Final Closure Report

Environmental Restoration

Pesticide Building #4126 and Ammunition Bunkers #2953, #2951, and #2950

Camp Bonneville, Washington

DACA67-95-G-0001 T.O. 58

Prepared for:
United States Army Corps of Engineers - Seattle District
4375 East Marginal Way South
Seattle, Washington

December 2001

Garry Struthers Associates, Inc.
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Construction Management ♦ Environmental Sciences ♦ Project Management ♦ Engineering

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No warranty is expressly stated or implied in this report with regard to the condition of the substrate and groundwater below the surface of this property with the exception of the sampling and analysis of substrate assessed by GSA. This report is not intended to, nor does it purport to encompass every record, report or document available on the site and the surrounding properties. This report reflects our observations of the condition of the property during the time of field activities, and does not cover any other conditions found on the property that were not visible during these field activities, nor does it cover changed conditions to the property that have occurred since the conclusion of field activities. This report is to be used in its entirety in order to understand the full perspective of activities conducted at this site.

CONSENSUS STATEMENT

The enclosed report is entitled "Final Closure Report, Environmental Restoration Multi-Sites, 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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APPENDICES

1. INTRODUCTION

Garry Struthers Associates, Inc. (GSA) has entered into a contract with the United States Army Corps of Engineers – Seattle District (USACE) for the environmental restoration of two sites at Camp Bonneville in Vancouver, Washington, under contract number DACA67-95-G-0001-58. A list of abbreviations and acronyms for the report is included in Appendix A.

The scope of work for this Task Order includes the remediation of identified hazards, at each of two designated sites, to meet regulatory soil cleanup standards with respect to chemical contamination. Confirmation soil samples were collected and analyzed to verify soil remediation. This report describes the technical approach GSA implemented in accordance with the approved Management Plan in order to manage the sampling, excavation, and transportation and disposal of the identified wastes. Historical information regarding the sites was taken from the scope of work issued to GSA.

The two sites covered under the scope of work for this contract are the Pesticide Building #4126 and Ammunition Bunkers #2953, #2951, and #2950. Maps of each of these sites are provided in Appendix B.

1.1 Site History

Camp Bonneville was established in 1909 as a drill field and rifle range. Army, Army Reserve, National Guard, Marine Corps Reserve, Navy Reserve, and Coast Guard Reserve units, as well as other Department of Defense (DoD) and government personnel have used the site over the years for various training operations. The facility is still used by federal, state, and local law enforcement agencies for both firearms and general training purposes. Camp Bonneville encompasses approximately 3,840 acres in the foothills of the Cascade Mountains, about 12 miles northeast of Vancouver, Washington (Appendix B, Figure 1).

1.1.1 Pesticide Building #4126

The Pesticide Building #4126 is located across the road from and southeast of the Camp Killpack cantonment (Appendix B, Figures 2, 4, and 6). This structure was built in approximately 1958 and is a painted wood structure with a wooden floor and wooden door. Other than doors and windows, the building has no ventilation system. The structure does not contain plumbing, electrical, or a heating system. The windows are simple framed openings with no glass and the door is detached and is leaning against an interior wall. The structure was designed to be moved from site to site as it was needed. It is approximately 6 feet deep by 8 feet wide (see Appendix J for photos).

The area surrounding the structure is relatively level and contains mostly brush and grass. There are two large Douglas fir trees within 10 feet of the structure. There is a concrete pad (approximately 8 feet by 8 feet) approximately four feet from the front of the structure.

Tasks performed previously at this site included UXO clearance/screening surveying, geophysical surveying, surface soil sampling, and wood sampling. For more details regarding this site, please refer to the "Supplemental Site Investigation Report – Ammunition Storage Magazines and Pesticide Storage Area, December 2000" prepared by URS.

Selenium and thallium were not detected in the samples. Arsenic, barium, beryllium, cadmium, chromium, copper, mercury, nickel, silver, and zinc were detected in some or all of the samples, but at concentrations below the project screening criteria. Antimony and lead were present in most or all samples at concentrations exceeding one or more of the project screening levels.

Herbicides and Pesticides were found at this site. 4,4-DDT, 2,4,5-T, and MCPP were present in most or all samples at concentrations exceeding one or more of the project screening levels.

TPH-diesel was present in most or all samples at concentrations exceeding one or more of the project screening levels.

Appendix D contains historical chemical data results from this site.

1.1.2 Ammunition Bunkers (#2953, #2951, and #2950)

The ammunition storage magazines are located east of the Camp Bonneville cantonment and southwest of the existing sewage treatment lagoon (Appendix B, Figures 2, 3 and 5). These structures are constructed of concrete with a heavy metal doors. According to historical records, the structures were built in 1976. These magazines were used to store munitions of various types that were brought to Camp Bonneville for training purposes.

The largest storage magazine is surrounded by a chain-link fence, topped with barbed wire, and with a gate near the northwest corner. The two smaller magazines are fenced separately from the larger magazine (with one common fence side). The entrance to this fenced area is north of the two structures. The area between and surrounding the ammunition storage magazines is covered with grasses. The area is relatively flat, with a slight slope downward to the south toward Lacamas Creek. The creek is located immediately south of the fenced area.

Tasks performed previously at these sites included UXO clearance/screening surveying, geophysical surveying, and subsurface soil sampling. For more details regarding these bunkers, please refer to the "Final Report Multisites Investigation, July 1999" prepared by Shannon and Wilson, Inc. and the "Supplemental Site Investigation Report – Ammunition Storage Magazines and Pesticide Storage Area, December 2000" prepared by URS.

1.1.2.1 Bunker #2953

This bunker is the westernmost ammunition storage magazine of the three bunkers. It is the largest, measuring approximately 80 square feet by 8 feet in height. The entrance to this structure faces generally southward (see Appendix J for photos).

Selenium was not detected in the samples. Mercury, and silver were detected in some or all of the samples, but at concentrations below the project screening levels. Antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, thallium, and zinc were present in most or all samples at concentrations exceeding one or more of the project screening levels.

PETN and Picric Acid were detected in some of the samples, but at concentrations below the regulatory screening criteria. 2,4-Dinitroltoluene (DNT) was present in some of the samples at concentrations exceeding one or more of the project screening levels.

Appendix D contains historical chemical data results from this site.

1.1.2.2 Bunker #2951

This bunker is the smallest of the three bunkers, measuring approximately 4 square feet by 4 feet in height. It is located between the other two bunkers. The entrance to this structure faces generally southward (see Appendix J for photos).

Selenium and thallium were not detected in the samples. Mercury, silver, and zinc were detected in some or all of the samples, but at concentrations below the project screening levels. Antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, and nickel were present in most or all samples at concentrations exceeding one or more of the project screening levels.

Appendix D contains historical chemical data results from this site.

1.1.2.3 Bunker #2950

This bunker measures approximately 16 square feet by 5 feet in height. It is located easternmost of the three bunkers. The entrance to this structure faces generally eastward (see Appendix J for photos).

Selenium and thallium were not detected in the samples. Beryllium, mercury, nickel, silver, and zinc were detected in some or all of the samples, but at concentrations below the project screening levels. Antimony, arsenic, barium, cadmium, chromium, copper, and lead were present in most or all samples at concentrations exceeding one or more of the project screening levels.

RDX was present in one sample at a concentration exceeding one or more of the project screening levels.

Appendix D contains historical chemical data results from this site.

1.2 Management Plan

GSA developed a Management Plan (MP) during the planning phase of GSA activities on this project (Titled "Supplemental Management Plan – Ammunition Bunkers #2953, #2950, and #2951 and Pesticide Building #4126, Camp Bonneville, Washington" dated April 25, 2001) for the purpose of conducting the project field activities. This MP underwent USACE review as well as regulatory review by Ecology and EPA. The USACE approved the Management Plan for the closure of the two identified sites.

The actual implementation of the field activities deviated from the Management Plan, following approval by the onsite USACE QA personnel, in the following ways:

1.2.1 Sampling Procedure for the Wooden Pesticide Building was Modified

Originally, sampling of the wooden structure was to be performed using a stainless steel drill bit, a paper plate, a stainless steel bowl, and sample jars. Due to the hardness of the wood and the large quantity of material needed to fill the sample jars, the drill bit did not work. Shavings were created using a chainsaw and making vertical cuts through each of the representative surfaces (four walls, floor, roof, door, window sill, and framing members). Because the building was to be removed as construction building debris, sample collection followed the "USAEHA Sampling Protocol Building Demolition Debris and Buildings Painted with lead-Based Paint." Shavings were collected into stainless steel bowls from the interior floor of the building and mixed prior to placing samples in sample jars.

1.2.2 Disinfection and Cleaning of the Ammunition Bunkers was Modified

The Management Plan called for leaving the disinfection solution (1:4 bleach/water solution) on the concrete surfaces of the bunkers for two hours, but was the duration was changed to one hour. The

research available regarding Hanta Virus disinfection indicated that the solution only needed to remain on the surface for one hour to kill the virus.

The Management Plan also called for a wet/dry heppa vacuum to be used to vacuum out the bunkers. However, the bunkers were already cleaned and the disinfectant spray had dried (no water present), so it was sufficient to clean out the bunkers using brooms and dustpans. The swept material was placed into plastic bags along with the disposable PPE and added to the wood stockpile. The brooms and dustpans were decontaminated by washing in soapy water followed by disinfection with the bleach/water solution.

1.2.3 Duration of UXO Clearance Support was Modified

The management plan required the UXO clearance support team to be onsite while the construction and sampling team were onsite. However, all construction, digging, and brush clearing were completed the first day of field activities and it was determined that the UXO team was not needed the second day when only sampling would be conducted. The UXO team was sent home after the first day of field activities.

2. CLOSURE REQUIREMENTS

A summary of the closure requirements for the two sites that was required for this project is presented in the following subsections.

2.1 Confirmation Parameters of Concern and Site-Specific Clean-Closure Levels

Site closure levels for this project were based upon parameters established from previous investigation data (refer to the "Final Report Multisites Investigation, July 1999" prepared by Shannon and Wilson, Inc. and the "Supplemental Site Investigation Report – Ammunition Storage Magazines and Pesticide Storage Area, December 2000" prepared by URS). Groundwater action levels were included to account for the possibility of finding groundwater in the excavations. Table 1 identifies the parameters of concern and the site-specific clean-closure levels for each of the identified parameters. The site cleanup levels for this project are based upon the MTCA Method B soil criteria, where available, and upon the MTCA Method A level when a method B level has not been established, as is the case for total lead, for example. An allowance has also been made in the established site-specific criteria for the elevated background concentrations of the metals arsenic and beryllium. The identification of which parameters were of concern for each site during this remedial activity was based upon the previous characterization work conducted by Shannon & Wilson and URS, which is discussed in Section 1.1 of this report and tabulated in Appendix D.

Table 1. Clean-Closure Soil Levels for Selected Site Confirmation Analytes of Concern

Site Location	Parameter	Highest Concentration Found[1]	Soil Cleanup Levels
Pesticide Bldg #4126	Diesel Range	59 mg/kg	2,000 mg/kg[2]
Pesticide Bldg #4126	Antimony	7 mg/kg	32 mg/kg
Pesticide Bldg #4126	**Lead**	**970 mg/kg**	**250 mg/kg**
Pesticide Bldg #4126	4,4-DDT	2.7 mg/kg	2.94 mg/kg
Pesticide Bldg #4126	2,4,5-T	92 mg/kg	800 mg/kg
Pesticide Bldg #4126	MCPP	42 mg/kg	61,000 mg/kg
Ammo Bunkers #2950, #2951, and #2953	Antimony	9.3 mg/kg	32 mg/kg
Ammo Bunkers #2950, #2951, and #2953	**Arsenic**	**15.5 mg/kg**	**7 mg/kg**
Ammo Bunkers #2950, #2951, and #2953	Barium	2,590 mg/kg	5,600 mg/kg
Ammo Bunkers #2950, #2951, and #2953	**Beryllium**	**5.6 mg/kg**	**2 mg/kg**
Ammo Bunkers #2950, #2951, and #2953	Cadmium	18.3 mg/kg	80 mg/kg
Ammo Bunkers #2950, #2951, and #2953	Chromium	114 mg/kg	400 mg/kg
Ammo Bunkers #2950, #2951, and #2953	Copper	297 mg/kg	2,960 mg/kg

Site Location	Parameter	Highest Concentration Found[1]	Soil Cleanup Levels
Ammo Bunkers #2950, #2951, and #2953	**Lead**	**566 mg/kg**	**250 mg/kg**
Ammo Bunkers #2951 and #2953	Nickel	117 mg/kg	1,600 mg/kg
Ammo Bunker #2953	Thallium	0.49 mg/kg	5.6 mg/kg
Ammo Bunker #2953	Zinc	525 mg/kg	24,000 mg/kg
Ammo Bunker #2953	2,4-DNT	17.2 mg/kg	160 mg/kg
Ammo Bunker #2953	PETN	2.28 mg/kg	NA mg/kg
Ammo Bunker #2953	Picric Acid	1.1 mg/kg	NA mg/kg
Ammo Bunker #2950	**RDX**	**410 mg/kg**	**9.09 mg/kg**

1 The levels listed are the highest concentrations documented by Shannon & Wilson and URS for the site (Appendix D)
2 A mutual agreement between the USACE and Ecology allowed the site-specific cleanup level of 200 mg/kg to be changed to the proposed new MTCA Method A level of 2000 mg/kg.
Bold values indicate historical concentrations found, which exceeded soil cleanup levels.

2.2 Waste Disposal Parameters of Concern and Associated Regulatory Levels

Waste streams encountered on this project were limited to:

- Waste Soil
- Wood Waste
- Waste Personnel Protective Equipment (PPE) and Disposable Sampling Supplies
- Waste Decon Water

A description of the parameters associated with the characterization of the above waste streams is provided in the following sections.

Waste munitions were not anticipated on this project and no UXO was encountered during the course of the remedial activities.

Waste characterization profiling for this project was based upon parameters established from previous investigation data and generator knowledge. Table 2 identifies the parameters of concern and the applicable waste designation levels for each of the identified parameters. The waste designation levels are based upon the Washington State Dangerous Waste characteristic criteria as promulgated in WAC 173-303-090. The identification of which parameters were of concern for each site during this remedial activity was based upon the previous characterization work conducted by Shannon & Wilson and URS, which is discussed in Section 1.1 of this report and tabulated in Appendix D.

Table 2. Waste Designation Level for Selected Analytes of Concern

Site Location	Parameter	Waste Designation Code	Waste Designation Level
Pesticide Building #4126 Wood Debris	Lead	D008	TCLP 5 mg/L
Pesticide Building #4126 Waste Soil	Lead	D008	TCLP 5 mg/L

Site Location	Parameter	Waste Designation Code	Waste Designation Level
Pesticide Building #4126 Waste Soil	DDD, DDE, DDT	U060, U061	Detected
Ammo Bunkers #2950, #2951, and #2953	Arsenic	D004	TCLP 5 mg/L
Ammo Bunkers #2950, #2951, and #2953	Barium	D005	TCLP 100 mg/L
Ammo Bunkers #2950, #2951, and #2953	Cadmium	D006	TCLP 1 mg/L
Ammo Bunkers #2950, #2951, and #2953	Lead	D008	TCLP 5 mg/L
Ammo Bunkers #2953	2,4-DNT	D030	TCLP 0.13 mg/L

2.2.1 Pesticide Building Soil Waste Stream

The soil from the pesticide building area was handled as "Discarded Chemical Products – U060, U061" (WAC 173-303) and accepted as is at the treatment facility in Arlington, OR.

2.2.2 Ammunition Area Soil Waste Stream

The soil from the ammunition area was handled as non-hazardous contaminated soil and accepted as is at the disposal facility in Hillsboro, OR.

2.2.3 Wood Waste Stream

The wood from the pesticide building was handled as a "Listed Waste – D008" (WAC 173-303), treated by microencapsulation, and accepted at the treatment facility in Arlington, OR.

The wood from the wooden pallets removed from the ammunition bunkers were transported to the waste disposal facility along with the wood building waste stream.

2.2.4 Disposable PPE and Sampling Supplies

The used disposable PPE and sampling supplies were transported to the waste disposal facility along with the wood building waste stream.

2.2.5 Waste Decon Water

The USACE and GSA determined that disposable PPE would be used to minimize the quantity of personnel decontamination water generated, and that the equipment decontamination water could be mixed together with the associated waste soil stockpiles. Since it was determined that only equipment that came into contact with the subsurface soils needed to be decontaminated, decontamination of equipment was primarily limited to the cleaning of the stainless steel sampling bowls and spoons and the bucket of the heavy equipment (i.e. backhoe or loader). The cleaning of the heavy equipment was deemed to only be necessary at the end of the usage of the equipment. The quantity of water necessary for this task was further limited by first sweeping off the equipment with a disposable broom. This approach was cost effective and enabled the project to be completed on an expedited schedule. The waste decontamination water was added to the waste soil waste stream prior to the characterization of that waste stream.

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3. REMEDIAL ACTIVITIES FOR THE MULTI-SITE INVESTIGATION AREAS

The field activities associated with this remedial action began on May 7, 2001, and continued intermittently until completion on September 17, 2001. The daily contractor quality control reports and daily field notes describing field activities are contained in Appendix E. The UXO contractor field notes can be found at the end of Appendix E. The remedial actions performed at the two sites are described in the subsequent sections of this report. A photographic record of field activities can be found in Appendix J.

Sections 3.1 to 3.3 describe the remedial actions performed in the field, including excavation, screening and confirmation sampling activities. Section 3.4 describes waste characterization sampling activities. Section 4.0 describes data quality control review of laboratory data, and Section 5.0 presents the results of the laboratory data. Section 6.0 describes waste disposal activities.

3.1 General

The rationale for specific elements of the remedial action are presented in this section. The closure design had been based on site-specific information, as well as consideration of EPA and State of Washington Department of Ecology regulations and guidance. The remedial confirmation sampling design consisted of the collection of five discrete samples from each excavation. One sample was collected from the excavation floor and an individual sample was collected at each of four locations that were representative of the sidewalls of the excavation.

The closure for each of the site areas included the excavation and stockpiling of the suspected contaminated soil, followed by confirmation sampling and fixed laboratory analysis, and concluded with backfilling and site restoration.

The excavated soil from each location was stockpiled separately and covered using 10-milimeter thick Visqueen sheeting.

3.2 Pesticide Building #4126

The field activities at Pesticide Building #4126 began on May 7, 2001. This area was previously determined not to be an area of UXO concern, however the UXO team was standing by while the work was conducted on this date. No UXO or UXO scrap was encountered.

The work began with the waste characterization sampling of the wooden structure (section 3.4). Following the sampling of the wood structure, the structure was dismantled. These timbers were stockpiled near the excavation for disposal. Once the structure was removed, a backhoe was used to excavate the footprint of the building and its dripline to a depth of one-foot bgs. The concrete slab located near the building was not removed. It was not included in the scope of work and the instructions to leave in place was confirmed during the remedial action by the USACE site QA.

GSA conducted the initial confirmation sampling at this site on May 7, 2001. The analytes of concern for the initial confirmation sampling event were diesel, antimony, lead, 2,4,5-T, 4,4 DDT, and MCPP. Samples included four wall samples, one floor sample, and one duplicate floor sample.

The results from the confirmation samples indicated that no additional excavation was needed. Restoration of this site occurred on September 17, 2001, with the import of backfill material to match that of the native material, and the regrading of the site.

Results from the samples collected at this site are found in Appendix C, Table C-1. Sample locations are shown in Appendix B, Figure 7.

3.3 Ammunition Bunkers #2953, #2951, and #2950

3.3.1 Ammunition Bunker #2951

The field activities at Ammunition Bunker #2951 began on May 7, 2001. This area was previously determined not to be an area of UXO concern, however the UXO team was standing by while the work was conducted on this date. No UXO or UXO scrap was encountered.

A backhoe was used to excavate the footprint of the excavation to a depth of one-foot bgs.

Following the excavation activities and determining that confirmation sampling could begin, GSA conducted the initial confirmation sampling at this site on May 7, 2001. The analytes of concern for the initial confirmation sampling event were antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, and nickel. Samples included four wall samples and one floor sample.

The results from the initial confirmation samples indicated that no additional excavation was needed. Restoration of this site occurred on September 17, 2001, with the import of backfill material to match that of the native material, and the regrading of the site.

Results from the samples collected at this site are found in Appendix C, Table C-2. Sample locations are shown in Appendix B, Figure 9.

Disinfection of the bunker was conducted on May 8, 2001. One hour following disinfection, a wooden pallet inside the bunker was removed and the bunker was swept clean of debris and soil.

3.3.2 Ammunition Bunker #2950

The field activities at Ammunition Bunker #2950 began on May 7, 2001. This area was previously determined not to be an area of UXO concern, however the UXO team was standing by while the work was conducted on this date. No UXO or UXO scrap was encountered.

A backhoe was used to excavate the footprint of the excavation to a depth of one-foot bgs.

Following the excavation activities and determining that confirmation sampling could begin, GSA conducted the initial confirmation sampling at this site on May 7 and 8, 2001. The analytes of concern for the initial confirmation sampling event were antimony, arsenic, barium, cadmium, chromium, copper, lead, and RDX. Samples included four wall samples, one floor sample, and one duplicate floor sample.

The results from the initial confirmation samples indicated that no additional excavation was needed. Restoration of this site occurred on September 17, 2001, with the import of backfill material to match that of the native material, and the regrading of the site.

Results from the samples collected at this site are found in Appendix C, Table C-2. Sample locations are shown in Appendix B, Figure 10.

Disinfection of the bunker was conducted on May 8, 2001. One hour following disinfection, a wooden pallet inside the bunker was removed and the bunker was swept clean of debris and soil.

3.3.3 Ammunition Bunker #2953

The field activities at Ammunition Bunker #2953 began on May 7, 2001. This area was previously determined not to be an area of UXO concern, however the UXO team was standing by while the work was conducted on this date. No UXO or UXO scrap was encountered.

A backhoe was used to excavate the footprint of the excavation to a depth of one-foot bgs.

Following the excavation activities and determining that confirmation sampling could begin, GSA conducted the initial confirmation sampling at this site on May 8, 2001. The analytes of concern for the initial confirmation sampling event were antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, thallium, zinc, 2,4-DNT, PETN, and picric acid. Samples included four wall samples, one floor sample, and one duplicate floor sample.

The results from the initial confirmation samples indicated that no additional excavation was needed. Restoration of this site occurred on September 17, 2001, with the hauling in of imported backfill material to match that of the native material, and the regrading of the site.

Results from the samples collected at this site are found in Appendix C, Table C-2. Sample locations are shown in Appendix B, Figure 8.

Disinfection of the bunker was conducted on May 8, 2001. One hour following disinfection, the bunker was swept clean of debris and soil.

3.4 Waste Characterization Sampling

Waste characterization sampling was conducted on May 7, 2001. The excavated soil from each location and the waste wood (pesticide building #4126) was stockpiled separately and covered using 10-milimeter thick Visqueen sheeting.

Soil waste characterization sampling for each stockpile was conducted by taking a composite sample comprised of three grab samples from different stockpile locations. The three samples were homogenized into a single sample before being collected for analysis.

Wood waste characterization sampling was conducted by creating wood shavings as the sample matrix. Initially, wood shavings were created using a 1-inch spade bit. It immediately became clear that the wood was too hard and not enough shavings were being created. Following a discussion with the construction team and the USACE, it was decided to use a chainsaw. Using the chainsaw from the inside of the structure, vertical cuts were made in the walls and the door of the wood structure. Shavings were collected from the floor of the structure and mixed in stainless steel bowls before being collected for analysis.

Results from the waste characterization samples are found in Appendix C, Table C-3.

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4. SUMMARY OF DATA QUALITY

This assessment combines the sampling plan, the results of the chemical data review process, field observations, and quality control to evaluate the overall precision, accuracy, representativeness, completeness and comparability of the sampling and measurement process. A QA/QC sample key is found in Appendix C, Table C-4. Detailed data quality memos are found in Appendices F and G.

4.1 Pesticide Building #4126

No significant nonconformities were reported for precision or accuracy. Field duplicates were evaluated and found to show acceptable precision. The sampling procedures were followed as written in the Management Plan. The measurement process record and quality control indicate that project objectives were met for representativeness. The results for total metals - antimony were qualified with a "J" flag indicating that these data are to be used with caution due to low-bias matrix spike QC recoveries. The sample set collected was as per the Management Plan and meets the completeness requirements for the project. The sampling and analytical methods used met comparability requirements for the project. The analytical methods included Washington NWTPH-Dx for diesel and heavy oil range hydrocarbons, EPA Method 6020 for total antimony and lead, EPA Method 8081 for pesticides, and EPA Method 8151 for herbicides. No sampling nonconformities were reported.

4.2 Ammunition Bunkers

4.2.1 Ammunition Bunker #2951

No significant nonconformities were reported for precision or accuracy. Field duplicates were evaluated and found to show acceptable precision. The sampling procedures were followed as written in the Management Plan. The measurement process record and quality control indicate that project objectives were met for representativeness. The results for total metals (antimony, arsenic, barium, chromium, copper, and nickel) were qualified with a "J" flag indicating that these data are to be used with caution due to low-bias matrix spike QC recoveries. The sample set collected was as per the Management Plan and meets the completeness requirements for the project. The sampling and analytical methods used met comparability requirements for the project. The analytical methods included EPA Method 6020 for total antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, thallium, and zinc. No sampling nonconformities were reported.

4.2.2 Ammunition Bunker #2950

No significant nonconformities were reported for precision or accuracy. Field duplicates were evaluated and found to show acceptable precision. The sampling procedures were followed as written in the Management Plan. The measurement process record and quality control indicate that project objectives were met for representativeness. The results for total metals (antimony, arsenic, barium, chromium, copper, and nickel) were qualified with a "J" flag indicating that these data are to be used with caution due to low-bias matrix spike QC recoveries. The sample set collected was as per the Management Plan and meets the completeness requirements for the project. The sampling and analytical methods used met comparability requirements for the project. The analytical methods included EPA Method 6020 for total antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, thallium, and zinc and EPA Method 8330 for explosives. No sampling nonconformities were reported.

4.2.3 Ammunition Bunker #2953

No significant nonconformities were reported for precision or accuracy. Field duplicates were evaluated and found to show acceptable precision. The sampling procedures were followed as written in the Management Plan. The measurement process record and quality control indicate that project objectives were met for representativeness. The results for total metals (antimony, arsenic, barium, chromium, copper, and nickel) were qualified with a "J" flag indicating that these data are to be used with caution due to low-bias matrix spike QC recoveries. The sample set collected was as per the Management Plan and meets the completeness requirements for the project. The sampling and analytical methods used met comparability requirements of the project. The analytical methods included EPA Method 6020 for total antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, nickel, thallium, and zinc and EPA Method 8330 for explosives. No sampling nonconformities were reported.

4.3 Waste Disposal Analysis

These samples were collected for profiling waste soil and wood transported to appropriate waste handling facilities. No critical nonconformities were reported for precision or accuracy, however some challenging matrices such as paint were analyzed. Field duplicates were evaluated and found to show acceptable precision. Field duplicates were collected for the other waste soil matrices and methods during the site characterization and remedial confirmation sampling. The sampling procedures were followed as written in the Management Plan. In general, the waste samples were collected as composites to improve representativeness. The measurement process record and quality control indicate that project objectives were met for representativeness. No data were qualified. The analytical methods, depending on the source of the sample, included Washington NWTPH-Dx for diesel and heavy oil range hydrocarbons, EPA 1311/6010 for TCLP metals and EPA 8330 for TCLP-2,4-DNT. No sampling nonconformities were reported.

5. WASTE PROFILING AND DISPOSAL

5.1 General

Waste characterization sampling, as described in Section 3.4, was used to categorize all of the individual waste streams for disposal.

5.2 Waste Soil

As the data provided in Table C-3 of Appendix C indicates, the soil stockpiles from the ammunition sites were characterized as non-regulated wastes. Based on this characterization and site-specific knowledge, the waste soil was transported to the Hillsboro disposal facility under waste permit number 5795. The corresponding waste profile information and the approved landfill disposal permit are contained in Appendix I.

The soil stockpile from the pesticide building site was characterized as regulated waste (U060, U061). Based on this characterization and site-specific knowledge, the waste soil was transported to the Arlington treatment facility under waste manifest number 00001. The corresponding waste profile information and the approved landfill disposal permit are contained in Appendix I.

A total of 8.67 tons of waste soil was transported to the Hillsboro Landfill on September 17, 2001. A total of 5 tons of waste soil was transported to the Arlington Treatment Facility on September 17, 2001. A certificate of disposal for these waste streams can be found in Appendix I. The following are estimates of the quantities handled from each site:

Pesticide Building #4126	5 cy	7.56 tons
Ammunition Bunkers	5.75 cy	8.67 tons

5.3 Wood Debris from Pesticide Building #4126

As the data provided in Table C-3 of Appendix C indicates, the wood debris (from the pesticide building structure) was handled as a “Listed Waste” (D008) in accordance with local and state regulations (WAC 173-303). Two wood pallets from the ammunition bunkers, disposable PPE, and sampling waste were included in this waste stream. Based on this characterization and site-specific knowledge, the waste debris was transported to the Arlington treatment facility under waste manifest number 00002. The corresponding waste profile information and the disposal manifest are contained in Appendix I.

A total of 1.38 tons (11.66 cy) of debris was transported to the Arlington Treatment Facility on September 17, 2001 for disposal. A certificate of disposal for this waste stream can be found in Appendix I.

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6. SUMMARY OF SITE CLOSURE STATUS

The results from the confirmation sampling data indicate that the pesticide building #4126 site and the ammunition bunker site (bunkers #2951, #2950, and #2953) are now in compliance with the site clean-closure levels. The tables in Appendix C contain the laboratory results for the confirmation samples collected from these areas.

Copies of complete laboratory data packages can be found in Appendix H.

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APPENDIX A
ACRONYMS

APPENDIX B
FIGURES

APPENDIX C
GSA INVESTIGATION RESULTS

APPENDIX D
HISTORICAL CHEMICAL INVESTIGATION RESULTS

APPENDIX E
DAILY CONTRACTOR QUALITY CONTROL REPORTS

APPENDIX F
QC REPORTS – SITE CONFIRMATION

APPENDIX G
QC REPORTS – WASTE DISPOSAL

APPENDIX H
LABORATORY ANALYSIS RESULTS

APPENDIX I
WASTE DISPOSAL DOCUMENTATION

APPENDIX J
PHOTOGRAPHS