**1,300**
72-43-5	Methoxychlor	4,000 U
53494-70-5	Endrin Ketone	800 U
7421-93-4	Endrin Aldehyde	800 U
57-74-9	gamma Chlordane	400 U
5103-71-9	alpha Chlordane	400 U
8001-35-2	Toxaphene	40,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	77.5%
Tetrachlorometaxylene	50.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01 RE**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83A
LIMS ID: 00-11330
Matrix: Wood
Data Release Authorized: CH
Reported: 07/17/00 7/17/0

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Date extracted: 07/10/00
Date analyzed: 07/11/00 19:21
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 5.00 g-as-rec
Final Extract Volume: 40 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	40 U
319-85-7	beta-BHC	40 U
319-86-8	delta-BHC	40 U J
58-89-9	gamma-BHC (Lindane)	40 U
76-44-8	Heptachlor	40 U
309-00-2	Aldrin	40 U
1024-57-3	Heptachlor Epoxide	40 U
959-98-8	Endosulfan I	40 U
60-57-1	Dieldrin	80 U
72-55-9	4,4'-DDE	80 U
72-20-8	Endrin	290 Y
33213-65-9	Endosulfan II	80 U
72-54-8	4,4'-DDD	150 Y
1031-07-8	Endosulfan Sulfate	80 U
~~50-29-3~~	~~4,4'-DDT~~	~~2,500 E~~ DK FLDKE
72-43-5	Methoxychlor	400 U
53494-70-5	Endrin Ketone	80 U
7421-93-4	Endrin Aldehyde	80 U
57-74-9	gamma Chlordane	40 U
5103-71-9	alpha Chlordane	40 U
8001-35-2	Toxaphene	11,000 Y

Pesticide Surrogate Recovery

Decachlorobiphenyl	70.2%
Tetrachlorometaxylene	66.8%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01 RE**
Pesticides/PCB by GC/ECD **DILUTION**

Lab Sample ID: BU83ADL QC Report No: BU83-URS Corp.
LIMS ID: 00-11330 Project: Camp Bonneville
Matrix: Wood 53F0072207
Data Release Authorized: CM Date Sampled: 06/26/00
Reported: 07/17/00 7/17/0 Date Received: 06/28/00

Date extracted: 07/10/00 Sample Amount: 5.00 g-as-rec
Date analyzed: 07/11/00 18:12 Final Extract Volume: 40 mL
GPC Cleanup: NO Dilution Factor: 1:10
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	400 U
319-85-7	beta-BHC	400 U
319-86-8	delta-BHC	400 U
58-89-9	gamma-BHC (Lindane)	400 U
76-44-8	Heptachlor	400 U
309-00-2	Aldrin	400 U
1024-57-3	Heptachlor Epoxide	400 U
959-98-8	Endosulfan I	400 U
60-57-1	Dieldrin	800 U
72-55-9	4,4'-DDE	800 U
72-20-8	Endrin	800 U
33213-65-9	Endosulfan II	800 U
72-54-8	4,4'-DDD	800 U
1031-07-8	Endosulfan Sulfate	800 U
50-29-3	4,4'-DDT	2,600 use only
72-43-5	Methoxychlor	4,000 U CM 8/1/00
53494-70-5	Endrin Ketone	800 U
7421-93-4	Endrin Aldehyde	800 U
57-74-9	gamma Chlordane	400 U
5103-71-9	alpha Chlordane	400 U
8001-35-2	Toxaphene	40,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	102%
Tetrachlorometaxylene	85.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS04**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83E
LIMS ID: 00-10494
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 7/19/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 12:45
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 10.0 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:1
Percent Moisture: 16.9%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	4.8 Y
319-85-7	beta-BHC	2.0 U
319-86-8	delta-BHC	2.0 U
58-89-9	gamma-BHC (Lindane)	2.0 U
76-44-8	Heptachlor	2.0 U
309-00-2	Aldrin	2.0 U
1024-57-3	Heptachlor Epoxide	2.0 U
959-98-8	Endosulfan I	2.0 U
60-57-1	Dieldrin	4.0 U
~~72-55-9~~	~~4,4'-DDE~~	~~220 E~~ DNR
72-20-8	Endrin	39 Y
33213-65-9	Endosulfan II	4.0 U
~~72-54-8~~	~~4,4'-DDD~~	~~70 E~~ DNR
1031-07-8	Endosulfan Sulfate	4.0 U
~~50-29-3~~	~~4,4'-DDT~~	~~S~~ DNR
72-43-5	Methoxychlor	20 U
53494-70-5	Endrin Ketone	4.0 U
7421-93-4	**Endrin Aldehyde**	**7.0**
57-74-9	gamma Chlordane	2.0 U
5103-71-9	alpha Chlordane	2.0 U
8001-35-2	Toxaphene	200 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	98.2%
Tetrachlorometaxylene	63.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No:** SS04
Pesticides/PCB by GC/ECD DILUTION

Lab Sample ID: BU83EDL QC Report No: BU83-URS Corp.
LIMS ID: 00-10494 Project: Camp Bonneville
Matrix: Soil 53F0072207
Data Release Authorized: CH Date Sampled: 06/27/00
Reported: 07/17/00 7/17/00 Date Received: 06/28/00

Date extracted: 07/06/00 Sample Amount: 10.0 g-dry-wt
Date analyzed: 07/12/00 05:48 Final Extract Volume: 4.0 mL
GPC Cleanup: NO Dilution Factor: 1:10
Florisil: YES Percent Moisture: 16.9%
Sulfur Cleanup: YES pH: 5.9
Instrument ID: ECD4

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	20 U
319-85-7	beta-BHC	20 U
319-86-8	delta-BHC	20 U
58-89-9	gamma-BHC (Lindane)	20 U
76-44-8	Heptachlor	20 U
309-00-2	Aldrin	20 U
1024-57-3	Heptachlor Epoxide	20 U
959-98-8	Endosulfan I	20 U
60-57-1	Dieldrin	40 U
72-55-9	4,4'-DDE	230 J
72-20-8	Endrin	45 Y
33213-65-9	Endosulfan II	40 U
72-54-8	4,4'-DDD	76 J
1031-07-8	Endosulfan Sulfate	40 U
50-29-3	4,4'-DDT	2,400 E DN2
72-43-5	Methoxychlor	200 U
53494-70-5	Endrin Ketone	40 U
7421-93-4	Endrin Aldehyde	40 U
57-74-9	gamma Chlordane	20 U
5103-71-9	alpha Chlordane	20 U
8001-35-2	Toxaphene	2,000 U

8/1/00

Pesticide Surrogate Recovery

Decachlorobiphenyl	135%
Tetrachlorometaxylene	70.0%

FORM-1

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No:** SS04
Pesticides/PCB by GC/ECD DILUTION

Lab Sample ID: BU83E-R
LIMS ID: 00-10494
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 mlm

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/11/00 23:25
GPC Cleanup: NO
Florisil: NO
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 10.0 g-dry-wt
lume: 4.0 mL
Dilution Factor: 1:50.00
Percent Moisture: 16.9%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	100 U
319-85-7	beta-BHC	100 U
319-86-8	delta-BHC	100 U
58-89-9	gamma-BHC (Lindane)	100 U
76-44-8	Heptachlor	100 U
309-00-2	Aldrin	100 U
1024-57-3	Heptachlor Epoxide	100 U
959-98-8	Endosulfan I	100 U
60-57-1	Dieldrin	200 U
72-55-9	4,4'-DDE	220
72-20-8	Endrin	200 U
33213-65-9	Endosulfan II	200 U
72-54-8	4,4'-DDD	200 U
1031-07-8	Endosulfan Sulfate	200 U
50-29-3	4,4'-DDT	2,700
72-43-5	Methoxychlor	1,000 U
53494-70-5	Endrin Ketone	200 U
7421-93-4	Endrin Aldehyde	200 U
57-74-9	gamma Chlordane	100 U
5103-71-9	alpha Chlordane	100 U
8001-35-2	Toxaphene	10,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	D
Tetrachlorometaxylene	D

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS04 RE**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83E
LIMS ID: 00-11525
Matrix: Soil
Data Release Authorized: ck
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/11/00
Date analyzed: 07/13/00 20:41
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 9.97 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:1
Percent Moisture: 16.9%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	2.0 U
319-85-7	beta-BHC	2.9 Y
319-86-8	delta-BHC	2.0 U
58-89-9	**gamma-BHC (Lindane)**	**2.8**
76-44-8	Heptachlor	2.0 U
309-00-2	Aldrin	2.0 U
1024-57-3	Heptachlor Epoxide	2.0 U
959-98-8	Endosulfan I	2.0 U
60-57-1	Dieldrin	4.0 U
72-55-9	**4,4'-DDE**	**220 E**
72-20-8	Endrin	42 Y
33213-65-9	Endosulfan II	4.0 U
72-54-8	**4,4'-DDD**	**45**
1031-07-8	Endosulfan Sulfate	4.0 U
50-29-3	**4,4'-DDT**	**S**
72-43-5	Methoxychlor	20 U
53494-70-5	Endrin Ketone	4.0 U
7421-93-4	**Endrin Aldehyde**	**9.6**
57-74-9	gamma Chlordane	2.0 U
5103-71-9	alpha Chlordane	2.0 U
8001-35-2	Toxaphene	460 Y

Pesticide Surrogate Recovery

Decachlorobiphenyl	120%
Tetrachlorometaxylene	84.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
Pesticides/PCB by GC/ECD

Sample No: SS04 RE
DILUTION

Lab Sample ID: BU83EDL
LIMS ID: 00-11525
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/11/00
Date analyzed: 07/13/00 17:12
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 9.97 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:10
Percent Moisture: 16.9%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	20 U
319-85-7	beta-BHC	20 U
319-86-8	delta-BHC	20 U
58-89-9	gamma-BHC (Lindane)	20 U
76-44-8	Heptachlor	20 U
309-00-2	Aldrin	20 U
1024-57-3	Heptachlor Epoxide	20 U
959-98-8	Endosulfan I	20 U
60-57-1	Dieldrin	40 U
72-55-9	**4,4'-DDE**	**210**
72-20-8	Endrin	46 Y
33213-65-9	Endosulfan II	40 U
72-54-8	**4,4'-DDD**	**38 J**
1031-07-8	Endosulfan Sulfate	40 U
50-29-3	**4,4'-DDT**	**1,500 E**
72-43-5	Methoxychlor	200 U
53494-70-5	Endrin Ketone	40 U
7421-93-4	Endrin Aldehyde	40 U
57-74-9	gamma Chlordane	20 U
5103-71-9	alpha Chlordane	20 U
8001-35-2	Toxaphene	2,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	158%
Tetrachlorometaxylene	82.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS04 RE**
Pesticides/PCB by GC/ECD **DILUTION**

Lab Sample ID: BU83E-R QC Report No: BU83-URS Corp.
LIMS ID: 00-11525 Project: Camp Bonneville
Matrix: Soil 53F0072207
Data Release Authorized: Date Sampled: 06/27/00
Reported: 07/17/00 Date Received: 06/28/00

Date extracted: 07/11/00 Sample Amount: 9.97 g-dry-wt
Date analyzed: 07/13/00 16:02 lume: 4.0 mL
GPC Cleanup: NO Dilution Factor: 1:50.00
Florisil: NO Percent Moisture: 16.9%
Sulfur Cleanup: YES pH: 5.9
Instrument ID: ECD4

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	100 U
319-85-7	beta-BHC	100 U
319-86-8	delta-BHC	100 U
58-89-9	gamma-BHC (Lindane)	100 U
76-44-8	Heptachlor	100 U
309-00-2	Aldrin	100 U
1024-57-3	Heptachlor Epoxide	100 U
959-98-8	Endosulfan I	100 U
60-57-1	Dieldrin	200 U
72-55-9	**4,4'-DDE**	**200**
72-20-8	Endrin	200 U
33213-65-9	Endosulfan II	200 U
72-54-8	4,4'-DDD	200 U
1031-07-8	Endosulfan Sulfate	200 U
50-29-3	**4,4'-DDT**	**1,500**
72-43-5	Methoxychlor	1,000 U
53494-70-5	Endrin Ketone	200 U
7421-93-4	Endrin Aldehyde	200 U
57-74-9	gamma Chlordane	100 U
5103-71-9	alpha Chlordane	100 U
8001-35-2	Toxaphene	10,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	D
Tetrachlorometaxylene	D

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS05**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83F
LIMS ID: 00-10495
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 01:44
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 8.47 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:1
Percent Moisture: 29.5%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	2.4 U
319-85-7	**beta-BHC**	**4.2**
319-86-8	delta-BHC	2.4 U J
58-89-9	gamma-BHC (Lindane)	2.4 U
76-44-8	Heptachlor	2.4 U
309-00-2	Aldrin	2.4 U
1024-57-3	Heptachlor Epoxide	2.4 U
959-98-8	Endosulfan I	2.4 U
60-57-1	Dieldrin	4.7 U
72-55-9	**4,4'-DDE**	**7.7**
72-20-8	Endrin	4.7 U
33213-65-9	Endosulfan II	4.7 U
72-54-8	4,4'-DDD	4.7 U
1031-07-8	Endosulfan Sulfate	4.7 U
50-29-3	**4,4'-DDT**	**42**
72-43-5	Methoxychlor	24 U
53494-70-5	Endrin Ketone	4.7 U
7421-93-4	Endrin Aldehyde	4.7 U
57-74-9	gamma Chlordane	2.4 U
5103-71-9	alpha Chlordane	2.4 U
8001-35-2	Toxaphene	240 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	62.5%
Tetrachlorometaxylene	69.0%

FORM-1

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS504**
Pesticides/PCB by GC/ECD

Lab Sample ID: BU83G
LIMS ID: 00-10496
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 7/17/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 16:14
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 9.41 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:1
Percent Moisture: 21.8%
pH: 5.9

CAS Number	Analyte	ug/kg	
319-84-6	alpha-BHC	2.7 Y	J
319-85-7	beta-BHC	2.1 U	
319-86-8	delta-BHC	2.1 U	
58-89-9	gamma-BHC (Lindane)	2.1 U	
76-44-8	Heptachlor	2.1 U	
309-00-2	Aldrin	2.1 U	
1024-57-3	Heptachlor Epoxide	2.1 U	
959-98-8	Endosulfan I	2.1 U	
60-57-1	Dieldrin	4.3 U	
~~72-55-9~~	~~4,4'-DDE~~	~~190 E~~	
72-20-8	Endrin	35 Y	J
33213-65-9	Endosulfan II	4.3 U	
72-54-8	**4,4'-DDD**	**48**	
1031-07-8	Endosulfan Sulfate	4.3 U	
~~50-29-3~~	~~4,4'-DDT~~	~~S~~	DNR
72-43-5	Methoxychlor	21 U	J
53494-70-5	Endrin Ketone	4.3 U	
7421-93-4	**Endrin Aldehyde**	**9.5**	
57-74-9	gamma Chlordane	2.1 U	
5103-71-9	alpha Chlordane	2.1 U	
8001-35-2	Toxaphene	210 U	

Pesticide Surrogate Recovery

Decachlorobiphenyl	93.8%
Tetrachlorometaxylene	76.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No:** SS504
Pesticides/PCB by GC/ECD DILUTION

Lab Sample ID: BU83GDL
LIMS ID: 00-10496
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 7/17/0

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 09:17
GPC Cleanup: NO
Florisil: YES
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 9.41 g-dry-wt
Final Extract Volume: 4.0 mL
Dilution Factor: 1:10
Percent Moisture: 21.8%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	21 U
319-85-7	beta-BHC	21 U
319-86-8	delta-BHC	21 U
58-89-9	gamma-BHC (Lindane)	21 U
76-44-8	Heptachlor	21 U
309-00-2	Aldrin	21 U
1024-57-3	Heptachlor Epoxide	21 U
959-98-8	Endosulfan I	21 U
60-57-1	Dieldrin	43 U
72-55-9	4,4'-DDE	190
72-20-8	Endrin	43 U
33213-65-9	Endosulfan II	43 U
72-54-8	4,4'-DDD	44
1031-07-8	Endosulfan Sulfate	43 U
50-29-3	4,4'-DDT	1,300 E
72-43-5	Methoxychlor	210 U
53494-70-5	Endrin Ketone	43 U
7421-93-4	Endrin Aldehyde	43 U
57-74-9	gamma Chlordane	21 U
5103-71-9	alpha Chlordane	21 U
8001-35-2	Toxaphene	2,100 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	128%
Tetrachlorometaxylene	87.5%

FORM-1

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No:** SS504
Pesticides/PCB by GC/ECD DILUTION

Lab Sample ID: BU83G-R
LIMS ID: 00-10496
Matrix: Soil
Data Release Authorized: CH
Reported: 07/17/00 11/11/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 01:10
GPC Cleanup: NO
Florisil: NO
Sulfur Cleanup: YES
Instrument ID: ECD4

Sample Amount: 9.41 g-dry-wt
lume: 4.0 mL
Dilution Factor: 1:50.00
Percent Moisture: 21.8%
pH: 5.9

CAS Number	Analyte	ug/kg
319-84-6	alpha-BHC	110 U
319-85-7	beta-BHC	110 U
319-86-8	delta-BHC	110 U
58-89-9	gamma-BHC (Lindane)	110 U
76-44-8	Heptachlor	110 U
309-00-2	Aldrin	110 U
1024-57-3	Heptachlor Epoxide	110 U
959-98-8	Endosulfan I	110 U
60-57-1	Dieldrin	210 U
72-55-9	4,4'-DDE	190 J
72-20-8	Endrin	210 U
33213-65-9	Endosulfan II	210 U
72-54-8	4,4'-DDD	210 U
1031-07-8	Endosulfan Sulfate	210 U
50-29-3	4,4'-DDT	1,400
72-43-5	Methoxychlor	1,100 U
53494-70-5	Endrin Ketone	210 U
7421-93-4	Endrin Aldehyde	210 U
57-74-9	gamma Chlordane	110 U
5103-71-9	alpha Chlordane	110 U
8001-35-2	Toxaphene	11,000 U

Pesticide Surrogate Recovery

Decachlorobiphenyl	D
Tetrachlorometaxylene	D

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

ANALYTICAL RESOURCES INCORPORATED

Sample No: FS01

Lab Sample ID: BU83A
LIMS ID: 00-10490
Matrix: Wood

Data Release Authorized: CH
Reported: 07/18/00 7/18/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 09:59
Instrument ID: ECD1
Sample Amount: 5.02 g-as-rec
Final Ext Vol: 40 mL

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1

Reported in Total ug/kg as received

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	800 U
53469-21-9	Aroclor 1242	800 U
12672-29-6	Aroclor 1248	800 U
11097-69-1	Aroclor 1254	800 U
11096-82-5	Aroclor 1260	800 U
11104-28-2	Aroclor 1221	1,600 U
11141-16-5	Aroclor 1232	800 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	96.8%
Tetrachlorometaxylene	89.8%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
NV Indicates no value reportable - see additional analyses.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

FORM-1 PCB

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS04

Lab Sample ID: BU83E
LIMS ID: 00-10494
Matrix: Soil

Data Release Authorized: CLK
Reported: 07/18/00 AKW

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 16:37
Instrument ID: ECD1
Sample Amount: 9.99 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 16.9%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	40 U J
53469-21-9	Aroclor 1242	40 U
12672-29-6	Aroclor 1248	40 U
11097-69-1	Aroclor 1254	40 U
11096-82-5	Aroclor 1260	40 U
11104-28-2	Aroclor 1221	80 U
11141-16-5	Aroclor 1232	40 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	139%
Tetrachlorometaxylene	86.0%

Data Qualifiers

- J Indicates an estimated value when that result is less than the calculated detection limit.
- E Indicates a value above the linear range of the detector. Dilution Required
- S Indicates no value reported due to saturation of the detector.
- D Indicates the surrogate was diluted out.
- U Indicates compound was analyzed for, but not detected at the given detection limit.
- B Found in associated method blank
- NA Indicates compound was not analyzed.
- NR Indicates no recovery due to interferences.
- NV Indicates no value reportable - see additional analyses.
- Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS05

Lab Sample ID: BU83F
LIMS ID: 00-10495
Matrix: Soil

Data Release Authorized: CH
Reported: 07/18/00 7/18/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 18:50
Instrument ID: ECD1
Sample Amount: 8.50 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 29.5%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	47 U
53469-21-9	Aroclor 1242	47 U
12672-29-6	Aroclor 1248	47 U
11097-69-1	Aroclor 1254	80 Y
11096-82-5	Aroclor 1260	96 Y
11104-28-2	Aroclor 1221	94 U
11141-16-5	Aroclor 1232	110 Y

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	99.0%
Tetrachlorometaxylene	75.5%

Data Qualifiers

- J Indicates an estimated value when that result is less than the calculated detection limit.
- E Indicates a value above the linear range of the detector. Dilution Required
- S Indicates no value reported due to saturation of the detector.
- D Indicates the surrogate was diluted out.
- U Indicates compound was analyzed for, but not detected at the given detection limit.
- B Found in associated method blank
- NA Indicates compound was not analyzed.
- NR Indicates no recovery due to interferences.
- NV Indicates no value reportable - see additional analyses.
- Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS504

Lab Sample ID: BU83G
LIMS ID: 00-10496
Matrix: Soil

Data Release Authorized: CK
Reported: 07/18/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/06/00
Date analyzed: 07/12/00 18:17
Instrument ID: ECD1
Sample Amount: 9.41 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 21.8%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	42 U
53469-21-9	Aroclor 1242	42 U
12672-29-6	Aroclor 1248	42 U
11097-69-1	Aroclor 1254	42 U
11096-82-5	Aroclor 1260	42 U
11104-28-2	Aroclor 1221	85 U
11141-16-5	Aroclor 1232	42 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	148%
Tetrachlorometaxylene	71.2%

Data Qualifiers

- J Indicates an estimated value when that result is less than the calculated detection limit.
- E Indicates a value above the linear range of the detector. Dilution Required
- S Indicates no value reported due to saturation of the detector.
- D Indicates the surrogate was diluted out.
- U Indicates compound was analyzed for, but not detected at the given detection limit.
- B Found in associated method blank
- NA Indicates compound was not analyzed.
- NR Indicates no recovery due to interferences.
- NV Indicates no value reportable - see additional analyses.
- Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS04 RE

Lab Sample ID: BU83E
LIMS ID: 00-11661
Matrix: Soil

Data Release Authorized: CK
Reported: 07/18/00 7/18/0

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/13/00
Date analyzed: 07/17/00 12:10
Instrument ID: ECD1
Sample Amount: 10.0 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 16.9%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	40 U
53469-21-9	Aroclor 1242	40 U
12672-29-6	Aroclor 1248	40 U
11097-69-1	Aroclor 1254	40 U
11096-82-5	Aroclor 1260	40 U
11104-28-2	Aroclor 1221	80 U
11141-16-5	Aroclor 1232	40 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	159%
Tetrachlorometaxylene	104%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
NV Indicates no value reportable - see additional analyses.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

FORM-1 PCB

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS05 RE

Lab Sample ID: BU83F
LIMS ID: 00-11662
Matrix: Soil

Data Release Authorized: CH
Reported: 07/18/00 7/18/00

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/13/00
Date analyzed: 07/17/00 13:34
Instrument ID: ECD1
Sample Amount: 8.47 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 29.5%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	47 U
53469-21-9	Aroclor 1242	47 U
12672-29-6	Aroclor 1248	47 U
11097-69-1	Aroclor 1254	47 U
11096-82-5	Aroclor 1260	47 U
11104-28-2	Aroclor 1221	94 U
11141-16-5	Aroclor 1232	47 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	104%
Tetrachlorometaxylene	99.2%

Data Qualifiers

- J Indicates an estimated value when that result is less than the calculated detection limit.
- E Indicates a value above the linear range of the detector. Dilution Required
- S Indicates no value reported due to saturation of the detector.
- D Indicates the surrogate was diluted out.
- U Indicates compound was analyzed for, but not detected at the given detection limit.
- B Found in associated method blank
- NA Indicates compound was not analyzed.
- NR Indicates no recovery due to interferences.
- NV Indicates no value reportable - see additional analyses.
- Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

Sample No: SS504 RE

Lab Sample ID: BU83G
LIMS ID: 00-11663
Matrix: Soil

Data Release Authorized: ck
Reported: 07/18/00 7/18/

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Date extracted: 07/13/00
Date analyzed: 07/17/00 14:03
Instrument ID: ECD1
Sample Amount: 9.42 g-dry-wt
Final Ext Vol: 4.0 mL
pH: 5.9

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1
Percent Moisture: 21.8%

Reported in Total ug/kg Dry Weight

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	42 U
53469-21-9	Aroclor 1242	42 U
12672-29-6	Aroclor 1248	42 U
11097-69-1	Aroclor 1254	63 Y
11096-82-5	Aroclor 1260	42 U
11104-28-2	Aroclor 1221	85 U
11141-16-5	Aroclor 1232	43 Y

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	NR
Tetrachlorometaxylene	131%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
NV Indicates no value reportable - see additional analyses.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

FORM-1 PCB

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD

ANALYTICAL RESOURCES INCORPORATED

Sample No: SS1003

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CA
Reported: 07/20/00 7/20/00

Date extracted: 06/30/00
Date analyzed: 07/12/00 06:06
Instrument ID: ECD1
Sample Amount: 500 mL
Final Ext Vol: 5.0 mL

GPC Cleanup: No
Florisil Cleanup: No
Acid Cleanup: Yes
Sulfur Cleanup: Yes
Conc/Dilution Factor: 1:1

Reported in Total ug/L

CAS Number	Analyte	Value
12674-11-2	Aroclor 1016	1.0 U
53469-21-9	Aroclor 1242	1.0 U
12672-29-6	Aroclor 1248	1.0 U
11097-69-1	Aroclor 1254	1.0 U
11096-82-5	Aroclor 1260	1.0 U
11104-28-2	Aroclor 1221	2.0 U
11141-16-5	Aroclor 1232	1.0 U

PCB-Aroclor Surrogate Recovery

Decachlorobiphenyl	87.0%
Tetrachlorometaxylene	84.0%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01**
Herbicides by GC/ECD

Lab Sample ID: BU83A
LIMS ID: 00-10490
Matrix: Wood

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Data Release Authorized: CH
Reported: 07/20/00 7/20/00

Date extracted: 07/05/00 15:00
Date analyzed: 07/12/00 23:19
Instrument ID:

Sample Amount: 15.0 g-as-rec
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	40 Y
93-76-5	2,4,5-T	S
88-85-7	Dinoseb	80 Y
1918-00-9	Dicamba	20 U
94-75-7	2,4-D	270
94-82-6	2,4-DB	1,600 Y
75-99-0	Dalapon	90 U
94-74-6	MCPA	42,000 U
120-36-5	Dichloroprop	33 U
94-74-6	MCPP	42,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 91.4%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01**
Herbicides by GC/ECD **DILUTION**

Lab Sample ID: BU83A-DL
LIMS ID: 00-10490
Matrix: Wood

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Data Release Authorized: CH
Reported: 07/20/00 7/20/00

Date extracted: 07/05/00 15:00
Date analyzed: 07/18/00 19:54
Instrument ID:

Sample Amount: 15.0 g-as-rec
Final Extract Volume: 50 mL
Dilution Factor: 1:400

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	3,400 U
93-76-5	**2,4,5-T**	**64,000**
88-85-7	Dinoseb	6,800 U
1918-00-9	Dicamba	8,000 U
94-75-7	2,4-D	13,000 U
94-82-6	2,4-DB	68,000 U
75-99-0	Dalapon	36,000 U
94-74-6	MCPA	17,000,000 U
120-36-5	Dichloroprop	13,000 U
94-74-6	MCPP	17,000,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid D

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

REVISED

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01**
Herbicides by GC/ECD

Lab Sample ID: BU83A
LIMS ID: 00-11330
Matrix: Wood

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Data Release Authorized: CH
Reported: 08/04/00 8/1/00

Date extracted: 07/14/00 13:00
Date analyzed: 07/18/00 21:23
Instrument ID:

Sample Amount: 15.0 g-as-rec
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg	
93-72-1	2,4,5-TP (Silvex)	23 Y	J
~~93-76-5~~	~~2,4,5-T~~	~~S~~	BNR
88-85-7	Dinoseb	73 Y	J
1918-00-9	Dicamba	20 U	
94-75-7	**2,4-D**	**500**	
94-82-6	**2,4-DB**	**3,000**	
75-99-0	Dalapon	90 U	
94-74-6	MCPA	42,000 Y	
120-36-5	Dichloroprop	37 Y	
94-74-6	MCPP	42,000 U	✓

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 93.2%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: FS01 RE**
Herbicides by GC/ECD **DILUTION**

Lab Sample ID: BU83A-DL
LIMS ID: 00-11330
Matrix: Wood

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Data Release Authorized: c/r 7/20/00
Reported: 07/20/00

Date extracted: 07/14/00 13:00
Date analyzed: 07/18/00 16:53
Instrument ID:

Sample Amount: 15.0 g-as-rec
Final Extract Volume: 50 mL
Dilution Factor: 1:400

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	3,400 U
93-76-5	2,4,5-T	92,000
88-85-7	Dinoseb	6,800 U
1918-00-9	Dicamba	8,000 U
94-75-7	2,4-D	13,000 U
94-82-6	2,4-DB	68,000 U
75-99-0	Dalapon	36,000 U
94-74-6	MCPA	17,000,000 U
120-36-5	Dichloroprop	13,000 U
94-74-6	MCPP	17,000,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid D

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS04 RE**
Herbicides by GC/ECD

Lab Sample ID: BU83E
LIMS ID: 00-11661
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CK
Reported: 07/20/00 7/20/00

Date extracted: 07/14/00 13:00
Date analyzed: 07/18/00 21:23
Instrument ID:

Sample Amount: 12.5 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	10 U
93-76-5	2,4,5-T	170
88-85-7	Dinoseb	20 U
1918-00-9	Dicamba	24 U
94-75-7	2,4-D	40 U
94-82-6	2,4-DB	200 U
75-99-0	Dalapon	110 U
94-74-6	MCPA	51,000 U
120-36-5	Dichloroprop	40 U
94-74-6	MCPP	50,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 95.6%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS05 RE**
Herbicides by GC/ECD

Lab Sample ID: BU83F
LIMS ID: 00-11662
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/20/00

Date extracted: 07/14/00 13:00
Date analyzed: 07/18/00 21:23
Instrument ID:

Sample Amount: 10.6 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg	
93-72-1	2,4,5-TP (Silvex)	12 U	J
93-76-5	2,4,5-T	160	
88-85-7	Dinoseb	24 U	
1918-00-9	Dicamba	28 U	
94-75-7	2,4-D	47 U	
94-82-6	2,4-DB	240 U	
75-99-0	Dalapon	130 U	
94-74-6	MCPA	59,000 U	
120-36-5	Dichloroprop	47 U	
94-74-6	MCPP	59,000 U	

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 94.9%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS504 RE**
Herbicides by GC/ECD

Lab Sample ID: BU83G
LIMS ID: 00-11663
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CR 7/24/00
Reported: 07/20/00

Date extracted: 07/14/00 13:00
Date analyzed: 07/18/00 21:23
Instrument ID:

Sample Amount: 11.7 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	11 U
93-76-5	2,4,5-T	230
88-85-7	Dinoseb	22 U
1918-00-9	Dicamba	26 U
94-75-7	2,4-D	42 U
94-82-6	2,4-DB	220 U
75-99-0	Dalapon	120 U
94-74-6	MCPA	54,000 U
120-36-5	Dichloroprop	42 U
94-74-6	MCPP	53,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 99.5%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS04**
Herbicides by GC/ECD

Lab Sample ID: BU83E
LIMS ID: 00-10494
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CK
Reported: 07/20/00 7/21/00

Date extracted: 07/05/00 15:00
Date analyzed: 07/13/00 00:19
Instrument ID:

Sample Amount: 12.5 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	10 U
93-76-5	2,4,5-T	150
88-85-7	Dinoseb	20 U
1918-00-9	Dicamba	24 U
94-75-7	2,4-D	40 U
94-82-6	2,4-DB	200 U
75-99-0	Dalapon	110 U
94-74-6	MCPA	51,000 U
120-36-5	Dichloroprop	40 U
94-74-6	MCPP	50,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 69.6%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS05**
Herbicides by GC/ECD

Lab Sample ID: BU83F
LIMS ID: 00-10495
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CH 7/20/00
Reported: 07/20/00

Date extracted: 07/05/00 15:00
Date analyzed: 07/13/00 00:19
Instrument ID:

Sample Amount: 10.6 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	12 U
93-76-5	2,4,5-T	**240**
88-85-7	Dinoseb	24 U
1918-00-9	Dicamba	28 U
94-75-7	2,4-D	47 U
94-82-6	2,4-DB	240 U
75-99-0	Dalapon	130 U
94-74-6	MCPA	59,000 U
120-36-5	Dichloroprop	47 U
94-74-6	MCPP	59,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 95.3%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS504**
Herbicides by GC/ECD

Lab Sample ID: BU83G
LIMS ID: 00-10496
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CK
Reported: 07/20/00 7/20/00

Date extracted: 07/05/00 15:00
Date analyzed: 07/13/00 00:19
Instrument ID:

Sample Amount: 11.7 g-dry-wt
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/kg
93-72-1	2,4,5-TP (Silvex)	11 U
93-76-5	2,4,5-T	**210**
88-85-7	Dinoseb	22 U
1918-00-9	Dicamba	26 U
94-75-7	2,4-D	42 U
94-82-6	2,4-DB	220 U
75-99-0	Dalapon	110 U
94-74-6	MCPA	54,000 U
120-36-5	Dichloroprop	42 U
94-74-6	MCPP	53,000 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 98.6%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: SS1003**
Herbicides by GC/ECD

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized: CR
Reported: 07/20/00 7/20/00

Date extracted: 06/30/00
Date analyzed: 07/12/00 20:19
Instrument ID:

Sample Amount: 500 mL
Final Extract Volume: 50 mL
Dilution Factor: 1:1

CAS Number	Analyte	ug/L
93-72-1	2,4,5-TP (Silvex)	0.28 U
93-76-5	2,4,5-T	0.60 U
88-85-7	Dinoseb	0.50 U
1918-00-9	Dicamba	0.70 U
94-75-7	2,4-D	1.5 U
94-82-6	2,4-DB	10 U
75-99-0	Dalapon	2.0 U
94-74-6	MCPA	1,200 U
120-36-5	Dichloroprop	3.1 U
94-74-6	MCPP	1,200 U

Herbicide Surrogate Recovery

2,4-Dichlorophenylacetic Acid 97.5%

Data Qualifiers

J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
U Indicates compound was analyzed for, but not detected at the given detection limit.
B Found in associated method blank
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: FS01**
TOTAL METALS

Lab Sample ID: BU83A
LIMS ID: 00-10490
Matrix: Wood

QC Report No: BU83-URS Corp.
Project: Camp Bonnev'lle
53F0072207
Date Sampled: 06/26/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 86.6%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	5	5 U
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	0.06	**0.11**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.3	**7.2**
3050	07/05/00	6010	07/10/00	7440-41-7	Beryllium	0.1	0.1 U
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**1.0**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.5	**0.8**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**1.2**
3050	07/05/00	7421	07/11/00	**7439-92-1**	**Lead**	3	**29**
CLP	07/05/00	7471	07/05/00	**7439-97-6**	**Mercury**	0.06	**0.46**
3050	07/05/00	6010	07/10/00	7440-02-0	Nickel	1	1 U
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.2	0.2 U
3050	07/05/00	6010	07/10/00	7440-22-4	Silver	0.3	0.3 U
3050	07/05/00	7841	07/12/00	7440-28-0	Thallium	0.1	0.1 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.7	**255**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS01**
TOTAL METALS

Lab Sample ID: BU83B
LIMS ID: 00-10491
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 80.5%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	6	6 U
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	1	**2**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.4	**119**
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.1	**0.5**
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**1.0**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.6	**28.1**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**77.2**
3050	07/05/00	7421	07/11/00	**7439-92-1**	**Lead**	3	**43**
CLP	07/05/00	7471	07/05/00	7439-97-6	Mercury	0.05	0.05 U
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	1	**18**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.6	0.6 U
3050	07/05/00	6010	07/10/00	**7440-22-4**	**Silver**	0.4	**0.9**
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.1	0.1 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.7	**78.3**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS02**
TOTAL METALS

Lab Sample ID: BU83C
LIMS ID: 00-10492
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 89.3%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	6	6 U
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	0.6	**3.1**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.3	**181**
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.1	**0.5**
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**5.6**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.6	**25.1**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**102**
3050	07/05/00	7421	07/13/00	**7439-92-1**	**Lead**	10	**280**
CLP	07/05/00	7471	07/05/00	7439-97-6	Mercury	0.05	0.05 U
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	1	**16**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.6	0.6 U
3050	07/05/00	6010	07/10/00	**7440-22-4**	**Silver**	0.3	**0.6**
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.3	0.3 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.7	**141**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

000463

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS03**
TOTAL METALS

Lab Sample ID: BU83D
LIMS ID: 00-10493
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 88.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	5	5 U
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	1	**3**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.3	**149**
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.1	**0.5**
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**1.4**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.5	**20.4**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**65.0**
3050	07/05/00	7421	07/11/00	**7439-92-1**	**Lead**	6	**72**
CLP	07/05/00	7471	07/05/00	7439-97-6	Mercury	0.05	0.05 U
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	1	**14**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.2	0.2 U
3050	07/05/00	6010	07/10/00	**7440-22-4**	**Silver**	0.3	**0.6**
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.3	0.3 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.6	**86.5**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS04**
TOTAL METALS

Lab Sample ID: BU83E
LIMS ID: 00-10494
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 77.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	6	6 U
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	0.6	**1.7**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.4	**197**
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.1	**1.0**
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**0.8**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.6	**30.2**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**85.8**
3050	07/05/00	7421	07/13/00	**7439-92-1**	**Lead**	10	**270**
CLP	07/05/00	7471	07/05/00	**7439-97-6**	**Mercury**	0.06	**0.09**
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	1	**15**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.3	0.3 U
3050	07/05/00	6010	07/10/00	**7440-22-4**	**Silver**	0.4	**0.7**
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.1	0.1 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.7	**214**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

000464

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS05**
TOTAL METALS

Lab Sample ID: BU83F
LIMS ID: 00-10495
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 74.2%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	7440-36-0	Antimony	6	7
3050	07/05/00	7060	07/13/00	7440-38-2	Arsenic	0.6	1.8
3050	07/05/00	6010	07/10/00	7440-39-3	Barium	0.4	250
3050	07/05/00	6010	07/10/00	7440-41-7	Beryllium	0.1	0.9
3050	07/05/00	6010	07/10/00	7440-43-9	Cadmium	0.3	0.9
3050	07/05/00	6010	07/10/00	7440-47-3	Chromium	0.6	28.2
3050	07/05/00	6010	07/10/00	7440-50-8	Copper	0.3	83.2
3050	07/05/00	7421	07/13/00	7439-92-1	Lead	30	970
CLP	07/05/00	7471	07/05/00	7439-97-6	Mercury	0.05	0.12
3050	07/05/00	6010	07/10/00	7440-02-0	Nickel	1	18
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.6	0.6 U
3050	07/05/00	6010	07/10/00	7440-22-4	Silver	0.4	0.6
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.3	0.3 U
3050	07/05/00	6010	07/10/00	7440-66-6	Zinc	0.8	330

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

000465

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS502**
TOTAL METALS

Lab Sample ID: BU83H
LIMS ID: 00-10497
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 89.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	**7440-36-0**	**Antimony**	5	**8**
3050	07/05/00	7060	07/13/00	**7440-38-2**	**Arsenic**	0.5	**2.9**
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.3	**174**
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.1	**0.5**
3050	07/05/00	6010	07/10/00	**7440-43-9**	**Cadmium**	0.2	**5.5**
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	0.5	**33.6**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.2	**89.6**
3050	07/05/00	7421	07/11/00	**7439-92-1**	**Lead**	10	**210**
CLP	07/05/00	7471	07/05/00	**7439-97-6**	**Mercury**	0.05	**0.05**
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	1	**19**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.5	0.5 U
3050	07/05/00	6010	07/10/00	**7440-22-4**	**Silver**	0.3	**0.6**
3050	07/05/00	7841	07/14/00	7440-28-0	Thallium	0.3	0.3 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	0.7	**165**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

000456

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SB01-4.5**
TOTAL METALS

Lab Sample ID: BU83I
LIMS ID: 00-10498
Matrix: Soil

QC Report No: BU83-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/17/00

Percent Total Solids: 76.8%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry
3050	07/05/00	6010	07/10/00	**7440-36-0**	**Antimony**	20	**20**
3050	07/05/00	7060	07/13/00	7440-38-2	Arsenic	0.6	0.6 U
3050	07/05/00	6010	07/10/00	**7440-39-3**	**Barium**	0.9	151
3050	07/05/00	6010	07/10/00	**7440-41-7**	**Beryllium**	0.3	**0.6**
3050	07/05/00	6010	07/10/00	7440-43-9	Cadmium	0.6	0.6 U
3050	07/05/00	6010	07/10/00	**7440-47-3**	**Chromium**	2	**36**
3050	07/05/00	6010	07/10/00	**7440-50-8**	**Copper**	0.6	**123**
3050	07/05/00	7421	07/11/00	**7439-92-1**	**Lead**	0.3	**7.0**
CLP	07/05/00	7471	07/05/00	7439-97-6	Mercury	0.05	0.05 U
3050	07/05/00	6010	07/10/00	**7440-02-0**	**Nickel**	3	**21**
3050	07/05/00	7740	07/11/00	7782-49-2	Selenium	0.6	0.6 U
3050	07/05/00	6010	07/10/00	7440-22-4	Silver	0.9	0.9 U
3050	07/05/00	7841	07/12/00	7440-28-0	Thallium	0.1	0.1 U
3050	07/05/00	6010	07/10/00	**7440-66-6**	**Zinc**	2	**76**

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET **Sample No: SS1003**
TOTAL METALS

Lab Sample ID: BU90A
LIMS ID: 00-10528
Matrix: Water

QC Report No: BU90-URS Corp.
Project: Camp Bonneville
53F0072207
Date Sampled: 06/27/00
Date Received: 06/28/00

Data Release Authorized:
Reported: 07/13/00

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L
3010	07/03/00	6010	07/08/00	7440-36-0	Antimony	0.05	0.05 U
7060	07/03/00	7060	07/10/00	7440-38-2	Arsenic	0.001	0.001 U
3010	07/03/00	6010	07/08/00	7440-39-3	Barium	0.003	0.003 U
3010	07/03/00	6010	07/08/00	7440-41-7	Beryllium	0.001	0.001 U
3010	07/03/00	6010	07/08/00	7440-43-9	Cadmium	0.002	0.002 U
3010	07/03/00	6010	07/08/00	7440-47-3	Chromium	0.005	0.005 U
3010	07/03/00	6010	07/08/00	7440-50-8	Copper	0.002	0.002 U
3020	07/03/00	7421	07/11/00	7439-92-1	Lead	0.001	0.001 U
7470	07/03/00	7470	07/05/00	7439-97-6	Mercury	0.0001	0.0001 U
3010	07/03/00	6010	07/08/00	7440-02-0	Nickel	0.01	0.01 U
7740	07/03/00	7740	07/11/00	7782-49-2	Selenium	0.002	0.002 U
3010	07/03/00	6010	07/08/00	7440-22-4	Silver	0.003	0.003 U
3020	07/03/00	7841	07/12/00	7440-28-0	Thallium	0.001	0.001 U
3010	07/03/00	6010	07/08/00	7440-66-6	Zinc	0.006	0.006 U

U Analyte undetected at given RL

RL Reporting Limit

FORM-I

Appendix C
Laboratory Quality Review Report

The analytical results for six primary soil samples, one primary wood sample, and three duplicates collected at Camp Bonneville in June 2000, were subject to a quality assurance/quality control (QA/QC) review. This QA/QC review includes evaluation of analytical precision, accuracy, representativeness, comparability, and completeness. Precision is evaluated by comparison of results for primary and sample duplicate analyses and laboratory duplicate analyses; accuracy is evaluated using the analytical results for blanks, surrogates, matrix spikes and blank spikes; representativeness is evaluated by examining chain of custody paperwork and verifying analysis was performed within allowable holding times; comparability is evaluated by examining laboratory reporting limits; and completeness is evaluated by calculating the percentage of acceptable data. Raw data were not reviewed and results were not recalculated.

Samples were collected by URS and analyzed by Analytical Resources, Inc. of Seattle, Washington and GPL Laboratories of Gaithersburg, Maryland. Samples were collected and analyzed according to the Management Plan prepared by URS. Where applicable, this data review follows the criteria established in the United States Environmental Protection Agency (EPA) Functional Guidelines for Organic Data Review (February 1994), the EPA Functional Guidelines for Inorganic Data Review (February 1994), and the United Stated Army Corps of Engineers (USACE) Shell (Shell) guidelines (November 1998). Samples were analyzed for one or more of the following analytical methods: ordnance, picric acid, nitroguanidine, PETN, and nitroglycerine by EPA Method 8330; ammonium perchlorate by EPA method 314.0; semi-volatile organic compounds (SVOCs) by EPA Method SW-846 8270; chlorinated herbicides by EPA Method 8151; chlorinated pesticides by EPA Method 8081; polychlorinated biphenyls (PCBs) by EPA Method 8082; petroleum hydrocarbons by NWTPH-Dx, NWTPH-Gx, and NWTPH-HCID; metals by EPA Method 6000/7000; total organic carbon by Walkley Black; and grain size analysis by ASTM 063.

All analytical data are acceptable for use. Three samples and one field duplicate were qualified as estimated (J) due to missed holding times. No data were qualified due to non-compliant surrogate percent recoveries. Some samples were qualified as estimated (J) due to non-compliant LCS percent recoveries. Two samples had analytes rejected due to non-compliant LCS recoveries. Two samples were qualified as estimated (J) due to non-compliant field duplicate precision. The reporting limits met the project goals.

REPRESENTATIVENESS

Chain of Custody and Holding Times

The chain of custody (COC) forms indicate that samples were maintained under chain of custody and forms were signed upon release and receipt.

All soil samples were analyzed within the holding times with the following exceptions:

- Samples FS01, SS04, SS05, and SS504 were re-extracted and re-analyzed for chlorinated herbicides 3 days past the holding time due to non-compliant quality control samples in the first extract and analysis. The samples were qualified as estimated (J) due to missed holding times.

ACCURACY

Review of Blanks

The laboratory analyzed at least one method blank for each analysis batch. One rinse blank, sample ID SS1003, was collected and analyzed for each method (except TPH-HCID and grain size). Frequency requirements for method and rinse blanks were met. Target analytes in method and equipment rinse blanks were below detection, with the exception listed in the table below. Associated samples did not have detections of bis (2-ethylhexyl) phthalate; therefore, no data were qualified.

SAMPLE ID	METHOD	BATCH	ANALYTE	RESULT (µG/L)
Rinse Blank SS1003	8270	BU90	bis (2-ethylhexyl)phthalate	2.9

Surrogate Recovery Review

The laboratories spike all samples (except for metals, TOC, and grain size analyses) with appropriate surrogates (system monitoring compounds). Surrogate compounds are compounds not expected to be found in environmental samples; however, they are chemically similar to several compounds analyzed in the method and behave similarly in extracting solvents. Surrogates are used to evaluate sample preparation and analysis. Surrogate recoveries are within Shell or laboratory-established control limits (whichever were applicable), with the following exceptions:

- One of four SVOC neutral/base (N/B) surrogate percent recoveries was below the control limits for sample SS01. Associated quality control data were within the control limits; therefore, no data were qualified.
- Two of two pesticide surrogate percent recoveries were not calculated for the third dilution of samples SS04 and SS504. The laboratory conducted a fluorisil/sulfur cleanup on the samples prior to dilution. The surrogates were not recovered due to the high dilution of the samples; therefore, no data were qualified.
- One of two PCB surrogate percent recoveries was above the control limits for sample SS504. Associated quality control data were within the control limits; therefore, no data were qualified.
- The diesel surrogate percent recovery was above the control limit for sample SS05. Associated quality control data were within the control limits; therefore, no data were qualified.
- One of two gasoline surrogate percent recoveries was above the control limit for LCS duplicate BU90LCD. The associated LCS percent recovery was within the control limits; therefore, no data were qualified.
- The HCID surrogate percent recoveries were below the control limits for sample SB01-504.5 and for matrix spike duplicate SB01-504.5MSD. Associated quality control data were within the control limits; therefore, no data were qualified.

- The herbicide surrogate percent recovery was not recovered for sample FS01RE. The surrogate was not recovered due to the necessary high dilution of the sample. Associated quality control data were within the control limits; therefore, no data were qualified.
- The nitroglycerine surrogate percent recovery was above the Shell control limits for sample SS01 due to matrix interference. Associated quality control data were within the control limits; therefore, no data were qualified.

Matrix Spike/Matrix Spike Duplicate Review

Matrix spike/matrix spike duplicate (MS/MSD) data presented and reviewed for these sample delivery groups are within laboratory control limits with the exceptions listed below. Data are qualified based on non-compliant MS/MSD percent recoveries only when the associated laboratory control sample is also non-compliant. Insufficient sample was submitted for MS/MSD analysis on the water matrix; therefore, either and LCS/LCSD was substituted or the MS/MSD analyses were reported from other GPL samples batched with Camp Bonneville samples.

- SVOC MSD SS02: the n-nitrosodiphenylamine percent recovery was below the Shell control limit at 44.1%. The associated MS percent recovery was within the control limits; therefore, no data were qualified. The MS/MSD relative percent difference (RPD) was above the Shell control limits for 2,4-dinititrotoluene at 70%. No data were qualified.
- Pesticide MS FS01: the delta-BHC percent recovery was below the Shell control limit at 4.7%. The associated LCS percent recoveries were also below the control limits; therefore, associated data were qualified as estimated (J). The 4,4-DDD and 4,4-DDT percent recoveries were above the Shell control limit as 147% and 144%. Associated quality control data were within the control limits; therefore, no data were qualified.
- Pesticide MS/MSD SS04: the percent recoveries were below the Shell control limits for 17 of 20 spiked compounds due to matrix interference. The associated compounds were within the control limits in the LCS, with the exception of delta-BHC and endrin aldehyde; therefore, delta-BHC and endrin aldehyde were qualified as rejected (R) for associated samples.
- PCB MS/MSD SS04: the percent recoveries were below the Shell control limits for two of two spiked compounds due to matrix interference. The associated LCS was within the control limits; therefore, no data were qualified.
- Diesel MS FS01: the matrix spike was not recovered. The spiked sample diesel was at least 5 times greater than the spike added; therefore, no data were qualified.
- Metals MS SS02: the percent recoveries were below the Shell control limits for antimony, arsenic, copper, and selenium. The associated LCS was within the control limits; therefore, no data were qualified.
- Explosives MS/MSD SS01: the 2,4-dinitrotoluene was not recovered in the MS/MSD due to the high level of the compound in the spiked sample. The associated LCS was within the control limits; therefore, no data were qualified. The MSD tetryl percent recovery was below the Shell control limit and the MS/MSD RPD for tetryl was above the Shell control limit. The associated MS was within the Shell control limits; therefore, no data were qualified.

- Picric acid MS/MSD SS03: the picric acid MS/MSD percent recovery was below the laboratory control limits. The associated LCS was within the control limits; therefore, no data were qualified.

Two matrix spike samples were analyzed for each analysis. The frequency requirement of five percent was met for each matrix included with the project samples

Laboratory Control Sample Review

Laboratory control sample (LCS) data presented and reviewed for these sample delivery groups are within laboratory control limits with the following exceptions.

- Pesticide LCS BU83SB: the percent recoveries for delta-BHC and endrin aldehyde were below the Shell control limits in the LCS. Associated samples were qualified as rejected (R).
- Gasoline LCS BU83SB: the LCS percent recovery was below the laboratory control limits at 70.4%. According to the laboratory the control limit is advisory since there was insufficient data to calculate a valid control limit. The percent recovery was only slightly below the advisory limit; therefore, the sample may be biased low. Considering the high detection of gasoline in the sample affected (FS01), the sample was qualified as estimated (J).
- Explosives LCS NLCSA: the tetryl LCS percent recovery was below the Shell control limits; however, it was within the laboratory control limits that were reported in the Work Plan. Associated data were qualified as estimated (J).

At least one laboratory control sample was analyzed per batch, meeting the project frequency requirements.

PRECISION

Field Duplicate Review

Three field duplicates were collected during the sampling event covered by this review. The field duplicate sample ID's are SS02/SS502, SS04/SS504, and SB01-4.5/SB01-504.5. The RPD is calculated for this review only when sample results are greater than 5 times the reporting limit. Control limits for field duplicate precision are 50 percent RPD for solid samples. The field duplicate results show good agreement for all sample pairs except for 4,4'-DDT in SS04/SS504 and TOC in SB01-4.5/SB01-504.5. The samples and the associated duplicate were qualified as estimated for the analytes with RPDs greater than 50 percent.

SAMPLE ID & DUPLICATE ID	ANALYTE	PRIMARY RESULT (µg/L)	DUPLICATE RESULT (µg/L)	RELATIVE PERCENT DIFFERENCE
SS02/SS502	arsenic	3.1	2.9	7
	barium	181	174	4
	beryllium	0.5	0.5	0
	cadmium	5.6	5.5	**2**
	chromium	25.1	33.6	30
	copper	102	89.6	13
	lead	280	210	29
	nickel	16	19	17
	zinc	141	165	16

SAMPLE ID & DUPLICATE ID	ANALYTE	PRIMARY RESULT (µg/L)	DUPLICATE RESULT (µg/L)	RELATIVE PERCENT DIFFERENCE
SS04/SS504	endrin aldehyde	7	9.5	30
	4,4'-DDE	230	190	19
	4,4'-DDD	76	48	45
	4,4'-DDT	2700	1400	**63**
	2,4,5-T	170	230	30
	diesel	42	59	34
SB01-4.5/SB01-504.5	TOC	0.13	0.28	**73**

The frequency of field duplicate collection meets the project duplicate frequency requirement of at least 10 percent of the field samples for every analytical method.

COMPARABILITY

Reporting Limits

The requested reporting limits (RLs) and the actual reporting limits for compounds of concern are shown below. Compounds detected below the reporting limit but above the method detection limit are considered estimates by the laboratory, and are qualified with a "J". Some samples required dilutions due to matrix interference, which resulted in elevated reporting limits. The laboratory conducted the appropriate cleanup procedures during the pesticide and PCB analyses to keep the reporting limits low. The reporting limits for toxaphene, MCPP, and MCPA are a factor of 100 (or more) higher than the other compounds in the method due to the intrinsic difficulty of analyzing these compounds. Even though the laboratory performed the necessary clean-ups on the samples, the matrices of the Camp Bonneville samples caused the laboratory to increase the reporting limits for all pesticides and herbicides resulting in even more elevated reporting limits for toxaphene, MCPP, and MCPA. No data were qualified based on reporting limits.

MATRIX	ANALYTE	REQUESTED REPORTING LIMIT (µg/Kg)	REPORTING LIMIT (µg/Kg)
soil/wood	metals	5	0.1 to 6 mg/Kg
soil/wood	herbicides	10000	10 to 59000
soil/wood	pesticides	170	2 to 4000
soil/wood	PCBs	330	40 to 800
soil/wood	diesel	5 mg/Kg	results > RL
soil/wood	gasoline	200 mg/Kg	6.2 to 6.9 mg/Kg
soil/wood	SVOCs	67	74 to 900 mg/Kg
soil/wood	ordnance	500	120 to 250
soil/wood	ammonium perchlorate	50	45 to 59.5
soil/wood	nitroglycerin	10	5450 to 6010
soil/wood	nitroguanidine	125	120
soil/wood	PETN	2000	480 to 500
soil/wood	picric acid	NA	952 to 1000

COMPLETENESS

The laboratory reported all requested analyses and the laboratory report is complete. The project completeness goal is 98 percent. No data were judged to be invalid; therefore, completeness for these sampling events is 100 percent.

Based on the QA/QC review, data can be qualified as estimated (J) or rejected (R). The following table summarizes the qualified results:

SAMPLE ID	SAMPLE TYPE	LAB ID	ANALYTE	QUALIFIER
FS01	wood	BU83A	delta-BHC all herbicides gasoline	40 UJ J or UJ 460 J
SS01	soil	BU83B	tetryl	250 UJ
SS02	soil	BU83C	tetryl	250 UJ
SS03	soil	BU83D	tetryl	250 UJ
SS04	soil	BU83E	delta-BHC endrin aldehyde all herbicides 4,4'-DDT	2 R 7 R J or UJ 2700 J
SS05	soil	BU83F	delta-BHC endrin aldehyde all herbicides	2.4 R 4.7 R J or UJ
SS504	duplicate of SS04	BU83G	delta-BHC endrin aldehyde all herbicides 4,4'-DDT	2.1 R 9.5 R J or UJ 1400 J
SS502	duplicate of SS02	BU83H	tetryl	238 UJ
SB01-4.5	soil	BU83I	tetryl TOC	250 UJ 0.13 J
SB01-504.5	duplicate of SB01-4.5	BU83J	TOC	0.28 J
SS1003	rinse blank	BU90A	none	
Trip Blank	trip blank	BU90B	none	

Appendix D
Chain of Custody Forms and Field Notebook

ARI

Chain of Custody Record & Laboratory Analysis Request

DACA-67-98-D-1005 WO 35

Page 1 of 1

Turn Around Requested: Regular

Analytical Resources, Incorporated
Analytical Chemists and Consultants
400 Ninth Avenue North
Seattle, WA 98109-4708
206-621-6490 206-621-7523 (fax)

Report to: Steve Wolfe	Proj Name: Camp Bonneville	Analyses Requested	Notes/Comments
Company: URS	Proj Number: 53F00722070		
Address: 2401 4th Ave Suite 809 Seattle, WA 981 21	Sampler: Galen C. Davis		
Phone: 206-674-1800	Shipping Method: Hand deliver		
Fax: 206-343-0513	AirBill:		

Sample ID	Sample Date	Sample Time	Sample Matrix	No Containers	Priority Pollutant Metals + Hg (6010/7000/7470)	Chlorinated Herbicides (8151)	Chlorinated Pesticides (8081)	PCBs (8082)	NWTPH-Dx	NWTPH-Gx	SVOC (8270)	NWTPH-HCID (w/ Silica Gel Clean-up)	Grain Size ASTM D63	TOC (Walkley Black)	
FS01	6/26/00	1215	wood	6	X	X	X	X	X	X					MS on FS01
SS01	6/27/00	0800	soil	2	X						X				
SS02	6/27/00	1300	soil	4	X						X				MS/MSD on SS02 metals SVOCs
SS03	6/27/00	1400	soil	2	X						X				
SS04	6/27/00	1100	soil	11	X	X	X	X	X	X					
SS05	6/27/00	1200	soil	6	X	X	X	X	X	X					
FSS04	6/27/00	1600	soil	5		X	X	X	X	X					
SS502	6/27/00	1800	soil	2	X						X				
SB01-4.5	6/27/00	0815	soil	7	X						X	X	X	X	MS/MSD on SB01-4.5 TOC
SB01-SB04.5	6/27/00	0900	soil	3								X	X	X	
SS003	6/27/00	1500	water	11	X	X	X	X	X	X	X	X		X	
TRIP Blank	—	—	water	2											
															Also MS/MSD on: SS04 NWTPH-Dx NWTPH-Gx Pest/PCB Chlor. Herbs

Relinquished: (Signature) Galen C. Davis	Relinquished: (Signature)	Relinquished: (Signature)	Special Instructions/Notes
Printed name: Galen Davis	Printed name:	Printed name:	
Company: URS	Company:	Company:	
Date: 6/28/00 Time: 1175	Date: Time:	Date: Time:	
Received by:	Received by:	Received by:	
Printed name:	Printed name:	Printed name:	
Company:	Company:	Company:	Number of Coolers: 2
Date: 6/28/00 Time: 1175	Date: Time:	Date: Time:	Cooler Temp(s):
			COC Seals Intact? NA
			Bottles Intact?

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
2400 Ninth Avenue North
Seattle, WA 98109-4708
206-621-6490 206-621-7523 (fax)

Page 1 of 1 Turn Around Requested: _____

Report to: Steve Wolfe	Proj Name: Camp Bonneville	Analyses Requested								Notes/Comments
Company: URS	Proj Number: 53F00T2207									
Address: 2401 4th Ave Suite 808 Seattle, WA 98121	Sampler: Galen C. Davis									
Phone: 206-674-1800	Shipping Method: Fed ex									
Fax: 206-343-0513	AirBill: Sealed Prior to Ship.									

Sample ID	Sample Date	Sample Time	Sample Matrix	No Containers	Organics Compounds 8330	Ammonium perchlorate 300							
SS01	6/27/00	0800	soil	2	X	X							
SB01-4.5	6/27/00	0815	soil	2	X	X							
SS02	6/27/00	1300	soil	2	X	X							
SS502	6/27/00	1400	soil	2	X	X							
SS03	6/27/00	1400	soil	4	X	X							MS/MSD on SS03
SS1003	6/27/00	1500	water	1	X	X							

Relinquished: (Signature) Galen C. Davis	Relinquished: (Signature)	Relinquished: (Signature)	Special Instructions/Notes
Printed name: Galen Davis	Printed name:	Printed name:	
Company: URS	Company:	Company:	
Date: 6/27/00 Time: 1630	Date: Time:	Date: Time:	
Received by:	Received by:	Received by:	
Printed name:	Printed name:	Printed name:	
Company:	Company:	Company:	Number of Coolers:
Date: Time:	Date: Time:	Date: Time:	Cooler Temp(s):
			COC Seals Intact?
			Bottles Intact?

LIMS 6030

DACA67-98-D-1005

Chain of Custody Record & Laboratory Analysis Request

Analytical Resources, Incorporated
Analytical Chemists and Consultants
400 Ninth Avenue North
Seattle, WA 98109-4708
206-621-6490 206-621-7523 (fax)

Turn Around Requested:

Cooler 1 of 1

Report to: Steve Wolfe URS	Proj Name: Camp Bonneville
Company: 2401 4th Ave	Proj Number: 53F0071207
Address: Suite 808	Sampler: Galen C. Davis
Seattle, WA 98121	
Phone: 206-674-1800	Shipping Method: Fed E
Fax: 206 343-0513	AirBill: 821229711474

Analyses Requested

Sample ID	Sample Date	Sample Time	Sample Matrix	No Containers	Chlorinated Herbicides 8150B	Chlorinated Pesticides 8081	Diesel NWTPH-Dx	Gasoline NWTPH-Gx	Ordnance Comp 8330	Ammonium Perchlorate 300 mod	PCB 8082	SVOC 8270	Priority Pollut Metals + Ba 11(?)		Notes/Comments
SS04	6/27/00	1100	soil		X	X	X	X			X				
SS02	6/27/00	1300	soil						X	X					
SS03	6/27/00	1400	soil									X	X		

Relinquished: (Signature) Galen C. Davis	Relinquished: (Signature)	Relinquished: (Signature)
Printed name: Galen Davis	Printed name:	Printed name:
Company: URS	Company:	Company:
Date: 6/27/00 Time: 1630	Date: Time:	Date: Time:

Special Instructions/Notes

Received by:	Received by:	Received by:
Printed name:	Printed name:	Printed name:
Company:	Company:	Company:
Date: Time:	Date: Time:	Date: Time:

Number of Coolers:

Cooler Temp(s):

COC Seals Intact?

Bottles Intact?

CONTENTS

PAGE	REFERENCE	DATE

6/25/00

1500 Galen Davis Leave seattle

1830 Arrive Vancouver

Directions: I-5 south to 205. Go East Exit to 500 East and West. Motels and Vancouver Mall to west of freeway. Site is ≈ 5 miles on 500 East.

1930 Reviewing plan, checking bottle inventory from ARI. Charging PID, Filling-out labels List to purchase in am

1) ice
2) Distill water
3) Dispos. camer
4) ziploc Bags
5) Drinks

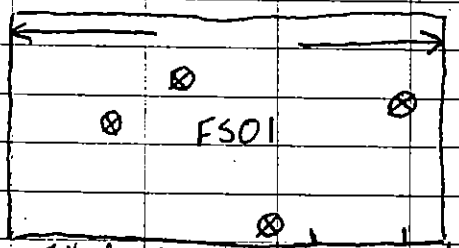
6/26/00

0654-0700 Arrive on-site, sign-in w/ Warren Fjeldos at HQ. Jim McBain and Kerry Singler from HFA are already out looking at the site.

0720 Notified by HFA that Equipment was shipped back by motel. will all be here @ 1030 am. No access til it is cleared. will fill out labels etc.

1130 still NO equip. NO HFA

1145 collecting Floor Sample from pesticide storage building. Method: Using a brace and bit w/ a stainless steel auger bit. Drilling 0.5 to 1.0 inches several holes close together in 4 locations:



Filled 6 8 oz Jars w/ Shavings
Sample time 1210

Floor Sample continued 6/26/00

Analyses: prior. polit. metals
Chlor. Herbicides
Chlor. Pesticides
PCBS
Petrol. NWTPH-Dx
Petrol. NWTPH-Gx

Note: Building Floor is 2"x12" planks' clear fir. minor staining Gray granulated powder in Some places. Some oil. Pine needles, dirt. some polymer compound near door.

1215 Began clearing boring locations near communition bunker

HFA 1) sweeping roadway that leads to front of bunker from main road. Red pin flags are being placed to delineate safe areas enroute.

2) HFA Hand-augering a 4 foot deep boring at location SB-1. URS notified that native soil begins at ≈ 6" bgs.

3) Using Schoonstadt Mark 26 to screen downhole. All readings are background.

4) clearing surface loc. front of bunker.

6/27/00

0700 Galen Dawes URS
Kerry Singler HFA
Jim McBain COE
on-Site

0730 H+S meeting
Setting-up on SB-1 downgradient of Bunker.

0810 Began drilling
1st Sample @ 4' bgs @ bottom of hand auger vxo clearance.
Sample at ~~2' bgs~~ Continuous to 20'.
Collected Sample from 2 split-spoons 4' to 7'. collected
primary
QA/QC duplic.
and MS/MSD on TOC,

0800

0815

Also collecting SS01 at ammo storage bunker. (See drawing 2 pages ahead)

6/27/00

1130 Boring Samples indicate clay (see log) from surface to very dense weathered bedrock at 24' bgs.
J. McBain (COE) notified Rodney Jaie (COE) via phone. COE decided that a well would not be useful (or functional) and there would be no point in drilling the upgradient boring.

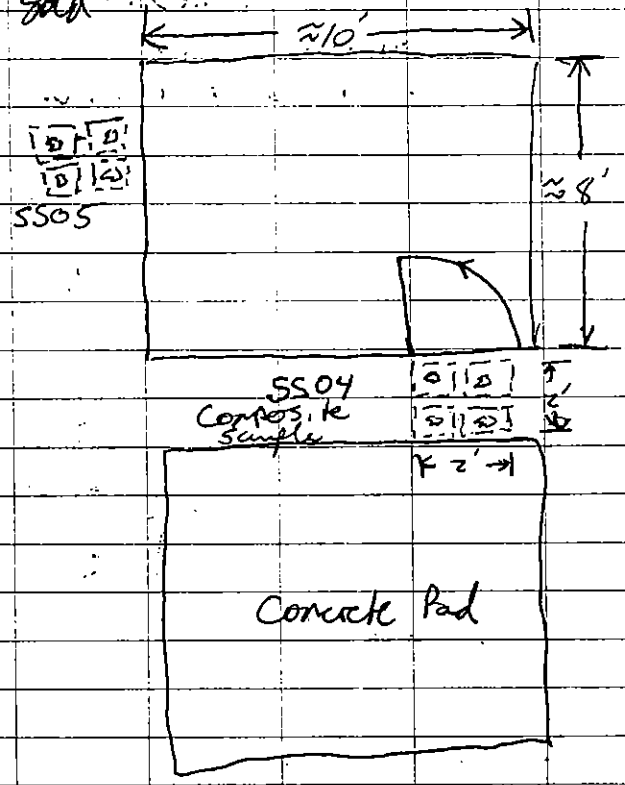
~~1200~~ Drillers are backfilling SB-1
1130 w/ bentonite chips. Sealing
2 drums of soil-cuttings
packing-up equipment.
(1300) ~~1800~~ Drillers exit site

1130 ~~1220~~ J. McBain COE is chipping up explor. hand-auger boring at location SB-2. HFA cleared this location this morning.

1130 ~~1330~~ URS is collecting surface soil Samples in front of bunker, however it would be better to complet pest. Stor. area while HFA is on-Site.

6/27

≈1200 Sample collection at Pest storage shed



collected primary sample from SS04 also collected Blind-dup And USACE split sample (see COCs)
SS05 is primary only

6/27

1300 Back @ Ammo Storage Magazine. Collecting
SS02 primary = all
~~split is SVOC + metals~~ GCO
~~SS03~~
split is ordnance and ammonium perchlorate

SS03 primary = all
split is SVOC and metals

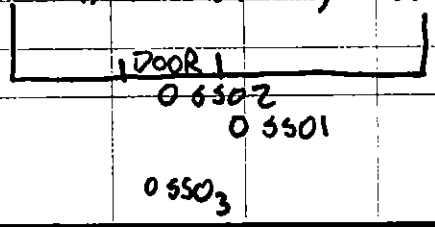
1400 packaging samples for Fed-EX advicing (additional) for ARI hand-delivery

1600 At Portland Airport Fed ex.
GPL LABS=821229911463
LIMS = 821229911474

1630 Drive to Seattle

1930 end of day

Ammo storage surface samp.



6/29

0900 Hand deliver Primary Eagles to ARI.

1000 Offload Equipment

1100 Return Van to Budget.

Appendix E

Response to Comments on Draft Supplemental Site Investigation Report

December 14, 2000
53-F0072207

Mr. Rodney Taie
U.S. Army Corps of Engineers, Seattle District
CENWS-PM-HW
4735 E. Marginal Way South
Seattle, WA 98134-2385

Re: Draft Supplemental Site Investigation Report
Ammunition Storage Magazines and Pesticide Storage Area
Camp Bonneville, Washington
Response to Comments
Contract No. DACA67-98-D-1005 (D.O. No. 0035)

Dear Mr. Taie:

This letter presents URS' response to comments on our "Draft Supplemental Site Investigation Report, Ammunition Storage Magazines and Pesticide Storage Area, Camp Bonneville, Washington," dated September 2000. Comments were received from the U.S. Army Corps of Engineers (USACE) on November 16, 2000. Responses are included below for each comment.

USACE COMMENTS

Rodney Taie

1. *Section One, Introduction, Page 1-1, 4th Paragraph, 3rd sentence. Delete extra period at the end of the sentence.*

URS Response:

The extra period will be removed from the end of the sentence.

2. *Section Three, Site Background. Site History, page 3-2, Paragraph 3, 2nd sentence. Change sentence to read, "The USACE under direction of the US Army Forces Command (FORSCOM), is currently pursing a lease extension with the DNR."*

URS Response:

The sentence will be revised as suggested.

3. *Site History, page 3-2, Paragraph 4, 1st sentence. Change "is" to was.*

URS Response:

The sentence will be revised as suggested.

4. *Site History, page 3-2, Paragraph 4, 3rd sentence. The reviewer takes exception to the sentence that "Camp Bonneville is currently used for weekday training of company units from Fort Lewis and weekend used by Oregon and Washington Reserve Units." Camp Bonneville is no longer an active base. Delete entire sentence from the paragraph.*

URS Response:

The indicated sentence will be deleted from the paragraph.

5. *Site History, page 3-2, Paragraph 4, 4th sentence. Change the work "includes" to included.*

URS Response:

The sentence will be revised as indicated.

6. *Section Four, Field Investigation Methods. UXO Avoidance, Paragraph 2. Please clarify what brand of handheld magnetometer was used.*

URS Response:

A Schonstedt Model GA-72CV magnetometer was used for UXO avoidance on the ground surface and a Mk26 Mod 0 Ordnance Locator (Forster Ferex 4.021) magnetometer was used for down-hole UXO avoidance. These instruments will be added to the text for clarification.

7. *Section Six, Discussion of Conceptual Site Model. Figure 6-1. Change text inside box from Ammunition Storage Magazines and DA-2 and DA-2 to Ammunition Storage Magazines and Pesticide Storage Area.*

URS Response:

The text box will be corrected.

8. *Figure 6-2 – same comment as comment number 6.*

URS Response:

The text box will be corrected.

Sandy Lemlich

1. *Page 4-3, Section 4.1.5, 1st Bullet. Please change the method to 8151.*

URS Response:

The text will be corrected as indicated.

2. *Page 4-5, 1st Full Paragraph, 2nd Line. Please clarify whether or not the "lead auger" is referring to a metal (Pb) auger or not. If it is referring to an auger composed of lead, how does this affect the metals data.*

URS Response:

The auger referred to is the first auger inserted into the borehole. It is not composed of lead. The text will be revised to read "leading" auger to eliminate potential confusion.

3. *Table 4-2. Please add PETN and picric acid to this table.*

URS Response:

The table will be corrected as indicated.

4. *Page 5-2, 1st Paragraph, Last Line. MCPP should be moved to the herbicides section and all parts of the document referring to MCPP should be modified.*

URS Response:

The text will be corrected as indicated.

5. *Table 5-1. Please explain in the text why reporting limits for toxaphene and PCB's were elevated in the wood sample and MCPA and MCPP were elevated in both the wood and floor samples. Did the laboratory conduct appropriate cleanup procedures before diluting samples?*

URS Response:

Appropriate cleanup procedures were performed before diluting the pesticide samples. Herbicide samples were not cleaned up. The text will be revised with an explanation as to why the reporting limits were high for toxaphene, MCPP, and MCPA.

6. *Table 5-2. The title is misleading since the boring samples are from the ammunition storage bunker.*

URS Response:

The title of the table will be reworded to read "Summary of TPH in Soil, Pesticide Storage Area and Ammunition Storage Magazines." In addition, clarification notes will be added at the bottom of the table to indicate which samples were collected from each area.

7. *Table 5-2. Please change the screening level to 2,000 mg/kg for diesel and 4000 mg/kg for motor oil range. This is based on an agreement with Christopher Maurer of Washington Department of Ecology that we could used the proposed values. Based on this change, text concerning exceedances of screening values may have to be modified.*

URS Response:

The text will be corrected as indicated.

8. *Table 5-3. The screening value for antimony is incorrect. The background value of 0.12 mg/kg should not be used as the screening value. Please change the value to 3 mg/kg.*

URS Response:

The table and text will be corrected as indicated.

9. *Table 5-3. The screening value for lead is incorrect. The Region 9 PRG of 130 mg/kg is the California modification which is not appropriate for Camp Bonneville. The correct Region 9 PRG is 400 mg/kg for residential soils. The correct screening value for this project is the MTCA method A value of 250 mg/kg.*

URS Response:

The table and text will be corrected as indicated.

10. Table 5-3. The screening value for cadmium is incorrect since MTCA A values are appropriate only for petroleum and lead. The appropriate value is 2 mg/kg. Please check all other screening values and make sure that they are appropriate.

URS Response:

The screening value listed for cadmium in Table 5-3 is 2 mg/kg.

11. Page 6-2, Section 6.3. Please add the Federally proposed species – coastal cutthroat trout. It is supposed to be listed sometime this month.

URS Response:

The text will be corrected as indicated.

12. Figures 6-1 and 6-2. Change DA-2 and DA-3 to pesticide storage building.

URS Response:

The Figures will be corrected as indicated.

13. Page C-2, Bullet 2. Please discuss whether the samples were cleaned up prior to dilution as required in the shell.

URS Response:

The laboratory conducted a fluorisil/sulfur cleanup on the samples prior to dilution. The surrogate recoveries in question were for the third dilution of the samples from which only 4,4'-DDT was reported. The surrogate recoveries did not have a bias on the samples due to the high dilution in addition to the high concentration of 4,4'-DDT in the sample.

14. Page C-3, 1st Bullet. Same as comment 13.

URS Response:

The laboratory did not conduct a GPC cleanup on this sample; however, the sample was not diluted.

15. Page C-4, Laboratory Control Sample Review, Bullets 1-3. Usually if LCS percent recoveries are low, all non-detects are rejected. Please review the data and determine if any of it should be rejected.

URS Response:

The data were reviewed. Some data were rejected; however, the other data remain estimated and the text has been revised to indicated more clearly why the data were not rejected.

16. Page C-5, Reporting Limits. Please discuss procedures taken by the lab to reduce reporting limits.

URS Response:

The text will be revised as indicated.

DEPARTMENT OF ECOLOGY COMMENTS

Christopher Maurer

1. *Page 6-2, Section 6.3: The source cited for the presence of California quail, chukhars, and rock doves a the site is in error. Suggest that URS consult the final version of the source rather than the draft version.*

URS Response:

The references to California quail, chukars, and western meadowlarks will be deleted. According the Draft Environmental Assessment referred to in the text, rock doves are present at Camp Bonneville. Because the final version of the Environmental Assessment has not yet been completed, the most current information is available in the draft version.

2. *Appendix C, page C-3, sixth bullet (MS SS02): The bullet should state whether any data were qualified as a result of the percent recoveries being too low.*

URS Response:

The bullet will be revised to state that the data were not qualified.

3. *Eric – in your e-mail of 13 September, you stated that you had had the contaminated soil at these two sites excavated. What action did you take regarding the contamination found inside both the Ammunition Storage Magazine and the Pesticide Mixing Area (Building 4126)?*

URS Response:

Discussions with the USACE have indicated that excavation of contaminated soil and cleanup of the interior of the Ammunition Storage Magazines and Pesticide Storage Area (Building 4126) has not yet been conducted. The remediation activities are tentatively planned for January 2001.

ENVIRONMENTAL PROTECTION AGENCY (REGION 10) COMMENTS

Harry Craig

1. *Table 5-9, Ordnance Screening Levels for Soils*

    a) *Based on EPA's National Center for Environmental Assessment (NCEA) toxicology review, the following toxicity values should be used for generating risk based screening levels:*

Chemical	Cancer Slope Factor 1/(mg/kg/day)	Cancer WOE	Non-Cancer RfD (mg/kg/day)	Source
2-Am-4,6-DNT	*3E-02*	*C*	*5E-04*	*3/12/98 NCEA e-mail, IRIS**
4-Am-2,6-DNT	*3E-02*	*C*	*5E-04*	*3/12/98 NCEA e-mail, IRIS**
PETN	---	---	*1*	*3/12/98 NCEA e-mail*
Picric Acid	---	---	*3E-03*	*6/15/92 NCEA*
2,4-DNT/2,6-DNT	*6.8E-01*	*B2*	---	*IRIS*

Note:
Technical grade DNT is a mixture of the 2,4-DNT (67%) and 2,6-DNT (19%) isomers, carcinogenic risk for the individual isomers should be based on the mixture.
**= based on the toxicity of 2,4,6-trinitotoluene (TNT)*

URS Response:

The values listed in the table above will be used for generating the appropriate screening values and the text will be modified as necessary. A mixture of 2,4-DNT and 2,6-DNT was not reported by the analytical laboratory.

b) PETN and picric acid are explosives rather that propellant compounds.

URS Response:

The text will be corrected in accordance with the comment.

2. *Appendix B – Please provide EPA for review a copy of the PETN and picric acid HPLC method(s) and QA criteria used by GPL Labs, these are likely modifications to the standard EPA Method 8330.*

URS Response:

A copy of modified EPA Method 8330 will be provided to EPA under separate cover by the analytical laboratory (GPL Labs). However, modified EPA Method 8330 will not become part of the Administrative Record for Camp Bonneville.

Please call me if you have any questions concerning this letter.

Sincerely,

URS

Steven P. Wolfe, R.G
Project Manager