Final

Corrective Action Work Plan

For

Interim Cleanup Action

Landfill 4/Demolition Area 1

Camp Bonneville Military Reservation, WA

Prepared for

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ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
BCT	BRAC Cleanup Team
bgs	below ground surface
BIP	blown-in-place
BRAC	Base Realignment and Closure
CAIS	Chemical Agent Identification Sets
CAWP	Corrective Action Work Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CKPS	Contaminants known to be present at the Site
CLARC	Cleanup Levels and Risk Calculations
COPC	Chemical of Potential Concern
CWM	Chemical Warfare Materiel
DGPS	differential global positioning systems
DNS	determination of nonsignificance
DOC	Dissolved Organic Carbon
DoD	Department of Defense
DOE	Washington State Department of Ecology
DS/Scoping	determination of significance/scoping notice
EE/CA	Engineering Evaluation/Cost Analysis
EIS	environmental impact statement
EO	Enforcement Order
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ESI	Expanded Site Investigation
ESQ	Environmental Safety and Quality
EZ	exclusion zone
GFL	Geophysics Field Lead
GIS	Geographic Information System
GTM	Geophysics Task Manager
HARC	historic, archaeological, and cultural
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IAW	in accordance with
IDW	investigation derived waste
LRA	Local Redevelopment Authority
LUMP	Land Use Management Plan
MC	munitions components
MD	munitions debris

MEC	Munitions and explosives of concern
MPM	most probable munition
MTCA	Washington State Model Toxics Control Act
NCP	National Contingency Plan
NEW	net explosive weight
OB/OD	open burn/open detonation
OSHA	Occupational Safety and Health Administration
PMC	Construction Project Manager
PMM	Project Manager for MEC Operations
PRG	Preliminary Remediation Goal
QC	Quality Control
RAB	Restoration Advisory Board
RBC	Risk Based Concentrations
SAP	Sampling and Analysis Plan
SEPA	State Environmental Policy Act
SOP	Standard Operating Procedure
SUXOS	Senior Unexploded Ordnance Supervisor
SVOC	semivolatile organic compound
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
UXO	unexploded ordnance
UXOQC	UXO Quality Control Officer
UXOSO	UXO Safety Officer
VLF	very low frequency
VOC	volatile organic compound
WAC	Washington Administrative Code

1. INTRODUCTION

This Corrective Action Work Plan (CAWP) describes the approach and proposed procedures for the environmental remedial action at Landfill 4/Demolition Area 1 (the Site) located on the Camp Bonneville Military Reservation (Camp Bonneville) near Vancouver, Washington. This CAWP represents the first of two phases of cleanup to be performed at the Site by the Army. This first phase is an interim cleanup action that will include the removal and disposal of open burn/open detonation (OB/OD) ordnance and landfill materials and specified associated contaminated soils. The second phase of the cleanup will address the groundwater contamination at the Site. Tetra Tech, Inc. is contracted to perform the first phase under Contract No. DAAD11-03-F-0102 with the Department of the Army, Atlanta Field Office.

In February 2003, the State of Washington, Department of Ecology (DOE), issued Enforcement Order (EO) 03TCPHQ-5286, pursuant to Washington Administrative Code (WAC) 173-303-646(3)(a) and 70.105 RCW, for the entire Camp Bonneville Military Reservation, including the Site. The Site is referred to as Remedial Action Unit 2C in the EO. The EO stipulated that the interim action for the Site shall be to "excavate and appropriately dispose of materials contained in and contaminated soils associated with Landfill 4/Demolition Area 1." This CAWP focuses on the first phase of the restoration of the Site, to meet the regulatory requirements to gain a no further action for the Landfill debris/soils to support the early transfer of the property to Clark County. The cleanup of the impacted groundwater is not part of this remedial action and will be performed under a separate program and contract.

Remedial activities at the Site are being completed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Contingency Plan (NCP) and the Washington State Model Toxics Control Act (MTCA). In addition, the remediation will comply with all associated applicable or relevant and appropriate requirements (ARARs) established by the State of Washington and local agencies. The goal of the remediation is to obtain all necessary regulatory approvals from relevant local, state, and Federal authorities.

The general purpose of the CAWP is to:

- Describe the proposed interim cleanup action;
- Present the cleanup levels and points of compliance for each contaminant of potential concern;
- Present the schedule for conducting the interim cleanup action;
- Describe any site restrictions or institutional controls; and

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- Provide a document for public comment regarding the interim cleanup action.

The major components of the interim action are:

- Setting up the staging and debris/soil stockpile area at the location designated by Army;
- Improving the road and bridge from the former landfill to the staging and stockpile area;
- Potential munitions and explosives of concern (MEC) and related munitions components (MC) clearing of the upper debris/soil portion of the Site prior to excavation;
- Screening and disposal of MEC/MC and munitions debris (MD);
- Excavating of the remaining landfill debris/soil;
- Segregating and characterizing the landfill debris/soil for disposal purposes;
- Transporting and disposing of hazardous wastes;
- Transporting and disposing of non-hazardous wastes;
- Backfilling the excavation; and
- Implementing soil erosion control measures.

2. SITE DESCRIPTION

Camp Bonneville is a military reservation situated in the southeastern region of Clark County, Washington. The camp is located along the western foothills of the Cascade Mountain Range within unincorporated Clark County, approximately 12 miles northeast of the city of Vancouver. The smaller cities of Camas and Washougal are approximately 6 miles to the south of the reservation. Figure 2-1 presents the location of Camp Bonneville.

Camp Bonneville was established in 1909 as a drill field and rifle range for Vancouver Barracks. The 3,020 acres upon which Camp Bonneville was established were purchased by the federal government in 1919. In addition, the U.S. Army leased 840 acres of adjacent property, in two separate parcels, from the State of Washington in 1955. Of these 840 acres, 20 acres were returned to the State of Washington in 1957. The Army used Camp Bonneville for live fire of small arms, assault weapons, artillery, and field and air defense artillery between 1910 and 1995.

Camp Bonneville was selected for transfer and reuse by the U.S. Government in 1995. The community has been looking at ways to transform the surplus military property and facilities into an area that can be used by the general public. The Camp Bonneville Draft Reuse Plan (Otak, Inc. 1998) outlines the potential options for the property. Current plans for future use of the property are for recreational land use only.

2.1 LANDFILL 4/DEMOLITION AREA 1

The Site is located in the northern part of the Camp Bonneville Military Reservation approximately one mile northeast of the Cantonment Area. Figure 2-2 presents the location of the Site. The Army proposes to use risk-based cleanup to close the Site and ultimately transfer the property to the county. The landfill reportedly received building demolition debris during the mid-1960s and later was used as an OB/OD area. The OB/OD area is, therefore, underlain by the old landfill.

In early 2003, an Expanded Site Investigation (ESI) was conducted to evaluate the potential impacts to groundwater resulting from historical landfill and OB/OD activities at the Site. It was determined that the Site was likely contributing to the contamination of the underlying groundwater with the potential of impacting the nearby Lacamas Creek.

The area of the Site is reported to be 120 by 200 feet and the depth appears to extend beyond 11 feet below ground surface (bgs). The Army has indicated that all unexploded ordnance (UXO) activities at the site were limited to the upper portion of the Landfill. Shallow soils at the site are comprised primarily of silts and clays. The depth to groundwater at the site fluctuates seasonally. Based on available data, the average depth to groundwater at the site is 15 to 19 feet bgs, depending on the time of year. Groundwater flow direction at the site appears to follow the surface topography and

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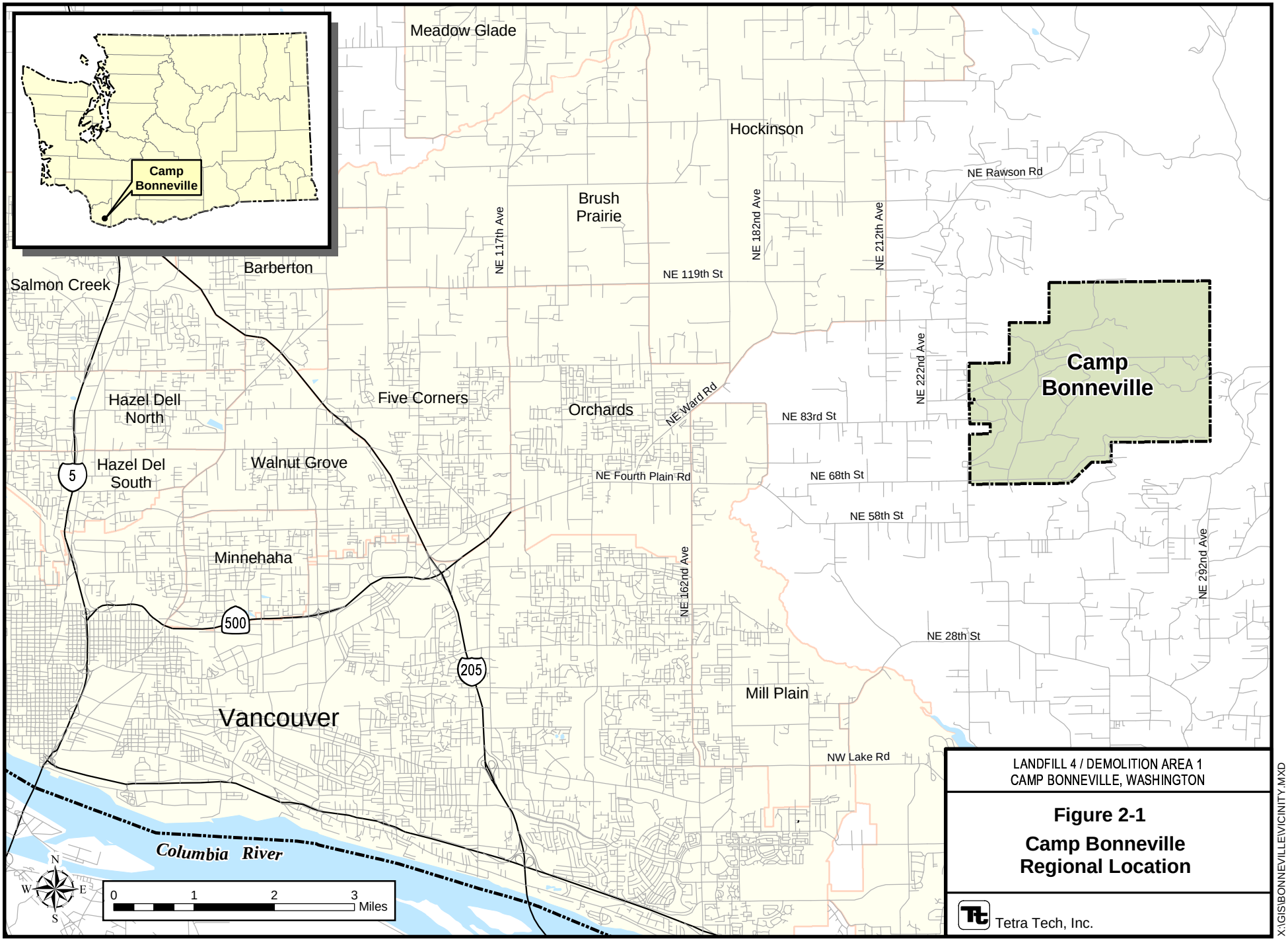

LANDFILL 4 / DEMOLITION AREA 1
CAMP BONNEVILLE, WASHINGTON

Figure 2-1

Camp Bonneville Regional Location

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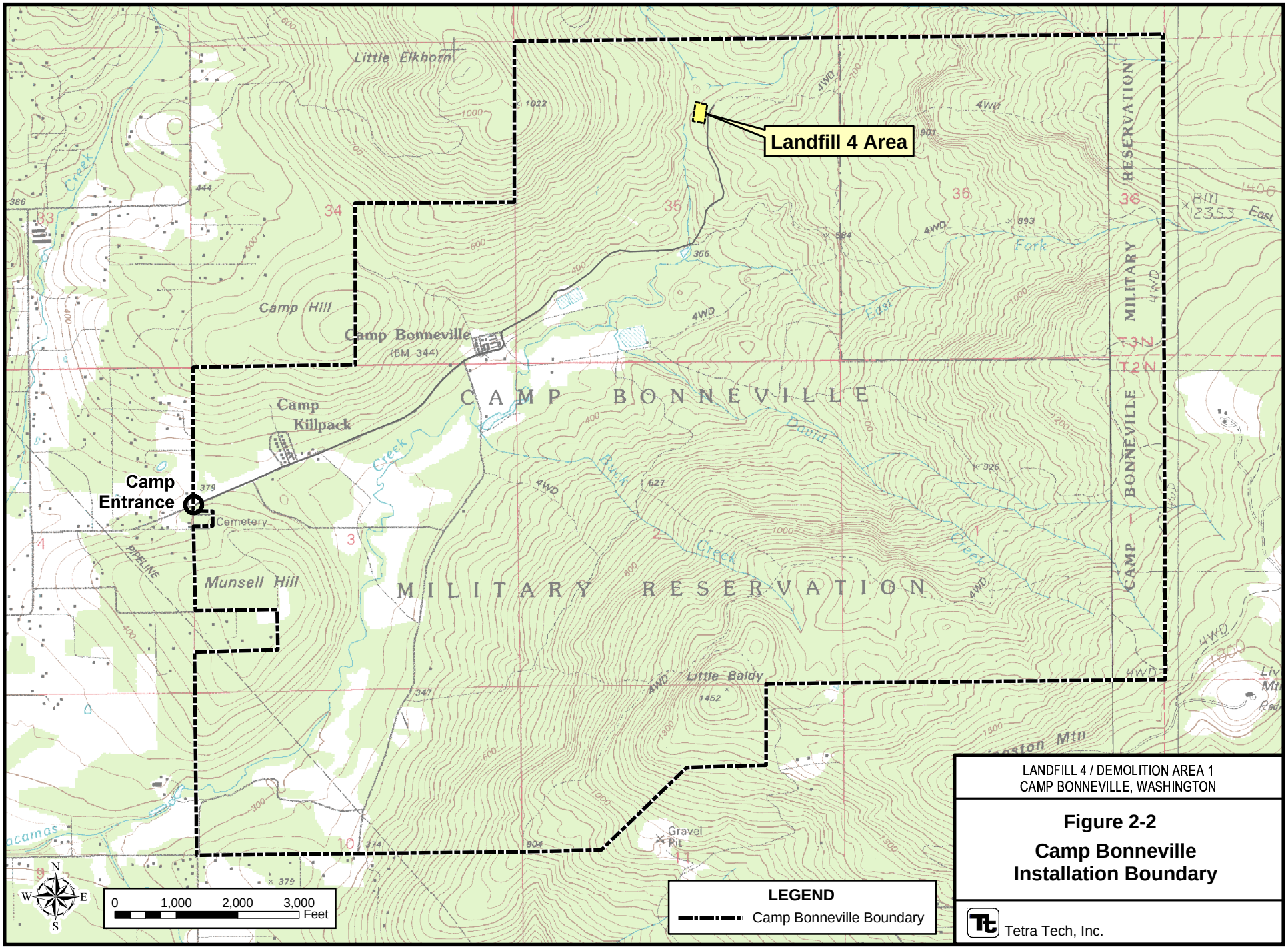

LANDFILL 4 / DEMOLITION AREA 1
CAMP BONNEVILLE, WASHINGTON

Figure 2-2

Camp Bonneville Installation Boundary

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generally flows from east to west toward the North Fork of Lacamas Creek. The fine-grained nature of the soils at the site has resulted in low hydraulic conductivities.

2.1.1 Chemical Constituents In Soil and Groundwater

Although investigations at the site have been limited to the areas adjacent to the former landfill because of concerns about UXO, the Base Realignment and Closure (BRAC) Cleanup Team (BCT) has agreed that the Chemicals of Potential Concern (COPCs) at the Landfill based on historic land use include high explosives and organic compounds, artillery propellants (including ammonium perchlorate), volatile organic compounds (VOCs), priority pollutant metals, semivolatile organic compounds (SVOCs), Total Petroleum Hydrocarbons (TPH) (gasoline, diesel and oil), and possibly pesticides and herbicides.

2.1.2 Ordnance In The Landfill

The Site has been used for the disposal of many types of MEC over the years. However, little or no accurate information is available regarding the specific types and amounts of materials destroyed at the Landfill. Research has yielded a general understanding of the types of ammunition commonly used, stored, or disposed of at Camp Bonneville during and after World War II. Table 2-1 presents a summary of ordnance items used, stored, and disposed of at Camp Bonneville. The ordnance presented in the table represents the potential MEC at Camp Bonneville. Table 2-2 presents a summary of the MEC found or known to have been disposed of at Landfill 4/Demolition Area 1. This information was obtained from the Final Archive Search Report Findings (USACE, 1997) and the Supplemental Archive Search Report (URS Greiner Woodward Clyde, 1999) for the site. In addition to the items listed in Table 2-2, car bodies, railroad ties, railroad rails, and old appliances have been found at Landfill 4/Demolition Area 1.

The historical munitions data available were reviewed, along with anecdotal information from past and present employees at Camp Bonneville, to assess the most probable munition (MPM) for the Site. The MPM for a site is the round with the greatest fragmentation distance that can reasonably be expected to exist in any particular MEC area. Based on the widespread use of large artillery projectiles on the ranges at Camp Bonneville and the discovery of a 155mm projectile at the Landfill, the 155mm projectile has been selected as the MPM for a majority of the site work. Two of the tasks outlined in this CAWP (tiered soil removal and soil screening) involve soils that have already been subjected to rigorous MEC removal procedures. For these two tasks, the MPM has been identified as a 20mm projectile. More details regarding the MPMs for the site and the rationale for their selection are provided in Section 5.0 of the CAWP.

The historical data available suggest that Chemical Warfare Materiel (CWM) is not present at the Landfill; however, Chemical Agent Identification Sets (CAIS) were utilized at Camp Bonneville and there is a remote chance that these items were disposed of at the Landfill. If CWM is encountered, the emergency response protocol described in Section 5-1 will be followed.

Table 2-1
Summary of Ordnance Items Used, Stored or Disposed of

Listing of Ordnance	
Small Arms, General	Cartridge, 81-mm, Smoke, WP, M370
Shell, Shotgun, 12 Gage	Cartridge, 81-mm, Illuminating, M301A2 and M301A1
Cartridge, 14.5-mm, Trainer-Spotter, M183A1	Cartridge, 81-mm, Illuminating, M301A3
Shell, Fixed, 37-mm, HE, MKII	Cartridge, 81-mm, SABOT, M1, 22-mm Sub-caliber Practice Cartridge M744, M745,
Shell, Fixed, HE, 37-mm, M54 with Self Destruct Tracer	M746 and M747
Shell, 37-mm, Fixed, HE, M54	Cartridge, 81-mm, Training, M68
Shot, AP, 37-mm, M74 with Tracer	Trench Mortar, HE, 3-Inch, MK I, MK II and Practice MK III
Shot, Fixed, APC, 37-mm, M59	Cartridge, 4.2-Inch, Illuminating, M335A2
Projectile, Practice, 37-mm, M55A1	Cartridge, 4.2-Inch, HE, M3A1 and M3
Cartridge, 37-mm, TP, M63 MOD 1	Mortar, 4.2-Inch, Smoke, WP, M328
Cartridge, AP-T, 40-mm, M 81	Cartridge, 4.2-Inch, Smoke, PWP or WP, M2A1 and M2
Projectile, 40-mm, HE, HE-I, Mk 2	Rocket, 2.36-Inch Anti-tank, M6A1, Practice, M7
Cartridge, 40-mm, Practice, M382	Rocket Motor, 2.75-Inch, MK40 Mod 7
Cartridge, 40-mm, Practice, M385	Rocket, HEAT, 3.5-Inch, M28
Cartridge, 40-mm, HE, M406	Rocket, Practice, 3.5-Inch, M29
Cartridge, 40-mm, Practice, M781	Rocket, HEAT, 66-mm, M72, A1, A2 and A3
Shell, 75-mm, High Explosive, M48	Rocket, Sub-caliber, 35-mm, M73
Cartridge, 75-mm, HE, M309A1 Recoilless Rifle	Missile, Aim-7E3, Aim-7F/M, Sparrow
Shell, Fixed, HE, 3-Inch, MK IX	Grenade, Fragmentation, Delay, M26A1 and M26
Shell, Fixed, 3-Inch, HE, M42 and M42A1	Grenade, Fragmentation, Delay, M33
Shell, Fixed, Practice, 3-Inch, M42B2	Grenade, Fragmentation, Delay, Mk II and Mk IIA1
Shot, Fixed, AP, 3-Inch, M79	Grenade, Hand, Training, Mk IA1
Cartridge, 105-mm, HE, M1	Rifle Grenade, Smoke, WP, M19A1
Cartridge, 105-mm, TP-T, M67	Rifle Grenade, Smoke, M22
Cartridge, 105-mm, HEAT-T, M622	Grenade, Rifle Practice, M11A2
Cartridge, 105-mm, Illuminating, M314A3	Anti-Tank Rifle Grenade, M9A1
Cartridge, 105-mm, Smoke, WP, M60, M60A1, M60A2	Rifle Grenade, Fragmentation, M17
Projectile, 155-mm, AP, M112	Grenade, Smoke, WP, M15
Projectile, 155-mm, HE, Mk I, Mk IA1	Grenade, Hand, Tear, CN, M7 and M7A1
Projectile, 155-mm, Smoke, WP, M110 and M110E1	Grenade, Smoke, M18 with fuze, M201, M201A1
Projectile, 155-mm, HE, M107	Grenade, Smoke, HC, AN-M8
Projectile, 155-mm, Illum, M118 Series	Mine, Anti-personnel, Practice, M68
Propelling Charge, 155-mm, M3 Series	Mine, Anti-Tank, M7A1
Propelling Charge, 155-mm, M4 Series	Mine, Anti-Tank, M1A1
Mortar, 60-mm, HE, M49A2	Signals, Illuminating, Ground, Parachute, Red Star, M126A1; White Star, M127A1; Green
Cartridge, 60-mm, Illuminating, M83A3, M83A2 and M83A1	Star, M195
Cartridge, 60-mm, Training, M69	Simulator, Projectile, Ground Burst, M115A2
Cartridge, 60-mm, SABOT M3, 22-mm Sub-caliber Practice Cartridge M744, M745,	Simulator, Hand Grenade, M116A1
M746 and M747	Simulator, Boobytrap, Flash, M117; Illuminating, M118; Whistling, M119
Shell, 81-mm, HE and Practice, M43A1	Chemical Agent Identification Set (CAIS): Set, Gas Identification, Detonation, M1

Note: In accordance with the text of the Archive Search Reports, this list of items may or may not include all ammunition that has been used on Camp Bonneville. The intent of the list is to provide the reader with the most likely, and in some cases the most hazardous, items that may still be present at Camp Bonneville.

Table 2-2
Summary of Ordnance-Related Items
Found/Known to Have Been Disposed of at the Landfill

Class C Fireworks
F-84 Ejection Seats
C-119 JATO Bottle
20mm Ammunition
2.75-inch Rockets
155mm Round
AIM 4 Falcon Missiles (warheads and motors)
AIM 9 Warheads
AIM 7 Sparrow Missiles
Mark 38 Rocket Motors
C4 Explosive (training)
Detonation Cord (training)
TNT (training)
Small Arms
Grenade Spoons
Rifle Grenades
Time Fuze

3. SUMMARY OF CLEANUP STANDARDS AND POINTS OF COMPLIANCE

The following section describes how Tetra Tech will evaluate the environmental condition of the site in compliance with the DOE MTCA Cleanup Regulation (WAC chapter 173-340). Indicator hazardous substances, applicable MTCA cleanup levels, points of compliance, and ARARs are defined in the following sections.

3.1 INDICATOR HAZARDOUS SUBSTANCES

Contaminants known to be present at the Site (CKPS) were identified based upon the results presented in the Landfill 4 Site Investigation Report prepared by Shannon and Wilson in 1999, and the Expanded Site Inspection Report prepared by URS in 2003. Given that contaminants detected in the groundwater underlying the Site likely originate from either the materials buried in the Landfill or the surface and near-surface ordnance detonation activities conducted at the Site, the indicator hazardous substances selected for soil include substances that have been detected in both the soil and groundwater. The selection was based upon the magnitude of results obtained during past investigations and the toxicity and persistence of the compounds under consideration. The CKPS for soil and groundwater and the selected indicator hazardous substances are presented in Sections 3.1.1 and 3.1.2, respectively. During the cleanup action, the analytical results of the indicator hazardous substances and other COPCs will be compared to MTCA soil cleanup criteria to determine when the cleanup action has reached compliance with MTCA cleanup criteria and is considered complete.

3.1.1 Soil Investigations

The CKPS in soil, the maximum observed concentration, and those contaminants selected as indicator hazardous substances for soil are presented in Table 3-1.

Table 3-1
CKPS in Soil and Those Selected as Indicator Hazardous Substances for Soil

Contaminants Known to be Present at the Site	Maximum Observed Concentration (mg/kg)	Selected as Indicator Hazardous Substances
Arsenic	6.6	
Barium	711	*
Beryllium	1.1	
Chromium	85.3	*
Copper	267	*
Nickel		

The only contaminants detected which exceed the DOE MTCA Method B screening levels for the protection of groundwater were barium, copper, and chromium. However, only total chromium levels were analyzed in the previous sampling effort and the MTCA screening value is based upon hexavalent Chromium (Cr^{+6}). Actual Cr^{+6} levels may be less than those reported. Therefore, although chromium may not warrant inclusion as an indicator hazardous substance, due to its toxicity it has been listed as such until further analyses and speciation indicate whether its inclusion is truly warranted. Arsenic, beryllium, and nickel were detected in Site soils above the MTCA Method B screening levels, however at concentrations lower than documented Clark County background concentrations for these metals. Therefore, these three analytes were not selected as indicator hazardous substances. Low levels of one or more VOCs, SVOCs, insecticides, and herbicides were also detected in some soil samples collected from the Site, but all detected concentrations were below regulatory screening criteria levels.

3.1.2 Groundwater Investigations

The CKPS in groundwater, the maximum observed concentration, and those contaminants selected as indicator hazardous substances for soil are presented in Table 3-2.

Explosives and propellants were detected in all groundwater samples collected from at the Site. The detected explosives and propellants were RDX, HMX, perchlorate, 2,4-dinotrotoluene, and 2-nitrotoluene. The maximum concentration of RDX detected in groundwater exceeds the MTCA Method B cleanup level, the U.S. Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goal (PRG) level, and the EPA Region 10 Risk Based Concentration (RBC) level. The maximum detected concentrations of perchlorate and 2,4-dinitrotoluene exceed the EPA Region 9 PRG and the Region 10 RBC level. Based on the detected levels and the regulatory thresholds, RDX, HMX, perchlorate, and 2,4-dinotrotoluene were selected as indicator hazardous substances for the interim cleanup action.

Thirteen VOCs were detected in groundwater samples collected from the Site, of which only five exceeded regulatory screening levels. These five compounds are 1,1,1-trichloroethane, 1,1-dichloroethene, benzene, dichlorodifluoromethane, and tetrachloroethene. All five of these VOCs were selected as indicator hazardous substances.

Thirteen metals were detected in all of the groundwater samples collected from the Site, of which only five exceeded regulatory screening levels. These five compounds are arsenic, copper, iron, lead, and zinc. All five of these metals have been selected as indicator hazardous substances.

No SVOCs, TPH-Gasoline, TPH-Diesel, nitrite, cyanide, Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), or herbicides were detected in any of the groundwater samples collected from the Site.

Table 3-2
CKPS in Groundwater Selected as Indicator Hazardous Substances for Soil

Contaminants Known to be Present at the Site	Maximum Observed Concentration (µg/L)	Selected as Indicator Hazardous Substances
Explosives and Propellants		
2,4-dinitrotoluene	0.49	*
HMX	2.9	*
2-nitrotoluene	0.26	
Perchlorate Ion	251	*
RDX	120	*
Volatile Organic Compounds (VOCs)		
Acetone	4.1	
Benzene	0.7	*
Dichlorodifluoromethane	120	*
1,1-dichloroethane	33	
1,1-dichloroethene	36	*
1,1,1-trichloroethane	290	*
Trichloroethene	9.8	
Trichlorofluoroethane	0.8	
1,1,2-trichloro-1,2,2-trifluoroethane	91	
Tetrachloroethene	1.1	*
Metals		
Arsenic	2.5	*
Barium	93	
Calcium	9020	
Chromium	65	
Copper	16	*
Iron	10,400	*
Lead	12	*
Magnesium	6410	
Nickel	40	
Potassium	10,600	
Selenium	0.6	
Sodium	26,500	
Zinc	49	*

In summary, CKPS are contaminants that have been positively detected in either the soil or the groundwater at the Site and, therefore, are presumed to be present in the Landfill debris/soils. The indicator hazardous substances selected for this proposed soil interim cleanup were derived from the CKPS in both soil and groundwater. Further, because of the limitations that the MEC/MC have placed on previous investigations conducted at the Site, the BCT has developed a comprehensive list of COPCs for testing during the excavation of the Landfill. Tetra Tech will analyze the soils at the point of compliance and excavation limits for the COPCs and compare the analytical results with the approved cleanup levels. The Confirmation Sampling and Analysis Plan (SAP) includes detailed information on the analytical methods and procedures proposed to identify the presence of COPCs.

3.2 CLEANUP LEVELS AND POINTS OF COMPLIANCE

The MTCA Cleanup Regulation (WAC Chapter 173-340) defines a two-step approach for establishing cleanup requirements for individual sites. First, cleanup standards must be established, including contaminant cleanup levels and points of compliance. The selected cleanup action, or actions, must then be able to meet these cleanup standards. Cleanup levels determine the concentration at which a particular hazardous substance no longer poses an unacceptable risk to human health or the environment. Points of compliance designate the location on the site where the cleanup levels must be met. The MTCA regulation provides three options for establishing cleanup levels, Methods A, B, and C.

Use of Method A is designed for cleanups that are relatively straightforward or involve only a few hazardous substances. Method A provides tables of cleanup levels established by DOE that are deemed protective of human health. These cleanup levels were developed using the procedures in Method B and include 25 to 30 of the most common hazardous substances found in soil and groundwater at sites. This method is typically used at smaller sites that do not warrant the costs of conducting detailed site studies and site-specific risk assessments.

Method B may be used at any site and is the most common method for setting cleanup levels at sites contaminated with substances not listed under Method A. Method B cleanup levels are established using applicable state and federal laws, the risk assessment equations provided in MTCA, and other requirements specified for each medium. Method B is divided into two tiers, standard and modified. Standard Method B uses generic default assumptions to calculate cleanup levels. The DOE has pre-calculated cleanup levels using the standard Method B equations for most regulated substances. Modified Method B provides for the development of site-specific cleanup levels using chemical-specific or site-specific information to change selected default assumptions in the standard method. Sites that are remediated using Method B cleanup levels generally do not require future

restrictions on the use of the property, due to the small amount of residual contamination typically left on the property.

Method C cleanup levels may be used to set soil and air cleanup levels at industrial sites, and for groundwater, surface water, and air cleanup levels, when Method A or Method B cleanup levels are lower than technically possible, or when cleanup levels are lower than area background concentrations. Like Method B, Method C is divided into two tiers, standard and modified. However, cleanup levels are based on less stringent exposure assumptions, and the lifetime cancer risk is set higher for both individual substances and for the total cancer risk caused by all substances on a site. Remediation to Method C cleanup levels assumes that risks to human health and/or the environment remain onsite subsequent to remediation, and so requires that institutional controls be placed on the property.

At the Site, Tetra Tech proposes the use of Method B cleanup levels for the following reasons:

1. Based on the review of previous investigations, not all of the contaminants previously detected at the site are listed under Method A.
2. The contaminant concentrations detected to date in soil and groundwater samples collected from the Site are relatively low. Therefore, Tetra Tech does not believe that the use of modified Method B to develop site-specific cleanup levels is currently warranted.
3. Method C is designed for use at industrial or controlled sites where contaminant pathways resulting in human health risks are limited and institutional controls can be put in place that eliminate or reduce the potential human health risks to acceptable levels. Given that proposed reuse options for the site include public access parkland, this Method represents a less desirable solution.

Once the initial results of confirmation samples have been obtained, these results will be compared to the standard Method B concentrations published by DOE in the document entitled MTCA Cleanup Levels and Risk Calculations (CLARC) Version 3.1, as revised in 2001. If this comparison indicates that site cleanup will not be achieved using standard Method B cleanup levels, additional data will be collected to support cleanup level development under modified Method B, or possibly Method C.

The Army's scope of work for the interim cleanup action and DOE's EO stipulate the Site is to be cleaned by excavation. The goal of the interim cleanup action is to remove contaminant sources to groundwater. Based on the likely operational history of the Site, contaminant sources are associated with the landfill disposals and ordnance demolition. Normal landfill construction would not result in excavation below the water table. Thus, it is unlikely that landfill debris was placed below the water table. Likewise, demolition activities occurred after landfill operations cease. Normal

demolition activities were unlikely to excavate through landfill debris to the water table to destroy munitions. Excavation to remove the sources within the landfill should initially terminate once native soil is encountered in the floor of the excavation. Confirmatory samples (taken on a maximum 25-foot grid spacing with biased samples collected from locations determined by site conditions) may indicate areas of soil contamination, i.e., potential sources of groundwater contamination. Identified areas of soil contamination will be excavated to clean native soil (confirmed with sampling).

Contaminated soil below the water table is not likely to represent primary sources. The contaminants of concern in the groundwater at Landfill 4 are RDX and perchlorate. The contaminants exhibit relatively low sorption coefficients, i.e., they tend to remain in solution and not sorbed to aquifer solids. The most efficient way to remediate the sorbed components on aquifer solids is to treat (e.g., in situ biodegradation) the dissolved phase components thereby promoting further desorption and treatment.

Therefore, Tetra Tech proposes to excavate all of the landfilled material present onsite vertically to an estimated average depth of 15 feet or to groundwater. Tetra Tech proposes to set the no further action vertical point of compliance for soil contamination at the Site at the point at which the MTCA Method B limits for soil are met. Laterally, the no further action point of compliance for soil contamination at the Site will be the point at which MTCA Method B limits for soil are met. If soil contamination extends into the saturated zone, the results of the confirmation sampling will be discussed with DOE to identify a path forward for further remedial action. No groundwater remedial action shall be included in this cleanup effort.

Table 3-3 presents the MTCA Method B soil cleanup levels for the selected indicator hazardous substances. A table similar to Table 3-3 will be developed for all COPCs detected during the confirmation sampling.

Table 3-3
Cleanup Criteria for Soil

Selected Indicator Hazardous Substances	MTCA Method B Soil Cleanup Level[a] (mg/kg)	EPA Region 9 PRG[b] (mg/kg)
Explosives and Propellants		
2,4-dinitrotoluene	0.5	120
Perchlorate Ion	0.5	7.8
HMX	3.2	3,100
RDX	0.5	4.4
Volatile Organic Compounds (VOCs)		
Benzene	0.05	0.6
Dichlorodifuoromethane	6.4	94
1,1-dichloroethene	0.003	120
1,1,1-trichloroethane	1.584	1,200
Tetrachloroethene	0.053	1.5
Metals		
Arsenic	6.0	22
Barium	450	5,400
Chromium III	576	100,000
Chromium VI	27	30
Copper	267	3,100
Iron	36,100	23,000
Lead	17	400
Zinc	96	23,000

Notes: a – Washington State Department of Ecology Model Toxics Control Act Cleanup Regulation, Washington Administrative Code Chapter 173-340, Method B Cleanup levels derived using DOE's MTCASGL10 workbook for the protection of groundwater.
b – From EPA Region 9 website: http://www.epa.gov/region09/waste/sfund/prg/files/02table.pdf.

3.3 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The EPA has defined ARARs as those promulgated regulations that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. EPA also states that non-promulgated advisories and guidance documents issued by federal or state governments do not have the status of potential ARARs, but may be used to determine the level of cleanup necessary to protect human health and the environment. For a regulation to be applicable, it must satisfy all jurisdictional prerequisites of the requirement.

DOE has defined the term "applicable state and federal laws" as including those legally applicable requirements and requirements that DOE determines are relevant and appropriate requirements. Legally applicable requirements include those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location or other circumstances at the Site. Promulgated requirements are those laws and regulations that are of general applicability and are legally enforceable. Relevant and appropriate requirements include those cleanup standards, standards of control, and other environmental requirements, criteria, or limitations established under state or federal law that, while not legally applicable to the hazardous substance, cleanup action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the Site that their use is well suited to the particular site.

Table 3-4 provides a list of the federal, state, and local statutes and regulations that could serve as potential ARARs for the cleanup action at the Site. The table is arranged as follows: in the first column, the appropriate federal or state statute is listed, with subsequent listings of the statute given as abbreviations; in the second and third columns, the corresponding regulations are cited as provided by regulatory agencies, and a brief description is given. The final column of the table presents a rationale for the selection of the ARAR in regard to the activities to be performed during the Cleanup Action.

Table 3-4
Preliminary Identification of Federal, State, and Local
Applicable or Relevant and Appropriate Requirements

Federal Statute	Regulation	Description	Preliminary Rationale for Selection
RCRA[a]	40 CFR Chapter I Subchapter D Part 148 and Subchapter I Parts 260 through 282	Establishes regulations for the identification, management, and disposal of hazardous materials and hazardous wastes	SELECTED – will regulate the management and disposal of investigation derived waste (IDW) and materials generated during landfill excavation
HMTA[b]	49 CFR Chapter I Parts 171 through 179	Establishes regulations regarding the transportation of hazardous materials and hazardous wastes	SELECTED – will regulate the transportation of landfill material and IDW for disposal
CWA[c]	40 CFR Chapter I Subchapter D, Parts 125 through 131	Establishes regulations for the protection of the surface waters of the United States	SELECTED – will regulate the control of surface discharges during excavation
CAA[d]	40 CFR Chapter I Subchapter C Part 63	National Emission Standards for Hazardous Air Pollutants	SELECTED – will regulate the control of air emissions during soil excavation
OSHA[e]	29 CFR Chapter 1910 and 1926	Establishes regulations to protect workers health and safety	SELECTED – will regulate the control of physical, chemical, and biological hazards to human health during the cleanup action
State Statute	**Regulation**	**Description**	**Preliminary Rationale for Selection**
WAC[f]	Chapter 173-340	Model Toxics Control Act (MTCA) establishing rules for contaminated site cleanup and soil and groundwater cleanup levels	SELECTED – MTCA will regulate site cleanup and the selection of cleanup levels
RCW[g]	Chapter 70.94.040	Law prohibiting any activity that causes air pollution	SELECTED – will regulate the control of air emissions during soil excavation
RCW	Chapter 70.105	State Hazardous Waste Statute creating a hazardous waste management system	SELECTED – will regulate the management and disposal of IDW and landfill materials generated during the removal action

Table 3-4
(continued)

State Statute	Regulation	Description	Preliminary Rationale for Selection
WAC	Chapter 173-303	State Dangerous Waste Regulations	SELECTED – will regulate the characterization, management, and disposal of IDW and landfill materials
RCW	Chapter 70.107	State Noise Control Law	SELECTED – will apply during cleanup activities
RCW	Chapter 49.17	Laws established to protect worker's health and safety	SELECTED – will apply during the cleanup action; designed to control physical, chemical, and biological hazards to human health
RCW	Chapter 296	Regulations established to protect worker's health and safety	SELECTED – will regulate the control of physical, chemical, and biological hazards to human health during the cleanup action
WAC	Chapter 173-400	Establishes standards for fugitive dust and specific VOC source emissions	SELECTED –will regulate the control of fugitive dust emissions during soil excavation
Local Statute	**Regulation**	**Description**	**Preliminary Rationale for Selection**
CCC[h]	Title 9 Chapter 9.14	Establishes Clark County's noise control ordinance	SELECTED – will apply during cleanup activities
CCC	Title 10 Chapter 10.08A	Establishes vehicle load limits and oversize load permit requirements for Clark County	SELECTED – will apply to the transportation of IDW, excavated materials, and fill materials during cleanup activities
CCC	Title 20	Establishes Clark County's State Environmental Policy Act Policies and Procedures	SELECTED – will apply based on the selected remedial action
CCC	Title 24 Chapter 24.12	Prescribes standards for the storage, transportation and disposal of wastes within Clark County	SELECTED – will apply to the transportation of IDW, excavated materials, and fill materials during cleanup activities

Notes: a – Resource Conservation and Recovery Act.
b – Hazardous Materials Transportation Act.
c – Clean Water Act.
d – Clean Air Act.
e – Occupational Safety and Health Administration.
f – Washington Administrative Code.
g – Revised Code of Washington.
h – Clark County Code.

4. PROPOSED INTERIM ACTION

The proposed interim action for the Site is the excavation and disposal of the landfilled material and associated soil contaminated above MTCA Method B cleanup levels. This interim action does not include the groundwater. Because of the topography, the available working area around the former landfill itself is limited. Sorting, stockpiling, and profiling of the excavated materials from the former landfill prior to transportation/disposal will take place a short distance away from the landfill. A relatively flat clearing located adjacent to the Camp Bonneville cantonment area is proposed for the sorting, stockpiling, and profiling area. The proposed layout of the Site is presented in Figure 4-1. Prior to the excavation of the former landfill, both site preparation and ordnance-related support will be required. The following section provides a general summary of the activities associated with the proposed interim action.

4.1 SITE PREPARATION

Prior to the excavation of the Landfill, several site preparation activities will be required. The activities are expected to include: the preparation of the soil stockpile areas, the equipment staging area, and the equipment decontamination station; improvements to the existing roadway and bridge; and the preparation of the Landfill buffer and work area. Because of the long history of ordnance use at Camp Bonneville, site preparation tasks will require inclusion of MEC/MC avoidance to protect construction workers performing intrusive tasks.

4.1.1 Soil Stockpile Areas, Equipment Staging Area, and Equipment Decontamination Station

Three areas will be required to provide space for ancillary activities such as equipment and materials storage, stockpiling of excavated soil, soil screening to remove MEC/MC, and equipment decontamination. The first area of approximately 2 acres will be used for screening, sorting, stockpiling, and profiling of the materials excavated from the former landfill. The second area of approximately one acre will be used for equipment staging and decontamination. The last area, also of approximately one acre, will be used for the stockpiling of backfill and other construction material.

4.1.2 Road and Stream Crossing Improvements

The road accessing the Site was not designed to handle the traffic that the proposed interim action will require. Therefore, the roadway that accesses the Site and the bridge that crosses Lacamas Creek require improvement. This activity will involve the grading, widening, and general improvement of the roadway and stream crossing at the project site to support the extensive truck traffic during the interim action.

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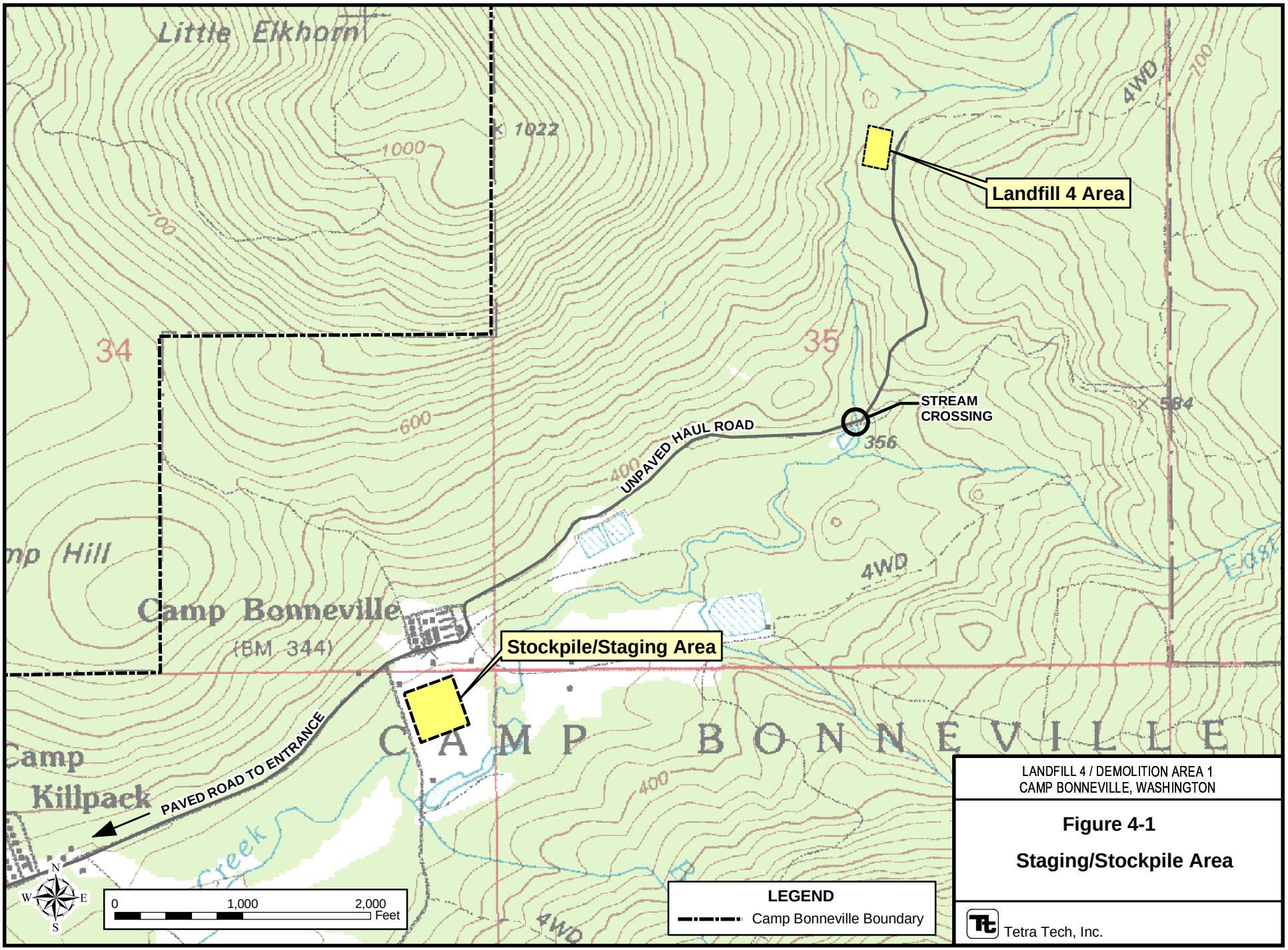
Little Elkhorn
1022
1000
700
34
35
600
400
4WD
700
Landfill 4 Area
STREAM
CROSSING
584
356
UNPAVED HAUL ROAD
Camp Bonneville
(BM 344)
Stockpile/Staging Area
CAMP BONNEVILLE
Camp
Killpack
Creek
PAVED ROAD TO ENTRANCE
East
N
W
E
S
0
1,000
2,000
Feet
LEGEND
Camp Bonneville Boundary
LANDFILL 4 / DEMOLITION AREA 1
CAMP BONNEVILLE, WASHINGTON
Figure 4-1
Staging/Stockpile Area
Tetra Tech, Inc.
X:\GIS\BONNEVILLE\STOCKPILE.MXD

4.1.3 Landfill Buffer and Work Area

A buffer around the Landfill for equipment to maneuver and a small working area adjacent to the Landfill to load and maneuver trucks will also be required. Both the buffer around the Landfill and the working area adjacent to the Landfill will be cleared of vegetation. The working area adjacent to the Landfill will be improved as necessary. Because of its proximity to the Landfill, this task will require inclusion of surface clearance and MEC/MC avoidance in specific areas to protect construction workers performing intrusive tasks such as earthwork.

4.2 DESCRIPTION OF ORDNANCE-RELATED SUPPORT ACTIONS

The ordnance support actions for this project consist of several inter-related tasks designed to ensure the safety of construction workers and other site personnel involved in the excavation of the Landfill. The physical activities described in this section of the CAWP will be supplemented with targeted training and rigorously enforced safety precautions to provide a comprehensive system for safe, effective implementation of the soil removal action described in the previous section. Ordnance-related support actions are briefly described in the following paragraphs. Specific details of the methodology for each task are presented in Section 5.

4.2.1 Surficial MEC/MC Clearance/Brush Removal

A surface clearance will be performed at the Landfill prior to the beginning of other planned activities. The purpose of this activity will be twofold: (1) to identify and remove MEC/MC that may pose a hazard to site personnel, and (2) to remove metallic debris that may interfere with planned geophysical activities in support of MEC/MC removal. During the surface clearance, brush and vegetation that may interfere with future geophysical survey activities and visual observation of construction activities will be removed. This will improve the ability of UXO personnel to provide effective MEC/MC avoidance and removal. Surface clearance will also be performed in other areas where intrusive work such as earthwork is planned.

4.2.2 Removal of MEC/MC in Shallow Landfill Soils

The techniques used by the Army for disposal of MEC at the Landfill may have resulted in MC in the shallow soils of the Landfill (approximately 0 - 4 feet). Removal of this soil for future disposal will require much more extensive MEC/MC avoidance efforts (in the form of MEC/MC removal) than those required for soils located deeper in the Landfill. The purpose of this task is to safely and effectively remove the MEC/MC from the shallow landfill soils so that less labor intensive techniques may be used to evaluate and remove soils that lie deeper in the Landfill. A mag and dig technique will be coupled with tiered soil removal to allow for careful examination of the shallow soils and comprehensive removal of the MEC/MC and metallic debris present.

4.2.3 Removal of MEC/MC in Deep Landfill Soils

Once the shallow soils of the Landfill have been cleared of MEC/MC and metallic debris, this task will be implemented to clear the deeper landfill soils for safe removal. Geophysical survey techniques will be applied to locate and evaluate potential ordnance items. UXO personnel will perform intrusive investigation of metallic anomalies and identify those items that require removal prior to more conventional excavation of the remainder of the Landfill.

4.2.4 MEC Avoidance for Soil Removal Action

The MEC/MC activities described in the previous section will result in identification and removal of a very large percentage of the MEC/MC present at the Landfill; however, all detection techniques used to identify ordnance-related items have limitations based upon the design of the metal detectors employed and the composition, size, depth, and orientation of the target items. In order to ensure the safety of construction personnel performing soil removal, all activities will be observed by trained UXO personnel. These individuals will provide constant monitoring of intrusive actions to allow prompt identification and removal of MEC/MC from the work area. UXO staff will also monitor intrusive actions at areas outside the landfill.

4.2.5 Mechanical Screening of Excavated Soils for MEC/MC

Mechanical screening of the soils removed from the Landfill during the mag and dig operations will provide another opportunity to increase the effectiveness of MEC/MC removal. Soils taken from the Landfill during this phase of operations will be processed through a mechanical screen plant equipped with a magnetic bar. Both the screen and the magnet will remove small MEC/MC items that may not have been detected or observed during previous MEC/MC removal activities. The screening is a very reliable method for evaluating the results of previous avoidance actions and removing remaining items of concern from the soils prior to disposal at a regional landfill.

4.2.6 Management and Disposition of MEC/MC and Metal Waste

The final component of MEC/MC support actions will be the inspection and/or disposal of MEC/MC and MD and final disposition of the wastes. All MEC and MC must be disposed of properly. The proposed method is sand bag tamped detonation at the Landfill. The proposed method and location will prevent the spread of contamination at Camp Bonneville, limit the amount of handling and transport required, and ensure that items are free of energetic materials prior to disposition. This activity will incorporate joint inspection of the final waste material with the Army prior to disposition offsite.

4.3 DESCRIPTION OF LANDFILL EXCAVATION

Following completion of MEC/MC removal activities, excavation of the former landfill will begin. All landfilled material and associated soil contaminated above MTCA Method B soil cleanup levels will be excavted and removed. In the unlikely event that landfill debris extends into the saturated zone it will be removed. The limits of the material and soil to be excavated (i.e., above the MTCA method B soil cleanup levels) will be determined through a combination of visual inspection and confirmation sampling. In the unlikely event that the excavation extends to the water table and the results of the confirmation sampling still exceed MTCA Method B cleanup levels for soil, the sampling results will be discussed with DOE and additional excavation or some form of treatment may be considered.

The excavated material will be visually sorted into three classifications (landfill debris, obviously stained or contaminated soil, and visually uncontaminated landfill soil) before loading it for transport to the stockpile area. After transportation to the stockpile area, the material will be further sorted and profiled for appropriate disposal.

UXO personnel will remain onsite during all excavation and sorting activities following the MEC/MC removal phase to provide MEC/MC avoidance. All construction equipment used on the cleanup action will be decontaminated before being removed from Camp Bonneville.

4.4 ALTERNATIVES CONSIDERED AND JUSTIFICATION OF THE SELECTED ACTION

Alternatives for this Interim Cleanup Action were not evaluated. The February 2003 DOE EO requiring the cleanup of the Site stipulates that the interim cleanup shall be to excavate and dispose of materials and contaminated soil from the Site.

5. IMPLEMENTATION OF INTERIM ACTION ORDNANCE SUPPORT ACTIVITIES

This section of the CAWP provides a safe and efficient methodology for removal of potential MEC and related MC in the soils that are scheduled for removal at the Landfill.

5.1 OVERVIEW

This methodology has been developed to protect the workers performing site preparation tasks (brush clearance, road improvements, etc.), MEC screening/removal, and landfill soil/debris removal. The procedures and guidelines presented in this section of the CAWP should be used in conjunction with the Site-Specific Health and Safety Plan (HASP) for Remedial Action Ordnance Support Operations, included in the overall HASP.

This section of the CAWP contains procedures and guidelines for the following ordnance-related activities:

- Mobilization/demobilization;
- Conventional survey of the Landfill work area, establishment of corners and boundaries;
- Surface MEC/MC clearance/brush removal;
- Geophysical survey to verify size of work area;
- Tiered excavation of MEC/MC contaminated soils (using mag and dig techniques);
- Geophysical survey to identify deep anomalies;
- Excavation of geophysical anomalies;
- MEC avoidance for landfill excavation and other intrusive activities;
- Screening of soils excavated from the Landfill for MEC/MC removal;
- Disposal of MEC/MC (as appropriate) by detonation; and
- Inspection and disposal of MD and scrap

In addition, this portion of the CAWP provides a description of staffing, equipment, and quality control for ordnance-related activities. Effective integration of qualified UXO staff, appropriate equipment, and proper implementation of technically sound procedures is essential for safe, efficient MEC/MC removal from the Landfill.

The procedures and guidelines presented in this section of the CAWP have been developed based upon several important decision criteria including the following:

- The known history of the Landfill;
- The known history of Camp Bonneville;
- The munitions that are known to have been destroyed at the Landfill;
- The munitions that are known to have been used, stored, or disposed of at Camp Bonneville; and
- The experience and training of senior level UXO staff who have performed numerous ordnance removal projects at similar sites.

Section 2.1.2 contains a discussion of the ordnance potentially present in the Landfill. Based on the information available, the 155 mm projectile has been selected as the MPM for most of the planned activities at the Site. Two of the planned activities will be performed on soils that will have already been subjected to rigorous MEC removal procedures. For these two tasks, the MPM has been identified as a 20mm projectile. The MPM s and associated exclusion zones are discussed in more detail in Section 5.1.3.

The historical data available suggest that CWM is not present at the Landfill; however, CAIS were utilized at Camp Bonneville and there is a remote chance that these items were disposed of at the Landfill. If any indications of CWM are observed at the Landfill, or if suspect items are found, all work at the Landfill will immediately be terminated and all personnel will promptly evacuate from the site. The Senior Unexploded Ordnance Supervisor (SUXOS) will immediately notify the Army caretaker staff on site at Camp Bonneville and the Army representative at Fort Lewis. Work will not be re-initiated until it can be demonstrated that it is safe to do so and authorization is received from the Project Manager for MEC Operations (PMM) and the SUXOS.

5.1.1 Personnel Qualifications, Roles and Responsibilities

All Tetra Tech employees and subcontractors conducting MEC-related activities on this project are expected to maintain vigilance at all times to ensure that the work is conducted in a safe and efficient manner. They are also required to follow Tetra Tech's general safe work rules as discussed in the company's Corporate Environmental Health and Safety Program Manual, as well as the provisions of the site-specific HASP.

Tetra Tech personnel will be assigned specific project roles and responsibilities to ensure that lines-of-authority, efficient communications, and well-defined work requirements and responsibilities are maintained during the project. These project roles and responsibilities, as well as the necessary qualifications for each key position, are described below.

5.1.1.1 *Project Manager – MEC Operations*

The PMM will be responsible for the management of all aspects of the MEC/MC avoidance and removal activities. The PMM will provide management of and direction to the UXO personnel assigned to the project site and will keep the Tetra Tech Construction Project Manager (PMC) informed of personnel requirements, schedule, and field execution issues requiring resolution. The PMM is also responsible for ensuring that all needed resources are provided for UXO personnel.

The PMM will be required to have experience with all aspects of project management including planning, scheduling, logistics, development of work plans and reports, and billing. In addition, the PMM will have the following qualifications:

- Successful completion of the Tetra Tech Project Management 100 training course;
- Successful completion of the Tetra Tech Project Management 200 training course;
- Successful completion of the Tetra Tech Loss Control training course;
- Current Occupational Safety and Health Administration (OSHA) 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training; and
- Previous experience with ordnance projects.

5.1.1.2 *Senior UXO Supervisor*

The SUXOS assigned to the project will direct MEC operations. This individual will be responsible for proper implementation of the field procedures outlined in the CAWP and the safety provisions of the HASP. He/she will have ultimate authority to stop work if MEC hazards above and beyond those outlined in the plans are encountered. The SUXOS will oversee all aspects of daily ordnance operations at the site and will work with the PMM to ensure safe, efficient, effective implementation of the Plans. This individual is responsible for tracking labor hours and equipment usage and preparing daily reports documenting MEC activities at the site.

The SUXOS will be a highly qualified UXO Technician III with 15 years of experience in the management of ordnance operations. The qualifications for a UXO Technician III are presented in Section 5.1.1.6. In addition, the SUXOS for this project will have the following qualifications:

- Demonstrated ability to plan, coordinate and supervise all on-site MEC activities;
- Demonstrated ability to supervise multiple UXO teams engaged in MEC activities, such as reconnaissance, surveying, vegetation clearance, location of surface MEC, excavation of subsurface MEC, classification of MEC, transportation and storage of MEC and explosives, and disposal of MEC by open burning or open detonation;
- Previous experience with soil screening operations for MEC removal;

- Previous experience in the development and implementation of site-specific UXO training programs; and
- Previous experience with onsite disposal of MEC/MC.

5.1.1.3 *UXO Safety Officer*

The UXO Safety Officer (UXOSO) assigned to the site will assist the SUXOS with implementation of the Site-Specific HASP and will be responsible for the observations, audits, and inspections needed to ensure that site operations are being conducted in a safe and prudent manner. The UXOSO will present daily safety briefings designed to increase awareness of site-specific hazards and the procedures in place to minimize them.

The UXOSO will be a highly qualified UXO Technician III with extensive experience in the management of ordnance operations. The qualifications for a UXO Technician III are presented in Section 5.1.1.6. In addition, the UXOSO for this project will have the following qualifications:

- Successful completion of the Tetra Tech corporate Environmental Safety Supervisor training (or other approved training);
- Successful completion of the Tetra Tech corporate Loss Control Course (or other approved training);
- Demonstrated ability to implement the approved UXO and explosives safety program in compliance with all Department of Defense (DoD), federal, state and local regulations;
- Demonstrated ability to analyze MEC operational risks, hazards and safety requirements; ensure compliance with all site-specific safety requirements for MEC operations; and, enforce personnel limits and safety exclusion zones for UXO operations; and
- Previous experience with OE/UXO transportation, storage and destruction.

5.1.1.4 *UXO Quality Control Officer*

The UXO Quality Control Officer (UXOQC) assigned to the Site will assist the SUXOS with implementation of the Quality Control (QC) measures specific to the ordnance operations onsite and will be responsible for the observations, audits, and inspections needed to ensure that site operations are being conducted in a manner consistent with the quality objectives for the project. The UXOQC will oversee equipment calibration, including daily function tests for metal detectors, and will participate in the inspection and certification process for MC found during excavation operations at the Landfill. The UXOQC role for this project will be filled by the UXOSO. This individual will perform both the health and safety related duties and the QC functions.

The UXOQC will be a highly qualified UXO Technician III with extensive experience in the management of ordnance operations. The qualifications for a UXO Technician III are presented in Section 5.1.1.6. In addition, the UXOSO for this project will have the following qualifications:

- Successful completion of the U.S. Army Corps of Engineers Construction Quality Management for Contractors training course, or other approved training or appropriate certification such as American Society of Quality certification as a QC Auditor, a QC Engineer, a QC Manager, or a QC Technician; and
- Demonstrated ability to fully implement the contractor's QC plans; conduct QC inspections of all MEC/MC operations for compliance with established procedures; and direct and approve all corrective actions to ensure all MEC operations comply with contractual requirements.

5.1.1.5 *UXO Team Leaders*

UXO Team Leaders assigned to the project will direct the daily activities of their individual teams. They will be responsible for ensuring that all required daily preparation tasks are performed, including equipment function testing. The team leaders are also responsible for clearly defining daily tasks assigned to the team and recording any required field data. The UXO Team Leaders will be qualified at the UXO Technician III level. The qualifications for a UXO Technician III are presented in Section 5.1.1.6. No additional, site-specific qualifications are required for this project.

5.1.1.6 *UXO Team Members*

UXO team members will be responsible for carrying out MEC operations in accordance with the instructions received from their respective team leaders. These individuals will operate metal detectors, perform visual observation for MEC items, and conduct intrusive investigation of subsurface anomalies identified using the metal detectors. UXO Team members are typically qualified at the Technician I or Technician II level; however, they may also be qualified at the UXO Technician III level. The minimum requirements for each technician level are specified below.

UXO Technician I

A UXO Technician I in the employ of Tetra Tech will be a graduate of one of the schools/ courses listed below, or any other DoD-certified equivalent school/course.

1. Explosive Ordnance Disposal (EOD) Assistants Course, Redstone Arsenal, AL
2. EOD Assistants Course, Eglin Air Force Base, FL
3. International UXO Training Program, Texas A&M University

A UXO Technician I can advance to the UXO Technician II level after 5 years of combined active duty military EOD and private sector UXO experience. This individual assists fully qualified UXO

personnel (level II and above) in conducting reconnaissance and classification of MEC items; identifying all types of munitions; locating surface and subsurface MEC using locator equipment; performing excavation of subsurface MEC; transporting MEC and demolition materials, and preparation of electric and non-electric firing systems for destruction of MEC.

UXO Technician II

A UXO Technician II in the employ of Tetra Tech will be a graduate of one of the schools/courses listed below, or a UXO Technician I with at least 5 years combined military and private sector UXO experience.

1. U.S. Naval Explosive Ordnance Disposal School, Eglin Air Force Base, FL (formerly located at Indian Head, MD)
2. U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MDEOD Assistants Course, Redstone Arsenal, AL

This individual must be able to perform all the functions of a UXO Technician I. In addition, he/she must be able to properly store MEC material, identify fuzes, determine fuze condition, and operate navigation and location equipment.

UXO Technician III

A UXO Technician III in the employ of Tetra Tech will be a graduate of one of the schools/courses listed below, and will have at least 10 years combined military and private sector UXO experience.

1. U.S. Naval Explosive Ordnance Disposal School, Eglin Air Force Base, FL (formerly located at Indian Head, MD)
2. U.S. Army Bomb Disposal School, Aberdeen Proving Ground, MDEOD Assistants Course, Redstone Arsenal, AL

This individual must have experience in the direction of MEC operations and the supervision of other personnel. He/she must be able to perform all the functions specified for the Technician I and II. In addition, this individual must be able to supervise on-site disposal of MEC; prepare explosive storage plans, administrative reports, and Standard Operating Procedures (SOPs) for MEC operations; perform MEC risk hazard analysis; conduct daily safety briefings; and supervise all onsite MEC operations.

5.1.1.7 *Geophysical Team Members*

The geophysical staff for the project will consist of a Geophysics Task Manager (GTM), Geophysics Field Lead (GFL), a data manager/QC technician, geophysical data acquisition/survey specialists, data processors/interpreters, and Geographic Information System (GIS) specialists. All of these individuals will have a background, as appropriate, in science, engineering, and computer

science, or will be trained in the specific use of the instrumentation employed. The GTM and GFL will have training and experience in positioning equipment operation, maintenance, and supporting software.

5.1.2 Equipment

Several types of electronic instruments will be used during the MEC-related activities, including two types of metal detectors. This section provides a brief description of the features and operational principles of the major instrumentation for the MEC work, including the rationale for selecting the equipment.

White Spectrum XLT Metal Detector

The White Spectrum XLT is a hand-held metal detector. This instrument, which is known as a very low frequency (VLF) detector, has a single transmitter coil and a single receiver coil located in the instrument head. Electronic current is driven through the transmitter coil to create an electromagnetic field. The direction of the current flow is reversed several thousand times every second. When the current flows in a given direction, a magnetic field is produced with the polarity pointing into the ground. When the current direction is reversed, the polarity points out of the ground. This pulsing magnetic field induces a current in any metallic or conductive objects within range of the detector. This induced current has a polarity that flows against (in the opposite direction from) the field generated by the detector. The receiver coil in the metal detector is configured, so that almost all of the current that would normally flow from the transmitter coil to the receiver coil is cancelled out. However, since the current created by conductive objects in the ground flows in the opposite direction, it is not cancelled out; it is received and amplified by the detector.

The current produced by metallic objects in the ground exhibits a phase shift from the original current. This shift is different for various metals and can be used to differentiate between magnetic soils and buried objects constructed from different types of metals. This discrimination between metallic objects and iron-bearing soils, together with the limited range of the detector (approximately 12 inches) that prevents interference from metal objects deep within the soil horizon, makes the White Spectrum detector ideal for the tiered soil clearance and removal planned at the Landfill. The signal generated by near-surface metal objects will not be distorted or masked by metal objects deeper in the Landfill, and iron-bearing soils can be differentiated from true target objects.

Geonics EM-61 High-Sensitivity Metal Detector

The second metal detector selected for use at the Landfill is the Geonics EM-61 time-domain, electromagnetic, high-sensitivity metal detector. This detector uses two 1-meter square coils oriented one above the other. These two coaxial coils measure the residual magnetic field generated

by conductive and/or magnetic materials. The EM-61 is designed to measure the residual magnetic field at a time when the response from conductive and/or magnetic objects is maximized, compared to the response from most earth materials (magnetic soils or rock). The use of two receiver coils also makes it possible to simply differentiate shallow versus deeper objects. An additional benefit of the specific design of the EM-61 system is that it permits a more focused observation of the subsurface in areas of cultural interference (e.g., utilities, landfill debris), as well as areas characterized by a high spatial density of subsurface objects. This is due both to the mechanical design and the operational parameters of the instrument, as well as to the inherent nature of active electromagnetic fields, which diminish in magnitude at a much higher rate than other sensor technologies such as magnetometers. The range of the EM-61 (can detect an isolated 55 gallon drum at approximately 3 meters bgs) coupled with the capacity of the instrument to provide relatively detailed data, makes it well suited for screening deeper landfill soils once the high-density metallic debris is removed from the upper soil horizon.

Location/Navigation Equipment

The third major component of the instrumentation for the MEC operations is a location/navigation system. The most likely choice for this system is the Leica Series 1100 RTS; however, alternative systems may be used, based on specific site conditions and needs. The Leica Series 1100 RTS consists of a laser-based total station survey instrument (transmitter), prism (receiver), and RCS 100 remote control. The transmitter is positioned over a ground position point of known location, and an x-y-z Cartesian coordinate system is defined by occupying an additional known ground position with the receiver prism. The RCS 100 remote control handheld unit allows one operator to control the RTS instrument from distances of several thousand feet away via wireless protocol. The receiver prism is mounted on a Tetra Tech doghouse centered over the EM-61. The RTS automatically tracks the prism at distances of several thousand feet to an accuracy of approximately 1 inch. Position data for the receiver prism are updated at a rate of 3-4 Hz and stored on a PCMCIA card located on the robotic total station. The RTS will fulfill all of the location/navigation needs for the project and will function well at the Landfill, despite the tall trees surrounding the area. Differential global positioning systems (DGPSs) may not be functional at the Site due to poor satellite signal recovery caused by the tall trees. However, these and other location/navigation systems may be used as appropriate for specific project tasks. A precision construction laser or other similar device may be used to simplify grade checking during excavation.

5.1.3 Establishment of Exclusion Zones Based on the MPM

The exclusion zones (EZs) for all ordnance-related activities at the Site will be based on the Department of Defense Explosive Safety Board, *Technical Paper 16*, Revision 1, 1 December 2003, Table B-1 (DDESB 2003) and the U.S. Army Corps of Engineers HNC-ED-CS-98-7, *Use of*

Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions (USACE, 1998). Two types of ordnance-based EZs are applicable to the work at the Landfill. The first type of EZ is based on a hazardous fragmentation distance (1/600 rule) for accidental detonations. This type of EZ is generally applicable to field activities that could result in an accidental detonation including both MEC operations and construction activities. The second type of EZ that will be used at the Landfill is based on the maximum fragmentation distance used to determine fragmentation distances for intentional detonations. This type of EZ will be used during MEC/MC disposal operations. At the request of the US Army Technical Center for Explosive Safety (USATCES), the maximum fragmentation distance has also been selected for soil screening operations even though this operation would result in an accidental detonation.

The size of the EZ for accidental detonation will be different for various tasks. For most activities, this EZ will be based on the 155 mm projectile as the MPM. Although AIM missiles, which have a greater overall NEW than the 155mm projectiles, were disposed of at Landfill 4, the 155mm projectile has a greater fragmentation distance due to its charge to weight ratio. Based on this greater fragmentation distance, the 155mm projectile was selected as the MPM. Since it is not known what type of 155 mm projectile was previously found at the Landfill, the Projectile, 155-Millimeter: HE, M107 was selected as the MPM. This projectile was chosen from among the various types used at Camp Bonneville based on the greater hazard associated with this type of projectile. The Net Explosive Weight (NEW) for this projectile is 14.5 pounds. Using Table 5-1, which is a reproduction of a portion of Table B-1 in the referenced DDESB publication, this EZ will be set at 447 feet.

The size of the EZ for accidental detonation during activities preceded by comprehensive MEC removal will be based on a 20 mm projectile as the MPM. It is not known what type of 20 mm ammunition was disposed of at the Landfill: however; anecdotal information obtained from the Portland National Air Guard (PANG), indicates that 20mm ammunition disposed of by that organization at Camp Bonneville was PGU 27 TPT ammunition. This particular round is a target practice munition that has no explosive filler and poses little hazard to site workers. Since no specific records are available to ensure that this was the only type of 20mm ammunition destroyed at the landfill, a 20mm round containing a high-average amount of filler has been selected as the MPM for soil excavation following mag & dig operations and for soil screening to provide adequate protection for site workers. The 20mm M56A4 contains 9 grams of filler, which is at the high end of the net explosive weight (NEW) for a majority of the 20mm projectiles made in the United States. In accordance with Table 5-1, EZ for this type of 20 mm projectile will be set at either 200 feet (hazardous fragmentation distance) or 318 feet (maximum fragmentation distance) depending on the type of operation being conducted. This smaller MPM is appropriate for selected activities because a 20 mm projectile is the largest munition that can reasonably escape detection during the

planned MEC removal activities preceding these tasks. EZs for accidental detonation during specific MEC-related project activities are presented in Section 5.2 of the CAWP and in the SOPs for specific tasks (see Appendix A).

The size of the EZ for disposal operations at the Landfill will be based on guidance provided in HNC-ED-CS-98-7. This document specifies the use of withdrawal distances based upon sandbag throw distances for specific types of MEC or 210 feet, whichever is greater. The EZ for disposal based upon the USACE document is greatly reduced over the maximum fragmentation distance required in the DDESB document. This reduction is based on the use of specific thicknesses of sandbags to contain the blast and fragmentation caused by the intentional detonation of MEC items with specific NEWs. A copy of the guidance is included in Appendix A, SOP 5 (MEC/MC Disposal).

5.2 FIELD METHODOLOGY

This section contains a detailed description of the equipment and procedures that will be used to conduct ordnance operations in support of interim remedial actions at the Landfill. These procedures and any associated requirements will apply to all Tetra Tech personnel, subcontract personnel, and any other personnel having a role in these operations or working onsite concurrently. The ordnance operations portion of the project work has been incorporated expressly to protect site workers during interim remedial actions. Strict adherence to the procedures and requirements for this work will be necessary to ensure that the goal of this project element is met.

Table 5-1

High Explosive Bombs And Projectiles

Munition	Explosive Weight (lbs.) *(Kg)*	Diameter (in) *(mm)*	Maximum Fragment Weight (lbs) *(g)*	Fragment Initial Velocity (ft/s) *(m/s)*	Maximum Fragment Range		Hazardous Fragment Distance (ft.) *(m)*
					Horizontal (ft) *(m)*	Vertical (ft) (m)	
GP Bomb (Mk XIII Mod 2)	511.00 *231.784*	17.70 *449.58*	0.9848 *446.6954*	8,239 *2,511.2*	3,617 *1,102.5*	2,859 *871.4*	734 *223.7*
Bomb MK 83	445.00 *201.848*	13.94 *354.08*	0.8923 *404.7433*	6,074 *1,851.4*	3,288 *1,002.2*	2,568 *782.7*	813 *247.8*
Bomb M64A1	274.00 *124.284*	14.20 *360.68*	0.0221 *10.0334*	8,116 *2,473.8*	2,501 *762.3*	1,991 *606.9*	680 *207.3*
Bomb MK 82 Mod 1	192.00 *87.089*	10.75 *273.05*	0.8963 *406.5300*	5,193 *1,582.8*	3,177 *968.3*	2,462 *750.4*	688 *209.7*
16" Mk 14 Projectile	153.57 *69.658*	16.00 *406.40*	15.4582 *7,011.6759*	2,426 *739.4*	5,639 *1,718.8*	3,995 *1,217.7*	550 *167.6*
250 lb Bomb M 57 TNT	129.02 *58.522*	10.36 *263.14*	0.2894 *131.2572*	8,293 *2,527.7*	2,032 *619.4*	1,625 *495.3*	534 *162.8*
250 lb Bomb M 57 Amatol	113.72 *51.582*	10.36 *263.14*	0.3396 *154.0578*	6,365 *1,940.1*	2,497 *761.1*	1,965 *598.9*	492 *150.0*
Bomb MK 81 Mod 1	100.00 *45.359*	9.00 *228.60*	0.5167 *234.3631*	6,674 *2,034.2*	2,856 *870.5*	2,247 *684.9*	583 *177.7*
100 lb Bomb GP Mk 1	65.00 *29.483*	7.90 *200.66*	0.1013 *45.9487*	9,005 *2,744.7*	1,863 *567.8*	1,491 *454.5*	200 *61.0*
100 lb Bomb AN M30A1	62.00 *28.123*	8.20 *208.28*	0.0997 *45.2229*	8,414 *2,564.6*	1,831 *558.1*	1,467 *447.1*	483 *147.2*
155 mm M795	28.80 *13.063*	6.10 *155.00*	0.5620 *254.9176*	4,635 *1,412.7*	2,699 *822.7*	2,078 *633.4*	436 *132.9*
155 mm M107	15.45 *7.007*	6.10 *155.00*	0.6482 *294.0227*	3,426 *1,044.2*	2,577 *785.5*	1,983 *604.4*	447 *136.2*
155 mm Mk I	15.17 *6.881*	6.10 *155.00*	0.7681 *348.4206*	4,032 *1,229.0*	2,842 *866.2*	2,169 *661.1*	395 *120.4*
6" Trench Mortar	13.00 *5.897*	6.00 *152.40*	0.1142 *51.7891*	3,939 *1,200.6*	2,631 *801.9*	2,008 *612.0*	366 *111.6*
75 mm Mk I	1.64 *0.744*	2.95 *75.00*	0.1531 *69.4288*	3,479 *1,060.4*	1,702 *518.8*	1,298 *395.6*	238 *72.5*
75 mm M48	1.47 *0.667*	2.95 *75.00*	0.1530 *69.4109*	3,471 *1,058.0*	1,701 *518.5*	1,297 *395.3*	234 *71.3*
81 mm M43	1.29 *0.585*	3.19 *81.00*	0.0573 *25.9907*	4,933 *1,503.6*	1,395 *425.2*	1,097 *334.4*	230 *70.1*
90 mm HEAT M371 & M431	1.20 *0.544*	3.54 *90.00*	0.1240 *56.2452*	3,075 *937.3*	1,546 *471.2*	1,170 *356.6*	209 *63.7*
60 mm M49A5	0.79 *0.358*	2.36 *60.00*	0.0166 *7.5296*	6,290 *1,917.2*	1,013 *308.8*	806 *245.7*	200 *61.0*
2.36 " Rocket (Case Only)	0.50 *0.227*	2.36 *59.94*	0.0010 *0.4695*	8,888 *2,709.1*	809 645 *246.6*	200 *196.6*	*61.0*
60 mm M49A3	0.42 *0.191*	2.36 *60.00*	0.0237 *10.7387*	5,114 *1,558.7*	1,080 *329.2*	856 *260.9*	200 *61.0*
40 mm MK2	0.187 *0.085*	1.57 *40.00*	0.0331 *14.9959*	3,605 *1,098.8*	1,095 *333.8*	847 *258.2*	200 *61.0*
3"/50 AP Mk 29	0.14 *0.064*	3.00 *76.20*	0.4299 *195.0079*	1,058 *322.5*	1,595 *486.2*	1,117 *340.5*	200 *61.0*
37 mm MK II	0.053 *0.024*	1.46 *37.00*	0.0245 *11.1130*	3,302 *1,006.4*	980 *299*	754 *230*	200 *61*
20 mm M56A4	0.026 *0.012*	0.79 *20.00*	0.0006 *0.2642*	3,183 *970.2*	318 *96.9*	251 *76.5*	200 *61.0*

5.2.1 Mobilization/Demobilization

Tetra Tech will coordinate closely with all site personnel and the Army staff assigned to the project to ensure that the equipment, supplies, and other resources needed to support ordnance activities are present onsite. Tetra Tech will schedule the arrival of the work force in the most effective manner designed to allow immediate productivity. All Tetra Tech and subcontractor personnel mobilized to the Site for ordnance operations will have completed OSHA HAZWOPER training and will meet medical surveillance requirements, as specified in the HASP.

On-site Training

As part of the mobilization process, Tetra Tech will perform site-specific training for all onsite personnel assigned to ordnance support tasks. The purpose of this training is to ensure that all onsite personnel fully understand the operational procedures and methods to be used at this site, including individual duties and responsibilities, and all safety and environmental concerns associated with operations. Any personnel arriving at the site after this initial training session will have to complete the training before starting work. The SUXOS and the UXOSO will conduct the training, which will include the following topics:

1. Field equipment operation, including safety precautions and equipment, field inspection of equipment, and maintenance procedures that will be used;
2. Procedures, guidelines, and requirements in relevant sections of this CAWP and the HASP, as they relate to the tasks being performed;
3. Site and task specific hazards, including physical, biological, and chemical hazards;
4. Public relations, including encounters with the press and public;
5. Environmental concerns and sensitivities, including endangered/threatened species and historic, archaeological, and cultural (HARC) resources onsite; and
6. Specific ordnance materials (MEC, MC, and demolition materials) potentially found onsite or proposed for use in disposal of MEC/MC.

Equipment

Project equipment for ordnance support activities will come from Tetra Tech sources, subcontractors, and local vendors offering equipment for lease or purchase. All equipment, regardless of source, will be inspected to ensure completeness and operational readiness. Any equipment found damaged or defective will be repaired or returned for replacement. All instruments and equipment that require routine maintenance and/or calibration will be inspected initially upon arrival and then periodically as required in the CAWP. This system of checks ensures

that the equipment onsite is functioning properly. If an equipment check indicates that any piece of equipment is not operating correctly and field repair cannot immediately be accomplished, the equipment will be removed from service until it can be repaired. Alternately, the equipment may be replaced with a like model or an approved substitute. Replacement equipment will meet the same specifications for accuracy and precision as the equipment removed from service.

Communications

As part of the initial equipment setup and testing, Tetra Tech will also install and test its communication equipment, including the following:

1. Hand-held portable radios, with a range of 2 miles, will be used to maintain communications between the SUXOS (Tetra Tech Base) and the field teams;
2. Cellular telephones, acquired through a local cellular service (very high frequency band 150-174), will be used as backup communications between the SUXOS and the field teams; and
3. Landline telephones installed in the Tetra Tech project office will complete the communication system and will provide ready access to offsite emergency and medical services.

Notifications/Coordination

During mobilization, the SUXOS and UXOSO will coordinate with local police and fire services and other agencies to ensure availability of resources that may be needed during the course of the project. At a minimum, coordination will occur with the following agencies and services:

- The Client (to reconfirm priorities/schedules and to identify any changes in the scope of work);
- Appropriate state/county personnel;
- Local police/sheriff's department personnel;
- Local fire department personnel;
- Local hospital staff; and
- Local vendors and suppliers.

5.2.2 Temporary Improvement of Roads, Stream Crossings, and Staging Areas

Following mobilization, the roads, stream crossings, and staging areas that will be used for the work and the associated ordnance activities will be improved to accommodate large dump trucks, heavy equipment, and other large or heavy vehicles safely. These improvement activities will incorporate

ordnance avoidance/surface clearance, as necessary, to safeguard personnel conducting the improvement activities.

Two staging/work areas will be used to facilitate the ordnance activities. One area near the Camp Bonneville cantonment area will be prepared for soil screening and storage (stockpiles). A second staging area will be created at the Landfill to facilitate onsite activities. This latter area will be used for storage of materials and chemicals used on-site and will be the location of an approved, sited portable magazine for storage of donor explosives used for MEC disposal. A Connex box or other temporary storage unit will be set up in this staging area for short-term storage of MC and MD. This storage unit will be enclosed by a fence with a locking gate to prevent entry by unauthorized persons. The staging area near the Landfill may also be the site of a storage locker or other storage facility for any hazardous chemicals brought onsite for the project. This storage area will also be fenced to prevent unauthorized access to potentially dangerous substances. Ordnance avoidance/surface clearance will be performed, as necessary, to protect personnel building the staging areas. More detailed procedures for surface avoidance are provided in Appendix A, SOP 1.

5.2.3 Conventional Survey of the Landfill Work Area, Establishment Corners and Boundaries

Before starting field activities in the Landfill work area, the work area boundaries will have to be delineated. Tetra Tech personnel or professional land surveyors will stake the boundary of the work area in accordance with information provided in the Statements of Work for the project. The estimated footprint of the Landfill is a rectangle measuring 120 by 200 feet (approximately 1.3 acres). A 40-foot buffer will be added around the Landfill as part of the work area. Stakes will be placed at intervals sufficient to properly delineate the boundary for follow-on activities.

A qualified UXO Technician II or III, who will provide MEC avoidance, will accompany the team performing the staking work. The UXO technician will sweep the areas where survey personnel will walk or place stakes. Surface MEC/MC items will be flagged/marked for future removal, and survey team members will be cautioned not to walk in areas near these items. Survey personnel may also be instructed to leave the work area upon discovery of an item considered to be immediately dangerous or unstable. The technician performing ordnance avoidance will have the authority to stop work at any time based on an imminent danger posed by MEC. Work will not resume until the UXOSO indicates that it is safe. If a subsurface metallic anomaly is detected at a location where a survey stake is to be placed, the stake will be moved to prevent contact with the item causing the anomaly. Detailed procedures for ordnance avoidance are presented in Appendix A, SOP 1. Required documentation for field operations is discussed in Section 7.

5.2.4 Surface MEC/MC Clearance/Brush Removal

During this task, the surface of the Landfill will be cleared of MEC/MC and metal debris. Concurrently, the brush and small trees growing on the Landfill are expected to be removed. These actions will help ensure the safety of personnel performing subsequent cleanup actions and ordnance-related tasks and will improve the ability of UXO personnel to screen the Landfill area for subsurface metallic items during various stages of the soil and debris removal.

After the boundary of the work area has been staked, a UXO team will perform the surface clearance/brush removal. The team will establish an EZ, set up survey lanes, and perform a detector-aided sweep of the survey lanes to identify all metallic items (including MEC/MC and MD) entirely or partially visible on the ground surface. These items will be managed in accordance with the procedures in Section 5.2.9. No intrusive work will be conducted during the surface clearance. Detailed procedures for this task are presented in Appendix A, SOP 2. Required documentation for field operations is discussed in Section 7.

5.2.5 Removal of MEC/MC in Shallow Landfill Soils

This task will be composed of two subtasks: verification of the size of the Landfill area and tiered soil removal. Each subtask is described below.

5.2.5.1 Geophysical Survey to Verify Size of Work Area

Following the initial clearance to a depth of 1 foot, a geophysical team will survey the Landfill work area using a Geonics EM-61 coupled to a RTS (or other approved location system) for positioning. This survey will be conducted to verify the estimated size and layout of the historical ordnance disposal area. Data will be collected over the entire work site; however, these data will be interpreted only to the degree necessary to obtain general information regarding the large-scale lateral extent of subsurface metallic anomalies potentially representing buried MEC/MC.

A one- or two-man team, accompanied by a UXO escort, will conduct the geophysical survey. Data will be acquired at an approximate line spacing of 5 feet over the 1.3 acre survey area. The EM-61 data will be digitally recorded at a rate of 12-15 samples per second, and RTS position data will be digitally recorded at a rate of 3 - 4 samples per second. Data will be processed at the end of each day to ensure the data are of sufficient quantity and quality to meet the project objectives.

In general, the geophysics QC program consists of a battery of pre-project testing and, once the project has started, a test regimen for each data acquisition session (usually 2-3 times per day). The test regimen includes functional checks to ensure the position and geophysical sensor instrumentation is functioning properly prior to and at the end of each data acquisition session; processing checks to ensure the data collected are of sufficient quality and quantity to meet the project objectives, and interpretation checks to ensure the processed data are representative of the

site conditions. Field personnel, data processors, and data interpreters implement the project and corporate QC programs in a consistent fashion.

Pre-project tests include functional checks to ensure the position and geophysical sensor instrumentation is operating within defined parameters, and includes the following:

- Static tests lasting 15 minutes for the EM-61 system;
- Cable integrity tests for the EM-61 system;
- Manufacturer suggested functional checks for RTS positioning systems;
- Time-stamp relative accuracy tests for position and EM-61 systems; and
- PCMCIA card integrity checks.

Specific functional checks conducted during the data acquisition program include the following:

- Acquisition personnel metal check (ensure no metal on acquisition personnel);
- Static position system check (accuracy and repeatability of position);
- Static geophysical sensor check (repeatability of measurements, influence of ambient noise);
- Static geophysical sensor check with test item (repeatability and comparability of measurements with metal present);
- Kinematic geophysical sensor check with test item (repeatability and comparability of measurements with sensor in motion);
- Repeatability of overall data (re-survey of a portion of the survey area during each data acquisition session); and
- Occupation of survey monuments to ensure comparability, accuracy, and repeatability of RTS positioning system.

All geophysical field data will be archived and backed up on a daily basis. The geophysical data will be used to generate color-coded maps of the EM-61 sensor intensity that represent the lateral limits of the potential burial area (first survey), as well as larger, isolated metal items residing within the burial area (second survey—see Section 5.2.6.1). All raw, processed, and interpreted data, as well as the QC checks, will be delivered to the client (as necessary) at the end of the field investigation. The processing/interpretation criteria and protocol are digitally recorded and stored in the project files so that the sequence of events can be reconstructed at a later date, if necessary.

5.2.5.2 Tiered Excavation of Shallow MEC Contaminated Soils

This phase of ordnance operations is intended to incrementally remove MEC, MC, and other metal debris from the upper soil horizon of the Landfill so that relatively accurate screening of deeper soils can be conducted. This will be accomplished by first removing all detectable ordnance items from the upper foot of the Landfill, then carefully scraping away a 6-inch lift of soil under the observation of a trained and qualified UXO technician. This process will be repeated until no subsurface metallic anomalies are detected. Once this objective has been satisfied, the geophysical screening discussed in the next section can be implemented to help verify that no large pieces of ordnance are present in the deeper soils of the Landfill.

The team will establish an EZ, set up survey (work) lanes, and perform MEC/MC clearance in the upper foot of the soil by using a metal detector to identify targets that will be investigated in real time. This methodology is referred to as "mag and dig." When the MEC/MC removal is complete, a chemical-based EZ will then be set up within the ordnance-based EZ, and construction personnel will enter the zone to excavate a 6-inch lift of soil. This chemical-based EZ will be configured so that dump trucks entering the work area to transport excavated soils will not have to enter this zone. Following excavation of the first lift, construction personnel will leave the ordnance-based EZ and the process will continue with clearance of the next 1-foot lift of soil.

The MEC/MC, MD and metal waste that are located will be managed in accordance with the procedures in Section 5.2.9. Detailed procedures for this task are presented in Appendix A, SOP 3. Required documentation for field operations is discussed in Section 7.

5.2.1 Removal of MEC/MC in Deep Landfill Soils

Removal of MEC/MC in deep landfill materials is performed in two phases. Geophysical surveys are used to locate potential targets and then the targets are investigated.

5.2.1.1 *Performance of a Geophysical Survey*

When magnetometer sweeps indicate that no more significant metallic items are located in the top foot of the soil, a second geophysical survey will be performed over the Landfill area to identify any potential large metal items remaining. This second geophysical survey will be performed in the same manner as the first survey (see Section 5.2.5.1); however, transect spacing will be reduced to between 2 and 2.5 feet for the second survey. The data from this survey will be interpreted to yield a target list with horizontal locations (coordinates), estimated depths, and relative sizes for the anomalies of interest. As with all other activities at the project site, a UXO escort/observer will be onsite at all times to provide ordnance avoidance for the geophysical team.

5.2.1.2 *Intrusive Investigation of Geophysical Anomalies*

Anomalies identified during the geophysical survey will be evaluated to determine which, if any, of the anomalies potentially represent large metallic items buried deep within the Landfill. Those anomalies identified will be investigated and, if necessary, removed. UXO teams conducting the intrusive investigation of subsurface anomalies identified during the geophysical survey will establish an EZ, reacquire target locations, mark the locations, excavate by hand or using heavy equipment, and identify and remove MEC/MC. The geophysicists will provide the teams with dig packages containing the coordinates and estimated depths of all targets for investigation.

The MEC/MC and metal waste that are located will be managed in accordance with the procedures in Section 5.2.9. Detailed procedures for this task are presented in Appendix A, SOP 4. Required documentation for field operations is discussed in Section 7.

5.2.2 MEC Avoidance for Soil Removal Action

Following completion of the planned MEC/MC removal activities, the remaining soils and debris in the Landfill will be removed to eliminate the source of groundwater contamination at the Site. This work will be performed in accordance with procedures provided in other sections of the CAWP. Since the Landfill was used as a disposal area for MEC, however, a single UXO technician will observe all intrusive activities and identify any potential ordnance items uncovered. The technician will be positioned out of the danger zone for the heavy equipment onsite, but in an area with a clear view of the excavation and soil loading activities. If any suspect items are observed, the technician will halt work to examine the items and, if necessary, will arrange for removal and disposal.

The MEC/MC and metal waste that are located will be managed in accordance with the procedures in Section 5.2.9. Detailed procedures for this task are presented in Appendix A, SOP 1. Required documentation for field operations is discussed in Section 7.

5.2.3 Mechanical Screening of Soils for MEC/MC

The soil removed from the Landfill may still contain relatively small metallic items and some small MEC/MC (small arms ammunition and, potentially, 20 mm projectiles). Therefore, the soil will be screened using mechanical screening techniques to separate debris and metallic items from the soil. Processed soil will be stockpiled for chemical evaluation and disposal. Debris and metallic items will be inspected individually to ensure that no residual explosive materials or MEC remain.

MEC/MC and metal waste located will be managed in accordance with the procedures in Section 5.2.9. Detailed procedures for this task are presented in Appendix A, SOP 1. Required documentation for field operations is discussed in Section 7.

5.2.4 Management and Disposition of MEC/MC, MD and Metal Waste

Several waste streams will be generated by the ordnance related tasks performed at the Landfill. These types of waste will include the following:

- MEC;
- MC (MEC related items that were, by design, exposed to energetic materials [formerly called OE waste]);
- MD (MEC related items that were not, by design, exposed to energetic materials [formerly called OE scrap]);
- Non-ordnance metallic debris; and
- Non-metallic debris.

This section of the CAWP describes the methodology that will be used to deal with the various wastes generated by the MEC/MC avoidance/removal activities.

5.2.4.1 *Munitions and Explosives of Concern*

Discovery and Identification

Trained MEC personnel (Technician III level or higher) will make preliminary MEC identifications based on personal education, training, and experience using appropriate ordnance publications. These individuals will be the appointed team leaders for the UXO Teams. The SUXOS will verify the identification of all MEC items before the items are removed from the work area or, if necessary, blown-in-place (BIP). If site UXO personnel are unable to identify a suspect MEC item, the SUXOS will request assistance from the Army representative at Fort Lewis.

Management and Handling

MEC located at the Landfill during any of the various ordnance-related tasks will be examined and identified. If an item is safe to move, it will be taken to a pre-determined location at the Landfill for disposal. If the item is not safe to move, it will be BIP. MEC located during soil screening operations at the stockpile/staging area near the Camp Bonneville cantonment area will be transported back to the Landfill for disposal, if it is safe to do so.

The preferred approach for disposal of MEC will be to have donor explosives stored on site in an approved, sited magazine. If this practice is infeasible for any reason (e.g., MEC is located before the magazine is placed on site), donor explosives may be delivered by an approved on-call vendor. Work hours may be adjusted to allow sample time for same day explosive delivery and MEC disposal. MEC will be tracked from discovery to disposal using the MEC Intrusive Data Sheet/MEC Accountability Form and the MEC Accountability Log (see Section 7, Documentation).

MEC Disposal/Disposition

All MEC discovered during the course of this project, whether they are discovered at the Landfill or during soil screening operations, will be disposed of at the Landfill. Disposal will be accomplished using detonation with donor explosives. Since the required separation distance for larger MEC cannot be attained within the Camp Bonneville boundaries, the DoD-approved sandbag method found in the U.S. Army Corps of Engineers HNC-ED-CS-98-7, *Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions (USACE, 1998)* will be implemented as appropriate. MEC will be destroyed in accordance with the procedures contained in Appendix A, SOP 5. Required documentation for field operations is discussed in Section 7. When feasible, disposal operations will be conducted between the hours or 4 p.m. and 6 p.m. to allow neighborhood residents to plan and prepare for these operations. However, MEC items that must be BIP due to their unstable or dangerous condition will be disposed of as they are found to ensure the safety of site personnel.

Following controlled detonation of MEC for purposes of disposal, the SUXOS will inspect residual metal scrap to ensure that complete disposal has been accomplished and energetic materials have been destroyed. The metal scrap will then be containerized and placed in the designated storage area near the Landfill. No scrap from MEC disposal will be removed from Camp Bonneville or otherwise disposed of until a representative of the Army inspects the material jointly with the SUXOS to ensure that all energetic materials have been eliminated via detonation. Once this inspection is complete, the metal scrap will either be transferred to a local recycling company or to a demilitarization facility for final disposition. As an alternative, this metal waste may be disposed of at a predetermined location at Camp Bonneville with the consent of the Army. Ecology will be included in any decision process regarding disposal of metal waste on site.

5.2.4.2 *Munitions Components*

Discovery and Identification

Trained MEC personnel (Technician III level or higher) will make preliminary MC identifications based on personal education, training, and experience, using appropriate ordnance publications. These individuals will be the appointed team leaders for the UXO Teams. If the UXO team leader cannot identify MC, then the SUXOS will be contacted to assist with the identification before the item is removed from the work area. If site UXO personnel cannot identify a suspect MEC item, the SUXOS will request assistance from the Army representative at Fort Lewis.

Management and Handling

MC found at the Landfill will be consolidated at predetermined locations during the workday.

At the end of the workday, the MC will be transported to the staging area next to the Landfill where it will be inspected by the SUXOS to ensure that no scrap or MEC items have been included with

the MC. After inspection, the MC will be placed in a 55-gallon drum or other suitable container and stored in a fenced compound at the staging area. As an alternative, the MC container(s) may be stored in a locking Connex Box or other portable storage unit that can be secured with a padlock. When enough material has accumulated, the MC will be combined with MEC find(s) for disposal by detonation.

MC found during soil screening operations at the staging area near the Camp Bonneville cantonment area will be handled the same way as that found at the Landfill; however, it will have to be transported back to the Landfill storage area for storage.

Disposal/Disposition

MC will be consolidated and disposed of during scheduled disposal operations for MEC. Metal scrap will then be containerized and placed in the designated storage area near the Landfill. No scrap from MC disposal will be removed from Camp Bonneville or otherwise disposed of until a representative of the Army inspects the material jointly with the SUXOS to ensure that all energetic materials have been eliminated via detonation. Once this inspection is complete, the metal scrap will either be transferred to a local recycling company or to a demilitarization facility for final disposal. As an alternative, this treated material may be disposed of at a predetermined location at Camp Bonneville with the consent of the Army. Ecology will be included in any decision process regarding disposal of metal waste on site.

5.2.4.3 *Munitions Debris*

Discovery and Identification

Trained MEC personnel (Technician III level or higher) will make preliminary MD identifications based on personal education, training, and experience, using appropriate ordnance publications. These individuals will be the appointed team leaders for the UXO Teams. If the UXO team leader cannot identify MD, then the SUXOS will be contacted to assist with the identification before the item is removed from the work area. If site UXO personnel cannot identify a suspect MD debris item, the SUXOS will request assistance from the Army representative at Fort Lewis.

Management and Handling

Munitions Debris found at the Landfill will be consolidated at predetermined locations during the workday. At the end of the workday, the debris will be transported to the staging area next to the Landfill where it will be inspected by the SUXOS to ensure that no MC or MEC have been included with the debris. After inspection, the MD will be placed in a 55-gallon drum or other suitable container and stored in a fenced compound at the staging area. As an alternative, the debris containers may be stored in a locking Connex Box or other portable storage unit that can be secured with a padlock.

MD found during soil screening operations at the staging area near the Camp Bonneville cantonment area will be handled the same way as that found at the Landfill; however, it will have to be transported back to the Landfill storage area for storage.

Disposal/Disposition

MD will be consolidated and disposed of along with metal scrap generated during the disposal of MEC and MC. No MD will be removed from Camp Bonneville or otherwise disposed of until a representative of the Army inspects the material jointly with the SUXOS to ensure that there are no energetic marterials present. Once this inspection is complete, the metal scrap will either be transferred to a local recycling company or to a demilitarization facility for final disposal. As an alternative, this treated material may be disposed of at a predetermined location at Camp Bonneville with the consent of the Army. Ecology will be included in any decision process regarding disposal of metal waste on site.

5.2.5 Decontamination of Equipment

Heavy equipment used during ordnance operations at the Landfill will be decontaminated in accordance with procedures provided in the CAWP sections dealing with construction work.

5.3 QUALITY CONTROL

This section of the CAWP presents the QC regime that will be applied to ensure that the MEC avoidance activities (whether conventional avoidance or avoidance via removal) incorporated into the interim remedial action at the Landfill are performed in a high-quality, technically sound manner. The systematic management quality processes and procedures presented here have been designed to create confidence that the project requirements and objectives will be achieved. QC personnel assigned to this project may be assigned other duties for the project, but will ensure that the QC responsibilities are properly addressed.

5.3.1 Objectives

QC objectives for the project are to optimize the following:

- Effectiveness—The degree to which the project team meets and preferably exceeds the customer's needs and requirements; and
- Efficiency—The rate at which resources are consumed in striving for effectiveness. Optimizing this objective leads to customer satisfaction by minimizing time and cost, and maximizing value.

5.3.2 Organization

Tetra Tech uses a matrix structure to efficiently allocate human resources for each project, so project managers can fully serve their clients' needs. A combination of internal and external resources provides the best possible result. The key personnel within the project directly responsible for the provision of quality are the Project Manager and the UXOQC. These two people are tasked with directly designing and implementing the quality system. Within the company's Environmental Safety and Quality (ESQ) Department, other independent personnel work to support and scrutinize the service delivery process. These personnel include the Tetra Tech Corporate Quality Manager at the company level and the UXO Quality Manager at the program level.

5.3.3 Personnel

Personnel performing work quality control work on this project will be appropriately trained and qualified with documentation provided in accordance with Tetra Tech requirements, contract requirements, and applicable portions of industry standards and practices. Personnel selected to perform duties as the UXOQC will possess the education, experience, and training commensurate with the specified activity and contract requirements. The UXOQC has the following responsibilities:

- Implementing the requirements of the three-phase, project QC plan;
- Supervising and directing personnel performing QC tasks;
- Conducting surveillance and inspection activities;
- Identifying, evaluating, initiating, recommending, or providing solutions and corrective actions to ensure that contract requirements are being met;
- Providing weekly project QC updates to the Project Manager and the QC Project Manager;
- Conducting QC familiarization training for project personnel and site visitors; and
- Issuing temporary stop work orders.

The UXOQC, with the concurrence of the Project Manager, may stop or suspend work when health and safety requirements are being compromised or the level of quality is such that a nonconforming condition or delivery of an unsatisfactory product may occur. A stop work order may be issued and left in place until the situation is corrected. A stop work order may also be issued for a portion of a process, allowing as much useful work to continue as possible, thus limiting the adverse impact of the stop work order on areas not affected by the condition.

5.3.4 Quality Control Planning

Two types of QC procedures are planned during this project, including the following:

- Process QC—The heart of process QC is identification, monitoring, and continuous improvement of the core and support processes implemented during the project; and
- Product QC—Procedures that fall into this category test the end product of the processes for conformance to quality requirements.

The ordnance-related work planned at the Landfill is construction support for the interim cleanup action for soil removal; therefore, there are no specific achievement criteria for the end product other than those driven by safety considerations. The soil that has been removed from the Landfill will ultimately be disposed of at non-hazardous or hazardous-waste landfills and must, therefore, be free of dangerous MEC/MC. The rigorous MEC/MC avoidance and removal procedures incorporated into the CAWP, including processing the shallow soils excavated during the mag & dig process through specifically sized screens to remove small MEC/MC items, are very reliable. Little product QC will be necessary, provided that the process QC measures in the plan are properly implemented. The emphasis for the project will be on process controls that will ensure compliance with the CAWP procedures.

5.3.4.1 *Process Quality Control*

This component of the QC function is an integral part of each process and is usually managed by the UXOQC, who works closely with project managers and the field supervisors to identify and meet project and quality objectives. Identified quality criteria of the inputs and outputs of each process identified are used as a basis for the assessment of each process. Flexibility is incorporated to allow due attention to those areas that need it most. The criteria for assessment can be changed at any time, depending on the nature of the situation. Process QC resources are finite, and good judgment is required to allocate resources appropriately to maximize process efficiency and effectiveness.

Process QC is conducted using a three-phase control process consisting of preparatory, initial, and follow-up (surveillance) inspections to ensure that processes are under control, and opportunities for improving processes are captured and implemented. Use of proactive process QC is a prevention approach. The inspection points selected for process QC during MEC operations at the Landfill are presented in Table 5-2.

Table 5-2
Inspection Points for Process Quality Control

Activity	Inspection Criteria
Surface Clearance	Verify that daily equipment checks are performed
	Re-survey 5% of the surface clearance area to confirm adequate removal of MEC/MC
Mag & Dig	Verify that daily equipment checks are performed
	Re-survey 5% of the clearance area to confirm adequate removal of MEC/MC
Tiered Soil Removal	Post UXO observers to identify potential MEC during excavation
	Verify that no more than 6 inches of soil are removed with each equipment pass (Laser level or other approved method)
	Verify that adequate freeboard is maintained in haul trucks to prevent loss of soil during transport to the screening area
Geophysical Survey	Verify that daily equipment checks are performed
	Perform senior level review of EM-61 interpretation data to ensure that interpretation process was carried out IAW the established procedures
Intrusive Investigation	Check geophysical dig data using geo-reference points at the site to ensure proper positioning
	Verify that daily equipment checks are performed
	Perform inspection of approximately 5% of digs to ensure adequate removal of MEC/MC
Soil Screening	Verify that unscreened and screened soils are being segregated in clearly delineated areas
	Ensure that plant operating speed is slow enough to allow identification of MEC items
	Verify that staff rotation is adequate to maintain alertness of observers

Preparatory Phase Inspection

A preparatory phase inspection will be performed before starting each ordnance-related process identified for the project. This inspection reviews applicable specifications and verifies that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The QC staff for each preparatory phase inspection should perform the following actions:

- Verify that appropriate plans and procedures are developed, approved, and available;
- Verify that personnel identified are available and meet the requirements qualifications for the position;
- Verify that the required training has been performed;
- Verify that identified equipment is available, functional, and appropriate for the job;
- Verify that the preliminary work and coordination have been accomplished;

- Verify that the level of quality expected is understood;
- Verify that the CAWP and the SOPs have been reviewed and are understood by the workers; and
- Conduct a briefing on the process improvement goals.

All necessary actions are listed on the Preparatory Phase Inspection Checklist. The specific QC activities performed during the preparatory phase inspection and the results of those activities will be documented on a QC surveillance report that will be attached to the daily QC report. Examples of these forms are provided in Appendix B.

Initial Phase Inspection

An initial phase inspection will be performed the first time a parcel of work is performed under a defined process. The purpose of the inspection is to check the preliminary work for compliance with procedures and contract specifications. Another aim is to establish the acceptable level of workmanship, check safety compliance, review the preparatory phase inspection, check for omissions, and resolve differences of interpretation. The following tasks will be performed during these inspections:

- Verification that deficiencies identified during the preparatory phase have been corrected;
- Verification that requirements of quality of workmanship will be established;
- Verification that readiness review actions are complete;
- Resolution of any differences of interpretation;
- Review of CAWP and applicable documents to ensure that the requirements are being met; and
- Observation of work to verify the adequacy of the work.

All necessary actions are listed on the Initial Phase Inspection Checklist. Discrepancies between site practices and approved plans/procedures will be resolved, and the UXOQC, or a designee, will verify corrective actions for unsatisfactory conditions or practices. The specific QC activities performed during the initial phase and the results of those activities will be documented on a QC surveillance report that will be attached to the daily QC report. Examples of these forms are provided in Appendix B.

Follow-up Phase Inspection (Surveillance)

The follow-up phase inspection will be performed on a scheduled and unscheduled basis. The purpose of the inspection is to ensure a level of continuous compliance and workmanship. The UXOQC is responsible for onsite monitoring of the practices and operations taking place and

verification of continued compliance with the specifications and requirements of the statement of work and approved SOPs. The following activities should be performed during each inspection:

- Inspection/surveillance to ensure that the work is in compliance with the statement of work and plans;
- Inspection/surveillance to ensure that the required level of workmanship is maintained; and
- Inspection/surveillance to ensure that the project logbook is properly filled out and maintained.

Follow-up results, positive or negative, will be documented on a surveillance report that is attached to the daily QC report. Examples of these forms are provided in Appendix B.

5.3.4.2 *Product Quality Control*

Product QC consists of the inspection procedures that ensure the final product is fit for its purpose before it is handed over to the client. This is a detection approach to QC, and proactive process QC inspections should be passed before the product proceeds to this stage. Percentage sampling is the selected method of product QC for this project.

Percentage sampling is a simple way to apply to the inspection of outputs from processes. Depending on the expected quality, past findings, and other characteristics of the product population, a fixed percentage is selected. A random sample of the final product based on that percentage is then inspected in order to determine the acceptability of the product population. This type of sampling strategy will be applied to the soils that have been identified for offsite disposal. Approximately 5% of the material randomly selected from the soil stockpiles will be spread on liner material in the stockpile/staging area. A UXO technician will perform a detector-aided, visual examination of the soil to determine whether any MEC/MC remains. If any suspect material is found, corrective action will be performed before disposal of the soil.

5.3.4.3 *Equipment Function Checks and Calibration*

Equipment function testing and calibration are major elements in the process QC for this project. Effective removal of MEC/MC from the landfill soils relies heavily on properly functioning detection equipment. All MEC/MC detection equipment will be function tested daily utilizing an onsite test bed or other approved methods. The test bed will be constructed in an area that has been cleared of MEC/MC and metal debris. It will contain one or more MEC-like items buried at known depths in order to facilitate function testing of a variety of instruments. Instruments will be function tested in accordance with the manufacturer's recommendation unless otherwise approved.

Equipment which is not functioning properly will not be used until it has been repaired or replaced and proper function has been demonstrated.

Instrument Standardization for the EM-61

Standardization Procedures

No calibration or standardization will be made to the instrument because it is calibrated before leaving the factory. Measurements will, however, be recorded over a portion of an existing data acquisition line or at a designated location before commencement of each data acquisition session to provide information on the precision and repeatability of the positioning and EM-61 data measurement processes.

Abbreviated Standardization Checks

When no metal is present and the EM-61 is stationary, the standard deviation of the readings for the top and bottom coils should not be in excess of 1mV. These repeatability data are collected before each data acquisition session and analyzed during processing.

Instrument Response to a Known Standard

Before and subsequent to data acquisition activities at each survey area, a metallic target will be placed on the ground surface. This test may be performed using a large piece of metal placed on the ground such as a trailer hitch. Data are acquired over the target at least three times in an alternate direction. This procedure ensures that the timing differences between the location system clock and EM-61 clock can be accounted for in data processing. These data can also be analyzed to provide information on the characteristic response of the instrumentation in an area with specific characteristics (i.e., topography, geology, vegetation).

5.3.5 Corrective Action

Once a product or a process displays a characteristic out of specification with those required by the project or quality objectives, corrective action must be conducted to identify the cause of the deficiency or nonconformance. When the cause of the problem is identified, appropriate corrective action can be instituted and then monitored for effect. Deficiency notices and nonconformance reports will be used to track the identification and correction of problems; however, they will not be submitted to the client unless a significant problem is noted that requires input from the client for resolution. Examples of deficiency and non-conformance reports are in Appendix B.

5.3.5.1 *Root Cause Analysis*

Both the deficiency and nonconformance report forms contain an area for the entry of information regarding the cause of the problem and proposed resolution. Determining the root cause of a deficiency or nonconformance is an integral part of the QC process. The depth and extent of the

root cause analysis depends on the situation; it may be as simple (minor) as an overlooked step or procedure, or it may be quite complicated. Root cause analysis is the responsibility of the functional manager or a designee.

Input can be obtained as necessary from field personnel and technical advisors in order to identify the factors that led to the problem. The root cause is almost always "upstream" from where the problem was detected. A two-step strategy will be employed for determining the root cause of a deficiency or non-conformance for this project. First, the problem will be traced back to the source. Second, the cause will be evaluated using basic questions such as who, what, when, where, why, and how. This process is repeated until the cause is identified.

5.3.5.2 *Implementation of Corrective Action*

Following the root cause analysis, the project personnel will undertake the most effective remedy to correct the problem. Potential remedies considered may include the following:

- Supplemental personnel training;
- Changes of equipment or modification of equipment currently in use;
- Acquisition of supplemental equipment;
- Implementation of new procedures or modification of existing procedures; and
- Changes in QC procedures.

Successful implementation of corrective action will be documented on the deficiency or nonconformance report. Through follow-up phase surveillance, the project QC representative will verify that the corrective action implemented has rectified the deficiency or nonconforming condition and is sufficient to prevent recurrence. Examples of deficiency and non-conformance reports are in Appendix B.

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6. IMPLEMENTATION OF SOIL REMOVAL ACTIVITIES FOR THE PROPOSED INTERIM ACTION

The following sections discuss the various related components of the proposed interim cleanup action.

6.1 MOBILIZATION

Tetra Tech personnel will coordinate closely with the Army staff assigned to the project to ensure that the equipment, supplies, and other resources needed to support the construction activities are present onsite. The work force will be scheduled to arrive in the most effective manner to allow for immediate productivity. All staff and subcontractor personnel mobilized to the Site will have completed OSHA HAZWOPER training and will meet medical surveillance requirements, as specified in the HASP.

Any required training will be part of the mobilization process. The purpose of this training is to ensure that all onsite personnel fully understand the operational procedures and methods to be used at this site, including individual duties and responsibilities and all safety and environmental concerns associated with operations. Any personnel arriving at the Site after this initial training session will have to complete the training before starting work. Training will include the following topics:

1. Field equipment operation, including safety precautions and equipment, field inspection of equipment, and maintenance procedures that will be used;
2. Procedures, guidelines, and requirements in relevant sections of this CAWP and the HASP, as they relate to the tasks being performed;
3. Site and task-specific hazards, including physical, biological, and chemical hazards;
4. Public relations, including encounters with the press and public;
5. Environmental concerns and sensitivities, including endangered/threatened species and HARC resources onsite; and
6. Specific ordnance materials (MEC, MC, and demolition materials) potentially found onsite or proposed for use in disposal of MEC/MC.

Any required permitting support will also be provided during mobilization.

6.2 SITE PREPARATION

Before the commencements of the excavation and disposal of the Landfill debris/soils, several site preparation activities are expected to be required. The activities include the preparation of the soil stockpile areas, the equipment staging area, and the equipment decontamination station; improvements to the existing roadway and bridge; and the preparation of the Landfill buffer and work area.

6.2.1 Clearing and Grubbing

All areas identified for improvements (stockpile, staging and work areas, and truck turnouts) that are currently vegetated will be cleared of all significant vegetation. The brush and trees that are removed will be stockpiled for salvage or disposal at a later date. Clearing and grubbing in the area of the former landfill will be performed with the aid of UXO-trained personnel in accordance with Section 5.2.4 of this Plan.

6.2.2 Road and Creek Crossing Improvements

The existing access road and creek crossing were not designed to handle the increased traffic associated with the removal of the Landfill and may require some improvements. The ½ - ¾ mile long single lane road will be graded smooth and as necessary will be upgraded, as required, with a compacted layer of 3 to 6 inches of base course to remove ruts, holes, and soft spots. In addition, to accommodate traffic in two directions, two turnouts may be constructed along the access road. The turnouts and the turnaround will be graded smooth and covered with a compacted layer of 3 to 6 inches of base course as well.

In addition to the road improvements, a temporary bridge crossing, adequate to support the increased traffic, will be installed over the creek. This improvement will likely be in the form of steel plates or a temporary bridge span placed over the existing roadway; however, the decision will be based on existing site conditions and available materials during the fieldwork. The temporary bridge will be periodically inspected during this interim cleanup action to ensure its integrity. The temporary bridge will be removed after the backfill operations are completed.

6.2.3 Stockpile and Staging Areas

Because of topography, the available working area around the Landfill is limited. Therefore, sorting, stockpiling, and profiling of the excavated landfill material prior to transportation/disposal will take place a short distance away from the Landfill. A relatively flat clearing located adjacent to Camp Bonneville cantonment area is proposed for the stockpile and lay-down area. The area is located approximately ½ to ¾ mile south of the Landfill across Lacamas Creek. A 2-acre stockpile area will be graded to drain to one end and bermed to control surface water and leachate. The

bermed stockpile area will be covered with a 20-mil or thicker liner to catch and hold any incidental water caught up in the excavated landfill material and to collect any precipitation that may come in contact with the excavated material. The liner will be protected from damage by equipment traversing it with 3 to 6 inches of compacted common fill. This material will be treated as stockpiled soil. If necessary, the stockpile itself will be covered with plastic to protect it from rain and erosion during its construction. Any surface water or leachate that may collect within the berm will be pumped off and temporarily stored in a Baker-type tank for subsequent profiling and disposal.

In addition to the stockpile area, a one-acre equipment and materials lay-down area will be cleared and graded. The lay-down area will also include an equipment decontamination pad. The decontamination pad will be lined with plastic and bermed to collect all decontamination-related liquid and solid waste. All liquid waste generated during decontamination will be pumped off and temporarily stored in a Baker tank for subsequent profiling and disposal. All solid waste will be profiled and disposed of offsite.

6.2.4 Landfill Buffer and Work Area

A buffer around the Landfill for equipment to maneuver and a small working area adjacent to the Landfill to load and maneuver trucks will be prepared. The limits of the Landfill will be mapped based on current data and the 40-foot buffer will be added to the limits. If, during the MEC/MC clearance the limits of the Landfill are adjusted, the buffer will be adjusted accordingly. Both the buffer around the Landfill and the working area adjacent to the Landfill will be cleared of vegetation, as required. The working area adjacent to the Landfill will be improved as necessary. Because of its proximity to the Landfill, this task will require inclusion of MEC/MC avoidance to protect construction workers performing intrusive tasks such as earthwork.

6.2.5 Equipment Decontamination

The trucks transporting the excavated landfill material to the stockpile area will not enter the Landfill excavation. They will stage and be loaded from a working area immediately adjacent to the Landfill excavation area. Before leaving the Landfill area, each truck will pull up to a site decontamination area where the load of excavated landfill material may be covered and all other landfill material will be mechanically removed from the exterior of the truck (e.g., tires, fenders). In addition, the road between the Landfill and the stockpile area will be routinely inspected to ensure that no landfill material has fallen off of the trucks. The same general procedures will be used before the trucks return from the stockpile area. At the close of the project, the roads will be tested randomly every 500 feet to confirm that the decontamination procedures were effective. Baseline testing will be conducted before commencing any material transporting for comparison purposes.

Should post-excavation sampling indicate that areas of the road have been contaminated due to the source removal activities, those impacted areas will be excavated and added to the Landfill stockpile for subsequent sampling and disposal. The road will then be repaired to pre-project conditions, as required.

All disposal trucks or equipment leaving the site will be decontaminated before leaving. The decontamination pad in the equipment and materials lay-down area near the stockpile area will be used. All trucks and equipment will be mechanically cleaned and inspected before being released from the Site.

6.3 CLEANUP ACTIVITIES

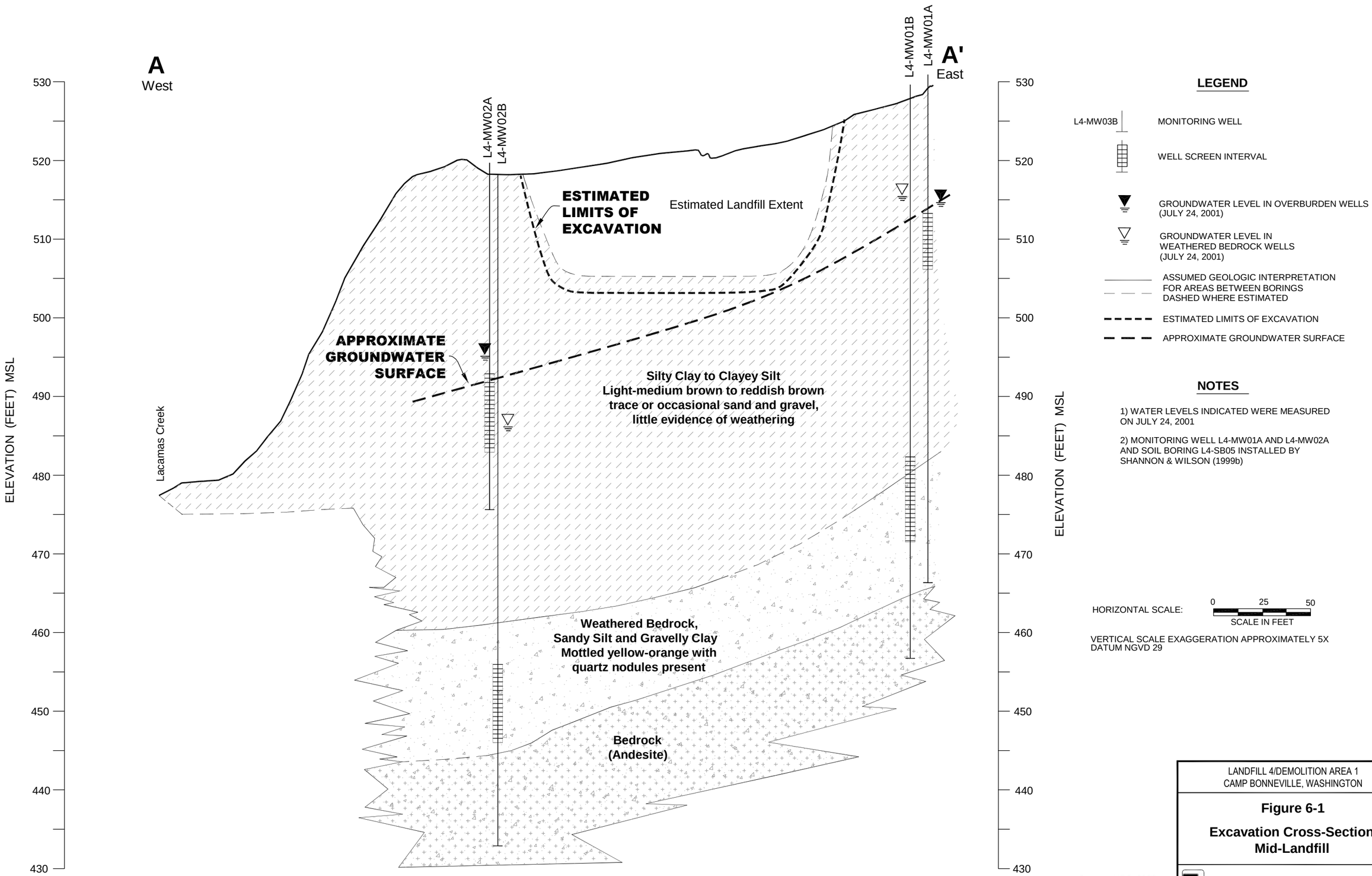
Cleanup activities will consist of excavation of the Landfill, confirmation sampling, onsite handling of the waste, waste disposal, backfilling the excavation, and site maintenance and restoration.

6.3.1 Landfill Excavation

The Landfill cannot be excavated until the Site (the limits of the Landfill, a 40 foot buffer, and the working area) has been cleared of all possible MEC/MC or related debris. Following certification of MEC/MC clearance, excavation of the Landfill will begin. All landfilled material and associated soil contaminated above established soil MTCA Method B cleanup levels are targeted for excavation and disposal. In the unlikely event that landfill debris extends into the saturated zone, it will be removed. In the unlikely event that the soil excavation extends to the water table and the results of confirmation sampling still exceed MTCA Method B cleanup levels for soil, the results of the confirmation sampling will be discussed with DOE and additional excavation or some form of treatment may be considered.

Excavation is planned to begin at the downhill side of the Landfill and progress uphill, optimizing the efficiency of the excavator while allowing the maximum space for the off-road trucks to maneuver. Sequencing the excavation in this manner will leave one end of the excavation open at all times, minimizing the potential for the accumulation of surface water in the excavation and allowing a small bulldozer and the excavator to work in tandem to excavate the Landfill. The lateral and vertical extent of the Landfill material and the impacted soil is expected to be removed before progressing upslope. The limits of the material and soil to be excavated may be determined through a combination of visual inspection and confirmation sampling. Confirmation sampling is discussed in Section 6.3.2. The walls of the excavation will be benched, as necessary, or sloped to protect against collapse. Figure 6-1 presents the general cross-section of the Landfill and estimated excavation at the mid-point of the Landfill.

The area of the Landfill is estimated to be 120 by 200 feet (24,000 ft^2) with an estimated depth in excess of 11 feet bgs. The depth to groundwater during the wet season is 15 feet bgs. The fine-



LEGEND

- L4-MW03B — MONITORING WELL
- WELL SCREEN INTERVAL
- GROUNDWATER LEVEL IN OVERBURDEN WELLS (JULY 24, 2001)
- GROUNDWATER LEVEL IN WEATHERED BEDROCK WELLS (JULY 24, 2001)
- ASSUMED GEOLOGIC INTERPRETATION FOR AREAS BETWEEN BORINGS DASHED WHERE ESTIMATED
- ESTIMATED LIMITS OF EXCAVATION
- APPROXIMATE GROUNDWATER SURFACE

NOTES

1) WATER LEVELS INDICATED WERE MEASURED ON JULY 24, 2001

2) MONITORING WELL L4-MW01A AND L4-MW02A AND SOIL BORING L4-SB05 INSTALLED BY SHANNON & WILSON (1999b)

HORIZONTAL SCALE: 0 25 50
SCALE IN FEET

VERTICAL SCALE EXAGGERATION APPROXIMATELY 5X
DATUM NGVD 29

Source: URS, 2003

LANDFILL 4/DEMOLITION AREA 1
CAMP BONNEVILLE, WASHINGTON

Figure 6-1

Excavation Cross-Section Mid-Landfill

Tetra Tech, Inc.

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grained nature of the soils at the site would make it very hard to dewater; also, it is unlikely the Site was dewatered while it was used as a landfill. Therefore, for volume estimating purposes, the maximum depth of the Landfill is presumed to be at most 15 feet bgs [13,333 in-place yd^3 at 1.6 ton/ yd^3 is 21,000 tons]. As stated earlier the vertical limits of excavation will be guided by MTCA Method B soil cleanup levels. Tetra Tech proposes to use a 40-ton excavator with a 4-yard bucket and thumb to excavate and load the Landfill material and impacted soil for transportation. The excavated material will be visually sorted into three classifications (landfill debris, obviously stained or contaminated soil, and visually uncontaminated landfill soil) before loading for transport to the stockpile area. The off-road articulated trucks (25-ton) will transport the sorted excavated material to the stockpile area for further sorting and profiling for disposal.

It is anticipated that dewatering of the Site can be avoided. Given the nature of the soils at the Site, it is not reasonable to assume that dewatering would have been part of the operation of the Landfill and, therefore, it is not presumed to be part of the excavation of the Landfill or the impacted soils, although the vertical limits of excavation will be guided by the MTCA Method B soil cleanup levels. Water that has infiltrated into the Landfill and accumulated in the bottom may be pumped out with a suction trash pump and stored in a Baker tank for later profiling and disposal.

A UXO Safety Officer will remain onsite during all excavation and sorting activities following the UXO removal phase. All construction equipment brought onsite will be decontaminated before being removed from Camp Bonneville.

6.3.2 Confirmation Sampling

Tetra Tech proposes not to perform a separate boundary investigation prior to landfill excavation. The boundary borings that have been drilled onsite are sufficient to define the general boundaries of the Landfill, and additional borings would not add significant value. The visual inspection and the confirmation soil samples collected during the excavation of the Landfill will be used to define the Landfill boundaries. During the excavation of the Landfill, visual inspection will be used to ensure that all of the suspected landfill material and associated debris has been removed. Confirmation soil samples of the walls and the floor of the excavation will be collected to ensure that the soil contaminated above MTCA Method B cleanup levels has been excavated and removed. The inspection and the confirmation samples will be used to define the boundary of the materials required to be removed and provide the supporting analytical data. Tetra Tech will inspect the entire excavation and proposes to collect confirmation soil samples from the bottom of the excavation on minimum 25-foot grid spacing. In addition, up to 12 biased samples may be collected, depending upon site-specific conditions and in consultation with DOE. The site conceptual model that provided the rationale for the grid size is discussed in the SAP. We anticipate collecting soil confirmation samples every 40 feet along the walls of the excavation, at the midpoint

on the wall and 1 foot bgs. The samples will be analyzed for the COPCs presented in the SAP. It is anticipated that at some point in the excavation of the Landfill that removal activities will cease until analytical results are received and the results can be discussed with the DOE. If any of the confirmation samples from soils located above the saturated zone produces results above the cleanup criteria, additional excavation will be performed and additional confirmation sampling will be conducted, as required. The additional confirmation samples will be analyzed for only those analytes that exceeded the cleanup criteria in the original testing. In the unlikely event that soil excavation extends to the water table and the results of confirmation sampling still exceed MTCA Method B cleanup levels for soil the results of the confirmation sampling will be discussed with DOE and additional excavation or some form of treatment may be considered.

6.3.3 Onsite Loading, Transportation, Sorting, and Stockpiling of Excavated Material

The trucks transporting the excavated landfill material to the stockpile area will not enter the Landfill excavation. They will stage and be loaded from a working area immediately adjacent to the Landfill excavation area. All material removed from the Landfill will be separated by material type (debris, visually uncontaminated soil, and visually contaminated soil) and staged for transport. The staged material will be loaded into the off-road trucks with a front end loader. The trucks will then be mechanically decontaminated and may be covered before transport to the designated stockpile area. The debris may include broken concrete, rocks, steel (non-UXO), wood, and other nonsoil materials. This debris may be further processed and sent to a recycling facility if uncontaminated and viable. If the debris is contaminated, it would go to the appropriate offsite disposal facility.

6.3.4 Offsite Disposal

The excavated material from the Landfill will be visually sorted into three classifications (landfill debris, obviously stained or contaminated soil, and visually uncontaminated landfill soil) for profiling before disposal. The total volume of material to be disposed of is estimated to be 13,333 in place yd^3. It is estimated this will produce 16,667 loose yd^3 of waste. In discussions with the disposal facilities, it was determined that waste characterization will require a sample every 200 yd^3 for the first 2,000 yd^3 and a sample every 500 yd^3 subsequently. The samples will be analyzed for all those chemicals required to be tested for by the disposal facility. Hazardous waste will be disposed by the ton at Waste Management Facility, Arlington, Oregon. Non-hazardous/debris waste could be disposed of by the ton at Hillsboro, Oregon. Other disposal facilities in the area may be used for disposal of the non-hazardous waste as well. The waste will be transported by highway trucks. The trucks will be lined with plastic before being filled with hazardous waste and will be decontaminated before leaving the Site. Any waste suitable for recycling, such as concrete, steel/metals, and wood will be characterized and recycled accordingly, as appropriate and feasible. All hazardous waste will be manifested and the disposal documented.

6.3.5 Backfill and Compaction of the Excavated Landfill

The trucks transporting the hazardous waste offsite for disposal will be lined with plastic before being filled with waste and will be decontaminated before leaving the site. If necessary, the trucks will also be decontaminated when they leave the disposal facility. This will allow for the same trucks that transport the waste for disposal to backhaul suitable fill for the backfill of the Landfill excavation, if feasible.

It is estimated that approximately 18,000 tons of material will be required to backfill the Landfill excavation. Suitable fill from offsite will be backhauled to the site. The material will be stockpiled at the lay-down yard and transported to the excavation with off-road trucks. The fill will be placed in the excavation in lifts and will be compacted to 85% of maximum dry density in accordance with American Society for Testing and Materials (ASTM) D1557.

6.3.6 Site Maintenance and Restoration

Surface water at the Site will be controlled with upstream trenches and sand bags around the perimeter. The creek will be protected from siltation from the excavation with a combination of silt fences and catch basins.

Haul roads on the Site will be patrolled routinely to ensure that waste has not inadvertently fallen off any trucks. In addition the roads will be routinely graded to maintain a safe operating surface.

The Landfill will be backfilled and graded to blend into the surrounding topography. After backfill has been completed, the Site will be stabilized with erosion mats, if necessary, and will be revegetated with native or grass-type species.

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7. DOCUMENTATION

This section specifies the documentation to be kept by both the on-site UXO and construction personnel. Both the Senior UXO and the construction staff will be required to collect and maintain similar records. There should not be any duplication of effort, since the two activities do not run in parallel. MEC/MC and construction activities will be documented using a variety of reports and forms including the following:

- Field logbooks;
- Daily activity reports;
- Daily health and safety briefing sign-in sheets;
- Surface clearance report forms;
- Intrusive investigation data/MEC accountability forms;
- QC inspection reports (see Section 5.3); and
- Health and safety reporting forms (see the site-specific HASP for MEC activities).

QC reporting is discussed in detail in Section 5.3 of this CAWP and in the Quality Assurance Project Plan (QAPP). Health and safety reporting requirements are covered in detail in the site-specific HASP for MEC Support Activities. The other types of documentation for MEC activities are discussed in the following paragraphs.

7.1.1 Field Logbooks

Field logbooks will be used routinely to record daily activities and unusual events for this project. Each UXO team leader and the construction foreman will keep a logbook containing a record of all daily activities performed by the team or each crew. Data recorded in the logbook will include the following:

- Date;
- Start time for field activities;
- Documentation of the daily tailgate safety briefing;
- Documentation of equipment checks/calibration;
- Documentation of vehicle inspections;
- The names of all personnel working on the Site that day;
- A list of equipment used by the team;

- A chronological list of activities performed by the team;
- Any unusual events occurring at the work site;
- Any injuries or health and safety concerns; and
- The stop time for field activities.

The information contained in the logbook will be the basis for preparation of the daily activity report. Therefore, this information should be as complete and concise as possible.

The SUXOS and Site Superintendent will also maintain a logbook in which to record daily activities and any other pertinent information. Data recorded in the logbook will include the following:

- Date;
- Start time for meetings, briefings, and other activities;
- Documentation of the daily operations briefing (concurrent with the health and safety briefing);
- Documentation of heavy equipment inspections;
- The names of personnel working onsite that day;
- A list of equipment used (or present) onsite;
- Any unusual events occurring at the work site;
- Any injuries or health and safety concerns;
- Equipment failure and other problems occurring;
- Hours worked by subcontract employees onsite; and
- The stop time for field activities.

The information contained in the logbook will be the basis for preparation of the daily operations report. Therefore, this information should be as complete and concise as possible.

The UXOSO/UXOQC and the Site Health and Safety Officer will also maintain a logbook in which to record health and safety and QC data. The information in this logbook will be instrumental in ensuring and documenting compliance with all health and safety provisions and QC requirements. The information recorded in the logbook will include the following:

- Documentation of the daily health and safety briefing;
- A record of any injuries or illnesses occurring;
- A record of all health and safety inspections and audits held onsite;

- The results of each inspection or a reference to the report number documenting the health and safety inspection/audit;
- A record of all QC inspections and audits held onsite; and
- The results of each inspection or a reference to the report number documenting the QC inspection/audit.

The information contained in the logbook will be the basis for preparation of numerous health and safety and QC reports. Therefore, this information should be as complete and concise as possible.

7.1.2 Daily Activity Reports

The UXO Team Leader and the Construction Foreman will be responsible for preparation of a daily activity report. This report will be submitted to the SUXOS or the Site Superintendent at the end of each working day and will summarize all work completed each day. Information contained in the report will include:

- Date;
- Start time for field activities;
- Documentation of the daily tailgate safety briefing;
- The names of personnel working that day;
- A list of equipment used by the team;
- A chronological list of activities performed by the team;
- Any unusual events occurring at the work site;
- Any injuries or health and safety concerns; and
- The stop time for field activities.

A blank Daily Activity Report form is included in Appendix A, SOP 1.

7.1.3 Daily Operations Report

The SUXOS and the Site Superintendent will be responsible for preparation of daily operations reports. These reports summarize the work performed onsite on any particular day and specify the equipment and personnel used to accomplish the work. In the report, they will note any QC or health and safety issues that arise and will document any site inspections/audits performed. At a minimum, these reports will include the following:

- The date and time operations began;
- The date and time operations were completed;
- The number of hours expended in performing operations;
- Equipment used by the personnel and subcontractors each day;
- Verification of equipment/instrument calibration or testing;
- Verification of the daily tailgate health and safety briefing; and
- Any unusual or unique events affecting the daily operations or team personnel (injuries, accidents, sightings of threatened or endangered animals, etc.).

Completed inspection/audit reports will be attached to the daily report. The daily reports will be submitted to their respective Project Manager and copied to the Program Manager. A copy of the reports will also be kept in the project files onsite. A blank Daily Operations Report form is included in Appendix B.

7.1.4 Daily Health and Safety Briefing Sign-in Sheets

The daily health and safety briefing sign-in sheet will be used to ensure that all personnel onsite are attending the daily briefing and are receiving continuing training with respect to site-specific health and safety issues. In addition to a space for the names of attendees, the sheet also has designated areas for recording the content on the daily briefing and any concerns raised by site personnel. The briefing is an essential tool in the implementation and management of the site HASP, as well as an integral part of the corporation's Zero Incident Program.

At the end of each daily briefing, the SUXOS and the Site Superintendent will review the sign-in sheet to ensure that all attendees are listed and will submit the sheet to the UXOSO and the Site Health and Safety Officer for inclusion in the project health and safety files. A blank copy of the daily briefing sign-in sheet is included in the ordnance operations HASP for the project.

7.2 UXO SPECIFIC DOCUMENTATION

7.2.1 Surface Clearance Data Forms

UXO Team Leaders will be responsible for completing the surface clearance data forms. These forms will be used to record pertinent clearance data for the project including the following:

- The number and type of MEC items found in each search area (lane or grid);
- The number of MC found in each area; and
- The number of subsurface contacts noted in each lane or grid.

For this particular project, the exact location (coordinates) of MC will not be recorded. The location coordinates for any MEC found will be recorded in the Team Leader's field logbook and on the MEC Investigation Data Form (see Section 7.2.2). A blank copy of the Surface Clearance Data Form is included in Appendix A, SOP 1.

Completed surface clearance data forms will be submitted to the SUXOS at the end of each field day. The SUXOS will review the data forms, note and correct any errors, and place them in the project file.

7.2.2 MEC Investigation Data Sheet/MEC Accountability Form

The upper portion of the MEC Investigation Data /MEC Accountability Form will be used to record pertinent data for any MEC found onsite including the following:

- Project name;
- Date;
- Location (coordinates and depth) of all MEC items encountered;
- A physical description of the items (width, length, diameter, general shape, color);
- Identification of the ordnance (type, fuzing, filler);
- Status and condition of the ordnance (used vs. unused; fired vs. unfired); and
- Photograph log ID number.

The UXO Team Leader will enter the appropriate data on the upper portion of the form (field data) and will submit the forms to the SUXOS at the end of each work day. The SUXOS will review the data forms, note and correct any errors, then use the lower portion of the form to track any transport or storage of MEC items and their ultimate disposal. Once the disposal is complete, the SUXOS will place the completed forms in the project file.

Pertinent data from the MEC Accountability section of the form will be entered into the MEC accountability log, which is an electronic summary log for all MEC items found. This log will be maintained by the SUXOS on a computer in the project office at Camp Bonneville. A blank copy of the MEC Investigation Data /MEC Accountability Form is included in Appendix A, SOP 4.

7.2.3 MEC Accountability Log

The SUXOS will use the MEC Accountability Log to summarize tracking data for all MEC items found at the Landfill. Selected data from the MEC Accountability Form will be entered into the electronic accountability log on a daily basis so that the PM and the Client may be kept informed of the results of the MEC/MC avoidance activities.

7.2.4 QC Reports and Forms

Several QC reports will be generated for this project including:

- Preparatory Inspection Reports;
- Initial Inspection Reports;
- Final Inspection Reports;
- Deficiency Notices; and
- Non-conformance Notices.

The QC reporting requirements are presented in detail in Section 5.3.

7.2.5 Range Residue Certificate for MC

A range residue certification form will be completed for each container of material proposed for transfer to a local recycler or demilitarization facility. The form will be completed as a container is filled and as items are individually inspected to ensure that no danger of detonation or explosion remains. Copies of the form will be attached to the container and provided with the bill of lading for shipment. A second copy of the form will be placed in the project files. The forms will be used as the principal tool for maintaining accountability for materials and inspection to confirm that the items are safe for unlimited release to the public. This form will also be completed for any MC that is left onsite at the direction of the Army (i.e., buried at a specified location onsite).

7.3 CLOSURE REPORT

Tetra Tech will document the completion of the CAWP with a closure report. The closure report will reference the appropriate planning documents and document the UXO clearance, UXO disposal, landfill excavation (waste and impacted soil), disposal of all excavated material, results of all confirmation sampling, and any deviations from the plan. The closure report will include an Operation and Maintenance Plan for the site and a Groundwater Monitoring Plan, if required.

The goal of the action is that any residual contamination must be protective of groundwater. If the nature and extent of the soil contamination is more than anticipated, such that it is technically impracticable to remove all contaminated soil, implementation of other closure measures that satisfy the criterion may be considered and will be documented in the closure report.

8. COMPLIANCE MONITORING

The goal of this phase of the interim cleanup is to remove all sources of groundwater contamination at the Site. Therefore, it is not anticipated that this phase of the closure of the Landfill will require any compliance monitoring.

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9. PUBLIC PARTICIPATION

Both DOE's MTCA and CERCLA require public involvement on an interim action.

CERCLA requires that the Engineering Evaluation/Cost Analysis (EE/CA) be made available for review and that the public be notified of the Interim Action. A summary of the EE/CA and the public's comments are then addressed in an Action Memorandum. Tetra Tech was not tasked to prepare an EE/CA. It is assumed that the activities performed to date and the associated documentation will serve as the EE/CA and that only the Action Memorandum will have to be prepared. An Action Memorandum is prepared for all removal actions performed under CERCLA after the EE/CA has been made available for public review and comment. The Action Memorandum is based on information contained in the EE/CA Report and consideration of public comments and community concerns.

Tetra Tech will prepare a concise Action Memorandum that identifies the response action chosen for implementation at the Site. As the primary decision document for the response action, the Action Memorandum will serve the following functions: (1) substantiate the need for the response action, (2) identify the proposed action, (3) explain the rationale for the response action selection, and (4) document that the appropriate process was followed in the selection of the response action.

MTCA requires that routine cleanup and interim actions include the following public involvement. Public notice shall be provided for any proposed routine cleanup or interim action. This public notice shall be combined with public notice of an order or settlement whenever practicable. At a minimum, the public notice shall briefly discuss the following:

- Describe the site;
- Identify the proposed action, including institutional controls and the permit exemptions authorized under RCW 70.105D.090;
- Identify the likely or planned schedule for the action;
- Reference any planning documents prepared for the action;
- Identify department staff who may be contacted for further information; and
- Invite public comment on the routine cleanup or interim action. The public comment period shall extend for at least 30 days from the date of the mailing of notice.

Tetra Tech will work with the Army and DOE to meet all public participation requirements including participation in the Restoration Advisory Board (RAB) as needed.

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10. STATE ENVIRONMENTAL POLICY ACT

The State Environmental Policy Act (SEPA) is intended to provide information to agencies, applicants, and the public to encourage the development of environmentally sound proposals. The environmental review process involves the identification and evaluation of probable environmental impacts, and the development of mitigation measures that will reduce adverse environmental impacts. This environmental information, along with other considerations, is used by agency decision-makers to decide whether to approve a proposal, approve it with conditions, or deny the proposal. SEPA applies to actions made at all levels of government within Washington State. The environmental review process involves a number of steps that are briefly described below.

Although not included in the SEPA Rules, it is recommended that agencies offer a process for the applicant to discuss a proposal with staff prior to submitting a permit application or environmental checklist. The applicant and agency can discuss existing regulations that would affect the proposal, the steps and possible timeline for project review, and other information that may help the applicant submit a complete application; and determine whether environmental review is required for the proposal by (1) defining the entire proposal, (2) identifying any agency actions (licenses, permits, etc.), and (3) deciding if the proposal fits one of the categorical exemptions. If the project does not involve an agency action, or there is an action but the project is exempt, environmental review is not required. Agency decisions are the hub of SEPA; if there is no agency action, SEPA is not required.

If environmental review is required, the "lead agency" is identified. This is the agency responsible for the environmental analysis and procedural steps under SEPA. The lead agency must review the environmental checklist and other information available on the proposal and evaluate the proposal's likely environmental impacts. The lead agency and applicant may work together to reduce the probable impacts by either revising the proposal or identifying mitigation measures that will be included as permit conditions.

After evaluating the proposal and identifying mitigation measures, the lead agency must determine whether a proposal would still have any likely significant adverse environmental impacts. The lead agency issues either a determination of nonsignificance (DNS), which may include mitigation conditions, or if the proposal is determined to have a likely significant impact, a determination of significance/scoping notice (DS/Scoping) is issued and the environmental impact statement (EIS) process is begun. The EIS will analyze alternatives and possible mitigation measures to reduce the environmental impacts of the proposal.

The agency decision-maker must consider the environmental information, along with technical and economic information, when deciding whether to approve a proposal. Decision-makers may use SEPA substantive authority to condition or deny a proposal based on information in the SEPA

document and the agency's adopted SEPA policies. Categorical exemptions are types of projects or actions that are not subject to SEPA review. Proposals are categorically exempt because the size or type of the activity is unlikely to cause a significant adverse impact.

An emergency exemption can be granted by the lead agency when an action is needed to avoid an imminent threat to public health or safety, public or private property, or to prevent serious environmental degradation.

For this project it is very likely that DOE will be the lead agency. If the project is not given an emergency exemption, then at a minimum the environmental checklist will have to be prepared and submitted to the lead agency for review, and the agency will have to determine if further environmental assessment will be required.

11. SCHEDULE

The major milestones and their respective delivery dates are summarized below.

Task	Delivery Date
CAWP Draft Final	January 2004
CAWP Final	March 2004
Mobilization	May 2004
Site Improvements	June 2004
UXO Clearance	July 2004
Begin Excavation	August 2004
Confirmation Sampling	August 2004
Backfill Excavation	September 2004
Site Restoration and Demobilization	October 2004
Closure Report	November 2004

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12. REFERENCES

Otak, Inc.

1998 *The Camp Bonneville Local Redevelopment Draft Reuse Plan.* Prepared for the Camp Bonneville Local Redevelopment Authority (LRA). September.

Shannon & Wilson

1999 *Final Landfill 4 Investigation Report, Camp Bonneville, Washington.* Contract DACA 67-94-D-1014. August.

URS Greiner Woodward Clyde

1999 *Supplemental Archive Search Report*, August.

2003. *Draft Final Report, Landfill 4 Demolition Area No. 1 Expanded Site Inspection, Camp Bonneville, Washington, Volume 1.* February.

U.S. Army Corps of Engineers

1997 *Archive Search Report*, July.

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PUBLIC WORKS
AFZH-PWE MS 17
BOX 339500
FORT LEWIS, WASHINGTON 98433-9500

WAC 197-11-960 Environmental checklist.

ENVIRONMENTAL CHECKLIST

Purpose of checklist:

The State Environmental Policy Act (SEPA), chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply." Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

A. **BACKGROUND**

1. Name of proposed project, if applicable:
   Interim cleanup action of Landfill 4/Demolition Area 1
   Camp Bonneville, WA

2. Name of applicant:
   Department of the Army

3. Address and phone number of applicant and contact person:
   Fort Lewis Public Works
   AFZH-PWE MS-17
   Box 339500
   Fort Lewis, WA 98433-9500

   Contact: Eric Waehling (253-966-1732)

4. Date checklist prepared:
   March 18, 2004

5. Agency requesting checklist:
   Department of Ecology (DOE)

6. Proposed timing or schedule (including phasing, if applicable):
   The Department of the Army plans to conduct interim cleanup activities in 2004. Below are the major milestones for the first phase of the interim cleanup activities.

Mobilization	**May 2004**
Site Improvements	**June 2004**
UXO Clearance	**July 2004**
Begin Excavation	**August 2004**
Confirmation Sampling	**August 2004**
Backfill Excavation	**September 2004**
Site restoration & demobilization	**October 2004**
Closure Report	**November 2004**

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.
   The second phase of the interim activity will be based on the findings of this proposal (first phase) and may include soil and groundwater cleanup.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.
   - **Initial Draft: Corrective Action Work Plan for Landfill 4/Demolition Area 1, Interim Cleanup Action, Camp Bonneville, WA. December 2003. Prepared by Tetra Tech Inc. for the Department of the Army.**

- **Summary of WA Department of Ecology comments to Camp Bonneville Landfill 4/Demolition Area 1 Corrective Action Work Plan Draft.**

- **Camp Bonneville Endangered Species Survey Final Report. Submitted by Pentec Environmental Inc. to the US Army Corps of Engineers. February 23, 1995.**

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

   No.

10. List any government approvals or permits that will be needed for your proposal, if known.

    No.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

    In February 2003, the State of Washington, Department of Ecology (DOE), issued Enforcement Order (EO) 03TCPHQ-5286, pursuant to Washington Administrative Code (WAC) 173-303-646(3)(a) and 70.105 RCW, for the entire Camp Bonneville Military Reservation, including Landfill 4/Demolition Area 1 (the Site). The Site is referred to as Remedial Action Unit 2C in the EO. The EO stipulated that the interim action for the Site shall be to "excavate and appropriately dispose of materials contained in and contaminated soils associated with Landfill 4/Demoltion Area 1." This proposal focuses on the first phase of the restoration of the Site, to meet the regulatory requirements to gain a no further action for the Landfill debris/soil to support early transfer of the property to Clark County.

    The Army proposes to use risk-based cleanup to close the Site. The Landfill reportedly received building demolition debris during the mid-1960s and later was used as an Open Burn/Open Detonation area.

    The area of the Site is reported to be 120 by 200 feet (0.6 acre) and the depth appears to extend beyond 11 feet below ground surface. Site preparation activities include: the preparation of soil stockpile areas, the equipment staging area, and the equipment decontamination station; improvements to the existing roadway and bridge; and the

preparation of the Landfill buffer and work area. Cleanup activities will consist of excavation of the Landfill, confirmation sampling, onsite handling of waste, transportation and disposal of waste, backfilling the excavation, and site maintenance and restoration.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

    Camp Bonneville is a military reservation situated in the southeastern region of Clark County, Washington. The camp is located along the western foothills of the Cascade Mountain Range within unincorporated Clark County approximately 12 miles northeast of the City of Vancouver. The Site is located in the northern part of the Camp Bonneville Military Reservation approximately one mile northeast of the Cantonment Area.

B. **ENVIRONMENTAL ELEMENTS**

1. **Earth**

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other . . . . . .

   Generally flat – one corner of the Site has a steep slope downwards.

b. What is the steepest slope on the site (approximate percent slope)?

   About 60% at the corner of the Site.

c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

   Soils found on the Site are primarily silts and clays.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

   No.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed Indicate source of fill.

   Approximately 18,000 tons of material will be required to backfill the Landfill excavation. Suitable fill from off-site will

be delivered to the Site. The Landfill will be backfilled and graded to blend into the surrounding topography.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.
Erosion could result from activities related to clearing and grubbing, roadway and bridge improvements, Landfill excavation, and filling and grading of the Site.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?
None.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:
Siltation from the excavation will be controlled with a combination of silt fences and catch basins. Haul roads on the Site will be patrolled routinely to ensure that waste has not inadvertently fallen off any trucks. In addition roads will be routinely graded to maintain a safe operating surface. The waste stockpile area will be constructed with a liner and sufficient soil cover to protect the liner during stockpiling activities.

2. **Air**

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.
There would be dust generated from unpaved surfaces, exhaust fumes from loaders and trucks, and odors stirred up by disturbing the Landfill.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.
No.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:
None.

3. **Water**

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, sltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

The North Fork of Lacamas Creek runs west of the Site. The Creek is downhill from the Site.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.
Yes. The existing access road and creek crossing were not designed to handle the increased traffic associated with the removal of the Landfill and may require some improvements. The ½ - ¾ mile long single lane road will be graded and smoothed and two turnouts may be constructed along the access road. A temporary bridge crossing, adequate to support the increased traffic, will be installed over the creek.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.
None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.
No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.
The area of proposed road improvement lies in the 100-year flood plain. The area is labeled as "unpaved haul road" and "stream crossing" on the attached map titled "Staging/Stockpile Area"

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.
No.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.
Groundwater will not be withdrawn. However, pore water samples at the bottom of the excavation may be collected and analyzed for the purpose of comparison to the results of the soil samples. All water used during decontamination operations will be stored in portable aboveground storage tanks pending receipt of analytical results. Disposal will be based on the results of these analyses.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.
None.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.
Storm water at the Site will be controlled with upstream trenches and sand bags around the perimeter. The creek will be protected from siltation from the excavation with a combination of silt fences and catch basins.

2) Could waste materials enter ground or surface waters? If so, generally describe.
No.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:
None proposed.

4. **Plants**

a. Check or circle types of vegetation found on the site:

X deciduous tree: (alder) maple, aspen, other: **red alder, Oregon ash, Garry oak, cottonwood, crabapple, willow**

X evergreen tree: (fir) cedar, pine, other: **red cedar, western hemlock**

X shrubs: **salmonberry, elderberry, hazelnut, salal, sword fern**

——— grass

——— pasture

——— crop or grain

——— wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other

——— water plants: water lily, eelgrass, milfoil, other

——— other types of vegetation

b. What kind and amount of vegetation will be removed or altered?
A buffer around the Landfill for equipment to maneuver and a small working area adjacent to the Landfill to load and

maneuver trucks will be required. Both the buffer area around the Landfill and the working area adjacent to the Landfill will be cleared of vegetation.

c. List threatened or endangered species known to be on or near the site.
The following have been found to exist in Camp Bonneville:
State endangered species - Hairy-stemmed checker-mallow
State sensitive species - Small-flowered trillium

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:
After the backfill has been completed, the Site will be stabilized with erosion mats, if necessary, and will be revegetated with native or grass-type species.

5. **Animals**

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other: **Pileated woodpecker, Vaux's swift**
mammals: deer, bear, elk, beaver, other:
fish: bass, salmon, trout, herring, shellfish, other: **Coho salmon, coastal resident cutthroat trout, sculpin, chiselmouth, redside shiner, western brook lamprey**

b. List any threatened or endangered species known to be on or near the site.
The following have been found to exist in Camp Bonneville:
Two federal threatened species: Coho salmon and cutthroat trout
One federal candidate species - Northern red-legged frog
Two state candidate species - Pileated woodpecker and Vaux's swift

c. Is the site part of a migration route? If so, explain.
No.

d. Proposed measures to preserve or enhance wildlife, if any:
Stormwater and construction best management practices to reduce and eliminate erosion and siltation.

6. **Energy and natural resources**

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.
None.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.
No.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:
Not applicable

7. **Environmental health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, describe.
There are potential chemical and physical hazards associated with the excavation of the landfill. The hazards include:

Chemicals of potential concerns include high explosives and organic compounds; artillery propellants (including ammonium perchlorate); VOCs; priority pollutant metals; SVOCs; TPH-(gasoline, diesel, and oil); and possibly pesticides and herbicides. The chemical exposure risk during cleanup activities at the Site is anticipated to be low.

Potential physical hazards associated with the proposed work include: construction hazards such as tripping, falling, slipping, handling of heavy equipment, noise, trenching and excavating, and stockpile operations; hazards associated with detonation (projectiles); heat and cold weather stress; waste transfer activities; traffic; electrical hazards; and UXO operations.

1) Describe special emergency services that might be required.
An emergency response plan for the proposal describes pre-planning, accident prevention, emergency communications, and injury decontamination and response procedures. Procedures for mitigating exposure to blood borne pathogen, and response and containment to spills are also discussed.

2) Proposed measures to reduce or control environmental health hazards, if any:
Measures to reduce and control environmental health hazards include worker training in accordance with OSHA requirements and UXO awareness training. Field personnel are prohibited from eating, smoking, chewing tobacco, or any other hand-to-mouth activity, which could result in the ingestion of contaminants. These activities will only be allowed outside of the work zone and after personnel have washed their hands. The minimum level of Personal

Protective Equipment (PPE) required to be used by all personnel is Level D. Regular site safety inspections will be conducted.

b. **Noise**

1) What types of noise exist in the area that may affect your project (for example: traffic, equipment, operation, other)?
None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.
Short-term high noise levels will be created by heavy equipment operating on the Site and detonation of UXO. Clean-up operations and traffic to and from the Site are expected to occur through the fall of 2004. Activity may take place between dawn and dusk.

3) Proposed measures to reduce or control noise impacts, if any:
Engineer controls include tamping of detonation noise, detonation size limits, and activity scheduling.

8. **Land and shoreline use**

a. What is the current use of the site and adjacent properties?
Camp Bonneville was a military installation established in 1909 as a drill field and fire range. The Army used Camp Bonneville for training between 1910 and 1995. In 1995 the U.S. Government selected Camp Bonneville for transfer and reuse under the Base Realignment and Closure (BRAC) program.

b. Has the site been used for agriculture? If so, describe.
No.

c. Describe any structures on the site.
A 10ftx15ft structure exists on the Site. The structure has three sides, a flat roof, and is constructed of railroad ties.

d. Will any structures be demolished? If so, what?
The 10ftx15ft structure on the Site will be demolished.

e. What is the current zoning classification of the site?
Federal Property.

f. What is the current comprehensive plan designation of the site?
Current plans for future use of the Camp Bonneville property are for public recreational use only.

g. If applicable, what is the current shoreline master program designation of the site?
Not applicable.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.
No part of the Site has been classified as an "environmentally sensitive" area.

i. Approximately how many people would reside or work in the completed project?
None.

j. Approximately how many people would the completed project displace?
None.

k. Proposed measures to avoid or reduce displacement impacts, if any:
Not applicable.

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:
The proposed corrective action to excavate Landfill 4/Demolition Area 1 is expected to increase the compatibility of this Site with the surrounding land use.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.
None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.
None.

c. Proposed measures to reduce or control housing impacts, if any:
Not applicable.

10. **Aesthetics**

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?
Not applicable.

b. What views in the immediate vicinity would be altered or obstructed?
None.

c. Proposed measures to reduce or control aesthetic impacts, if any:
Not applicable.

11. **Light and glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?
None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?
Not applicable.

c. What existing off-site sources of light or glare may affect your proposal?
None.

d. Proposed measures to reduce or control light and glare impacts, if any:
Not applicable.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?
None.

b. Would the proposed project displace any existing recreational uses? If so, describe.
No.

c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:
Public recreation opportunities are anticipated future uses of the Camp Bonneville property. This proposal is part of the action necessary to achieve future use goals.

13. **Historic and cultural preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.
No.

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.
None.

c. Proposed measures to reduce or control impacts, if any:
Not applicable.

14. **Transportation**

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Please see attached maps for routes:

- **From Camp Bonneville to Hillsboro Landfill and Recycling in Hillsboro, OR**
- **From Camp Bonneville to Chemical Waste Management in Arlington, OR**

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No.

c. How many parking spaces would the completed project have? How many would the project eliminate?

None.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

The proposal will require about ½ - ¾ mile road improvements and a new temporary bridge.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

Not applicable.

g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable.

15. **Public services**

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable.

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity, which might be needed.
Utilities are not proposed for this project.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: .....
Randall W. Hanna
Deputy Director
Public Works
Fort Lewis, WA

Date Submitted: .....

D. **SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS**

(do not use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

   Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

   Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

   Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

   Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or publicservices and utilities?

   Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local, state, or federal laws or requirements for the protection of the environment.

End of SEPA Checklist.

WAC 197-11-970 Determination of nonsignificance (DNS).

DETERMINATION OF NONSIGNIFICANCE

Description of proposal **Interim cleanup action** of Landfill **4/Demolition Area 1 involving excavation of landfill material and associated contaminated soils**

Proponent **Department of the Army**

Location of proposal, including street address, if any **Camp Bonneville Military Reservation, Vancouver, Washington**

Lead agency **Department of Ecology**

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An environmental impact statement (EIS) is not required under RCW 43.21C.030 (2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead agency. This information is available to the public on request.

☐ There is no comment period for this DNS.

☐ This DNS is issued after using the optional DNS process in WAC 197-11-355. There is no further comment period on the DNS.

☐ **X** This DNS is issued under WAC 197-11-340(2); the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted by **May 12, 2004**

Responsible official **Tim Nord**

Position/title **Toxics Cleanup Program, Section Manager** Phone. **360-407-7226**

Address **P. O. Box 47600, Olympia, WA 98504-7600**

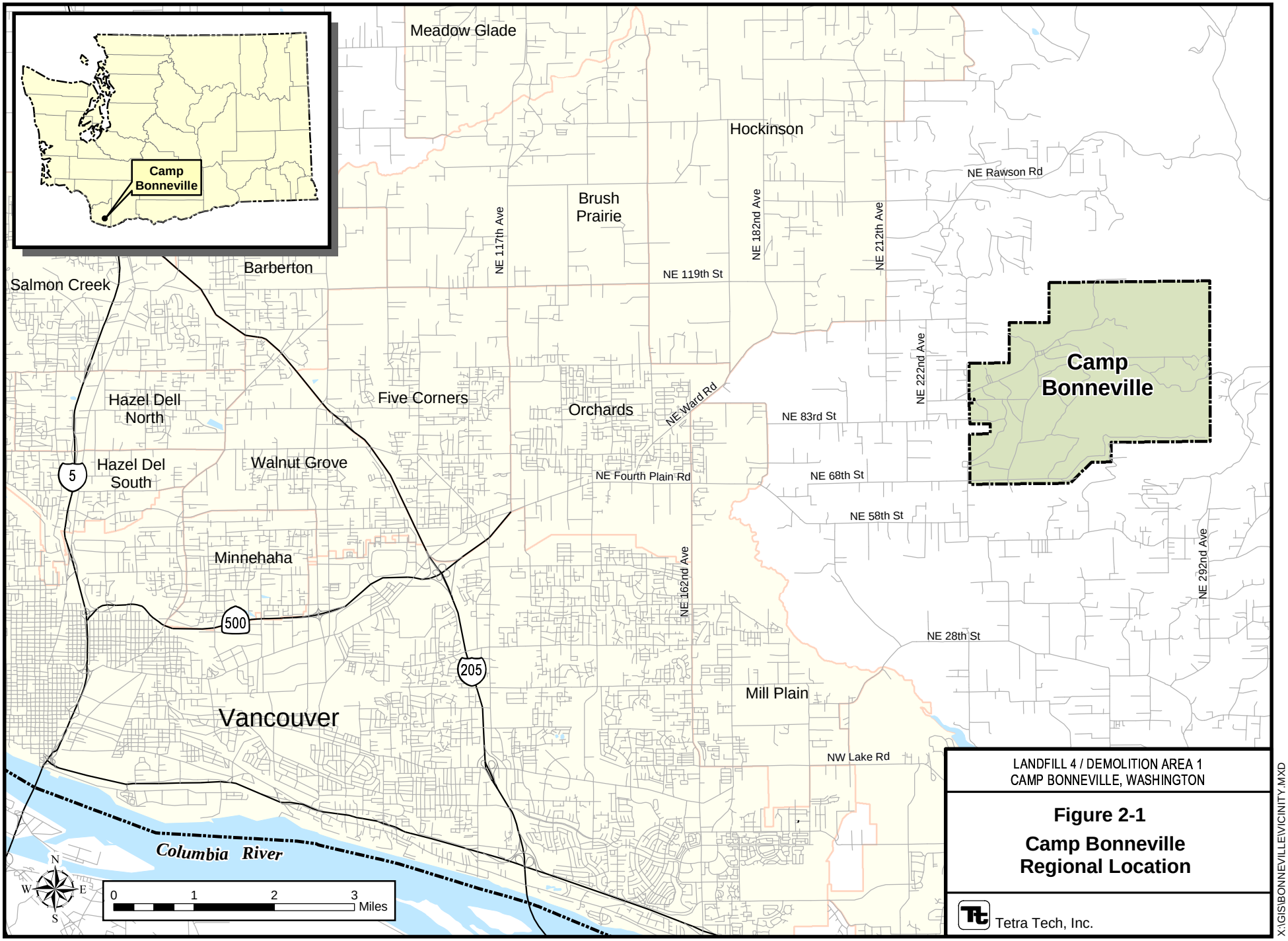
Date. 4-12-04 Signature

(OPTIONAL)

☐ You may appeal this determination to (name)
at (location)
no later than (date)
by (method) .....

You should be prepared to make specific factual objections.
Contact _____ to read or ask about the procedures for SEPA appeals.

☐ There is no agency appeal.



LANDFILL 4 / DEMOLITION AREA 1
CAMP BONNEVILLE, WASHINGTON

Figure 2-1

Camp Bonneville Regional Location

Tetra Tech, Inc.

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