FINAL

WORK PLAN

Former Evergreen Infiltration Range Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

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Attn: Matt Allen (PM-EM)
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Reviewed and Approved by:

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Timothy Yu, Ph.D., PE
Program Manager

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List of Acronyms and Abbreviations

APP	Accident Prevention Plan
BMP	Best Management Practices
CFR	Code of Federal Regulations
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
DERA	Defense Environmental Restoration Permit Program
DOT	United States Department of Transportation
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	Exclusion Zone
FIO	For Information Only
GA	Government Approved
ICP	Inductively coupled plasma
LRI	Land Recover Inc.
MLLW	Mean Low Level Water
MP	Management Plan
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
QCSM	Contractor Quality Control System Manager
RORO	Roll-On, Roll-Off
SAP	Sampling and Analysis Plan
SHM	Site Safety and Health Manager
SPERP	Spill Prevention and Emergency Response Plan
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan/Accident Prevention Plan
SWPPP	Storm Water Pollution Prevention Plan
SWPs	Safe Work Practices
TLV-TWA	Threshold Limit Value- Time Weighted Average
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WP	Work Plan
WWMP	Waste Water Management Plan
XRF	X-ray fluorescence

1.0 INTRODUCTION AND BACKGROUND

This Work Plan (WP) is a component of the project Management Plan (MP). The WP describes the overall technical approach and specific field activities to be implemented by TPA-CKY Joint Venture (TPA-CKY) and its subcontractors to perform the contractor services described in the plans and specifications for Contract No. DACW67-03-D-1007, Task Order No. 0002. TPA-CKY will furnish the labor, materials, tools, equipment, transportation, supervision, quality control, and necessary incidental services to accomplish the project objectives.

1.1 SITE LOCATION

The remediation areas are located on Fort Lewis. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington (see Figure 1-1). The Former Evergreen Infiltration Range (AOC 4-6.3) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. (See Figure 1-2.) Work activities will begin at the Evergreen Infiltration Range and then move to the Thompson Machine Gun sites. The remediation area at the Thompson Machine Guns sites is currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area.

1.2 SITE BACKGROUND

The former Evergreen Infiltration Range was identified from a 1951 aerial photograph and appears to have been in use until 1965. This site was used to condition soldiers to move under live fire and under combat type situations. Fixed-position machine guns firing into an impact berm provided live fire training. The ammunition associated with infiltration range training during this era was the .30 caliber cartridge. Soil contamination was documented in the impact berm. The primary contaminant of concern is lead. The maximum detected concentration was 62,500 mg/kg. Antimony and copper were also detected, but only when lead was above the action level of 250 mg/kg.

The former machine gun sites (AOC 4-6.1 and 4-6.2) were identified on a 1944 map. Preliminary assessment activities did not confirm site use. Recent magnetometer work confirmed the presence of .45 caliber bullets in isolated pockets. Site assessment is currently being performed by USACE to delineate remediation areas.

2.0 PROJECT OBJECTIVES AND SCOPE OF SERVICES

The overall project objective is the remediation of the Former Evergreen Infiltration Range and the Thompson Machine Gun Range. The remediation will consist of excavation of designated soils, removal and recycling of bullets, stabilization of the remaining waste stream to pass TCLP, transportation and disposal of treated soils to active Fort Lewis ranges, confirmation sampling and site restoration.

The scope of services for this project will include the following tasks:

- Mobilize to project site
- Pre-construction survey
- Identification and marking of utilities
- Perform stabilization bench tests
- Prepare the site, including field office setup, sheds, and erosion control
- Clearing of work area
- Stump removal
- Excavation of designated areas
- Placement of excavated soil in temporary stockpile
- XRF sampling and re-excavation (if necessary)
- Confirmation sampling to ensure clean closure
- Post-construction survey
- Screening of soil to remove bullet fragments
- Disposal / recycling of bullet fragments
- Testing of soil for off-site disposal
- Stabilization of remaining soils to pass TCLP criteria
- Placement of stabilized soil onto active ranges at Fort Lewis
- Site restoration
- Final testing under stockpiles and testing of any waste for disposal
- Demobilization
- Close-out Documents

TPA-CKY will implement specific procedures throughout field operations, to ensure safe operations, meet project objectives, comply with applicable environmental regulations, and conform to environmental constraints and minimize potential adverse impacts to the environment. These procedures are delineated in other components of the MP, including the Site Specific Safety and Health Plan (SSHP/APP), Environmental Protection Plan (EPP), Sampling and Analysis Plan (SAP), Waste Management Plan (WMP), and Contractor Quality Control Plan (CQCP).

The work activities described below consider and incorporate applicable environmental constraints and environmental protection procedures. In addition, Best Management Practices (BMPs) will be employed to reduce the potential for construction activities to affect aquatic species and their habitats, and to control erosion and stormwater runoff.

3.0 PROJECT APPROACH AND FIELD ACTIVITIES

TPA-CKY's field construction approach is designed to accomplish all technical objectives and specifications, and to incorporate BMPs applicable to environmental constraints and requirements. This will ensure protection of the environment.

3.1 PRE-CONSTRUCTION ACTIVITIES

3.1.1 Mobilization and Site Preparation

The mobilization will be performed in two phases. During the first phase, TPA-CKY will perform those activities necessary to perform soil stabilization bench testing. At this time, the work area will be inspected to identify existing conditions. The inspection will note any damaged areas or areas that may constitute a change in condition. A series of digital color photographs will be taken to establish the pre-field activity site conditions. Additional photographs will be taken during the course of the project and submitted to the USACE on a monthly basis. Orange construction fencing will be installed around the perimeter of the construction area. Signage will also be installed. This will include the Project Sign as well as warning placards. These measures will define the work areas and restrict access to the site. TPA-CKY will mobilize equipment and material necessary to perform stabilization bench testing.

After completion of bench testing, the second phase of mobilization will occur. TPA-CKY will mobilize all equipment and materials necessary to perform the project. A project staging area will be established. This will include a project office trailer, portable generator, tool shed, portable toilets and handwash stations. In the work area, an exclusion zone will be established. Stockpile and treatment area will be identified. Areas for personnel and truck access and egress will be established. Decontamination stations will be constructed. Erosion control measures will also be installed.

TPA-CKY will coordinate with the COR and Fort Lewis Public Works (PW) regarding bringing an XRF meter on site. This instrument will be rented and may be brought on site during site preparation as well as near the end of remediation. TPA-CKY and/or the meter vendor will comply with all applicable PW procedures.

3.1.2 Surveys

Joint Condition Survey - TPA-CKY and the Contracting Officer will make a joint condition survey. Areas of concern, such as trees, shrubs or structures that need to be protected, will be identified and marked. The inspection will also note any damaged areas or areas that may constitute a change in condition. A series of digital color photographs will be taken to establish the pre-field activity site conditions.

Immediately following the survey, TPA-CKY will prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the assigned storage area and access route(s), as applicable. This survey report will be signed by TPA-CKY and the Contracting Officer upon mutual agreement as to its accuracy and completeness. TPA-CKY will protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference, which their preservation may cause to our work under the contract.

All survey data will be submitted to the COR when they are developed.

Additional photographs will be taken during the course of the project and submitted to the USACE on a monthly basis.

The excavation area will also be surveyed. There will be two types of survey performed: 1) layout and 2) quantity. TPA-CKY will adhere to the following specified survey requirements:

a. Reference project site reference points and survey control points to the provided permanent benchmarks, with horizontal and vertical data, on As Built Records.
b. Use contractor resources to obtain working or construction lines or grades as needed.
c. All control surveys for elevation to be +0.01 foot and, for horizontal, control angles to be to the nearest twenty (20) seconds +10 seconds, and measured distances to be to +0.01 foot. All measurement surveys for elevation to be to the nearest 0.01 foot and for horizontal distances to + 0.01 foot.
d. All material to be of good professional quality and in first-class condition.
e. All lasers, transits, and other instruments to be calibrated and maintained in accurate calibration throughout the execution of the work.
f. Furnish all materials and accessories (i.e., grade markers, stakes, pins, spikes, etc.) required for the proper location of grade points and line.
g. All marks given to be carefully preserved and, if destroyed or removed without the CO's approval, to be reset, if necessary, at Contractor expense.

The following survey data will be submitted with the project closeout report:

SD-06 Test Reports: Field Notes, Computations, and Survey Quantities. Upon completion of the fieldwork, TPA-CKY will furnish the CO copies of all field notes, computations, any records relating to the quantity survey or to the layout of the work, and an IBM PC-compatible version of any computer software required to interpret the finished data and records. As applicable, software used for data transfer to the COR will be provided to the Contracting Officer (CO) and written approval will be received from the CO prior to the start of the site work.

SD-07 Certificates: Survey Crew Qualifications. Prior to start of any survey work, TPA-CKY will submit name, address, telephone number, and qualifications of the surveyor, crew chief, superintendent, and all other persons who are proposed to perform surveys or survey-related duties to the CO for review and acceptance. All survey, layout, and related work shall be performed and signed by a qualified land surveyor registered in the State of Washington.

Calibration certificates to be submitted to the CO prior to the use of any instrument.

TPA-CKY will maintain on site a complete, accurate log of control of survey work as it progresses. Upon completion of the work, TPA-CKY will submit final survey of site a part of the project closeout report.

Layout Survey – TPA-CKY will provide all materials, items, operations, or methods specified, listed, or scheduled on the contract Drawings or in the Specifications, including all materials, labor, equipment, and incidentals necessary and required to conduct proper surveys required to stake and layout the work.

The layout survey will consist of establishing three permanent control points, and a sufficient number of temporary control points and off-sets to perform for locating and marking the limits of the specified excavation areas and confirmatory sampling grids.

Quantity Survey - In addition, a quantity survey will be conducted to determine the amount of soil removed from the impact berm. To accomplish this, a pre-construction survey will be performed to establish the existing size and shape of the excavation area. A post-construction survey will be performed at the completion of excavation activities. The difference will represent the actual volume of soil removed from the excavation area. Survey data will be submitted to the COR.

3.1.3 Utility Location

Underground utilities will be identified and marked prior to implementing the excavation program. In addition, obstacles, obstructions and areas to be protected will be identified and marked. TPA-CKY will also obtain an excavation permit from Fort Lewis.

3.2 STABILIZATION BENCH TESTING

TPA-CKY will perform bench tests to determine optimize screen design and the selection of and dosage of fixation agent(s). The following activities will take place during bench testing:

- Temporary Stockpile area will be constructed
- A small representative amount of soil will be excavated using a backhoe and placed in the stockpile area.
- Material will be screened with different size screens to optimize separation/recovery of bullets and bullet fragments
- Measured amounts of screened material will be fixated in a small concrete mixer with various types and concentrations of fixation agents.
- Soil samples will be analyzed for TCLP Lead from each batch.

Once the sample results are obtained, TPA-CKY will use the data to determine the optimal mixing ratio and fixation agent to be used during full-scale operations. Considerations will include effectiveness, ease of mixing and cost. At the end of bench test activities, all equipment will be demobilized. Any left over soil will be returned to the berm awaiting full-scale operation.

3.3 CONSTRUCTION ACTIVITIES

After mobilization we will place equipment and perform site setup. On-site activities will include four main project tasks: Excavation, Screening, Stabilization, and Disposal. Once started, these tasks will be performed concurrently until each task has been completed.

3.3.1 Clearing of Work Area

Numerous trees have been identified to be left standing. These trees will be protected using orange construction fencing and will not be harmed. Other trees have been previously removed by others from the impact berm and work area. It is not anticipated that any other trees will need to be removed. There are several slash piles from the tree removals located to the southeast side of the impact berm. TPA-CKY will remove debris, trash, slash, logs, snags, branches and brush from the work and excavation area. This woody material will be disposed of on site, as much as possible out of sight of the roadway. Other debris and trash will be separated from woody material and will be properly disposed of with other construction debris.

The stockpile area will also be cleared of any debris or large rocks that may interfere with the geomembrane liner.

Prior to initiation of intrusive work, OSHA 8-hour refresher certificates and Certificates of Worker Acknowledgement for each worker will be submitted to the CO. The Exclusion Zone (EZ), Contamination Reduction Zone (CRZ), and Support Zone will be delineated with fencing and signage. Hard hat areas and the first aid station will be labeled with appropriate signage.

3.3.2 Stump Removal

Stumps and large roots located in the excavation area will be removed using an excavator. Large stumps will be cut into smaller sections to facilitate transportation and disposal. Prior to removal, clinging soil will be removed from the stumps and roots. Stumps and roots will be disposed of as approved of by the CO.

3.3.3 Excavation of Designated Areas

Prior to beginning excavation, the individual excavation areas will have been identified and marked by the surveyor. These areas are defined by depth and well as location. The areas will be excavated to 1' below ground surface (bgs), 2' bgs, 3' bgs, 5.5' bgs and 7' bgs, as delineated in the contract drawings. TPA-CKY will install field staking and string lines, as necessary, to further define the individual excavation areas. The excavation areas are divided into two groups, those on the front side (street side) of the impact berm and those on the backside (south) of the impact berm. Excavation will begin on the back side of the impact berm and then proceed to the front side.

The back side of the impact berm has areas with indicated excavation depths of 1' bgs, 2' bgs and 5.5' bgs. The 5.5'-bgs area is located near the ridgeline in the center of the impact berm. This area will be excavated first. The remainder of the impact berm will be excavated from the ridgeline down. The majority of the remaining area to be excavated is to 1' bgs, with a small 2'-bgs area located at the far eastern side of the impact berm.

The front side of the impact berm has excavation area depths of 1' bgs, 3' bgs and 7' bgs. The 7'-bgs area is located near the ridgeline in the center of the impact berm. This area will be excavated first. The remainder of the impact berm will be excavated from the ridgeline down. The majority of the remaining area to be excavated is to 3' bgs, with a small 1'-bgs area located at the far northwest area of the impact berm.

Care will be taken to excavate the areas to the limits shown of the contract drawings. Excavation depths will be measured using marked rods and recorded in the Daily Reports. Depth measurements will be taken normal to the excavation slope. However, due to the instability of the rocky material used to construct the impact berm, some natural sloping of the excavation sidewalls may occur.

Excavation logs will be prepared and maintained in accordance with ASTM D 5434.

3.3.4 Temporary Stockpiles

Excavated soils will be placed in managed temporary stockpiles designed to optimize remediation production. Screened and treated lead and soils will also be placed in temporary stockpiles and tagged until cleared by required performance testing. QC checks will be performed on screened soil as required on pace with production to minimize the number of screened soil batch stockpiles. Stabilized soil batches will be tagged and maintained as discrete stockpiles until cleared by TCLP.

Temporary stockpiles for contaminated material will be established behind (away from Evergreen Road) the berm in the remediation process area. Clean (stabilized or uncontaminated) material will be stockpiled as necessary to support hauling operations in a clean area between the berm and Evergreen Road.

Initial production rates are based on 150 CY of stabilized soil per day. At this rate, a 50-CY stockpile for prescreened excavated soil will be required. Pre-screened oversized rocks and cobbles will be stockpiled on site as directed by the COR. Screened bullets and other lead fragments will be discharged from the screening plant via conveyor belt directly into transport containers as supplied by the recycler. Screened material for stabilization will be discharged from the screening plant to the pug mill for processing, therefore, no stockpile will be required for screened untreated material. Based on a 7 day turn around

time for the TCLP analysis, space for up to eleven 100-CY stockpiles for stabilized material will be required.

Stockpile areas will be reasonably level except for slope necessary for collection of leachate. A bottom geomembrane liner will be installed. The liner will be free of holes, tears or other damage and will have a minimum thickness of 20 mils. The area will also be free of rocks or debris that may cause damage to the liner. Stockpile covering will also be free of tears, holes or other damage.

Stockpiles will be constructed to prevent incursion of rain or stormwater and to allow for the collection of any accumulated leachate. At the end of each workday stockpiles will be covered. Covers will be weighted down and/or secured with ropes or other devices as necessary to prevent wind or storm damage. Stockpile maintenance will be performed as necessary throughout the project duration.

Stockpile areas will be sampled before and after stockpiling as required by specification.

3.3.5 Soil Screening / Bullet Disposal

Excavated soils will be screened (filtered) prior to treatment. The purpose of the screening is to reduce the volume of waste and maximize recovery of lead bullets/fragments for recycling.

Excavated soil will be moved by loader from the excavation areas to a *Grizzly* vibrating rock grate. The Grizzly is expected to remove large rocks and cobbles and to reduce the excavated material volume by approximately 30 percent. Separated rock material will be stockpiled on site as clean material (no sticking dirt). The soil fraction will be moved by loader as it is generated to a screening plant. Material input to the screening plant will be separated into four waste streams:

1. cobbles larger than the initial screen;
2. whole bullets, large bullet fragment, and incidental pebbles;
3. small bullet fragments and incidental pebbles; and
4. soil to be treated.

Our anticipated screen plant design is as follows; actual site conditions may require modifying screening operations to obtain required results:

1. Pre-filter – designed to remove cobbles greater than 1/2" in size (entrained cobble material larger than a bullet – i.e., not including bullets or bullet fragments - will be stockpiled and left on-site as clean material, i.e. no sticking dirt);
2. Intermediate Filter – 7/16" mesh screen intended to separate out whole bullets and bullet fragments (entrained material will be hauled off site and recycled as lead) ;
3. Final Filter – mesh size of 0.667cm (1/4”). Entrained material will be hauled off site and recycled as lead. Filtered soil will be fixated and hauled off-site for disposal.

Recovered bullets and bullet fragments will be disposed of off site at a recycler facility as possible. See the SAP for a description of performance testing. The bullets will be screened into two streams: whole bullets, large bullet fragments and incidental pebbles (whole bullets); and small bullet fragments and incidental pebbles (fragments). It is anticipated that the whole bullets and fragments will be recycled at General Commodity Company (GCC) of Tacoma, WA. GCC will accept a percentage of foreign material with the whole bullet and fragments. The profiling process will consist of submitting samples of each of the screened bullet materials. GCC has a sliding scale acceptance criteria based on volume of material and metal to foreign material percentages. TPA-CKY will submit preliminary samples to GCC obtained during bench testing and profile samples collected during full-scale operations. TPA-CKY will closely monitor and adjust the screening process to maximize the amount of recycled material.

All off-site disposal of materials will be performed in accordance with applicable Federal, state and local regulations. Copies of manifests, bills of lading and weight tickets will be provided to the USACE with the DCQCR and project close-out documents.

See the WMP for a list of potential lead recyclers and disposal facilities.

3.3.6 Soil Stabilization

After screening, the remaining soil will be stabilized. Stabilization performance will meet or exceed the performance of 3% Enviro 50:50 additive to soil (defined as TCLP less than or equal to 5.0 mg/L). The pH of the soil will be maintained between 6 and 9. If the native soil is outside this range, the pH will not be allowed to change more than 1 pH unit. The pH cannot be lower than 2 or greater than 12 to avoid being classified as RCRA hazardous waste criteria. Additionally, the stabilization process will not cause the soil to exceed any criteria or to cause the soil to be classified as a Federal RCRA hazardous waste or to be classified as a State of Washington Department of Ecology Dangerous Waste.

Lead stabilization will be accomplished using a pug mill mixer. Screened soil and fixation agent(s) will be loaded into the hopper of the pug mill and mixed together. The stabilized material will then be placed in temporary, tagged stockpiles. During the process, care will be taken during loading to avoid spillage of material. Dust suppression will be accomplished using fixed spray bars and hoses. The stockpiles will be 100 CY in size as required for performance measurement. TCLP samples for lead will be collected from each stockpile per the SAP. If a stockpile fails the TCLP criterion, then it will be retreated. Stockpiles that pass the TCLP criterion will be transported to active Fort Lewis ranges.

3.3.7 Placement of Stabilized Soils

After stabilization, treated soils will be transported from the remediation areas and taken to active ranges on Fort Lewis (see haul route map at **Appendix A of the Environmental Protection Plan)**. As indicated in Section 3.3.4, above, each 100-CY batch of stabilized soil will be tagged and positively controlled until cleared by TCLP. Stabilized soil stockpiles will not be commingled or transported to Fort Lewis ranges until cleared by the COR. The active ranges are Ranges 18-19, 21-22, 89 and 90. The order of transport will be as directed by the COR. Soil volume at any individual range will be as directed by the COR. The specific areas of soil placement at each range will be as directed by the COR. TPA-CKY will subcontract the trucking to a local trucking firm. The soil will be transported using end dumps, bottom dumps, transfers or any combination thereof. To avoid delays and minimize disruptions, soil placement will be scheduled as bulk events rather than as a daily operation. In addition, each truck will be identified with a unique windshield placard and each driver will have a Rapid-Pass.

It is anticipated that fixated material will be disposed of as non-hazardous material. However, if TCLP sample results from this material are greater than 5 mg/L, then it will be disposed of off site as hazardous waste. All off-site disposal of materials will be performed in accordance with applicable Federal, state and local regulations. Copies of manifests, bills of lading and weight tickets will be provided to the USACE with the project close-out documents.

3.3.8 Equipment Decon

All trucks and heavy equipment leaving the Evergreen-Thompson sites will be decontaminated prior to departure to prevent release of lead-contaminated materials to the environment. Decontamination will involve brushing and scraping horizontal surfaces, tires and all areas where dust or soil has accumulated on the vehicles.

3.3.9 XRF Sampling and Re-excavation

After excavation of the individual designated excavation areas is complete or nearly complete, a grid system will be established over the entire remediation site and tailored to excavation area. The grid system will be constructed using stakes and string lines based on surveyor offsets. Each grid will be a 30' by 30' square, or approximately 900 sf, to deal with irregular excavation areas. Each grid will be given an identification number, i.e. – Grid 01, Grid 02, Grid 03, etc. A map of the excavation area showing the location and identification of the grid system is included with the SAP and will be maintained during confirmation sampling and potential additional remediation or sampling. Updates will be provided to the COR as part of daily reports submittals and in the close-out documents.

X-ray fluorescence (XRF) sampling will then be performed in each grid in accordance with the SAP to provide field information for deciding whether additional excavation of the grid is needed or not Where the COR indicates that individual grids or groups of grids require further excavation, the designated grids will be re-excavated to a depth of 1 foot additional. After re-excavation the grids will be re-sampled by XRF. When all excavation areas pass the XRF decision criteria (see SAP), TPA-CKY will proceed with confirmatory analysis (XRF and fixed-laboratory ICP analysis).

3.3.10 Confirmatory Analysis

Confirmatory soil samples will be selected and handled per the SAP. This includes XRF cup subsampling and analysis and shipment of cup samples to a local laboratory for Total Lead analysis by inductively coupled plasma (ICP). Clean closure is defined as being below the action level of 250 mg/kg of Total Lead. If analytic results indicate that the excavation passes the confirmation criteria (see SAP), no further excavation will occur. If the results fail the decision criteria, then the results will be evaluated and a new re-excavation strategy will be developed in concert with the COR. Re-excavation and re-sampling will continue until clean closure is obtained.

3.3.11 Site Restoration

Site restoration will follow remediation activities. Excavation areas will be finished with a smooth surface. No backfilling will occur. The work area will be graded to remove evidence of construction. Graveled and graded truck access ramps will be removed unless requested to remain by the COR.

3.4 DEMOBILIZATION

At the completion of on-site activities TPA-CKY will conduct demobilization. Final sampling beneath contaminated stockpiles will be completed as outlined in the SAP. All equipment and excess materials will be transported off-site. Any remaining trash or debris will be removed. Fencing and signage will be removed. All work area will be inspected and any signs of construction will be removed.

3.5 PROJECT CLOSE-OUT DOCUMENTS

At the completion of on-site activities TPA-CKY will prepare the Final Report. The Final Report will include a summary of project activities, maps showing excavation and sampling areas, sample results, survey date, a discussion of the final disposition of materials, and copies of manifests, bills of lading, weight tickets photographs and as-built drawings.

Manifest, bills of lading and weight tickets will be provided to the COR prior to submittal of the project closeout documents.

4.0 SCHEDULE

The initial project schedule is shown in **Figure 4-1**. This schedule indicates the phasing of field work and the planned timing for major pre-construction and construction activities, including performance testing and confirmatory sampling and analysis. The main project tasks of excavation, screening, stabilization, and disposal will be performed concurrently until each task has been completed. The schedule does not provide for additional sampling and analysis or excavation beyond the current contract Schedule B, though we acknowledge that such change in condition may occur. The initial schedule of activities is designed to be completed prior to the end of the contractual period of performance.

FIGURES

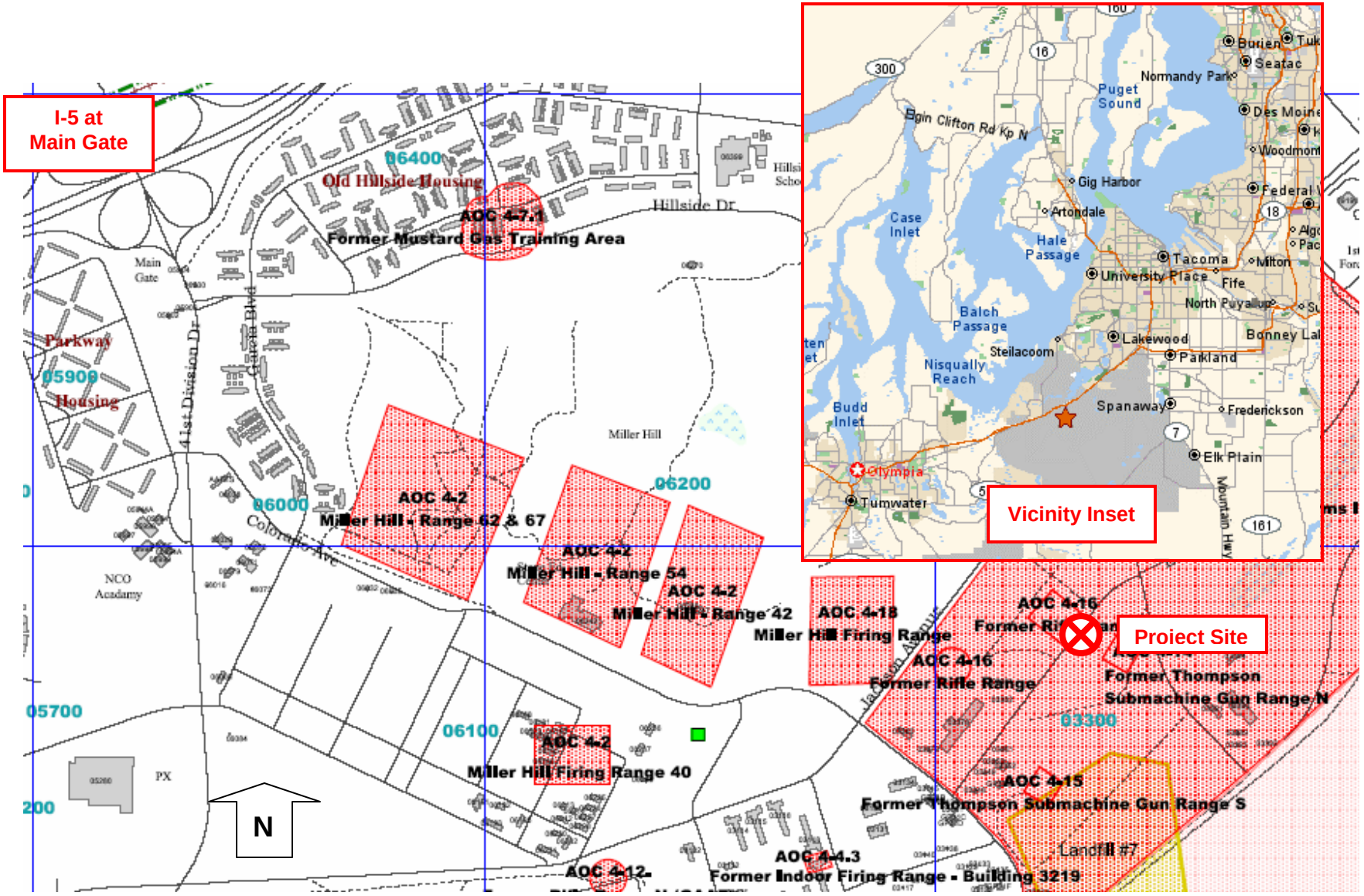


Figure 1-1. Fort Lewis Vicinity and Site Map

EVERGREEN AVENUE

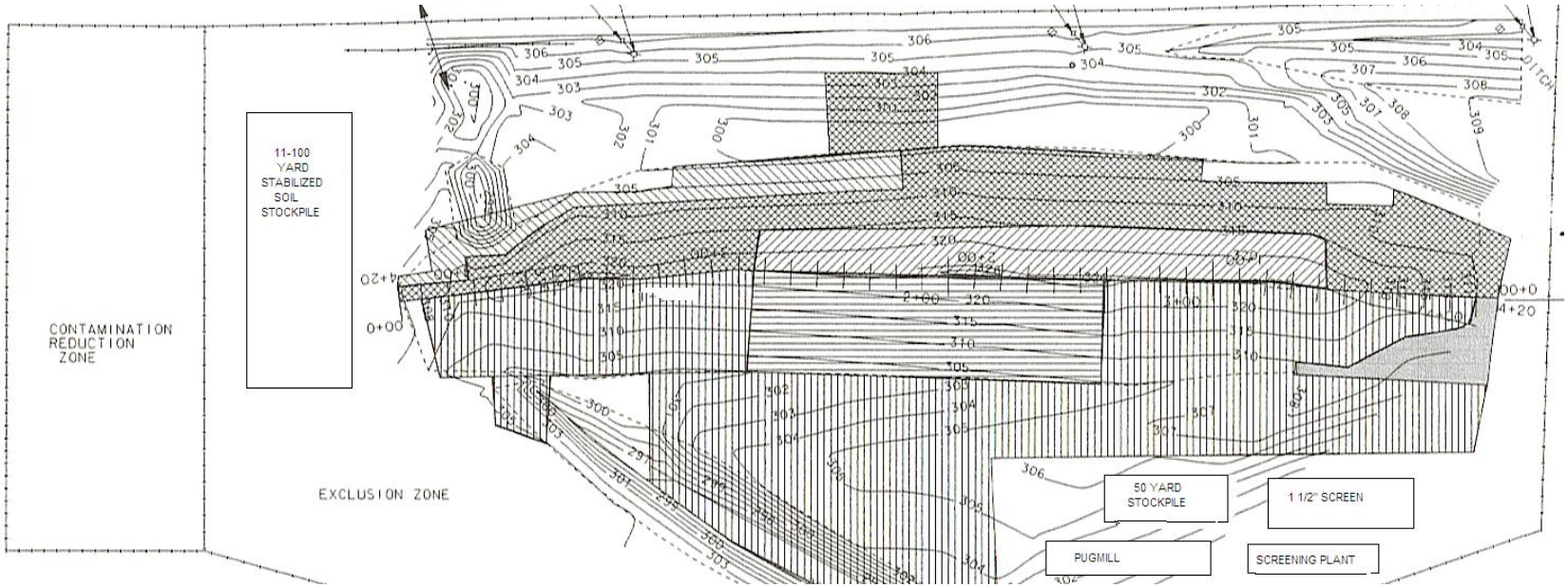
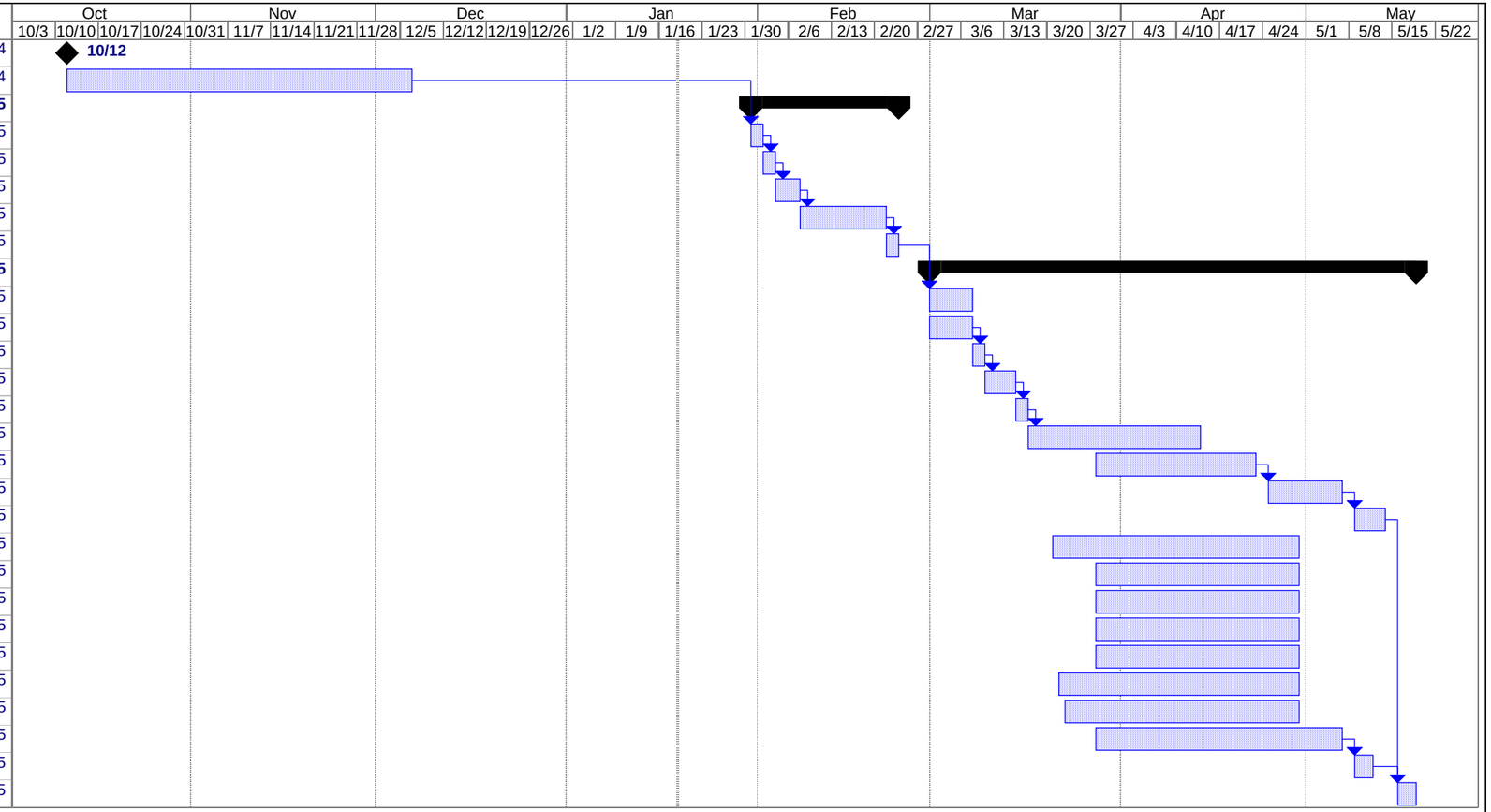


Figure 1-2 Site Layout

ID		Task Name	Duration	Start	Finish
1		NTP	0 days	Tue 10/12/04	Tue 10/12/04
2		Initial Submittals	40 days	Tue 10/12/04	Mon 12/6/04
3		**Bench Testing**	**18 days**	**Mon 1/31/05**	**Wed 2/23/05**
4		Mob for Testing	2 days	Mon 1/31/05	Tue 2/1/05
5		Site Setup	2 days	Wed 2/2/05	Thu 2/3/05
6		Pre-construction Survey	2 days	Fri 2/4/05	Mon 2/7/05
7		Stabilization Testing	10 days	Tue 2/8/05	Mon 2/21/05
8		Demob	2 days	Tue 2/22/05	Wed 2/23/05
9		**Full Scale Operations**	**57 days**	**Tue 3/1/05**	**Wed 5/18/05**
10		Mobilization	5 days	Tue 3/1/05	Mon 3/7/05
11		Set Setup	5 days	Tue 3/1/05	Mon 3/7/05
12		Clearing and Grubbing	2 days	Tue 3/8/05	Wed 3/9/05
13		Stump Removal	3 days	Thu 3/10/05	Mon 3/14/05
14		Mark Excavation Areas	2 days	Tue 3/15/05	Wed 3/16/05
15		Excavation	20 days	Thu 3/17/05	Wed 4/13/05
16		XRF Sampling	20 days	Mon 3/28/05	Fri 4/22/05
17		Confirmation Sampling	10 days	Mon 4/25/05	Fri 5/6/05
18		Post-Construction Survey	5 days	Mon 5/9/05	Fri 5/13/05
19		Screening of Soil	30 days	Mon 3/21/05	Fri 4/29/05
20		Profile Bullets for Disposal	25 days	Mon 3/28/05	Fri 4/29/05
21		Disposal of Bullets	25 days	Mon 3/28/05	Fri 4/29/05
22		Profile Fragments for Disposal	25 days	Mon 3/28/05	Fri 4/29/05
23		Disposal of Fragments	25 days	Mon 3/28/05	Fri 4/29/05
24		Treatment of Soils	29 days	Tue 3/22/05	Fri 4/29/05
25		Sample Treated Soils	28 days	Wed 3/23/05	Fri 4/29/05
26		Transport Treated Soils	30 days	Mon 3/28/05	Fri 5/6/05
27		Site Restoration	3 days	Mon 5/9/05	Wed 5/11/05
28		Demobilization	3 days	Mon 5/16/05	Wed 5/18/05



Project: MH-Final_Evergreen Ramp
Date: Wed 1/19/05

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

FINAL

SITE SPECIFIC SAFETY AND HEALTH PLAN / ACCIDENT PREVENTION PLAN

Former Evergreen Infiltration Range Remedial Action Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

FINAL

SITE SPECIFIC SAFETY AND HEALTH PLAN / ACCIDENT PREVENTION PLAN

Former Evergreen Infiltration Range Remedial Action Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
Attn: Matt Allen (PM-EM)
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202
January 2005

Reviewed and Approved by:

Timothy Yu, Ph.D., PE
Program Manager

Michael Ridosh, CIH
Health and Safety Officer

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LIST OF ACRONYMS AND ABBREVIATIONS

APP	Accident Prevention Plan
BMP	Best Management Practices
CFR	Code of Federal Regulations
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
DERA	Defense Environmental Restoration Permit Program
DOT	United States Department of Transportation
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	Exclusion Zone
FIO	For Information Only
GA	Government Approved
LRI	Land Recover Inc.
MLLW	Mean Low Level Water
MP	Management Plan
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
QC	Contractor Quality Control System Manager
RORO	Roll-On, Roll-Off
SAP	Sampling and Analysis Plan
SHM	Site Safety and Health Manager
SPERP	Spill Prevention and Emergency Response Plan
SSHO	Site Safety and Health Officer
SSHP/APP	Site Safety and Health Plan/Accident Prevention Plan
SWPPP	Storm Water Pollution Prevention Plan
SWPs	Safe Work Practices
TLV-TWA	Threshold Limit Value- Time Weighted Average
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WP	Work Plan
WWMP	Waste Water Management Plan

TPA-CKY HEALTH AND SAFETY POLICY

The TPA-CKY Health and Safety Policy Manual establish approved policies, procedures and work practices that apply to the performance of all TPA-CKY work. This Site-specific Health and Safety Plan/Accident Prevention Plan (SSHP/APP) is the main guide and reference to health and safety procedures for the field operations at the former Evergreen Infiltration Range (AOC 4-6.3) remediation area, located on Fort Lewis, Washington. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The remediation area is located off Evergreen Ave near 4th Division Drive. The SSHP/APP summarizes relevant features of the TPA-CKY Health and Safety Policies and Procedures, and emphasizes non-routine tasks and emergency response procedures that will be observed on the project site. Relevant TPA-CKY Policies and Procedures are included as appendices. All site operations will be performed in accordance with applicable Washington and Federal Occupational Safety and Health Administration (OSHA) requirements.

TPA-CKY considers safety the highest priority during field activities. The maintenance of a safe working environment is the responsibility of every employee. Project activities will be conducted in a manner that minimizes the possibility of injury, accident or incident occurrence. TPA-CKY employees, subcontractors, and visitors are expected to adhere to these policies and procedures in the performance of their work and they are required to read and sign the SSHP/APP Acknowledgement prior to starting work on site.

SAMPLE FORM FOR CERTIFICATE OF WORKER/VISITOR ACKNOWLEDGMENT

PROJECT NAME: Former Evergreen Infiltration Range RA CONTRACT NO.: DACW67-03-D-1007
PROJECT ADDRESS: Fort Lewis, WA
CONTRACTOR'S NAME: TPA-CKY Joint Venture (TPA-CKY)
[EMPLOYEE'S][VISITOR'S] NAME _____

The Contract for the above project requires the following: that you be provided with and complete formal and site-specific training; that you be supplied with proper personal protective equipment including respirators; that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that your employer has met these obligations to you.

I HAVE READ, UNDERSTAND AND AGREE TO FOLLOW THE SITE SAFETY AND HEALTH PLAN FOR THIS SITE.
Name _____ Date _____

FORMAL TRAINING: I have completed the following formal training courses that meet OSHA's requirements:

Date Completed
40-hour training: _____
8-hour supervisory: _____
8-hour refresher: _____

SITE-SPECIFIC TRAINING: I have been provided and have completed the site-specific training required by this Contract. The Site Safety and Health Officer conducted the training.

_____

RESPIRATORY PROTECTION: I have been trained in accordance with the criteria in [The Contractor's] [my Employer's] Respiratory Protection program. I have been trained in the proper work procedures and use and limitations of the respirator(s) I will wear. I have been trained in and will abide by the facial hair policy. _____

RESPIRATOR FIT-TEST TRAINING: I have been trained in the proper selection, fit, use, care, cleaning, and maintenance, and storage of the respirator(s) that I will wear. I have been fit-tested in accordance with the criteria in [The Contractor's] [my employer's] Respiratory Program and have received a satisfactory fit. [I have been assigned my individual respirator.] I have been taught how to properly perform positive and negative pressure fit-check upon donning negative pressure respirators each time.

_____

MEDICAL EXAMINATION: I have had a medical examination within the last twelve months, which was paid for by my employer. The examination included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray. A physician made determination regarding my physical capacity to perform work tasks on the project while wearing protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. My employer's industrial hygienist evaluated the medical certification provided by the physician and checked the appropriate blank below. The physician determined that there:

__ were NOT identified physical limitations to performing the required work tasks.
__ were identified physical limitations to performing the required work tasks.

Date medical exam completed _____

[Employee's][Visitor's] Signature _____
Date _____ Printed Name _____

The Contractor's Site Safety and Health Officer Signature _____
Date _____ Printed Name _____

REFERENCES

TPA-CKY maintains a comprehensive Health and Safety Program containing policies and procedures consistent with the guidelines and requirements presented in the following list of documents:

- *OSHA Safety and Health Standards*, 29 CFR 1910/1926, U.S. Department of Labor, Occupational Safety and Health Administration.
- OSHA Standard, 29 CFR 1926.65, *Hazardous Waste Operations and Emergency Response*.
- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, NIOSH/OSHA/EPA/USCG, DHHS (NIOSH) Publication No. 85-115,1985.
- *U.S. Army Corps of Engineers Safety and Occupational Health Requirements Manual*, EM 385-1-1, 3.September 1996.
- USACE, Appendix B, *Safety and Occupational Health Document Requirements for Emergency Operations*, ER 385-1-92.
- American Conference of Government Industrial Hygienists (ACGIH), *Threshold Limit Values and Biological Exposure Indices for 1994 –1995.*
- Washing Administrative Code (WAC) 296-24, *General Safety and Health Standards*.
- WAC 296-62, General Occupational Health Standards.
- WAC 296-155, *Safety Standards for Construction*.
- WAC 173-303, *Dangerous Waste Regulations*.
- *Health and Safety Manual*, CKY Incorporated Environmental Services, September 1994.

1.0 INTRODUCTION AND BACKGROUND

This Site Specific Safety and Health Plan/Accident Prevention Plan (SSHP/APP) is a component of the project Management Plan (MP). The SSHP/APP outlines the scope of work and describes activity hazards and safety and health controls applicable to specific field activities to be implemented by the TPA-CKY Joint Venture (TPA-CKY) and its subcontractors pursuant to contractor services described in the plans and specifications for Contract No. DACW67-03-D-1007, Task Order No. 0002.

1.1 SITE LOCATION

The remediation areas are located on Fort Lewis **(see Figure 1).** Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The Former Evergreen Infiltration Range (AOC 4-6.3, **see Figures 2 and 3**) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. Work activities will begin at the Evergreen Infiltration Range and then move operations to the Thompson Machine Gun sites. The remediation areas at the Thompson Machine Gun sites are currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area.

1.2 SITE BACKGROUND

The former Evergreen Infiltration Range was identified from a 1951 aerial photograph and appears to have been in use until 1965. This site was used to condition soldiers to move under live fire and under combat type situations. Fixed-position machine guns firing into an impact berm provided live fire training. The ammunition associated with infiltration range training during this era was the .30 caliber cartridge. Soil contamination was documented in the impact berm. The primary contaminate of concern is lead. The maximum detected concentration was 62,500 mg/kg. Antimony and copper were also detected, but only when lead was above the action level of 250 mg/kg.

The former machine gun sites (AOC 4-6.1 and 4-6.2) were identified on a 1944 map. Preliminary assessment activities did not confirm site use. Recent magnetometer work confirmed the presence of .45 caliber bullets in isolated pockets. Site assessment is currently being performed by USACE to delineate remediation areas.

1.3 SCOPE OF WORK

The scope of work for this project includes the following activities:

- Mobilization and Site Preparation
- Stabilization Bench Testing
- Clearing of Work Area and Stump Removal
- Excavation and Stockpiling
- Confirmatory Sampling and Analysis
- Soil Screening / Bullet Disposal
- Soil Stabilization
- Placement of Stabilized Soils
- Site Restoration and Demobilization

2.0 ORGANIZATION AND RESPONSIBILITIES

The SSHP/APP organization chart is presented in **Figure 4**. The safety and health personnel and their responsibilities are presented below. Field work on this project is scheduled to start following completion of a second active MARC task order to TPA-CKY, namely the Pier 23 restoration project. In the event that the actual schedules of the two projects are determined to be overlapping, TPA-CKY will confer with the COR to resolve any personnel issues. Any required change of personnel due to potential overlap will be handled as a change in key staff, subject to COR approval.

Program Manager

The TPA-CKY Program Manager is responsible for overall contract management and for selecting the task order project team. The Program Manager monitors performance on all MARC task orders and ensures that all technical and schedule objectives are met under safe operating conditions.

Project Manager/Site Superintendent

The TPA-CKY Project Manager/Site Superintendent is directly responsible for task order performance. He communicates directly with the USACE Project Manager (COE-PM) and the USACE Construction Representative (COE-Con Rep), as required for construction activities and project administrative matters. He will be the Government's primary point of contact (POC) at the job site. He maintains an on-site copy of the SSHP/APP and conducts the proper safety orientation for all staff on the project. He is responsible for direct management of TPA-CKY field staff and subcontractor personnel, including assigning responsibilities and monitoring or directing medical and training certifications, operation procedures, equipment and field supplies.

As Site Supervisor, he has primary responsibility for site safety including the following activities:

- Inspecting the work of TPA-CKY and subcontractor personnel.
- Ensuring that safety and health requirements are met.
- Briefing the field team on specific duties.
- Controlling site access.
- Providing liaison with public officials.

Program Health and Safety Officer

The TPA-CKY Health and Safety Officer is responsible for the development of this SSHP/APP in accordance with OSHA standards and TPA-CKY safety and health policies. Additional responsibilities include:

- Modifying and/or developing new safety and health procedures as necessary.
- Ensuring all on-site personnel have been medically certified and trained in accordance with applicable OSHA standards required to perform field activities.
- Review medical surveillance procedures as outlined in TPA-CKY's Safety and Health Manual.
- Conducting initial site-specific training.
- Being available for consulting on first day of site activities and for emergencies.
- Reviewing accident reports, air monitoring reports, and daily inspection reports.
- Selecting respiratory protection, personal protective equipment (PPE), and levels of protection.
- Authorizing a stop-work order, in consultation with the Site Safety Officer (SSO), if it is determined that a safety hazard or potentially dangerous situation exists.

Site Safety Officer

The TPA-CKY SSO will implement and enforce the SSHP/APP at the project site. The SSO will report directly to the TPA-CKY Program Health and Safety Officer for safety matters. On-site safety and health concerns will be the responsibility of the SSO. Specific responsibilities include:

- Inspecting safety procedures prior to and during fieldwork.
- Participating in the preparation of the SSHP/APP and ensuring its implementation on site.
- Conducting daily tailgate safety meetings.
- Selecting the proper level of PPE and respiratory protection in accordance with this SSHP/APP, and ensuring its use by all onsite employees.
- Regularly inspecting all PPE and respiratory protection (as needed) and providing proper maintenance and storage of PPE.
- Monitoring on-site workers for signs of stress (e.g., heat stress and general fatigue).

Occupational Physician

The TPA-CKY Occupational Physician for this project, Dr. Paz Eilat of Western Medical Group, Occupational Medicine, Torrance, CA, is a licensed physician, board certified in internal medicine, and has the necessary training and experience for certification by the American Board of Preventative Medicine. He is familiar with this site's hazards and the scope of this project. He will be responsible for determination of medical surveillance protocols and for review of examination/test results performed in compliance with 29 CFR 1910.120, (f) and 29 CFR 1926.65, (f) and paragraph MEDICAL SURVEILLANCE.

CPR and First Aid On-site Personnel

At least two people who are currently certified in First Aid and CPR will be on site at all times during site operations and will be immediately available to render first aid as needed. Mark Hallock, Noah Rivera, and Howard Wittenberg are among the TPA-CKY project personnel who have the required certification.

Other Project Personnel

All personnel on site will have responsibility for the adherence to the requirements of this SSHP/APP. Subcontractors will prepare their own APP, which will meet or exceed the safety standards of this Plan. Subcontractor's APP will be reviewed and approved by TPA-CKY prior to beginning work on site. TPA-CKY and subcontractor personnel who constitute the field team will have the following individual responsibilities:

- Read and be thoroughly familiar with all aspects of this SSHP/APP (or subcontractor counterpart).
- Complete all assigned tasks in compliance of the SSHP/APP.
- Notify the SSO of any potentially unsafe conditions.
- Attend on-site safety meetings.

Subcontractors will be selected as needed based on the scope of work. Subcontractors are regarded as team members and as such, will be working under the direction of the Project Manager /Site Superintendent, following the same standard operating procedures as practiced by TPA-CKY field personnel. TPA-CKY plans to use the following subcontractors for this phase of the project:

- Surveying – Thornton Land Surveying, 8803 State Highway 16, Gig Harbor, WA 98335; POC: Rick Nielson, License # 35980
- ICP Analysis – Severn Trent Laboratories (STL) 5755 8 th St. East, Tacoma, WA 98424; POC Tom Boyden, (253) 922-2310
- Waste Transport and Disposal – Haulers, disposal facilities and recyclers (see WMP Section 5)

3.0 POTENTIAL SAFETY AND HEALTH HAZARDS

3.1 PUBLIC SAFETY AND HEALTH

The site activities pose minimal risk, if any, to the public and government employees because the work is performed in regulated areas with limited access. Potential risks to public safety and health are limited to physical injury during waste transport activities and, if not controlled, air-borne dust from lead-contaminated soils. The project regulated areas will be fenced with warning sign posted. Unauthorized personnel will not be allowed in the regulated work areas.

3.2 WORKER SAFETY AND HEALTH

TPA-CKY employees and subcontractor personnel who may come into contact with hazardous materials are required to observe the training and medical monitoring procedures in this SSHP/APP. All TPA-CKY employees and subcontractor personnel are required to follow TPA-CKY and subcontractor company policies and procedures indicated in this SSHP/APP.

3.2.1 Chemical Hazards

The principal chemical hazard anticipated on this project is exposure to dust from lead-contaminated soils. Inorganic lead exposure can occur via inhalation of dusts, ingestion of dusts, and skin and eye contact. The principal target organs of lead toxicity include the nervous system, kidneys, blood, gastrointestinal, and reproductive systems. Generalized symptoms of lead exposure include decreased physical fitness, fatigue, sleep disturbances, headaches, bone and muscle pain, constipation, abdominal pain, and decreased appetite. More severe exposure can result in anemia, severe gastrointestinal disturbance, "lead-line" on the gums, and neurological symptoms.

3.2.1.1 Lead Exposure Assessment

For field operations where the potential for airborne exposure to lead exists, it shall be initially determined if any employee may be exposed to lead at or above the lead action level (0.03 mg/m3) through the use of personal air monitoring. Personal samples shall be representative of a full shift. All air monitoring and sample analysis shall be performed according to NIOSH Method 7082 or equivalent. Sites with known or suspected lead contamination greater than 1100 mg/kg or which are former ranges shall have air monitoring performed to determine potential for exposure. Adequate dust control measures will be the primary control measure used.

3.2.1.2 Negative Initial Determination

If the exposure assessment performed for a specific site determines that no employee is exposed to airborne concentrations of lead at or above the action level, a written record of this determination shall be created. This record shall include the date of determination, location within the work site, specific duties, and the name and social security number of each employee monitored.

3.2.1.3 Frequency

For each shift/site, the person with the greatest potential for exposure shall be monitored for full shift. If the exposure assessment reveals employee exposure to be below the action level, further exposure determination need not be repeated. However, if there is a change of equipment, process, control, or a new task has been initiated that may result in any employee being exposed at or above the action level, additional air monitoring for lead shall be conducted.

3.2.1.4 Employee Notification of Results of Exposure Assessment

Within five working days after the completion of the exposure assessment for a given site, the employer shall notify each employee in writing of the results representing that employee's exposure.

Table 1. Air Quality Action Levels

Analyte (Instrument)	Result	Action Required	Notes
Respirable Dust (MIE Miniram or equivalent)	< 5 mg/m^3	No need to continue periodic dust monitoring, unless conditions change.	
	5 to 10 mg/m^3	Monitor every half-hour; implement dust control measures (water misting)	d
	> 10 mg/m^3	Stop work; contact HSO to evaluate why dust control measures are not effective in reducing dust concentrations.	d
Lead (MIE Miniram or equivalent, with cassette sent for lead analysis by NIOSH method 7082)	< 0.03 mg/m3	Negative initial determination for exposure; resume monitoring if conditions change	
	0.03 mg/m3 to 0.05 mg/m3	Implement dust control measures	
	>0.05 mg/m3 to 0.5 mg/m3	½ face APR with P100 filters required; evaluate dust control measures	
	>0.5 mg/m3	Stop work; contact HSO to evaluate why dust control measures are not effective in reducing lead concentrations.	

Note d - Use engineering controls to reduce potential exposures.

3.2.2 Physical Hazards

Physical hazards are inherently present during field operations. The primary physical safety risks for this project are associated with 1) cut, trip, slip, and fall and heat stress that may occur during field operations, and 2) process machinery and heavy equipment. Excavators and loaders will be used to excavate and move soil during remediation. Shaker/conveyor equipment and pug mills will be used in filtering and stabilizing excavated soils, respectively. Such equipment includes moving parts such as belts, rollers, vibratory mechanisms, and gear-driven rotary devices. Shaker/conveyor equipment may be fitted with elevated catwalks that could pose a falling hazard.

3.2.3 Biological Hazards

The following biological hazards may be encountered on site, although such encounters are not anticipated to pose a significant risk to site personnel:

- Animal bites and insect stings can cause swelling and minor pain that can be handled by first aid treatment. In sensitized individuals, however, effects can be more serious such as anaphylactic shock, which can lead to severe reactions in the circulatory, respiratory, and central nervous system. Animals such as rodents or wild cats can possibly bite, causing parasitic infections.

- Exposure to animal droppings can cause infectious diseases such as Hepatitis B and Hanta virus. The potential to inhale infections airborne particulate must be minimized. If such droppings are present, workers may don PPE, wet the area to reduce dusty conditions, or remove the material prior to starting the work.

- The SSO shall be notified of any observed rodent droppings or nests and of the potential for animal and or insect bites.

3.3 TPA-CKY TRAINING PROGRAM

The field team will include at least one individual with current CPR & First-Aid training. All site employees will have received, at a minimum, the following training and briefings:

- Injury and Illness Prevention Plan, TPA-CKY
- HAZCOM, 29 CFR 1910.1200 – TPA-CKY/Proposition 65
- Fire Extinguisher, TPA-CKY (review)
- 40-Hour Hazardous Waste Operations, 29 CFR 1910.120 (Level B, C, D)
- 8-Hour Hazardous Waste Site Supervisor, 29 CFR 1910.120 (Supervisor only)
- 8-Hour Refresher Hazardous Waste Site Worker, 29 CFR 1910.120 (current)
- Respirator Training, TPA-CKY (including fit test)
- Lead training per 29 CFR 1926.62
- CPR & First Aid (current/selected staff) training provided by Safety Works
- Daily Safety Briefings and Tailgate Meetings (see Appendix A forms).

Training is conducted by a Certified Industrial Hygienist (CIH) or a professional qualified in CPR & First Aid. Mark Hallock, Noah Rivera, and Howard Wittenberg are among the TPA-CKY project personnel who are currently certified in First Aid and CPR.

3.4 MEDICAL REQUIREMENTS AND MONITORING

All TPA-CKY personnel will have successfully completed a physical examination which meets the requirements of 29 CFR 1910.120 (F) prior to entering work zones. All field personnel undergo a physical examination annually, which is performed by a physician Board-certified in Occupational Medicine. The physician is made familiar with the job-related duties of each employee examined as well as each employee's anticipated exposure and description of any PPE to be used. In addition, the physician is provided a copy of 29 CFR 1910.120, any information from previous examinations, a copy of Section 5.0 of NIOSH 85-115, and information required by 29 CFR 1910 Section .134 if any of these documents are not already in his possession.

The physical examination consists of the following, at a minimum:

- Medical and occupational history, including information on allergies and sensitivity or susceptibility to hazardous substances exposure;

- Physical examination, with particular emphasis on the cardiopulmonary system, general physical fitness, skin, blood-forming system, renal and nervous systems;
- Urinalysis;
- Blood analysis (including specifically for this project, lead blood level and zinc protoporphyrin (ZPP) measurement ; and
- Additional tests as appropriate, including chest X-ray electrocardiogram stress test, pulmonary function test. Specifically, on-site workers are evaluated as to their ability to wear PPE inclusive of NIOSH certified respirators under extreme temperature conditions.

This medical examination will be conducted annually. In addition, on-site workers will have to undergo a blood test for lead prior to and upon completion of remediation. Personal air monitoring will be conducted and results will be reviewed to evaluate workers' exposure to lead. If results indicate exposure above safe levels (as determined by the occupational physician and based on published standards), follow-up medical tests and, if needed, special protection or removal from the site will be conducted in accordance with 29 CFR 1926.62.

3.5 ACTIVITY HAZARD ANALYSIS

The Activity Hazard Analysis (AHA) identifies potential hazards posed by each major field activity, as well as the hazard control measures required to abate the potential hazard. Activity hazard analysis appropriate to this project is given in **Table 2.**

The activities listed in Table 2 are consistent with the outline of activities described in the Work Plan. These activities and the associated hazard and control analysis represents the starting point for controlling safe operation of field work. As each activity is initiated, the specific activity steps and hazards will be revisited. As deemed necessary to maintain safe operations, TPA-CKY will elaborate the hazards specific to those steps as well as controls for those hazards. As an example, it may be necessary to further address exposure to dust/lead beyond what is indicated in the initial Table 1, prior to starting excavation and loading operations. This SSHP is intended to be updated in order to maintained safe operations. Elaboration of hazards, controls and SOPs will be documented as addenda to the SSHP during field work.

Table 2. Activity Hazard Analysis

Activity	Hazards	Controls
Driving to, from, or on the site	Striking pedestrians, runaway vehicles, striking structures, overturning vehicles, other vehicular accidents	• Wear seat belts at all times while vehicles are in motion. Use licensed drivers. • Define vehicle routes of travel. • Obey all Fort Lewis driving regulations. • Do not drive over holes or down sides of improperly sloped depressions.
Working outdoors	UV radiation: During site activities, workers may be exposed to direct and indirect sunlight and corresponding UV radiation. Even short-term exposure to sunlight can cause burns and other dermal damage. Exposure to hot and humid conditions may also result in heat stress, which can manifest itself as heat exhaustion and heat stroke.	• Minimize direct sun exposure by wearing sun hats, long-sleeved shirts, full-length pants, and by applying UV barrier sunscreen • Shade work and break areas if possible • Minimize exposure to heat stress by taking frequent breaks, drinking adequate fluids, and performing work during the early morning and later afternoon hours

Table 2. Activity Hazard Analysis

Activity	Hazards	Controls
General activities on the work site.	Slips, trips, falls, muscle strains Muscle injuries: manual lifting of heavy objects may expose workers to back, arm, and shoulder injuries.	• Do not run on site. Do not carry objects that may obscure your vision, or be too heavy for one person to carry safely. Use proper lifting techniques. Always use the buddy system. • Use mechanical lifting equipment to lift heavy loads • Use proper lifting techniques including, stretching, bending at the knees, and bringing the load close to the body prior to lifting (see EM 385-1-1, Section 14.A). Use two people for manual lifting.
	Biological contaminants: Workers may be exposed to inhalation/ingestion and/or dermal contact with pathogens, such as *Coccidioides sp., Histoplasma sp.,* and *Mycobacterium sp.* The resulting exposure may result in occupational illness.	• Enforce (strictly) eating, drinking, and smoking restrictions prior to washing/decontamination. • Decontamination with water and/or disinfectant soaps may be used to control exposure. • Avoid dust inhalation.
	Pests: Workers may be exposed to a wide array of biological hazards, including snakes, bees, wasps, ticks, hornets, and rodents during any phase of remediation. The symptoms of exposure vary from mild irritation to anaphylactic shock and death. Rodents can transmit Hanta virus.	• Perform periodic inspections of the site to identify stinging insect nests and to check for snakes and rodents. • Use tick and insect repellents for exposure control. Workers should check their skin and clothing periodically throughout the day. • Personnel who have allergic reactions to insect stings, etc. should let other site workers know and carry sting kits.
Clearing and stump removal	Equipment: During site clearing, workers may be seriously injured or killed by heavy equipment such as excavators or backhoes. This equipment may also generate excessive noise during operation.	• Use extreme care around operating equipment. • Use heavy equipment with backup alarm to alert workers. • Approach operating equipment from the front and within view of the operator, preferably making eye contact. • Wear reflective vest. • Wear hearing protection as required. • Never stand in the general path of bucket or tool travel.
Excavation and stockpiling	Equipment: During soil excavation, workers may be seriously injured or killed by heavy equipment such as excavators or backhoes. This equipment may also generate excessive noise during operation.	• Use extreme care around operating equipment. • Use heavy equipment with backup alarm to alert workers. • Approach operating equipment from the front and within view of the operator, preferably making eye contact. • Wear reflective vest. • Wear hearing protection as required. • Never stand in the general path of bucket or tool travel.
	Excavation wall collapsing or flooding: Excavations will be shallow and relatively wide. No wall collapse or flood hazards are anticipated	N/A
	Airborne Dust: Workers may be exposed to lead via dust clouds created during soil handling.	• Maintain proper dust control (water misting/spraying) as required during dry conditions. • Provide continuous air monitoring to ensure that LELs are not exceeded or work is stopped, as appropriate.
Soil screening	Equipment: Workers may contact moving parts of the separator machinery, including motors, conveyor belts, screen racks, rollers, idlers. Operation and maintenance of equipment may require working on elevated catwalks or ladders.	• Use extreme care around operating equipment. • Strictly observe all safety provisions in equipment O&M manuals. • Conduct specific training for all individuals who may work on or around the pug mill. • Wear hard hats, gloves, steel toed boots and hearing protection as required.
Soil stabilization	Equipment: Workers may contact moving parts of the pub mill and be in the path of	• Use extreme care around operating equipment. • Strictly observe all safety provisions in equipment O&M

Table 2. Activity Hazard Analysis

Activity	Hazards	Controls
	loaders or backhoes used to place soil.	manuals. • Conduct specific training for all individuals who may work on or around the pug mill. • Wear hard hats, gloves, steel toed boots and hearing protection as required.
	Chemical Reagents: Works may come in contact with the stabilizing reagents. The hazard is similar to that experienced by concrete workers.	• Wear rubber gloves, rubber boots and protective eye wear as required to avoid excessive exposure to reagents.
Confirmatory sampling	• Inhalation or eye contact with dusts or airborne vapors • Skin contact with contaminated • Accidental ingestion of contaminants	• Wear safety glasses. • Use water misting to control dusts. • Wear suitable gloves to protect hands from contacting media. • Wash hands and face before eating, drinking, smoking, or other hand to mouth contact.
Transportation and use of portable XRF device	Radiation exposure	• Do not point device at anyone while device is ON. Keep in carrying case when not in use. • Brace instrument in trunk or rear of vehicle while transporting.

3.6 LEVELS OF PROTECTION AND PPE

Modified Level C protection will be observed. The Site Safety Officer will continually monitor air monitoring results and other conditions in paragraph 1.11.2 of Section 1352-9 and adjust PPE accordingly. PPE C protection will be used when there is significant dust present. However, TPA-CKY intends to maintain dust control using sprayed water or misting at all times when dry soil is being worked.

- Hard hat (mandatory)
- Orange vest (mandatory)
- Safety glasses (optional)
- Steel toed boots (mandatory)
- Tyvek coveralls (optional/as needed)
- Gloves, nitrile or neoprene (optional/as needed)
- Gloves, cotton or leather (optional/as needed)
- Hearing Protection (optional, except during equipment operation)
- Air purifying respiratory protection (optional/as needed–½ face APR with P100 filters)

4.0 PERTINENT FIELD PROCEDURES

Specific pertinent procedures for the successful completion of this project have been developed and included in this section. The following SOPs apply to this section (and are found in Appendix D):

HS-106 Accident Prevention Program
HS-107 Fall Protection (working on elevated platforms)
HS-205 Hazard Communication Program
HS-301 Site Safety Information Worksheet
HS-503 Incident Reports
HS-504 Site Control
HS-505 Emergency Preparedness
HS-512 Excavation and Trenching

4.1 MOBILIZATION OF PERSONNEL AND EQUIPMENT

- Set up office trailer and portable toilets.
- Obtain copies of all required employee and subcontractor training certificates.
- Conduct on-site employee orientation, review of SSHP, and site-specific safety training.
- Conduct daily safety briefing.
- Stage equipment and materials in lay-down area.
- Inspect all equipment upon arrival at the site and daily.

4.2 TRAFFIC CONTROL

This project is located adjacent to Evergreen Road. Project-generated road traffic will include mobilizing and demobilizing equipment and truck hauling. Both Fort Lewis roads and area surface streets, highways and freeways may be involved.

On-site truck parking and haul route will be marked to facilitate traffic movement and minimize traffic hazards. Traffic control will be provided for the efficient completion of work activities in a safe working environment. If necessary, during periods of (treated) waste hauling, a competent flagman will be assigned to direct movement of facility traffic through and around the work area and give adequate warning to facility personnel and tenants of any dangerous conditions to be encountered. Loading and transportation of (treated) wastes will be scheduled in advance and preferably during off-peak hours to minimize disruption to facility traffic. Trucks will be required to drive below Fort Lewis and area speed limits at all times. During non-construction periods, non-applicable signs will be covered with black plastic or temporarily removed.

The TPA-CKY Project Manager will confer with the USACE-PM to determine whether PT activities are conducted along Evergreen Road near the project site. If such activities are found to occur, TPA-CKY will provide such controls (e.g., posted flagmen, speed limit appropriate to passing marching soldiers, etc.) as are necessary to protect FL personnel.

4.3 WASTE HANDLING AND DISPOSAL

This task involves loading trucks (e.g., end-dumps), transporting of treated soil to a designated area located within Fort Lewis and stockpiled or for offsite disposal. The equipment used for this task will include loaders, end-dumps (or equivalent) and water trucks. The procedures to be followed include working on and around heavy equipment, loading of trucks and WDOT-safe transport.

4.4 DUST CONTROL

Convenient access to driveways and around the work area will be maintained during construction activities. Water and dust control abatement measures will be applied as necessary to the on-site roads used by haul trucks and during loading of trucks for alleviation or prevention of nuisance or hazardous dust. Control will be affected in all areas where trucks or equipment could encounter dry soil and will include repeated application of sprayed water or mist. Dust control will be especially strict in the remediation areas due to the potential for dust to be created from lead-contaminated soils.

4.5 ROUTINE AND NON-ROUTINE TASKS

Performing routine and non-routine tasks will require emphasis on established policies and procedures. Some of these tasks include working around noisy process or construction equipment, working with or near equipment with moving parts, compiling safety information, completing incident reports or managing complicated or sensitive site security issues.

5.0 EMERGENCY RESPONSE

5.1 EMERGENCY PREPAREDNESS

Emergency preparedness procedures require advanced planning to achieve an effective quick response to site emergencies, initiate a coordinated response effort with emergency service organizations, and provide a planed evacuation of employees to a safe location. The procedures also direct personnel to maintain and frequently inspect emergency equipment and have the emergency plan ready to implement.

- Emergency Telephone Numbers (**Appendix B**).
- Emergency meeting location at the field trailer office
- Evacuating Route
- Route to Hospital Map (**Appendix C)**
- Personnel Training – Confined-space Entry (duties including rescue).
- Prior notification of site activity to emergency services (not expected under this contract)
- Verify Notification Procedure of emergency services for incident response.
- Verify Evacuation Procedure – verbally or by air-horn alarm signal (where appropriate), three blasts signal "Immediate Emergency Evacuation".

5.2 EVALUATE EMERGENCY

- Evacuation Procedure (verbally by radio or by three blasts with air horn).
- Evaluate severity and nature of emergency. Be prepared to give details of incident to emergency services dispatcher (911) and to the Incident Commander (Fire Chief).
- Initiate notification of emergency service dispatcher (911).
- SSO or Site Supervisor performs head count, and checks site entry log to determine all personnel are accounted for.

5.3 ESCAPE ROUTE

There is no site-wide hazard associated with the remediation tasking on this project that would merit evacuation of all personnel from the site; emergencies are more likely to arise as the result of injury to an individual worker. However, it is possible that a side-wide event unrelated to the project could occur. Examples would be fire or incident coincidentally involving the Evergreen site.

However, in the event of a site-wide emergency, all personnel will evacuate the site upwind unless the emergency precludes in such direction. This measure may require personnel to abandon normal decontamination procedures; in this event, decontamination should be performed in a safe location. The SSO or Site Supervisor will use the Site Entry Log to ensure that all personnel have evacuated the site.

Workers should be cognizant of the reduction of communication abilities in high-noise areas. In the event of withdrawal from the working area, verbal notification or hand signals will be given. Verbal and hand signal communications will be reviewed as part of the daily tailgate meetings. The SSO or Site Supervisor will positively account (body count) for complete evacuation of everyone on site.

A cellular telephone will be at the site if another telephone is not available.

5.4 PERFORM INITIAL RESPONSE

- Assess nature of emergency. If all personnel are *not* accounted for, notify emergency services dispatch (911).

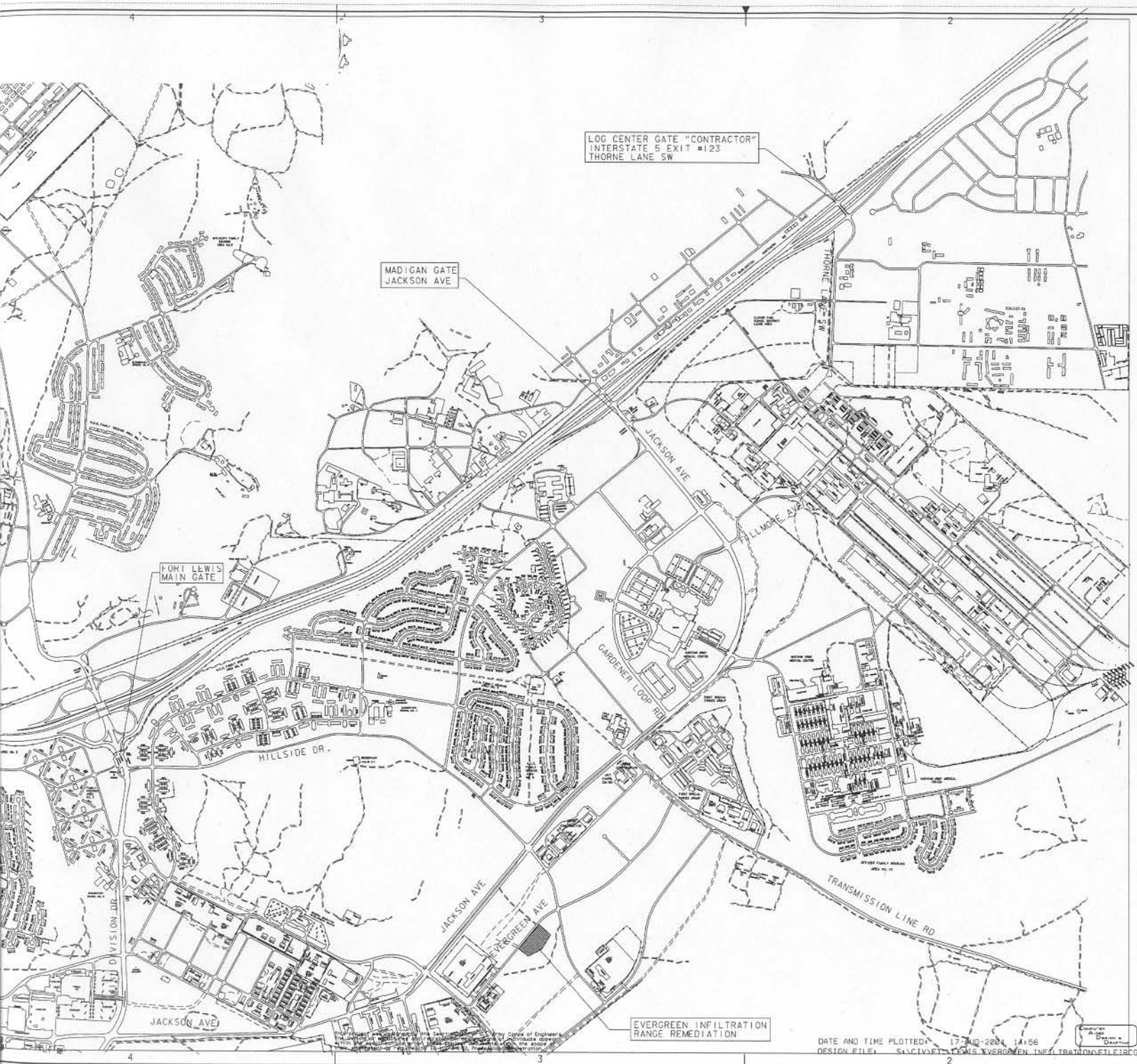
- If illness or injury is involved, observe crew condition.
- Initiate efforts to locate missing crewmembers as applicable without endangering additional crewmembers.
- Notify first responders.

5.5 PERFORM MAJOR RESPONSE

- On-site response team shall evaluate and stabilize affected personnel, check airway, breathing and circulation (ABC's). Also check for physical injury, apparent exposure, and evaluate if personnel are exposed to immediate danger.
- If personnel are *not* in immediate danger, but have signs of head, neck or spine trauma, Do Not Move! Notify emergency services of condition and wait for assistance. Treat for shock (immobilize the victim comfortably; continue to monitor victim's airway, breathing and circulation; control any external bleeding; keep victim from getting chilled or overheated; and DO NOT give food or drink).
- If personnel are in immediate danger, remove to a safe location as quickly as practicable. Notify emergency services of conditions, and wait for assistance. Treat for shock (immobilize the victim comfortably; elevate feet approximately 12 inches; continue to monitor victim's airway, breathing and circulation; control any external bleeding; keep victim from getting chilled or overheated; and DO NOT give food or drink).

FIGURES

FIGURE 1
SITE VICINITY / ACCESS MAP



N

1" = 800' 800' 400' 0 800' 1600'

ACCESS MAP
EVERGREEN INFILTRATION RANGE REMEDIATION
FORT LEWIS , WASHINGTON

REDUCED TO 50% OF FULL SIZE

DATE AND TIME PLOTTED: 17-AUG-2004 14:56
DESIGN FILE: S:\CIVIL\FTLEWIS\EVERGREEN_INFILTRATION\FTLEIRC00A.DGN

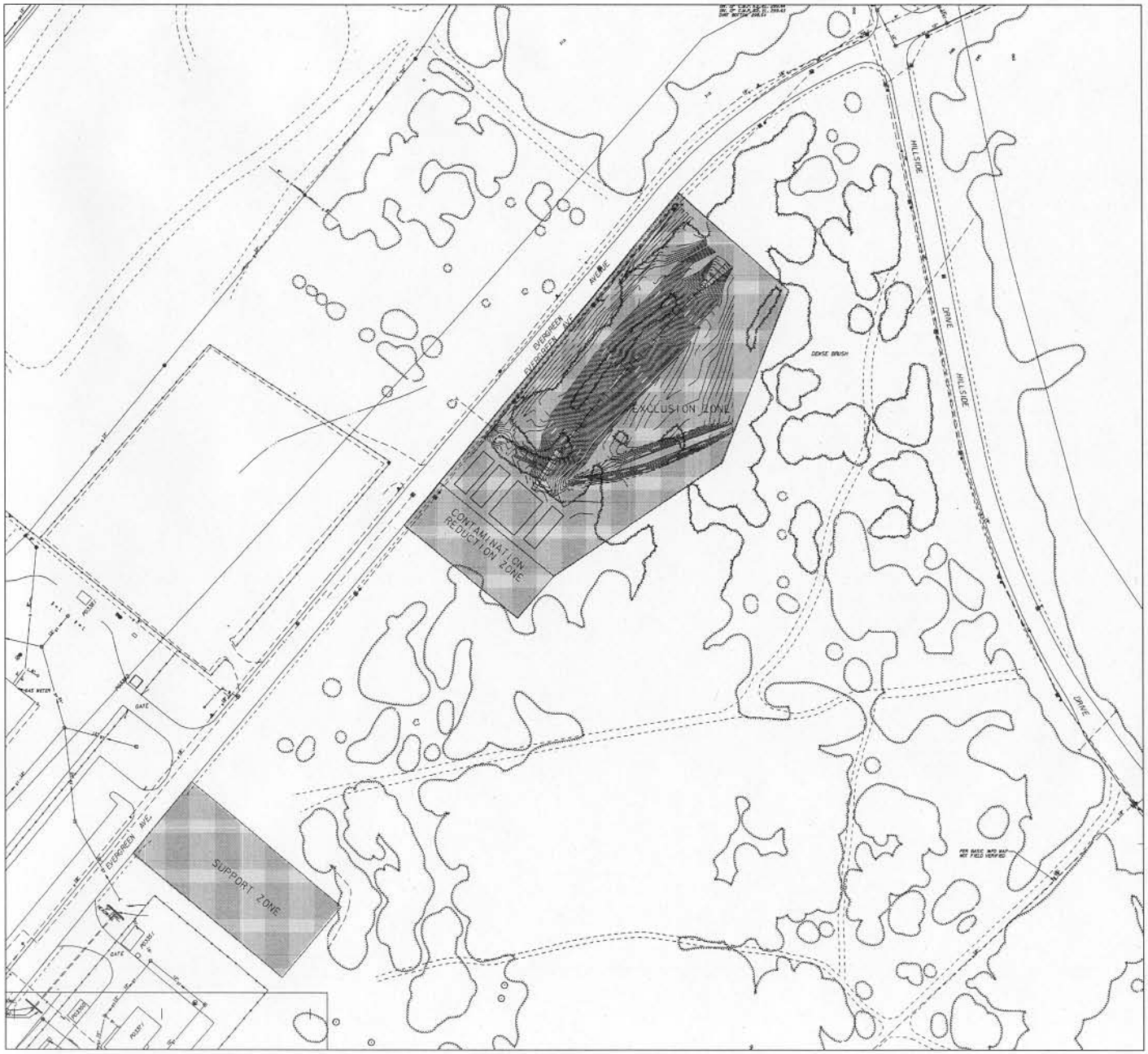
PREPARED:
DESIGN MANAGER
REVIEWED:
CHIEF, TECH ENGINEERING AND REVIEW SECTION
SUBMITTED:
CHIEF, DESIGN BRANCH
RECOMMENDED:
CHIEF, ENGINEERING & CONSTRUCTION DIVISION
APPROVED:
COL, CORPS OF ENGINEERS DISTRICT ENGINEER

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

FORT LEWIS
EVERGREEN INFILTRATION RANGE
COMTAMINATED SOIL REMEDIATION
PROJECT
SITE ACCESS MAP

SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D			01 JUN 04	C-1
DSGN. BARRETT		CHK. FISCHER	SHEET 2	

FIGURE 2
SITE PLAN



CONTROL BASED ON FOUND ACOE CONTROL POINTS

PT. NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
541	648685.27	1127784.45	308.23	FOUND PK NAIL
608	649592.19	1127578.12	305.26	FOUND PK NAIL
613	649671.53	1127929.71	305.29	FOUND CAP AND REBAR

CONTROL BASED ON APSSM SET POINTS

PT. NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
101	649164.88	1127199.45	304.18	SET CAP AND REBAR
102	649165.20	1127306.46	325.38	SET NAIL SPIKE
103	648974.35	1127142.42	322.66	SET HUB

BERM FOOTPRINT
EVERGREEN INFILTRATION SITE
SCALE: 1" = 40' C.I. = 1'
MAP COMPILED FROM FIELD SURVEY PERFORMED MAY 2004 BY APS SURVEY & MAPPING.
HORIZONTAL CONTROL BASED ON WASHINGTON COORD. SYSTEM, NAD 83/91, SOUTH ZONE.
VERTICAL CONTROL BASED ON NAVD '88.

N

1" = 80' 40' 0 100' 200'

REDUCED TO 50% OF FULL SIZE

This project was designed by the Seattle District U.S. Army Corps of Engineers. The initials or signatures and registration designations of individuals appear within the specifications or on these project documents within the scope of their employment as required by ER 1110-1-8152, Professional Registration.

DATE AND TIME PLOTTED: 17-AUG-2004 14:58
DESIGN FILE: S:\CIV\FT. LEWIS EVERGREEN INFILTRATION\FTLEIRC08.DGN

PREPARED:
DESIGN MANAGER:
REVIEWED:
CHIEF, TECH. ENGINEERING AND REVIEW SECTION: WILLIAM P. CRAVEY
SUBMITTED:
CHIEF, DESIGN BRANCH:
RECOMMENDED:
CHIEF, ENGINEERING & CONSTRUCTION DIVISION:
APPROVED:
COL, CORPS OF ENGINEERS DISTRICT ENGINEER:

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

FORT LEWIS
EVERGREEN INFILTRATION RANGE
COMTAMINATED SOIL REMEDIATION PROJECT
SITE PLAN

SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D			01 JUN 04	C-2
DSGN: BARRETT		CH: FISCHER	SHEET 3	

FIGURE 3
DETAILED SITE PLAN

NOTE:
1. BERM AREA CONTAINS ABOUT 200 STUMPS FOR GRUBBING.

N

1" = 60' 60' 30' 0 60' 120'

REDUCED TO 50% OF FULL SIZE

This project was designed by the Seattle District U.S. Army Corps of Engineers. The initials or signatures and registration designations of individuals appear within the specifications or on these project documents within the scope of their employment as required by ER 1110-1-8152, Professional Registration.

DATE AND TIME PLOTTED: 17-AUG-2004 14:59
DESIGN FILE: S:\CIV\FT. LEWIS EVERGREEN INFILTRATION\FTLEIRCG0C DGN

Computer Aided Design & Drafting

PREPARED:	U.S. ARMY ENGINEER DISTRICT, SEATTLE CORPS OF ENGINEERS SEATTLE, WASHINGTON
DESIGN MANAGER	
REVIEWED:	
CHIEF, TECH ENGINEERING AND REVIEW SECTION — WILLIAM P. CRANEY	FORT LEWIS EVERGREEN INFILTRATION RANGE COMTAMINATED SOIL REMEDIATION PROJECT
SUBMITTED:	DETAILED SITE PLAN
CHIEF, DESIGN BRANCH	
RECOMMENDED:	
CHIEF, ENGINEERING & CONSTRUCTION DIVISION	
APPROVED:	
COL, CORPS OF ENGINEERS DISTRICT ENGINEER	

SIZE	INVITATION NO.	FILE NO.	DATE	PLATE
D			01 JUN 04	C-3
DSGN. BARRETT		CHK. FISCHER	SHEET 4	

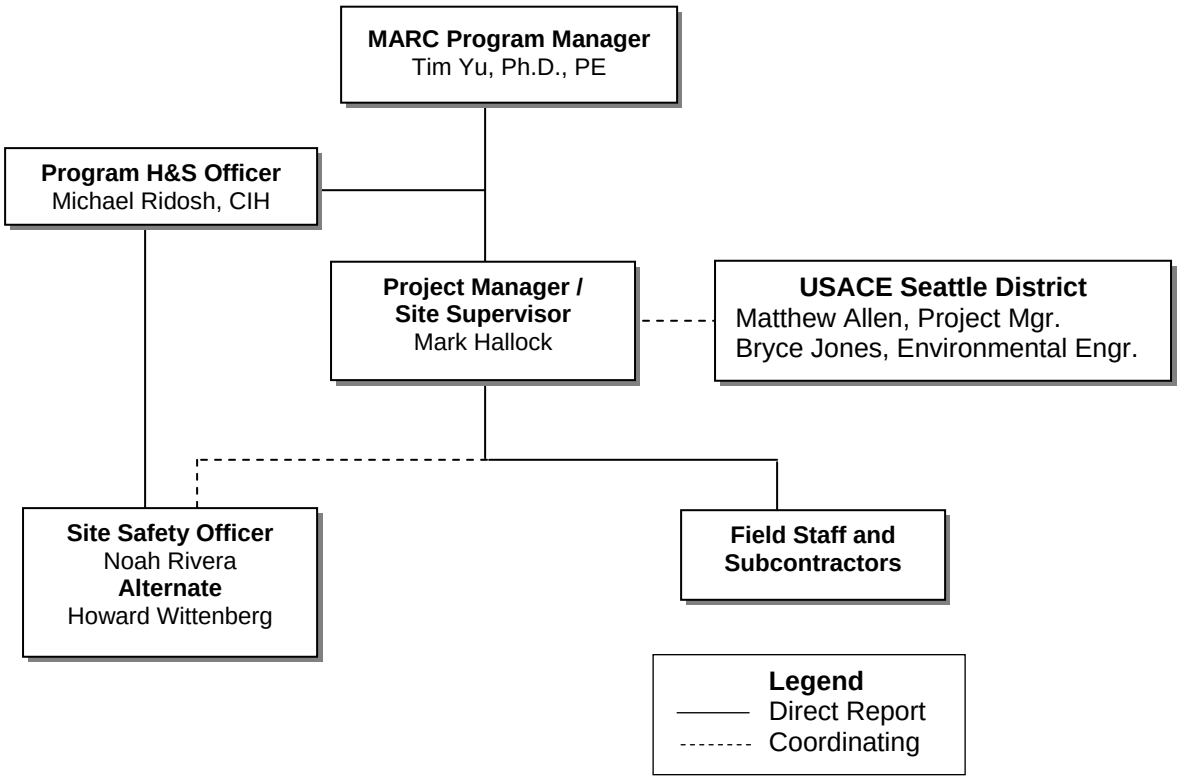


Figure 4 – Project Health and Safety Organization

APPENDIX A
SITE ENTRY LOG, TAILGATE SAFETY MEETING AND OTHER FORMS

SITE ENTRY LOG

Former Evergreen Infiltration Range
Fort Lewis, Washington
Contract No. DACW67-03-D-1007, CTO 0002

Location: _____

Date: _____

Print Name	Sign	Company	Time in:	Time out

Site Safety Officer: _____ Date: _____

TAILGATE SAFETY MEETING

Former Evergreen Infiltration Range
Fort Lewis, Washington
Contract No. DACW67-03-D-1007, CTO 0002

Location: _____ Date: _____

Accident since last meeting:

_____

Hazards discussed today:

_____

_____

_____

Main topic of discussion: _____

_____

_____

_____

Personnel in attendance (please print name):

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Comments: _____

_____

_____

_____

Site Safety Officer: _____

INCIDENT REPORT

Former Evergreen Infiltration Range
Fort Lewis, Washington
Contract No. DACW67-03-D-1007, CTO 0002

This incident report shall be filled out by the Site Health and Safety Officer or Site Supervisor within 48 hours when an injury or illness has occurred.

1. Administrative Information

Project No.: _____

Project Name: _____

Health and Safety Officer: _____

2. Type of Incident

___ Illness resulting from chemical exposure
___ Unexpected chemical exposure (as indicated by irritation of eyes, nose, throat, or skin)
___ Physical injury
___ Fire, explosion, or flash
___ Property damage
___ Vehicular accidents
___ Infractions of safety rules and requirements

3. Personal Data

Name: _____

Age: _____ Sex: _____

TPA-CKY Employee: _____

Subcontractor: _____

4. General Information

Date of Incident: _____ Time of Incident: _____

Location of Incident: _____

_____

Site Activity: _____

_____

_____

_____

_____

_____

_____

_____

5. Description of Activity When Incident Occurred:

6. Incident Description:

Prepared by: _____

Date: _____

MACHINERY AND MOBILE EQUIPMENT (BACKHOES, DOZERS, SCRAPERS, EXCAVATORS, LIFT TRUCKS, etc.)	
Contract Name and Number:	Contractor/Subcontractor:
Government Inspector:	Location:
Contractor Inspector:	Date:
Equipment name and number:	

Complete one checklist for each piece of equipment.	**Yes**	**No**	**N/A**
1. Is the slow moving emblem used on all vehicles which by design move at 25 mph or less on public roads? (08.A.04)			
2. Are initial and daily/shift inspection records available? (16.A.01 and .02)			
3. When machinery or equipment is found to be unsafe or when a deficiency which affects the safe operation of equipment is observed, is the equipment immediately taken out of service and its use prohibited until unsafe conditions have been corrected? (16.A.03)			
4. Is machinery or equipment operated only by designated personnel? (16.A.04)			
5. Have inspections or determinations of road conditions and structures been made in advance to assure that clearances and load capacities are safe for the passage or placing any machinery or equipment? (16.A.06)			
6. Are seats or equal protection provided for each person required to ride on the equipment? (16.A.07a)			
7. Is equipment operating on streets and highways equipped with headlights, tailights, brake lights, back light, and turn signals (visible from front and rear)? (16.A.07b)			
8. Is all equipment equipped with operable windshield wipers, and defrosting or defogging equipment? (16.A.07c)			
9. Does the unit have an emergency brake which will automatically stop the equipment upon brake failure? Is this system manually operable from the drivers position? (16.A.07d)			
10. Is all maintenance (including preventive maintenance) and repairs done in accordance with the manufacturer's recommendations and is it documented? (16.A.08a)			
11. Has bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment been fully lowered or blocked when being repair or when not in use? (16.A.09)			
12. Has adequate ventilation been provided when equipment powered by internal combustion engines is operating in enclosed areas? (16.A.12)			
13. Are all vehicles which will be parked or moving slower than normal traffic on haul roads equipped with a yellow flashing light or flasher visible from all directions? (16.A.13)			
14. Is all mechanized equipment shut down before and during refueling? (16.A.14)			
15. Are all towing devices used on any combination of equipment structurally adequate for the weight drawn and securely mounted? (16.A.15a)			
16. Have the wheels been chocked or track mechanisms blocked and the parking brake set when equipment is parked on an incline? (16.A.17b)			

This checklist is based on EM 385-1-1, dated 3 September 1996. Use of this checklist is optional.

MACHINERY AND MOBILE EQUIPMENT (con.)

	Yes	No	N/A
17. Are personnel prohibited from working or passing under or riding in the buckets or booms of loaders in operation? (16.A.24)			
18. Does the unit have a dry chemical or carbon-dioxide fire extinguisher with a minimum rating of 5-B:C? (16.A.26)			
19. Is there an effective, working reverse alarm? (16.B.01)			
20. Is there a signalperson or warning device when there is a danger to persons from moving equipment, swinging loads, buckets, booms, etc.? (16.B.02)			
21. Are all belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts guarded? (16.B.03a)			
22. Is protection against hot surfaces, exhausts, etc., provided? (16.B.03b)			
23. Are platforms, footwalks, steps, handlholds, guardrails, and toeboards designed, constructed, and installed on machinery and equipment to provide safe footing and accessways? (16.B.03d)			
24. Are fuel tanks located in a manner to prevent spills or overflows from running onto engine exhaust or electrical equipment? (16.B.04)			
25. Are exhaust or discharges from equipment directed so they do not endanger persons or obstruct operator vision? (16.B.05)			
26. Are seatbelts installed and worn in all motor vehicles? (16.B.08)			
27. Is protection (grills, canopies, screens) provided to shield operator from falling or flying objects? (16.B.10 and .11)			
28. Is roll over protection provided? (16.B.12)			
Comments:			

This checklist is based on EM 385-1-1, dated 3 September 1996. Use of this checklist is optional.

MOTOR VEHICLES, TRAILERS AND TRUCKS	
Contract Name and Number:	Contractor/Subcontractor:
Government Inspector:	Location:
Contractor Inspector:	Date:
Equipment name and number:	

Complete one checklist for each vehicle.	**Yes**	**No**	**N/A**
1. Are records of safety inspections of all vehicles available? (18.A.02)			
2. Are all vehicles to be operated between sunset and sunrise equipped with two headlights, one on each side of the front; at least one red tailight and one red or amber stop light on each side of the rear; directional signal lights (both front and back); and three emergency flares, reflective markers, or equivalent portable warning devices? (18.A.04)			
3. Are vehicles, except trailers or semi-trailers having a gross weight of 5000 lbs or less, equipped with service brakes and manually operated parking brakes? (18.A.05a)			
4. Are service brakes on trailers and semi-trailers controlled from the driver's seat of the prime mover? (18A.05c)			
5. Does the vehicle have a speedometer; a fuel gage; an audible warning device (horn); a windshield & adequate windshield wiper: an operable defroster and defogging device; an adequate rearview mirror(s); a cab, cab shield, and other protection to protect the driver from the elements and falling or shifting materials; non-slip surfaces on steps; and power-operated starting device? (18.A.06)			
6. Has all broken or cracked glass been replaced? (18.A.07)			
7. Are all towing devices adequate for the weight drawn and properly mounted? (18.A.08a)			
8. Are locking devices or a double safety system provided on every fifth wheel mechanism and tow bar arrangement to prevent accidental separation? (18.A.08b			
9. Are trailers coupled with safety chains or cables to the towing vehicle? (18.A.08c)			
10. Are trailers with power brakes equipped with a break-away device which will lock-up the brakes in the event the trailer separates from the towing vehicle? (18.A.08d)			
11. Are all dump trucks equipped with a holding device to prevent accidental lowering of the body while maintenance or inspection work is being done? (18.A.10a)			
12. Is vehicle exhaust controlled so as not to present a hazard to personnel? (18.A.12)			
13. Are all rubber tired vehicles equipped with fenders and tires which do not extend beyond the fenders? Mud flaps may be used in lieu of fenders whenever motor vehicle equipment is not designed for fenders. (18.A.14)			
14. Are all vehicles, except buses, equipped with seat belts? (18.B.02)			
15. Are employees prohibited from getting between a towed and towing vehicle except when hooking and unhooking? (18.B.12)			

This checklist is based on EM 385-1-1, dated 3 September 1996. Use of this checklist is optional.

MOTOR VEHICLES, TRAILERS AND TRUCKS (con.)

	Yes	**No**	**N/A**
16. Is a signal person used when the point of operation is not in full view of the			

vehicle, when vehicles are backed more than 30 feet, when terrain is hazardous, or when two or more vehicles are backing in the same direction? (8.B.04 and 18.B.14)			
17. Are the loads on every vehicle distributed, chocked, tied down, or secured? (18.B.16c)			
18. Do all self-propelled construction and industrial equipment have a working reverse signal alarm? (16.B.01)			
19. Are all hot surfaces of equipment, including exhaust pipes or other lines, guarded or insulated to prevent injury or fire? (16.B.03)			
20. Are off road vehicles, equipped with rollover protective structures? (16.B.12)			
21. Does every all terrain vehicle (ATV) operator possess a valid state drivers license and has completed an ATV training course? (18.D.02)			
22. Are ATVs operated off-road only and during daylight hours? (18.D.04 and .05)			
23. Are all ATVs equipped with four or more wheels? (18.D.06)			
Comments:			

This checklist is based on EM 385-1-1, dated 3 September 1996. Use of this checklist is optional.

APPENDIX B
EMERGENCY TELEPHONE NUMBERS

Contractor Project Contracts	**Project Manager**..... Mark Hallock (916) 997-2842 **Health and Safety Officer (HSO)** .... Michael Ridosh, CIH (818) 888-5894 **Site Safety Coordinator (SSC)**..... Noah Rivera (253) 377-7448
Fort Lewis Emergency Information	**Fort Lewis Emergency Response** Police ..... 911 Fire..... 911 Ambulance..... 911 **Hospital** **St. Clare Hospital**..... (253) 588-1711 (See Appendix C for hospital route map) **Fort Lewis Directorate of Public Works** **Environmental Management**..... Rich Wilson (253) 966-1801
Emergency Response/Spill Response Information	**National Response Center** ..... (800) 424-8802 **EPA** ..... (800) 424-8802 **Environmental Incident Report - Northwest Regional Office** **Oil Spills** ..... (800) 258-5990 or (800) OILS-911 **Non-oil Spills**……..(425) 649-7000
USACE Seattle District	**Steve Rossignol**..... (253) 405-0004 **Kim Calhoun**..... (253) 405-3199

APPENDIX C
HOSPITAL ROUTE MAP

ST. CLARE HOSPITAL
11315 BRIDGEPORT WAY SW
LAKEWOOD, WA 98499
(253) 588-1711

Starting from: A Fort Lewis, WA

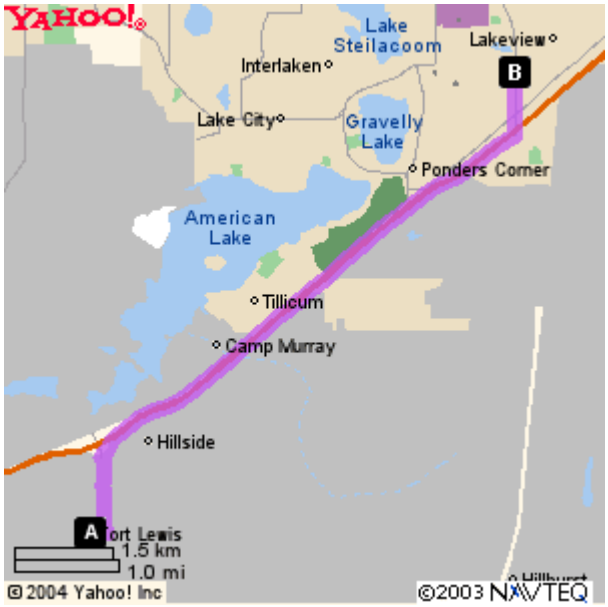
Arriving at: B 11315 Bridgeport Way SW, Lakewood, WA 98499-3004

Distance: 6.5 miles **Approximate Travel Time:** 11 mins

Your Directions

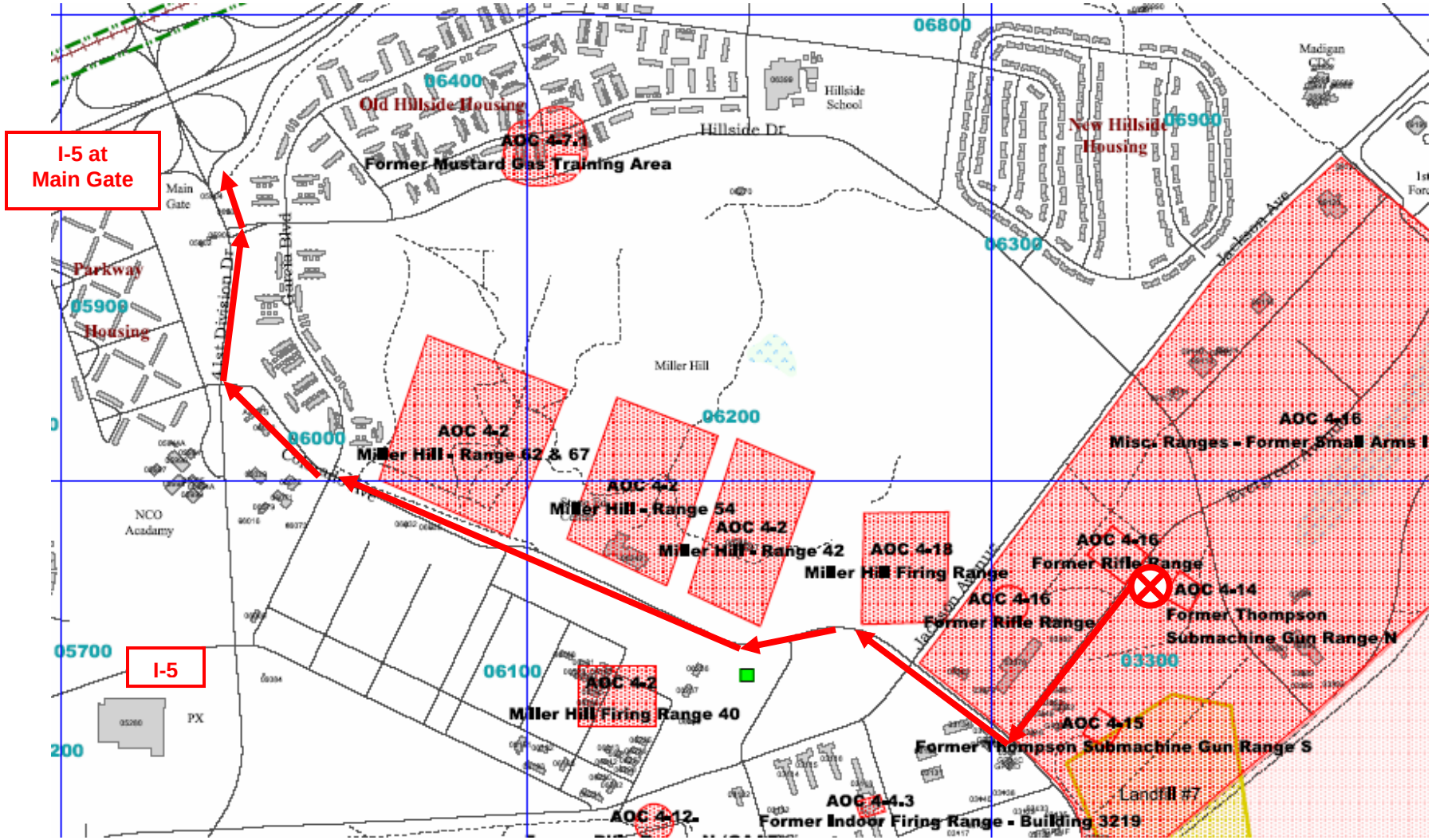
1. Starting in **FORT LEWIS, WA** on **NEVADA AVE** - go **0.1** mi
2. Turn L on **41ST DIVISION DR S** - go **0.7** mi
3. Bear R to take **I-5 NORTH** towards **TACOMA/SEATTLE** - go **4.8** mi
4. Take exit **#125** towards **MC CHORD A.F.B./LAKEWOOD** - go **0.2** mi
5. Turn L on **BRIDGEPORT WAY SW** - go **0.6** mi
6. Arrive at **11315 BRIDGEPORT WAY SW, LAKEWOOD,** on the R

Your Full Route



Your Destination

Address:
11315 Bridgeport Way Sw
Lakewood, WA 98499-3004



On-Base Portion of Hospital Route Map

Project Site

APPENDIX D
STANDARD OPERATING PROCEDURES (SOPs)

HS-106	Accident Prevention Program
HS-107	Fall Protection
HS-201	Selection and Use of Respiratory Protective Equipment
HS-205	Hazard Communication Program
HS-301	Site Safety Information Worksheet
HS-503	Incident Reports
HS-504	Site Control
HS-505	Emergency Preparedness
HS-512	Excavation and Trenching
HS-518	Guarding Of Machinery And Equipment

OPERATING PROCEDURE NO. HS-106

ACCIDENT PREVENTION PROGRAM

106.1 PURPOSE

To establish basic guidelines and health and safety practices for the completion of work involving potential physical and chemical hazards. Additional information regarding CKY's health and safety policies and procedures can be found in the Corporate Health and Safety Plan and the Operating Procedures.

106.2 ADMINISTRATIVE RESPONSIBILITIES

The Project Manager will have primary responsibility for implementing safety procedures. The Site Safety and Health Officer will have primary responsibility for enforcement of safety provisions as outlined in the Safety and Health Plan (SHP) including daily safety and health inspections. The Quality Control (QC) Inspector is responsible for equipment safety (other than safety and health equipment). Administrative responsibilities are specified in Section 2.5 of CKY's Corporate Health and Safety Plan.

106.3 SUBCONTRACTORS

Subcontractors are required to adhere to all policies and procedures in effect for a specific project, including the Safety and Health Program, the Site Specific Safety and Health Plan, the Accident Prevention Plan, all training requirements, etc. Subcontractor equipment and materials will be required to submit to all required inspections and testing.

106.4 TRAINING

All CKY employees and subcontractors at this site have had 40-Hour Hazardous Waste Operations Training and three days of actual field experience in compliance with 29 CFR 1910.120. Eight-hour refresher training has been provided to all employees in the past 12 months who have had the 40-hour training. Onsite managers and supervisors have received an additional eight hours of specialized training. Copies of course materials, attendance records and certification of completion for each employee are available for inspection, if requested .

106.5 TAILGATE MEETINGS

Daily site employee safety meetings will be held and documented onsite. Each day prior to commencing work, a safety meeting will be held to discuss safety considerations for the day and work to be done. A safety topic will be addressed each day from the following list:

- Site-Specific Safety and Health Plan (first day and once a week thereafter)
- Site Emergency Procedures
- Fire Fighting Techniques
- Decontamination
- Levels of Protection
- Heat Stress
- Emergency Equipment on Site
- Respirator Maintenance
- Self-Contained Breathing Apparatus (if necessary)
- Back Care

Daily safety tailgate meetings will be documented in writing along with the daily QC reports.

106.6 INSPECTION

All job sites will be inspected daily by a QC Inspector. Inspections will be performed and recorded on the attached *Safety Inspection Check List For Construction Equipment* form.

106.7 ACCIDENT REPORTS

A report will be submitted to the Health and Safety Officer within 24 hours of each incident involving medical treatment. The Health and Safety Officer will distribute copies of the report to the Corporate Health and Safety Officer (CHSO). When an injury or illness is reported, the CHSO will deliver a copy of the report to the individual in charge of personnel affairs so that a Worker's Compensation Insurance Report can be filed if necessary. Reports will be received by personnel within 48 hours of each qualifying incident.

OPERATING PROCEDURE NO. HS-107

FALL PROTECTION

107.1 PURPOSE

To provide guidelines and safe work practices to minimize the risk of injury due to falls during site activities.

107.2 IMPLEMENTATION

Fall protection such as standard guardrails, catch platforms, temporary floors, safety nets, and personal fall protection devices will be used in the following situations:

- On accessways (including ladders) or work platforms from which an employee may fall 6 feet or more.
- On accessways (including ladders) or work platforms over water, machinery, or dangerous operations.
- On runways from which an employee may fall 4 feet or more.

All stairway and ladderway floor openings will be guarded on all sides, except the entrance opening, by securely anchored standard guardrails. The entrance opening will offset or provided with a gate to reduce the risk of employees falling into them.

Platforms over 6 feet in height will have standard guardrails installed on all open sides and ends, or employees working on the platforms will be required to wear personal fall protection.

107.3 FALL PROTECTION TRAINING

Employees will receive training in the safe use of accessways and fall protection systems and the recognition of potential hazards related to their use. This training will, at a minimum, include the following:

- The nature of access and fall hazards in the work area.
- The correct procedures for constructing, erecting, maintaining, using, and dismantling accessways and fall protection systems.
- The maximum intended load-carrying capacities of accessways and fall protection systems.

107.4 USE OF PERSONAL FALL PROTECTION DEVICES

Work that will require the use of personal fall protection devices includes, but is not limited to the following:

- Working in hoppers, bins, silos, tanks, or other confined spaces.
- Working on hazardous slopes, structural steel, poles, etc.
- Erecting or dismantling safety nets.
- Tying reinforcing bars.
- Working from any unguarded location elevated 6 feet or greater.
- Working on skips and platforms used in shafts when a cage is not provided.

The selection of fall protection equipment will be based on the type of work to be performed: the work environment, the weight, size, and shape of the user; the type and position of anchorage; and length of the lanyards.

Type I equipment will be used for restraint and/or fall arrest in work areas where vertical free fall hazards exist. This equipment may include body belts, body harnesses, or lanyards. Type I lanyards are used for fall arrest and will limit the fall to 5 feet or less.

Type II equipment will be used for suspension, support, and/or positioning, but not for fall arrest. This equipment can include chest harnesses, positioning and suspension belts, body belts, body harnesses, and lanyards. Type II lanyards will be used for restraint at the working level.

107.5 SAFETY NETS

Safety nets will be used for work performed in unguarded locations over water, machinery, dangerous operations, or locations elevated 25 feet or higher above the ground surface.

Safety nets will be installed as close under the work surface as practical, and no lower than 25 feet below the work surface. The nets will extend a minimum of 15 feet beyond the work area. Impact load tests will be performed to assure sufficient clearance is available below the net.

107.6 LADDERS

All portable ladders will be of sufficient length so that workers do not have to stretch or assume hazardous positions. The length of portable ladders will not exceed 20 feet, and the ladders will extend a minimum of 3 feet past the landing.

Ladder set-up and use procedures are as follows:

- Ladders will not be placed in passageways, doorways, drives, or any other locations where they may be accidentally displaced.

- Portable ladders will be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is not greater than one-forth the vertical distance between these points.

- Ladders will be held in place by top, bottom and intermediate fastenings, as appropriate.

- Lifting of heavy equipment will be prohibited on ladders.

- Portable ladders will have slip-resistant feet.

- The top rung of ladders will not be used as a step.

- Ladders will be inspected daily. Broken ladders will be immediately tagged with a sign warning not to use and withdrawn from service.

OPERATING PROCEDURE NO. HS-201

SELECTION AND USE OF RESPIRATORY PROTECTION EQUIPMENT

201.1 PURPOSE

To provide information for the proper selection of respiratory protection equipment. It is to ensure that respirators are properly selected and used in accordance with OSHA requirements. Respirators must be selected on the basis of the hazards to which personnel are or may potentially be exposed.

201.2 REQUIREMENTS

The OSHA standards found in Title 29 of the Code of Federal Regulations (CFR), Section 1910.134 establishes requirements for respiratory protection programs, as summarized in the following twelve major points:

- Establish Written Operating Procedures - A formal written document outlining aspects of the respiratory protection program must be developed.

- Respirator Selection - Proper selection of respirators will be made according to the guidance of ANSI Z88.2, 1980. In choosing respirators, consider the nature and extent of the hazard, the work requirements and conditions, and the characteristics and limitations of the respirators available. When examining the hazardous environment, the questions that should be asked are:

  - What are the contaminants?
  - What are their concentrations?
  - Are they gaseous or particulate?
  - Do they have adequate warning properties?
  - Are concentrations immediately dangerous to life or health?
  - Does the air contain at least 19.5 percent oxygen?
  - Are protective clothing and hand protection necessary?

- Training - Users of respirators should be trained in how to select, use, clean, maintain, and store their respirators. Such training will provide the respirator user with an opportunity to handle the respirator, have it properly fitted, test its facepiece-to-face seal, wear it in normal air for a long familiarity period, and finally, wear it in a test atmosphere. Every respirator wearer will receive fitting instructions, including demonstrations and practice in how to determine if it fits properly.

- Assign Individual Respirators Where Practical - When respirators are assigned individually, there is less chance that a worker will use one that does not give him or her the best protection. Sometimes it overcomes the unwillingness of an employee to wear

a respirator if he or she thinks someone else has used it, and that it was not properly sanitized afterward.

- Regularly Clean and Sanitize Respirators - There is a three-step method of washing the respirator in a detergent or cleaner-sanitizer, rinsing it in warm water, and air drying it.

- Respirator Storage - Storing respirators in clean plastic bags or other suitable containers in a clean and sanitary location maintains the integrity of the cleaning and maintenance program.

- Respirator Inspection and Maintenance - Inspection and maintenance of respirators in accordance with the manufacturer's instructions will ensure that the respirators, when properly used, will give the wearer the best possible protection.

- Monitor the Work Area - Make sure the right respirator is being used. If there is a change in materials, or processes, in the work area that change the concentration of contaminants, or creates completely different contaminants, changes must be made in the respirator program.

- Continually Enforce and Evaluate the Respirator Program - No matter how well the written SOPs are drawn up, the program cannot be effective if it is not enforced. Frequent random inspections will be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained. If defects are found, corrective action should be taken.

- Medical Evaluation of Respirator Wearers - If a potential respirator wearer is not physically able to perform the work using of a respirator, the use of a respirator may create more problems than it solves. A physician should be consulted to make sure each respirator wearer is physically qualified.

- Use Approved or Accepted Respirators - The respirators used in the work environment must be NIOSH/MSHA certified, where applicable, or be otherwise accepted to provide adequate protection for the hazards encountered.

- Air quality - Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration will be of high purity. Oxygen must meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air must meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966 as required by 29 CFR 1910.134. Compressed oxygen should not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have previously used compressed air. Oxygen must never be used with air line respirators.

201.3 SELECTION

The type of respirators will be selected based on the following considerations:

- What is the estimated contaminant concentration in the work area where the respirator will be used, as determined by industrial hygiene monitoring information.

- What is the permissible exposure limit (PEL) to the contaminant, threshold limit value (TLV), and short-term exposure limit (STEL)? Health standards for many specific substances are available. Good industrial hygiene practice should base respirator selection on current TLV's or other new toxicity data.

- Is the contaminant a gas, vapor, mist, dust or fume? This information can be determined by studying the manufacturing or maintenance process raw materials, intermediate products, by-products and the wastes. See Material Safety Data Sheets (MSDS) when available.

- Could the contaminant concentrations be termed immediately dangerous to life or health (IDLH)? This knowledge is derived from the manufacturer of raw materials, the knowledge of process engineer or chemist, the company or plant industrial hygienist, and MSDS, when available. In addition, consideration should be given to the potential for contamination of atmospheres under abnormal or emergency conditions.

- If the contaminant is flammable, does the estimated concentration approach the lower explosive limit (LEL), or do dust concentrations create a potential explosion problem? Besides creating a potential fire and explosion condition, in most situations flammable vapor or gas concentrations exceeding the LEL are IDLH. Plant gas or vapor levels can be determined with an explosion or combustible gas indicator (CGI). Here, too, emergency (such as spill) conditions should be considered.

- Does the contaminant have adequate warning properties? Manufacturers can supply such information, directly or through MSDS. Warning properties such as odor, irritation or taste should ideally be present at concentrations at or below the PEL.

- Will the contaminant irritate the eyes at the estimated concentration? Frequently, this will be self-evident if the operation is in progress. This information, too, is available from the MSDS of raw materials. For irritant materials, a full facepiece respirator should be employed.

- If the contaminant is a gas or vapor, is there any available sorbet that traps it efficiently? Respirator manufacturers and/or industrial hygienists can provide this information.

- Can the contaminant be absorbed through the skin as a vapor or liquid? If so, will it significantly add to the employee's exposure and cause injury? MSDS will indicate skin absorption potential.

- What is the size of the employee's face? Some manufacturers offer the same model respirator in two or three sizes. This will help to fit most employees properly with one brand of respirator.

- What types of respirators will give the required maximum use concentration (MUC)? The MUC is a measure of the degree of protection provided by a respirator to a wearer. It takes into account the respirator limitations and the ability of a user to get a satisfactory fit. Multiplying the PEL (or STEL) by the protection factor assigned to a respirator gives the MUC of the hazardous material for which the respirator can be used.

201.4 AIR PURIFYING RESPIRATORS

201.4.1 General Considerations and Limitations

- Chemical cartridge respirators will not be used in environments immediately dangerous to life or health (IDLH) or in atmospheres containing less than 19.5 percent oxygen.

- Warning Properties of Contaminant - Chemical cartridge respirators will not be used for exposures to air contaminants that cannot be easily detected by odor or irritations. For example, cartridge respirators should not be used to protect against methyl chloride or hydrogen sulfide. The former is odorless; and the later, while foul smelling, paralyzes the olfactory nerve so quickly that odor detection is unreliable.

- Irritation - When working in environments where concentrations are irritating to the eyes, full facepiece respirators will be used.

- Chemical cartridge respirators cannot be used for protection against gases that are not effectively stopped by chemical filters utilized; for example, carbon monoxide.

201.4.2 Cartridge Selection

- Select the cartridge or cartridge/filter group that best fits the type of exposure. Using the wrong cartridge and filter may be like using no respirator at all. For example, acid gas respirators cannot be used for protection against organic vapors. However, an organic vapor-acid gas respirator can be used for one or both of the exposures. Check and recheck the label on the cartridges to make sure the correct ones are issued.

201.4.3 Respirator Use

- After correct cartridges have been selected, screw each cartridge into the facepiece after checking it for intactness; see SOP HS-203, Respirator Inspection, Care, Maintenance and Storage. Make sure cartridge seals (usually part of packaging) have been removed.

- Fit the respirator as outlined in SOP HS-202, Respirator Fit Testing.

- The cartridges may be used until the odor of the contaminant can be smelled, irritation occurs or the substance can be tasted by the wearer.

- Do not use cartridges after expiration date printed on the label.

- If the facepiece and cartridges are used by one employee and the cartridges are not used until exhaustion, they may be resealed after use, by the employee, and reused at a future time. This may be done until cartridge exhaustion.

- Inspect, clean and maintain respirators as outlined in SOP HS-203, Respirator Inspection, Care, Maintenance and Storage.

- Most respirator manufacturers now supply a given model respirator in different sizes so that many employees can be fitted with a single brand of respirator.

201.5 SELF-CONTAINED BREATHING APPARATUS

The self-contained breathing apparatus (SCBA) affords complete respiratory protection in any atmosphere for which the lungs are the principal route of entry into the body. They supply the wearer with cool, non-contaminated breathing air, as demanded by the wearer, at approximately ambient atmospheric pressure. For specific instructions on SCBA units, consult the SCBA manufacturer's manual.

201.5.1 Component Parts

- A cylinder and valve to contain a supply of compressed air.

- A high-pressure, flexible hose that routes the compressed air from the cylinder to the regulator.

- An audible alarm that rings to indicate low cylinder air pressure.

- A pressure-demand regulator that reduces the cylinder pressure to a breathable pressure and supplies the wearer with air in direct response to breathing requirements. All entry or re-entry into immediately dangerous or hazardous atmospheres require the use of a pressure-demand regulatory.

- A facepiece assembly consisting of a rubber facepiece and lens, with head band, exhalation valve, and breathing tube.

- A carrier and harness on which the cylinder is mounted and by which the entire apparatus is worn.

201.5.2 General Checking Procedure

A check of the breathing apparatus is very important to ensure its proper operation. Keep records of these inspections. The following procedure should be followed:

- Put on breathing apparatus.
- Check its normal regulator cycling under exertion or extremely deep breaths.
- Check functioning of emergency bypass.
- Disconnect breathing tube from regulator and place bottom of tube tightly on palm. Inhale to check seal. Reconnect breathing tube.
- Take off breathing apparatus and close cylinder valve.
- Observe both gauges to see if they correspond, and check for air leaks in system.
- Crack emergency bypass or use facepiece and slowly reduce air pressure on regulator gauge to determine that the audible alarm activates at the proper pressure.
- Check:
  - Condition of straps on harness.
  - Tightness of screws and fasteners on: straps regulator bracket all valve handles.
  - Rechecking devices on: main line valve cylinder valve carrier to secure cylinder. Note holes in diaphragm cap on regulator to see if open.
  - Facepiece: should be clean, head band in good condition, exhalation valve not sticking or held open inhalation valve not sticking or held open speaking diaphragm and gasket in correctly.
- Gaskets should be in good condition at:
  - Regulator side of breathing tube.
  - Facepiece where breathing tube connects.
  - Speaking diaphragm assembly.
  - O-ring in coupling that connects to cylinder valve.
- Audible alarm bell cap is tight.
- All threads in good condition.
- Hydrostatic test data is current.

- Cylinder pressure at least 1500 psi, 1800 psi, or 4000 psi, depending on model.

- Sanitize facepiece as outlined in SOP HS-203, Respirator Inspection, Care, Maintenance, and Storage. Return facepiece to plastic bag.

NOTE: If the diaphragm cap is removed to check condition of the diaphragm and level assembly, then this unit must be correctly reassembled to operate properly. If the diaphragm is removed, an operational test of the SCBA must be performed before returning the unit to service.

201.6 WARNINGS RELATED TO RESPIRATOR SELECTION AND USE

- Failure to properly select the appropriate respirator for all the materials and concentrations (to which the respirator wearer may be exposed) may result in serious illness, disability, or death of the affected worker.

- Only self-contained positive pressure breathing apparatus are designed for use in:
  - Oxygen deficient atmospheres (an atmosphere of less than 19.5 percent oxygen by volume at sea level).
  - Poorly ventilated areas or confined spaces such as tanks, small rooms, tunnels or vessels, unless the confined space is well ventilated and the concentration of toxic contaminants is known to be below the upper limit recommended for the respirator.
  - Atmospheres where the concentrations of toxic contaminants are unknown or are IDLH.
  - For fire fighting.
  - At concentrations of substances higher than the upper limits recommended for air purifying respirators.

- Immediately leave the area and replace the respirator if:
  - Breathing becomes difficult; dizziness or other distress occurs.
  - Sense irritation and/or smell or taste the contaminants.
  - If the respirator becomes damaged.

- The respirator selected must properly fit the wearer. Carefully follow the fitting instructions, fit tests, and fit checks contained in the Instruction Booklet that accompanies each respirator to make certain the respirator fits and operates properly (also see HS-202, Respirator Fit Testing).

- If the worker is exposed to two or more contaminants for which different air-purifying elements are recommended (e.g., ammonia and benzene) and a combination element is not available, then air supplied respirators should be used.

- Some toxic contaminants are readily absorbed through the skin. In these cases, appropriate gloves and/or protective clothing may be required to protect other areas of the body that might be exposed to the contaminant.

- Respirators should not be used by individuals with beard or other facial hair that passes between the sealing flange of the respirator facepiece and the wearer's face. Facial hair may cause leakage or interfere with the proper operation of the respirator exhalation valve, thereby exposing the wearer to the hazardous contaminants.

- Air-purifying respirator should not be used for sandblasting or for gas or vapor contaminants with poor warning properties.

- Any air-purifying respirator, when properly selected and fitted, will significantly reduce, but will not completely eliminate, the breathing of contaminant(s) by the respirator wearer. The wearer, when working in atmospheres containing substances such as asbestos (that are reputed to cause cancer in amounts below their TLV) will obtain better protection from a continuous flow or positive pressure air supplied respirator.

201.7 SPECIAL RESPIRATOR-USE PROBLEMS

Facial hair lying between the sealing surface of a respirator face piece and the wearer's skin will prevent a good seal. Except with positive pressure air-line respirators, powered air-purifying respirators, and pressure-demand SCBA, a negative pressure exists within the mask upon inhalation; a poor seal will permit contaminated air to enter the facepiece. Even a few days' growth of beard can permit contaminant penetration.

Respirators should not be worn when conditions prevent a good seal of the facepiece to the face. Facial hair in the form of beards, mustaches, sideburns, and stubble should not be permitted on employees required to wear respirators, if the hair comes between the facepiece sealing surface and the face.

201.7.1 Corrective Lenses

Employees wearing corrective eye glasses present a special problem with respect to respiratory protection. Spectacle temple bars, or straps that pass between the sealing surface of a full facepiece respirator and the wearer's face, prevent a good seal and thus must not be worn.

Spectacles with short temple bars that do not interfere with respirator sealing and are taped to the employee's face may be used temporarily. Special corrective lenses or spectacle inserts that can be permanently mounted inside a full facepiece respirator are available from most manufacturers. Such corrective lenses should be mounted in the facepiece such that it ensures good vision and comfort.

Spectacles or goggles may also interfere with quarter or half-mask sealing; in this case a full facepiece respirator should be employed.

Contact lenses should not be worn while wearing a respirator in a contaminated atmosphere. Contaminants may get into the eyes and cause severe irritation and/or discomfort with quarter or half-masks. Full facepieces can pull at the side of the eye and pop out the lens.

201.7.2 Cold Weather Use of Respirator

Under cold weather conditions a number of problems can develop, such as fogging of full facepiece respirators, valve sticking and rubber stiffness that prevents good facial seal.

Fogging of full facepiece respirators can be eliminated easily by installing a nose-cup into the facepiece. This device, available from most manufacturers, deflects the exhalation breath away from the cold facepiece lens. Defogging solution should also be used.

Other cold weather problems should be discussed with the respirator manufacturer.

201.7.3 Voice Communication

Under some conditions it is necessary for respirator wearers to communicate with other personnel within or outside the contaminated area. When this is necessary, special communicating equipment, generally available from the respirator manufacturer, can be installed inside the facepiece. If penetration of the facepiece or altering of the respirator in any way is necessary to install communications equipment, check with the respirator manufacturer to be sure that the NIOSH/OSHA approval will not be voided by the installation.

201.8 POWERED AIR-PURIFYING RESPIRATORS

Powered air-purifying respirators protect against particulates and/or gases and vapors. The great advantage of the powered air-purifying respirator is that it usually supplies air at a positive pressure so that any leakage is outward from the facepiece. It may be used with a helmet, hood or facepiece. Air can be supplied by a user mounted, battery powered backpack purifier, or by a stationary pump through up to 25 feet of low pressure hose. It has good applicability to abrasive blasting, grinding, pesticide spraying and operations using asbestos.

Generally, powered air-purifying units can be used up to 25 times the PEL for dusts, mists, and fumes, when used with filters that are approved for materials with PELs not less than 0.05 mg/m^3 or 2 mppcf and nuisance dusts. Such respirators can be used up to 25 times the PEL when used with high efficiency filters. For use in chemical vapor or gaseous atmospheres, the MUC depends on the chemical cartridge or canister used. In all cases check the manufacturer's specifications and the NIOSH/MSHA approval for the particular configuration used. Consideration should first be given to standard air-purifying units, supplied air devices, and SCBA.

201.9 DISPOSABLE RESPIRATORY PROTECTION EQUIPMENT

The use of disposable respiratory protection devices eliminates the need to clean, disinfect, inspect and repair equipment. Since the cleaning and maintenance aspects of a respiratory protection program can require time and dollar expenditures, the use of equipment not requiring such services may be desirable in some instances. While the cost of disposable equipment may, in some cases, be higher than comparable reusable devises, this cost may be offset or recoverable by the savings of labor and capital investments for cleaning and inspection facilities.

Disposable chemical vapor or gas respirators might be used economically where limited numbers of this type of respirator are in use or where specific operations are performed infrequently.

201.10 REFERENCES

American Conference of Governmental Industrial Hygienists, TLVs, Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment 1984-85, ACGIH, Cincinnati, Ohio.

American National Standard, Practices for Respiratory Protection ANSI Z88.2-1980, American National Standards Institute, New York.

Birkner, L.R., Respirator Protection, A Manual and Guideline, American Industrial Hygiene Association, 1980.

National Institute for Occupational Safety and Health, A Guide to Industrial Respiratory Protection, DHEW (NIOSH) Publication 76-189, U. S. Government Printing Office, Washington, April 1979.

National Institute for Occupational Safety and Health, Occupational Health Guidelines for Chemical Hazards, DHHS (NIOSH) Publication No. 81-123, U. S. Government Printing Office, Washington, January 1981.

NIOSH/OSHA Pocket Guide to Chemical Hazards, U. S. DHEW (NIOSH), Publication No. 78-210, September 1978.

U. S. Department of Labor, Occupational Safety and Health Administration, OSHA Safety and Health Standards for General Industry, Respiratory Protection (29 CFR Part 1910.134), Washington.

OPERATING PROCEDURE NO. HS-205

HAZARD COMMUNICATION PROGRAM

205.1 GENERAL COMPANY POLICY

CKY is committed to informing its employees of hazardous substances present in their places of work in accordance with the OSHA Hazard Communication (HAZCOM) requirements, Title 29 Code of Federal Regulations (CFR) Part 1910.1200 and 1926.59. This program applies to CKY work operations where employees may be exposed to hazardous substances.

Under the HAZCOM program, employees will be informed of the contents of the HAZCOM regulations, the hazardous properties of chemicals with which they work, safe handling procedures, and measures to take to protect themselves from these chemicals.

205.2 MATERIAL SAFETY DATA SHEETS (MSDS)/ CHEMICAL HAZARD INFORMATION

MSDS provide specific information on the chemicals to which workers may be exposed. The MSDS should be a fully completed OSHA Form 174 or equivalent. Every effort will be made to obtain all pertinent MSDS or similar chemical hazard information whenever chemical exposure of CKY employees is possible.

The Health and Safety Officer is responsible for acquiring and updating MSDS for chemicals stored in buildings/offices. On field sites, MSDS for chemicals used by other firms will be available for examination. For hazardous waste activities, chemical hazard information will be provided in the Heath and Safety Plan.

205.3 LABELS AND OTHER FORMS OF WARNING

Hazardous chemicals used will be properly labeled. Original labels will list the chemical identity, appropriate hazard warnings, and the name and address of the manufacturer. Referral will be made to the corresponding MSDS to assist in verifying label information. Original labels will not be defaced or removed.

If chemicals are transferred from a labeled container to a portable container that is intended only for immediate use, no labels are required on the portable container. However, no hazardous materials or chemicals should permanently used or stored in unlabeled containers.

205.4 TRAINING

Everyone who works with or is potentially exposed to hazardous chemicals will receive initial training on the Hazard Communication Standard requirements and the safe use of those chemicals. Those individuals involved in the Hazardous Waste Practice have chemical hazard training included in their 40-hour course (CKY Basic Health and Safety), in the 8-hour refresher course, and in site specific briefings.

Employees not in the hazardous waste practice who are potentially exposed to hazardous chemicals will be trained in:

- The basic requirements of HAZCOM and employees' right to information on chemical hazards.

- CKY's program to comply with HAZCOM and procedures to follow the standard, the company program, and MSDS recordkeeping/availability.

- How to interpret and use the labels on containers of hazardous materials.

- The potential physical hazards and health effects of the hazardous substances and how to use MSDS for more information.

- Methods and observations that may be used to detect the presence or release of chemicals.

- The measures that employees can take to protect themselves from chemicals.

All HAZCOM training will be documented by a sign-in sheet recording each employee's attendance, the date, and the training topics covered. This sign-in sheet will be retained in the Project File. Such training can be performed by any of the following individuals:

- Project Manager
- Site Manager
- Site Safety Officer
- Health and Safety Officer
- Corporate Health and Safety Officer

The implementation of the Hazard Communication Program will be under the general direction of a Certified Industrial Hygienist.

205.5 PROTECTIVE MEASURES

The use of chemical splash goggles, gloves, protective clothing, boots, and possibly respiratory protection may be required. If respiratory protection is used, it must be in full compliance with the OSHA standards under 29 CFR 1910.134 and 29 CFR 1926.103. All personal protective equipment used will be in accordance with Subpart I of 29 CFR 1910 and Subpart E of 29 CFR 1926. Any emergencies or problems involving hazardous chemicals will be reported to the Project Manager, the Health and Safety Officer and a Corporate Health and Safety Officer.

OPERATING PROCEDURE HS-301

SITE SAFETY INFORMATION WORKSHEET

301.1 PURPOSE

To facilitate site safety planning. Site safety information worksheet (SSIW) identifies information needed to prepare Site-specific Safety and Health Plans (SHP) and organizes the information in a manner that should increase the efficiency of the individual who prepares the plans. See Form HS-301. Use of the SSIW is not mandatory, but highly recommended.

301.2 COMPLETION INSTRUCTIONS

SSIW should be completed jointly by the Project Manager (PM) and Corporate Health and Safety Officer (CHSO). The PM provides the following:

- Administrative and site information.
- Site vicinity maps.
- A list of chemicals known and/or suspected of being at the site.
- The highest measured concentrations of the chemicals.
- Other potential hazards.
- A description of planned field activities.
- The names and functions of site personnel.
- Telephone numbers of local emergency response organizations.
- Telephone number, address, and directions to the nearest hospital with emergency services.
- The name, address, authorized representative, and telephone number of each firm contracted to perform site work.

The CHSO enters information regarding chemical exposure units, acute and chronic health effects, acute symptoms, ionization potentials, and relative instrument response. The Project Health and Safety Officer then uses the information to develop a list of protective, monitoring, and other safety equipment, decontamination procedures, and work zone requirements.

301.2.1 Administrative Information

Enter the information requested. In general, the kinds of information to be entered in this section are self-explanatory. In the space after Project Health and Safety Officer, enter the name and the CHSO.

301.2.2 Site Information

Under history, indicate site type (waste disposal site, chemical spill, industrial facility, USTs, etc.); describe important events, with dates, leading to the work to be performed; state if previous investigations have been performed and describe their nature. Under physical features, state site size, describe its topography, and provide vicinity of site maps. Site maps should identify, if present, roads, fences, gates, buildings, and known areas of contamination. Under biological features, identify life, other than site personnel, that might be threatened by chemical releases (e.g., people working or living on site or in adjacent areas, aquatic life, wildlife, livestock, etc.).

301.2.3 Chemicals of Concern

List all known and suspected chemical contaminants. Consult OSHA guidelines for PEL, IDLH, and LEL values; and ACGIH guidelines for TLV. PEL and TLV are commonly considered synonymous terms; enter the lower of the values under PEL, PEK, IDLH, and TLV values should be expressed in parts per million (ppm) units unless given only in mg/m3 units. For symptoms of acute exposure and acute and chronic health effects, consult OSHA guidelines, Patty (Third Edition, 1981), Sax, and other compendia of toxicological information. If available, list highest measured concentration of each chemical in soil, water, and air.

Enter instrument response factors for volatile and gaseous contaminants measured with flame-ionization detection (FID) meters (example, Century Systems Model 128 organic vapor analyzer) and photoionization detection (PID) meters (examples, HNU Model 101 photoionization analyzer and Analytical Instruments Development Co. Model 580 organic vapor meter). Instrument response factors are usually found in the instrument operating manuals. They can be obtained from instrument manufacturers.

For FID meters, enter percent response values; for PID meters, enter ionization potentials and percent response values.

301.2.4 Chemical Disposition

Describe what is known about the disposition of the chemicals on site and off site. State if environmental contamination has occurred, identify contaminated media and levels of contamination. Identify areas of highest contamination. Identify chemicals stored in drums, tanks, sumps, lagoons, and other storage facilities.

301.2.5 Other Hazards

If any of the listed other hazards are or may be present, identify them by entering a check mark in the appropriate blanks. Write in any unlisted hazard.

301.2.6 Planned Field Activities

Briefly describe the planned field activities for which health and safety requirements will be prepared and dates (estimate if not known) each activity will start and end. Group the activities with similar health and safety requirements together and assign each group of activities a task number. Activity descriptions must include methods and list equipment.

301.2.7 Health and Safety Requirements

For each task/activity, list the names and affiliations of the individuals who will be or have been assigned to the task. Also describe their primary job (e.g., site safety, driller, geophysical survey and soil sampling, etc.). Indicate the level of protection (Level A, B, C, or D) and contingency level required for each person listed.

List the personal protective equipment, field monitoring equipment, and other safety equipment (first aid kits, barricades, eye-wash stations, etc.) required for the activity. Also list decontamination equipment and materials and identify work zone requirements (i.e., need for and size of contaminated, contamination-reduction, and support zones).

Use one page (Page 4 of SSIW per activity, and number the pages 4A, 4B, and 4C, etc.).

301.2.8 Emergency Contacts

Enter the telephone number, location (city or county), and, if known, the name of a person to contact at each of the listed agencies.

301.2.9 Medical Emergency

Enter the name, address, and telephone number of the nearest hospital with emergency services and describe the primary route to the hospital. If there is an alternate route, describe it also. Include a route map if available.

301.2.10 Subcontractors

Enter the name of each firm that has been or will be contracted to perform field or laboratory work. For each firm, enter the name of the principal contact, telephone number, and type of service it will perform. If a firm has been pre-qualified with respect to health and safety, enter "Yes" in the pre-qualified column; otherwise, enter "No."

301.3 INFORMATION SERVICES

Sources of information for completing SSIW include:

- NIOSH/OSHA Pocket Guide to Chemical Hazards.
- ACGIH Threshold Limit Values for Chemicals in the Work Environment.
- Dangerous Properties of Industrial Materials, N. Irving Sax, 6th Edition.

FORM HS-301
SITE SAFETY INFORMATION WORKSHEET

1. Administrative Information

Project No.: _____
Project Name: _____
Health and Safety Officer: _____

2. Site Information (Attach maps as necessary)

Site History: _____
_____
_____
_____

Physical Features: _____
_____
_____
_____

Biological Features: _____
_____
_____
_____

3. Chemicals of Concern

Chemicals	OSHA PEL	OSHA IDLH	OSHA LEL	ACGIH TLV	Symptoms of Exposures	TOXICOLOGY

FORM HS-301
SITE SAFETY INFORMATION WORKSHEET (Continued)

4. Chemical Disposition:

5. Other Hazards:

6. Planned Field Activities:

7. Health and Safety Requirements:

FORM HS-301
SITE SAFETY INFORMATION WORKSHEET (Continued)

8. Emergency Contacts:

9. Medical Emergency:

10. Subcontractors:

OPERATING PROCEDURE NO. HS-503

INCIDENT REPORTS

503.1 GENERAL COMPANY POLICY

All health and safety incidents that occur during field activities associated with investigations and remediation of sites containing hazardous materials must be reported to the Corporate Health and Safety Officer (CHSO).

503.2 DEFINITIONS

A health and safety incident is any event listed below:

- Illness resulting from chemical exposure or unknown causes.
- Physical injury, including those that do not require medical attention.
- Property damage resulting from activities performed by CKY and its subcontractors.
- Vehicular accidents occurring onsite or while traveling to and from sites.
- Infractions of safety rules and requirements.
- Unexpected chemical exposures (indicated by irritation of eyes, nose, throat, or skin).
- Fire, explosions, and flashes resulting from activities performed by CKY and its subcontractors.

503.3 REPORTING PROCEDURES

503.3.1 Reporting Format

Incident reports shall be prepared by completing Form HS-503. This form may be obtained from the CHSO.

503.3.2 Responsible Party

Reports of incidents occurring in the field shall be prepared by the Site Health and Safety Officer or, in the absence of the Site Health and Safety Officer, Site Supervisor, witness, or injured/exposed individual.

503.3.3 Filing

A report must be submitted to the CHSO within 24 hours of each incident involving medical treatment. When an injury or illness is reported, the CHSO must deliver a copy of the report to the individual in charge of personnel affairs so that a Worker's Compensation Insurance Report can be filed if necessary. Reports must be received by personnel within 48 hours of each qualifying incident.

FORM HS-503

INCIDENT REPORT

This incident report shall be filled out by the Site Health and Safety Officer or Site Supervisor within 48 hours when an injury or illness is occurred.

1. Administrative Information

Project No.: _____
Project Name: _____
Health and Safety Officer: _____

2. Type of Incident

___ Illness resulting from chemical exposure
___ Unexpected chemical exposure (as indicated by irritation of eyes, nose, throat, or skin)
___ Physical injury
___ Fire, explosion, or flash
___ Property damage
___ Vehicular accidents
___ Infractions of safety rules and requirements

3. Personal Data

Name: _____ Age: _____ Sex: _____
CKY Employee: _____ Subcontractor:_____

4. General Information

Date of Incident: _____ Time of Incident: _____
Location of Incident: _____
Site Activity:_____
_____
_____
_____

5. Description of Activity When Incident Occurred:

_____
_____
_____
_____

6. Incident Description:

_____
_____
_____
_____

Prepared by: _____ Date:_____

OPERATING PROCEDURE NO. HS-504

SITE CONTROL

504.1 PURPOSE

To provide guidance in establishing site control during hazardous waste site activities. Site control consists of providing for security, communications, layout of site activity facilities (i.e., command post, decontamination area, etc.), setting up work zones, and monitoring of weather conditions.

504.2 SECURITY

Site security should be established to limit access to the site and prevent unauthorized personnel from entering the site area. The following should be considered when providing site security:

- The site should be secured with fencing (i.e., chain link fence, wire, or barriers), as appropriate.

- A security guard should be provided as necessary, and be located in the vicinity of the command post (office trailer).

- A controlled access to the regulated zones should be established. This controlled access should be through a decontamination unit or area.

- Only authorized personnel are permitted to enter regulated zones. No one shall enter the site without appropriate authorization.

- All persons entering the regulated zones shall be equipped with appropriate personal protective devices.

- All persons entering the regulated zones must be familiar with and abide by the health and safety plan.

504.3 COMMUNICATIONS

Methods of maintaining communications on site between site personnel should be provided. Communication between the command post and personnel working in regulated zones should be provided. Communication, as well as visual contact, should be maintained between personnel in regulated zones. Use of the "buddy" system should be practiced. The following methods of communication should be utilized as appropriate:

- Radios
- Hand signals
- Air horns
- Bells

- Flags
- Boards or signs

Emergency information (routes, phone numbers, etc.) should be posted on site.

504.4 SITE LAYOUT

In developing a site layout for site investigation activities and establishing command post, decontamination facilities, etc., the following criteria should be considered:

- Site location and ownership
- Location of roads, power lines, etc.
- Terrain (line-of-sight, avenues of approach, ingress and egress)
- Prevailing wind direction
- Location of sources of water and power
- Proximity to inhabitants or residents
- Location of emergency facilities

504.5 WORK ZONES

Work zones should be established within a site as appropriate depending on the degree of potential hazard and the type of work activities being performed. Areas known or suspected to be of high potential should be designated as regulated or exclusion zones. The immediate areas (e.g., 25-foot radius) around intrusive activities (i.e., drilling, excavating, etc.) may be classified as regulated or exclusionary. Decontamination areas should also be regulated. Appropriate personal protective equipment should be worn by personnel in regulated zones, in accordance with the site specific safety plan for the site. Command posts should be in clean areas upwind of contaminated or exclusionary zones.

504.6 WEATHER CONDITIONS

Monitoring of weather conditions should be performed during site activities as may be appropriate. Monitoring for the following should be considered:

- Wind direction (vane, wind sock, flagging)
- Temperature for heat stress conditions
- Temperature for cold stress conditions

504.7 DOCUMENTATION

Description of site control should be presented in the site safety plan, including a plot plan of the site indicating locations of site features and work facilities. Records should be maintained regarding site access and monitoring of weather conditions. The Site Supervisor or his/her designate will be responsible for monitoring site access and weather conditions.

OPERATING PROCEDURE NO. HS-505

EMERGENCY PREPAREDNESS

505.1 PURPOSE

To provide guidance in preparing for contingency or emergency situations during field activities. Accidents can and do happen. However, with adequate planning and preparedness resulting consequence can be minimized or prevented.

Emergency preparedness starts with advanced planning. It requires anticipation of potential problems or hazards. Proper emergency preparedness involves use of the project health and safety plan that may address emergency situations. It involves training, site orientation of personnel, medical information of personnel, and availability of emergency equipment and services.

505.2 TYPES OF EMERGENCIES

There are three major categories of emergencies that can occur during hazardous waste site activities. They are medical emergencies, accidents, and safety equipment problems.

505.2.1 Medical Emergency

Medical emergencies can be described as situations that present a significant threat to the health of personnel involved in site activities. These can result from chemical exposures, heat stress, cold stress, and poisonous insect or snake bites. Medical emergencies must be dealt with immediately and proper care should be administered. This may be in the form of first aid and emergency hospitalization.

505.2.2 Accidents

Accidents can result from physical hazards on a site. These hazards can include tripping, catching, cutting, and may be associated with debris on a site or heavy equipment used in the investigation. Accidents may include:

- Broken bones
- Burns
- Sprains
- Puncture wounds
- Electrical shock
- Cuts by contaminated materials

Appropriate medical attention must be provided to individuals involved in site activities who have suffered an accident.

505.2.3 Safety Equipment Problems

A source of emergency may develop due to malfunction or other problem associated with safety equipment being utilized by site personnel. These types of problems may or may not result in emergency situations. However, safety equipment problems must be corrected before proceeding with field activities. Safety problems may include:

- Leaks or tears in protective clothing
- Failure of respiratory protective devices (SCBA, air-purifying respirators)
- Encountering contaminants for which prescribed protective equipment may not be suitable

505.3 ADVANCE PLANNING

Advance planning should be practiced and include assessments of potential hazards or problems that may be encountered. Emergency preparedness should be addressed in the site safety plan. It should consider:

- Hazard evaluation
- Emergency precautions
- Hospital/poison control centers (telephone numbers)
- Emergency transportation systems (fire, police, ambulance)
- Emergency routes (maps, dry runs)
- Escape routes:
  - On-site escape (rapid evacuation to safe area)
  - Off-site escape (best means of evacuation from site)

505.4 TRAINING

Field teams should include personnel with training in first aid and CPR. Personnel should become familiar with site area, available equipment, and emergency services available.

505.5 MEDICAL SURVEILLANCE INFORMATION

Personnel should be aware of any special medical problems of individual team members. This may include allergies, insect stings, poison plants, penicillin, etc.

505.6 EMERGENCY EQUIPMENT

Provisions should be made to have appropriate emergency equipment available and in proper working condition. This equipment may include:

- First aid kits
- Eye wash kits - fill and pressurize
- Fire extinguisher
- Emergency oxygen
- Splints
- Stretcher

- Blankets
- Life vests

Equipment should be checked before commencing site activities, and defective equipment repaired or replaced before performing site work. Provisions should be made for redundant or back-up safety equipment.

505.7 SAFETY PRACTICES

The following safety practices should be utilized to prevent or deal with emergency situations:

- A continuous line-of-sight should be maintained between work party downrange and personnel at the command post. Personnel stationed beyond the command post, in order to maintain the line-of-sight with the work party, must be outfitted with appropriate protective equipment.

- Person should be dressed to same degree as the work party in order to provide an extra man for any needed rescue effort.

- Communications should be maintained and work party must have system for rapid and clear distress call back to command post.

- Check to insure that all preplanning information is correct.

- Maintain thorough knowledge of expected weather conditions. Avoid working in wet weather, electrical storms, extremely hot conditions, or extremely cold conditions.

- Thoroughly understand tasks to be performed.

- Thoroughly brief all team members on all aspects of the tasks.

505.8 DOCUMENTATION

Records should be maintained with regard to emergency situations. Incident/Accident Reports should be filed in the event of an incident or accident (see SOP HS-503). The Site Supervisor is responsible for preparing and maintaining the incident or accident report.

OPERATING PROCEDURE NO. HS-512

EXCAVATION AND TRENCHING

512.1 PURPOSE

Excavation involves the removal of earth to form a man-made cut, cavity, trench, or depression in the earth's surface. Strict health and safety requirements are essential for any project involving excavation to minimize the risk of injury associated with such hazards as potential cave-ins; slip, trip, and fall hazards, and the operation of heavy equipment.

Excavation safety regulations present a significant challenge for operations within California. Prior to the 1990 Fed-OSHA revision, Cal-OSHA had some of the most stringent excavations standards in the nation. However, the new federal standard (29 CFR 1926.650) presented many discrepancies with the California standard (Title 8 Section 1540). The newly modified Cal-OSHA excavation standard can be found in Title 8 1540-1541.1. Refer to Table HS-512 for a California Excavation Checklist. If excavation is to be performed in a state other than California, that state's regulations will be reviewed and the more stringent requirements will be followed.

512.2 APPLICABILITY

This procedure applies to excavation and trenching operations associated with geotechnical and environmental investigations. The procedure must be used as an attachment to a site specific health and safety plan for projects where hazardous or potentially hazardous materials may be encountered.

512.3 DEFINITIONS

Trench - A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width at the bottom, but the width of a trench at the bottom is not greater than 15 ft.

Excavation - A man-made cavity or depression in the earth's surface, including its sides, walls, or faces formed by the removal of materials, and producing unsupported earth conditions by reason of such removal. If installed forms or similar structures reduce the depth-to-width relationship, the excavation may become a trench.

512.3 EXCAVATION SAFETY CONSIDERATIONS

Factors that influence excavation safety include:

- Traffic
- Nearness of structures and their condition
- Soil type

- Surface and groundwater
- Water table location
- Overhead and underground utilities
- Weather conditions
- Presence of hazardous waste/materials

These and other conditions can be determined by job site studies, observations, test borings for soil type and conditions, and consultations with local officials and utility companies.

Before any excavation begins, the contractor shall determine the estimated location of utilities (sewer, telephone, fuel, gas, electrical, water lines). In addition, the contractor must contact the utility companies, Digsafe, USA, or similar, before excavating.

512.4 ON THE JOB EVALUATIONS

The excavation/trenching standard requires that a competent person inspect, on a daily basis, excavations and the adjacent areas for possible cave-ins, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions. If any of these conditions are encountered, the exposed employees must be removed from the hazardous area until the necessary safety precautions have been taken. Inspections are also required after natural (i.e. rain) or man-made events (i.e. blasting), that may increase the potential for hazards .

If employees or equipment are required or permitted to cross over an excavation, walkways or bridges with standard guard rails shall be provided.

512.5 CAVE-IN AND PROTECTIVE SUPPORT SYSTEMS

Excavation workers are exposed to a wide variety of hazards, cave-ins being the chief danger. OSHA requires that in all excavations employees exposed to potential cave-ins must be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

Design of the protective system can be complex because of the number of factors involved. These might include soil classification, depth of cut, water content of the soil, changes due to weather and climate, or other operations in the vicinity. The new Federal standard provides several different methods and approaches (4 for sloping and 4 for shoring, including the use of shields) for designing protective systems that can be used to provide the required level of protection against cave-ins. These alternatives or options include the following:

Option 1 - Allowable configurations and slopes

Excavations shall not be sloped at an angle greater than 1-1/2 horizontal to 1 vertical (34° measured from the horizontal). This 1-1/2:1 sloping requirement does not hold true if one of the other three options is utilized.

Option 2 - Determination of slopes and configuration (using Appendices A & B included in the Federal excavation standard)

The maximum allowable slope and the allowable configurations for sloping and benching systems, will be determined in accordance with the conditions and requirements as stated in Appendix A and B of 29 CFR 1926, Subpart P. Appendix A involves classifying soils as Type A, B, or C, or a combination of the three. Appendix B involves specifications and configurations for sloping and benching systems.

Option 3 - Design by using other tabulated data

Sloping and benching systems can be designed by utilizing other tabulated data such as tables and charts. However, the tabulated data will be in written form and include the following elements:

- Identification of the parameters that affect the selection of a sloping or benching system drawn from the tabulated data
- Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe
- Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data
- At least one copy of the tabulated data (which identifies the registered engineer who approved the data), shall be kept at the jobsite during construction of the protective system. After that time the data may be stored off-site but available upon request of the inspector.

Option 4 - Design by a registered professional engineer

Sloping and benching systems which do not utilize Options 1, 2 or 3 will be approved by a registered professional engineer. The design will be in written form and will contain at least the following:

- The magnitude of the slopes that were determined to be safe for the particular project
- The configurations that were determined to be safe for the particular project
- The identity of the registered professional engineer approving the design

At least one copy of the engineer's plan must be kept at the work site during construction of the protective system. After that time the data may be stored offsite but will be available upon request of the inspector.

Employees who work within the excavation must be provided with protection systems such as sloping, benching, shoring, bracing, or underpinning to ensure the stability of adjacent structures such as buildings, walls, sidewalks, or pavement. Another form of protection known as a trench box or shield (also known as a welder's hut) can also be utilized as a form of protection. However, this method is known as an alternative protection system and thus, must be approved by a Registered Professional Engineer. In the State of California, that person must be a Registered Civil Engineer.

Excavation will not be conducted below the level of the base or footing of any foundation or retaining wall unless (1) a support system such as underpinning is provided, (2) the excavation is in stable rock, or (3) a Registered Professional Engineer determines that the structure is sufficiently removed from the excavation and that excavation will not pose a hazard to employees. Excavation under sidewalks and pavement is also prohibited unless an appropriately designed support system is provided or another effective method is used.

512.6 INSTALLATION AND REMOVAL OF PROTECTIVE SYSTEMS

The following procedures are for the protection of employees during installation and removal of protective systems:

- Securely connect members of support systems to prevent sliding, falling, kickouts, or other predictable failures.

- Safely install support systems in a manner that protects employees form cave-ins, collapses, or from being struck by members of the support system.

- Never overload members of support systems.

- Install other structural members to carry loads imposed on the support system when temporary removal of individual members is necessary.

As soon as work in the excavation is completed, the excavation will be backfilled as the protective system is dismantled. After the excavation has been cleared, workers will slowly remove the protective system from the bottom up, taking care to release the system slowly.

512.7 MATERIALS AND EQUIPMENT

The employer is responsible for the safe condition of materials and equipment used for protective systems. Defective and damaged materials and equipment can result in the failure of a protective system and cause excavation hazards.

To avoid the possible failure of a protective system failure, the employer must ensure that (1) materials and equipment are free from damage or defects, (2) manufactured materials and equipment are used and maintained in a manner consistent with the recommendations of the manufacturer and in a way that will prevent employee exposure to hazards, and (3) while in operation, damaged materials and equipment are examined by a competent person to determine if they are suitable for continued use. If materials and equipment are not safe for use, they must be removed from service. These materials cannot be returned to service without the evaluation and approval of a Registered Professional Engineer.

512.8 OTHER HAZARDS

512.8.1 Falls and Equipment

In addition to cave-in hazards and secondary hazards related to cave-ins, there are other hazards from which workers must be protected during excavation related work. These hazards include: exposure to falls, falling loads, and mobile equipment. To protect employees from these hazards, the following precautions will be taken:

- Materials and equipment that might fall or roll into an excavation will be kept at least 2 feet from the edge of excavations, or have retaining devices, or both.

- Warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs will be used to alert operators of the edge of an excavation.

- Scaling will be provided to remove loose rock and soil, or protective barricades or other equivalent protection will be installed to protect employees against falling rock, soil or materials.

- Employees will be prohibited from working on faces of sloped or benched excavation at levels above other employees unless employees at lower levels are adequately protected from the hazards of falling, rolling, or sliding material or equipment.

- Employees will be prohibited from standing or working under loads that are handled by lifting or digging equipment. To avoid being struck by any spillage or falling materials, employees will be required to stand away from vehicles being loaded or unloaded. If cabs of vehicles provide adequate protection from falling loads during loading and unloading operations, the operators may remain in them.

512.8.2 Water Accumulation

Employees will not work in excavations where water has accumulated or is accumulating unless adequate protection has been taken. If water removal equipment is used to control or prevent water from accumulating, the equipment and operations of the equipment must be monitored by a competent person to ensure proper use. Diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering into the excavation and to provide adequate drainage of the area adjacent

to the excavation. In addition, a competent person must inspect excavations subject to run-offs from heavy rains. The Site Supervisor will be responsible for inspecting the excavations after a heavy rain or runoff has impacted the site.

512.8.3 Hazardous Atmospheres

A competent person must test excavations greater than 4 feet in depth as well as excavations where oxygen deficiency or a hazardous atmosphere exists or could reasonably be expected to exist, before an employee enters the excavation. If hazardous conditions exist, controls such as proper respiratory protection or ventilation must be provided. Also, controls used to reduce atmospheric contaminants to acceptable levels must be tested regularly.

Where adverse atmospheric conditions may exist or develop in an excavation, emergency rescue equipment, (i.e. breathing apparatus, safety harness, lifeline, basket stretcher, etc.) will be readily available. This equipment must be attended when used.

512.8.4 Access and Egress

Employees working within an excavation must be provided with safe access and egress to all excavations. When an employee is within an excavation 4 feet or greater, adequate means of exit, such as ladders, steps, ramps, or other safe means of egress, must be provided and be within 25 feet of lateral travel. If structural ramps are used as a means of access or egress, they must be designed by a competent person if used for employee access or egress, or a competent person qualified in structural design if used by vehicles.

512.9 REFERENCES

U.S. Department of Labor, Occupational Safety and Health Administration, OSHA Safety and Health Standards for General Industry (29 CFR Part 1926), Subpart P - Excavation, Washington.

TABLE HS-512

CALIFORNIA EXCAVATION CHECKLIST

1. Prior to beginning an excavation, the location of all underground utilities and other underground hazards shall be determined.

2. A hazard assessment shall be conducted by a qualified person to evaluate the potential exposure to employees who may work in or around the excavation.

3. The excavation shall also be inspected by a qualified person after each rain or other hazard-increasing event to evaluate the potential hazards from slides or cave-ins.

4. Anytime an employee enters an excavation 5 feet or greater in depth, that employee must be protected by a system of shoring, sloping, benching, or alternative means as per the four options outlined above.

5. The conditions in #4 above will also require the employer to obtain the necessary excavation permit from Cal-OSHA. Two types of permits are available; (1) $50 per excavation type, (2) $100 annual permit for entire state. In order to obtain either permit, the employer must fill out the application form, provide Cal-OSHA with the employer's Accident Prevention Program, and pay the fee. This must be conducted every time for the $50 permit. The $100 permit has a requirement that the employer contact the closest Regional Cal-OSHA office of the up-coming excavation, protection system utilized, date, located, etc.

6. Excavated materials shall be prevented from falling back into the excavation. Spoils should be placed no closer than 2 feet from the edge of the excavation.

7. Work which is conducted within the excavation should be under the direct supervision of a qualified person who is capable of modifying the shoring or sloping system.

8. A convenient and safe means of egress shall be provided for employees working within an excavation 4 feet deep or greater. This may consist of a stairway, ladder, or ramp located within 25 feet of lateral travel.

9. Any employee working in the vicinity of an excavator or other equipment shall not be in a position where that employee might fall into contact with the moving parts of that equipment. Employees shall also be wearing a reflective vest.

10. An adequate means of water drainage shall be implemented to reduce the likelihood of run-off entering the excavation. This shall hold true during the rainy season. If the accumulation of water could pose a hazard to employees, the situation should be controlled prior to resumption of operations.

11. All shoring systems shall incorporate the soil specification and conditions for that particular site. The installation of shoring systems shall be conducted in such a way that the employee is properly protected from the potential of cave-ins. Additionally, the removal of the system shall follow the same requirement.

12. If the excavation exceeds 20 feet, or if an alternative shoring, sloping, or benching system is utilized, a registered professional engineer shall prepare detailed plans showing the materials and methods to be utilized.

13. The detailed plans in #12 above, shall be available for inspection at the site.

14. Shoring shall be installed in accordance with GISO 1541.1, Appendices C & D.

15. If protective shields, (i.e. trench box or shield) are to be utilized for the protection of employees within an excavation, a registered professional engineer must prepare the necessary calculations and designs prior to the use of such equipment.

OPERATING PROCEDURE NO. HS-518

GUARDING OF MACHINERY AND EQUIPMENT

518.1 PURPOSE

To reduce the risk of injury to employees working on or near heavy equipment or machinery with moving or rotating parts.

518.2 GUARDING PROCEDURES

The following procedures will be instituted at all work sites that involve the use of heavy equipment or machinery with moving parts:

- Safety guards will be installed on all belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment.

- All hot surfaces of equipment and machinery will be guarded and/or insulated to prevent injuries and fire.

- All equipment with charging skips will be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

- Machinery and equipment will be provided with appropriate platforms, footwalks, steps, handholds, guardrails, and toeboards.

- Overhead protection will be provided for the operators of forklifts and similar material handling equipment.

Equipment and machinery guards will be inspected periodically. Damaged guards will be replaced immediately. No guard or other safety appliance will be removed from site equipment or machinery.

APPENDIX E
TPA-CKY Safety and Health Record

TPA-CKY Safety & Health Record			
Calendar Year	Incident Rate (Frequency)	Severity Rate	Worker Compensation EMR*
2001	0	0	0.80
2002	0	0	0.78
2003	0	0	0.88

*EMR = Experience Modification Rate

FINAL

ENVIRONMENTAL PROTECTION PLAN

Former Evergreen Infiltration Range
Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

FINAL

ENVIRONMENTAL PROTECTION PLAN

Former Evergreen Infiltration Range Remedial Action
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Seattle, WA 98134

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San Pedro, CA 90731

Project No. J202
January 2005

Reviewed and Approved by:

_____
Timothy Yu, Ph.D., PE
Program Manager

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List of Acronyms and Abbreviations

APP	Accident Prevention Plan
BMP	Best Management Practices
CFR	Code of Federal Regulations
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	contamination reduction corridor
CRZ	contamination reduction zone
DERA	Defense Environmental Restoration Permit Program
DOT	United States Department of Transportation
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	exclusion zone
FIO	For Information Only
GA	Government Approved
LRI	Land Recover Inc.
MLLW	Mean Low Level Water
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PID	photo ionization detector
PPE	personal protective equipment
QCSM	Contractor Quality Control System Manager
RAMP	Remedial Action Management Plan
RORO	roll-on, roll-off
SHM	Site Safety and Health Manager
SPERP	Spill Prevention and Emergency Response Plan
SSHP	Site Safety and Health Plan
SSHO	Site Safety and Health Officer
SWPs	safe work practices
SWPPP	Storm Water Pollution Prevention Plan
TLV-TWA	Threshold Limit Value- Time Weighted Average
TPH	Total Petroleum Hydrocarbons
USCG	United States Coast Guard
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USARC	United States Army Reserve Center
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WWMP	Waste Water Management Plan
WP	Work Plan

1.0 INTRODUCTION AND BACKGROUND

This Environmental Protection Plan (EPP) is a component of the project Management Plan (MP). The purpose of the EPP is to ensure the protection of environmental resources at the sites during and after construction activities. The EPP identifies plans, procedures and organizations necessary to minimize, manage, control and avoid pollution of or damage to the environment. TPA-CKY Joint Venture (TPA-CKY) and its subcontractors will utilize this plan as a tool to identify applicable regulatory requirements and track compliance with management, recordkeeping, reporting and technical specification requirements. This plan also establishes the scope of work, and procedures necessary to comply with the identified substantive requirements for environmental protection. This plan will be subject to revision reflecting changes during the project.

1.1 SITE LOCATION

The remediation areas are located on Fort Lewis. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The former Evergreen Infiltration Range (AOC 4-6.3) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. Work activities will begin at the Evergreen Infiltration Range and then move operations to the Thompson Machine Gun sites. The remediation area at the Thompson Machine Guns sites is currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area.

1.2 SITE BACKGROUND

The former Evergreen Infiltration Range was identified from a 1951 aerial photograph and appears to have been in use until 1965. This site was used to condition soldiers to move under live fire and under combat type situations. Fixed-position machine guns firing into an impact berm provided live fire training. The ammunition associated with infiltration range training during this era was the .30 caliber cartridge. Soil contamination was documented in the impact berm. The primary contaminate of concern is lead. The maximum detected concentration was 62,500 mg/kg. Antimony and copper were also detected, but only when lead was above the action level of 250 mg/kg.

The former machine gun sites (AOC 4-6.1 and 4-6.2) were identified on a 1944 map. Preliminary assessment activities did not confirm site use. Recent magnetometer work confirmed the presence of .45 caliber bullets in isolated pockets. Site assessment is currently being performed by the USACE to delineate remediation areas.

2.0 PROJECT OBJECTIVE AND SCOPE OF SERVICES

The overall project objective is the remediation of the Former Evergreen Infiltration Range and the Thompson Machine Gun Range. The remediation will consist of excavation of designated soil removal areas, separation and removal of bullets, stabilization or remaining waste stream to pass TCLP, transportation and disposal of treated soils to active Fort Lewis ranges, confirmation sampling and site restoration.

The scope of services for this project will include the following tasks:

- Mobilize to project site
- Pre-construction survey
- Identification and marking of utilities
- Perform stabilization bench tests
- Prepare the site, including field office setup, sheds, and erosion control
- Clearing of work area
- Stump removal
- Excavation of designated areas
- Placement of excavated soil in temporary stockpile
- XRF sampling and re-excavation (if necessary)
- Confirmation sampling to ensure clean closure
- Post-construction survey
- Screening of soil to remove bullet fragments
- Disposal / recycling of bullet fragments
- Testing of soil for off-site disposal
- Stabilization of remaining soils to pass TCLP criteria
- Placement of stabilized soil onto active ranges at Fort Lewis
- Site restoration
- Final testing under stockpiles and testing of any waste for disposal
- Demobilization
- Close-out Documents

TPA-CKY will implement specific procedures throughout field operations, to conform to environmental constraints and to minimize potential adverse impacts to the environment.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

3.1 PARTY INTERFACE AND CONTRACTURAL RESPONSIBILITIES

Key parties for this Task Order includes the U.S. Army Corps of Engineers, Seattle District (USACE), TPA-CKY, and it's trucking subcontractor (TBD).

3.2 PROJECT STAFF RESPONSIBILITIES

The team for this project has well defined roles. The Program Manager is Tim Yu. Table 1 identifies the key parties involved in the project and their responsibilities.

Table 1
Key Personnel

Organization	Role / Responsibility	Contact Name
USACE – Seattle District	Contracting Officer Representative	Dave Roden
USACE – Seattle District	Program Manager (PM)	Matthew Allen
USACE – Seattle District	Quality Assurance Representatives	Bryce Jones Rebekah Barker
USACE – Seattle District	Technical Lead	Kira Lynch Kym Takasaki
TPA-CKY	MARC Program Manager	Tim Yu
TPA-CKY	Project Manager	Mark Hallock
TPA-CKY	Quality Control Program Manager	Tan Phung
TPA-CKY	Quality Control System Manager	Noah Rivera
TPA-CKY	Site Safety Officer	Noah Rivera

Project Manager: Mr. Mark Hallock

Mr. Mark Hallock will be responsible for ensuring adherence of the EPP. Mr. Hallock has over 25 years of professional experience managing environmental and construction projects. Clients have included US Army Corps of Engineers, Department of Transportation, Department of the Navy, Department of the Air Force, Department of Defense, EPA, State and local governments, and private industry clients. Mr. Hallock has also been responsible for development and implementation of company training, corporate and site-specific quality control plans, environmental protection plans and safety and health plans.

Mr. Hallock communicates directly with the USACE PM and will serve as the primary point of contact. He is responsible for all site activities including:

- Ensuring that environmental requirements are met.
- Inspecting and monitoring the construction area and work practices for compliance with the plan, noting any deficiencies and ensuring that corrective action is taken.
- Modifying and/or developing new safety procedures as necessary.
- Conducting initial and follow-up site-specific training.
- Briefing field team on specific duties.
- Authorizing a stop-work order if he determines that an environmental hazard or potentially harmful situation exists.
- Controlling site access.
- Providing liaison with public officials.

QC System Manager: Mr. Noah Rivera

Mr. Noah Rivera will assist Mr. Hallock in ensuring adherence of the EPP. Mr. Rivera has over 5 years experience managing environmental and construction projects. Mr. Rivera has held the position of Quality Control Inspector and Site Safety Officer. He has also been responsible for development and implementation of site-specific environmental protection, quality control and health and safety plans. Mr. Rivera has worked on projects for The US Army Corps of Engineers, Department of the Navy and private firms. Mr. Rivera will have the same duties of Mr. Hallock and will report to Mr. Hallock.

Other Project Personnel

TPA-CKY and subcontractor personnel who constitute the field team will have the following individual and collective responsibilities:

- Read and be thoroughly familiar with all aspects of the EPP.
- Complete all assigned tasks in compliance with the EPP.
- Notify Mr. Hallock, Mr. Rivera or direct supervisor of any actual or potential conditions that might adversely affect the environment or be in non-compliance with the EPP.
- Attend all on-site environmental meetings.

4.0 ENVIRONMENTAL PROTECTION REQUIREMENTS

4.1 ENVIRONMENTAL PROTECTION TRAINING

Mr. Mark Hallock, Project Manager, will have overall responsibility for ensuring that this Environmental Protection Plan is followed and adhered to. Mr. Hallock will also conduct initial and follow-on Site Specific Environmental Training. A copy of Mr. Hallock's resume is included in the Work Plan.

Prior to beginning on-site activities, all on-site personnel, TPA-CKY and subcontractors, will receive an initial environmental protection training secession. This will consist of a review of the project site, scope of work and site specific environmental concerns. This Environmental Plan will also be reviewed. Specific environmental concerns will be discussed with appropriate TPA-CKY and subcontractor personnel prior to beginning each new definable feature of work. In addition, environmental protection issues will be discussed will the field crew during TPA-CKY's daily employee briefings.

TPA-CKY's personnel will be trained in all phases of environmental protection and pollution control. TPA-CKY will conduct environmental protection/pollution control meetings for all TPA-CKY personnel prior to commencing construction activities. Additional meetings will be conducted for new personnel and when site conditions change. The training and meeting agenda will include:

- Methods of detecting and avoiding pollution;
- Familiarization with statutory and contractual pollution standards and permits;
- Installation and care of devices; vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control;
- Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; and
- Recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

4.2 EROSION AND SEDIMENT CONTROL

The project site is a soil impact berm located in a clearing on the south side of Evergreen Ave. The topography at the site suggests that stormwater runoff will flow towards and along Evergreen Ave. TPA-CKY will be removing soil from the face of the impact berm and then performing remediation of the soil in a remediation area located to the southwest of the impact berm. A drawing of the project site is found in the Work Plan at **Figure 1-2**.

Sediment Control

Best Management Practices (BMP) will be implemented during the project to reduce and control sediment flow, including a series of sediment control measures to be constructed to collect sediments. TPA-CKY will install a series straw wattle and/or silt fence barriers in the potential path of stormwater flow. These barriers will allow stormwater flow but will collect sediments. If necessary, diversion ditches will be dug to divert stormwater towards barriers. Regular maintenance and inspection will be performed on barriers. This may include removal of collected sediments and repair or replacement of damaged sections.

Stockpiles

Contaminated soil stockpiles will be placed on and covered with 20-mil *Visqueen* plastic sheeting. The purpose for this is to isolate the contaminated material from stormwater and to prevent contamination movement via stormwater. Stockpile covers will be weighted and secured to prevent storm damage. The

covers will extend over the edges of the stockpile to prevent stormwater from impacting stockpiled soil. Straw wattle/soil berms and diversion ditches will be constructed as necessary to control stormwater flow.

TPA-CKY will attempt to avoid excavating wet soil. However, if it becomes necessary to temporarily stockpile wet soil, we will collect any de-water and use it for dust control in the excavation and remediation process areas or as make up water for the stabilization process. All stockpiles will be covered to prevent rainwater infiltration.

Erosion Control

The most likely source of erosion will be from the movement of construction equipment and haul trucks. During on-site activities, construction areas will be inspected. Ruts and soft areas will be graded as necessary to maintain a smooth surface. Imported gravel or base rock will be placed in soft areas, high traffic areas or at road access points.

Stormwater Control

TPA-CKY will control runoff from excavation and process areas to prevent contaminated water from being released to areas surrounding the project site. This will take the form of general erosion control, as discussed elsewhere in this section, and construction of detention basins as necessary to prevent release of potentially contaminated stormwater. Any water so recovered will be treated as wastewater and recycled or disposed of as described in the WMP.

Roadway Protection and Truck Decon

TPA-CKY will temporarily place gravel at the access road off Evergreen Road onto the project site to prevent tracking mud onto Base roadways.

Trucks will not be overloaded, and care will be taken during loading to minimize material from spilling onto sides of trucks. All trucks and heavy equipment leaving the Evergreen-Thompson sites will be decontaminated prior to departure from the project site. Off-site disposal is only intended for containerized material for recycling and clean (stabilized) soil. Truck decontamination will involve visual inspection and brushing and scraping horizontal surfaces, tires and all areas where dust or soil has accumulated on the vehicles.

In the event it becomes necessary to haul uncontainerized, hazardous material off site, a temporary truck washing station will be installed to decon trucks hauling hazardous waste before they leave the project site. Wastewater from such an operation would be recycled, being used for dust control in the excavation and remediation process areas and/or as make up water for the stabilization process. We do not anticipate a need to dispose of wastewater off site.

Truck routes will be inspected during hauling. Any spilled material or mud will be cleaned up immediately by TPA-CKY.

4.3 WORK AREAS

The work area will be delineated using orange construction fencing. In general, the exclusion zone will encompass the entire clearing. The boundary will be the edge of Evergreen Ave. and the tree line surrounding the impact berm. Treated soil will be placed near Evergreen Ave. After confirmatory soil sampling, the exclusion zone will be modified to include a truck loading area. This will include an entrance from Evergreen Ave.; a loading area that includes treated non-hazardous soil stockpiles and an exit back onto Evergreen Ave.

Remediation and stockpile areas are shown in **Figure 1-2** in the Work Plan.

4.4 SPILL CONTROL PLAN

This Spill and Discharge Control Plan has been developed to prevent the contamination of soils, water, atmosphere, uncontaminated areas, equipment or material by the uncontrolled release of hazardous waste and materials during field operations involved in this project.

The following spill control equipment will be available in the event of a spill of liquid or solid waste:

- Sand or other appropriate spill absorbent material
- Front-end loader
- 55-gallon drums (DOT 17 E or 17H)
- Shovels
- Decontamination supplies and protective clothing
- Hand operated pump

Regardless of the type of spill (liquid or solid), the following measures will be taken to isolate the spilled material:

- Isolate and contain the spill area
- Restrict access of unauthorized personnel
- Prevent contact with the spilled material
- Relocate upwind and upgradient of the spilled material
- Take air, soil, or appropriate samples to determine if cleanup is complete

4.3.1 Solid Materials Spills

In the event of a spill or release of a solid, TPA-CKY will remove and place contaminated materials a dry container with a cover. The container should be appropriately labeled and disposed of as soon as possible.

4.3.2 Liquid Material Spills

Liquid spills (e.g., chemical stabilizer reagent or oil from vehicles) will be adsorbed with sand or other appropriate absorbent material (sand would only be used over an impervious substrate such as asphalt paving). The absorbent material will be placed in a dry container with a cover. The container should be appropriately labeled and disposed of as soon as possible.

In the event of a discharge of liquid into the soil, TPA-CKY's PM or his delegate will immediately identify the location of the discharge and take appropriate remedial actions to eliminate further spillage. The discharged liquid material will be controlled and disposed of as described above. If a reported discharge of any materials stored in drums, baker tanks, vacuum trucks, etc. occurs, the following steps will be followed:

1 Notify the CO and the Fort Lewis Fire Department; in the event of a reportable quantity discharge, notify (253) 967-4786 or 3268, the National Response Center (800) 424-8802, and the Washington Department of Ecology (888) 258-5590
2 Contain and eliminate the discharge (if not prevented by safety considerations)
3 Remove/retrieve any discharged liquids (if not prevented by safety considerations)
4 Isolate the spill area restricting access to unauthorized personnel
5 Decontaminate the spill area, if necessary
6 Prepare a spill report

The Spill Report will contain the following:

- Description of the material spilled including identity, quantity, and a copy of any waste manifests or bills of lading. Identify the cause of the spill. (If possible, MSDS sheets for spilled material and material used to clean it up will be included in any Spill Reports generated.)
- Exact time and location of the spill and a description of the area involved.
- Containment procedures utilized.
- A description of the corrective actions implemented during the spill including the disposal of the cleanup residues.
- A summary of the communications between TPA-CKY and Government officials.

Because no large quantities of hazardous liquids will be involved, no additional supplies or equipment beyond those specified are expected to be needed for the duration of this project.

4.4 DISPOSAL OF NON-HAZARDOUS SOLID WASTES

Generation of trash and debris will be kept to a minimum during project operations. The bulk of this material will be generated from packaging material. There will be a small amount of debris generated by employee lunches and field trailer activities. Daily housekeeping will be conducted during each work shift to police up generated debris. A weekly dumpster service will be employed at the site for the purpose of collection and disposal of these wastes. If available, separate dumpsters will be employed for the collection of recyclable materials. Dumpster will be equipped with lids to prevent windblown debris.

An inventory of non-hazardous solid waste diversion and disposal will be maintained and a Non-hazardous Solid Waste Diversion Report will be submitted on the first working day of each fiscal year quarter. This report will include the amount of non-hazardous debris disposed, the amount recycled, and the total amount generated.

4.5 DISPOSAL OF HAZARDOUS AND OTHER NON-HAZARDOUS WASTES

These are discussed in the Waste Management Plan.

4.6 PROTECTION OF AIR RESOURCES

TPA-CKY will implement special management techniques as described in the following paragraphs to promote emission reduction measures and control air pollution.

Dust

The release of particulate matter may occur during clearing, grubbing, soil removal, soil remediation and material hauling. The amount of particulate matter generated is anticipated to be minimal. Care will be taken to prevent dusty conditions resulting from work activities. Motorized equipment will be operated at speed that will not cause undue release of particulate matter. Water sprinkling will be implemented throughout the project to avoid generation of dust, and the disturbed area will be kept damp at all times. Water sprinkling will be applied at rate sufficient to reduce dust without generating wastewater.

Burning

Burning of rubbish and debris will not be permitted on the site.

Exhaust

Standard engineering devices will be in place on all heavy equipment and vehicles to control exhaust.

4.7 WASTEWATER

Wastewater may be generated during decontamination activities if dry brushing is determined to be inadequate or as a result of de-water from temporary excavated material stockpiles. Any wastewater generated during decontamination of personnel or equipment will be collected and recycled on the project site. Wastewater may be utilized as make up water for mixing the stabilization agent during the soil stabilization process or used for dust control in the excavation and remediation process areas. Although off-site disposal of wastewater is not anticipated, any residual water from this process would be profiled and disposed of off site in accordance with the SAP and WMP.

It is not anticipated that any other wastewater will be generated during this project. Soil excavations will be from the raised impact berm and surrounding area. It is not anticipated that groundwater will be encountered during soil any excavation activities.

4.8 ARCHEOLOGICAL / HISTORICAL FINDS

There are no known indications that historical or archeological artifacts are present in the construction areas. Field staff, upon discovering any historical or archeological evidence, will discontinue operations in the immediate area, notify the Project Manager, who will then notify the COR. TPA-CKY will then await further instructions before proceeding with further activities in that area.

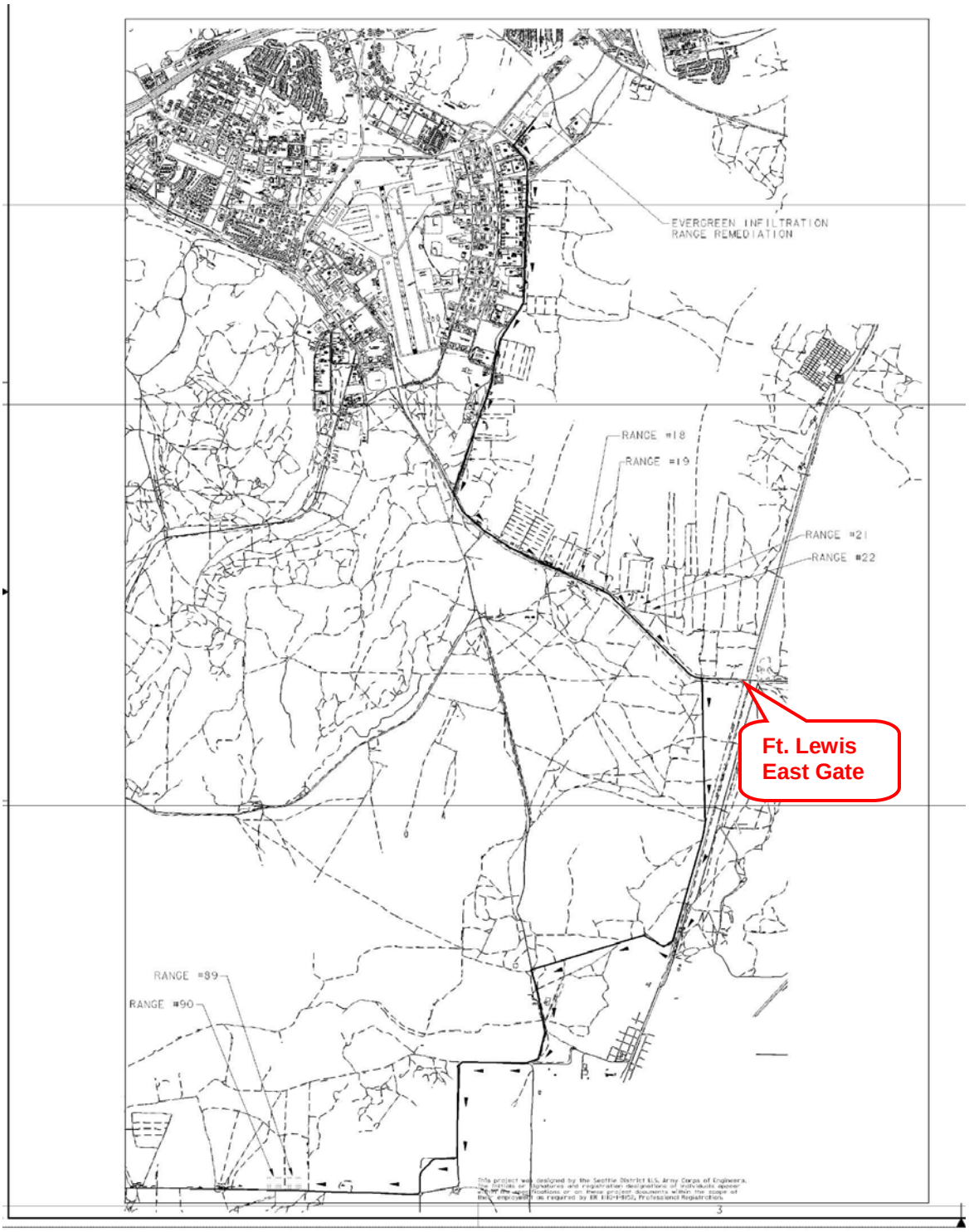
4.9 TREE AND SHRUB PROTECTION

TPA-CKY and the USACE Environmental Engineer have conducted a site survey to identify trees that need to be protected during the course of field activities. All identified trees and shrubs will be protected. TPA-CKY will take all necessary precautions to ensure the trees and shrubs are not damaged. Trees and shrubs will be protected using temporary fencing, barricades, staking, marking, and employee awareness. Existing trees and shrubs will not be used to anchor cables, ropes or guys. Existing trees will not be trimmed or removed without permission from the COR. There is a small group of trees in the remediation area that have been identified as not protected. If possible, TPA-CKY will protect these trees as well. However, if soil stockpiling requires the use of this area then the trees will be removed. The trees, slash and stumps will be removed and disposed of in accordance with contract specifications.

4.10 POST CONSTRUCTION CLEANUP

At the completion of task order activities TPA-CKY will remove all temporary construction facilities such as job trailers, signage, fencing, barricades or any other vestiges of construction. Areas of excavation will be graded to a smooth surface and seeded. No backfilling is required for this project.

APPENDICES



On-Base Haul Routes

FINAL

SAMPLING AND ANALYSIS PLAN

Former Evergreen Infiltration Range
Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

FINAL

SAMPLING AND ANALYSIS PLAN

Former Evergreen Infiltration Range Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
Attn: Matt Allen (PM-EM)
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202
January 2005

Reviewed and Approved by:

_____
Timothy Yu, Ph.D., PE
Program Manager

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LIST OF ACRONYMS AND ABBREVIATIONS

%R	Percent Recovery
APP	Accident Prevention Plan
bgs	below ground surface
BMP	Best Management Practices
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chain of Custody
CPR	Cardiopulmonary resuscitation
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
CY	Cubic yard
DERA	Defense Environmental Restoration Permit Program
DMA	Demonstration of Method Applicability
DOT	United States Department of Transportation
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	Exclusion Zone
FIO	For Information Only
FSP	Field Sampling Plan
ft2	Square feet
GA	Government Approved
GPC	Gel Permeation Cleanup
ICAL	Initial Calibration
ICP	Inductively coupled plasma
IDL	Instrument detection limit
IS	Information Systems
LCS	Laboratory Control Sample
LIMS	Laboratory information management system
LRI	Land Recover Inc.
MDL	Method Detection Limit
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MLLW	Mean Low Level Water
MP	Management Plan
MS/MSD	Matrix spike/matrix spike duplicate
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PEL	Permissible Exposure Level
PID	Photo-ionization detector
PPE	Personal Protective Equipment
PRRL	Project Required Reporting Limit
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control

RL	Reporting Limits
RPD	Relative Percent Difference
SAP	Sampling and Analysis Plan
SDG	Sample delivery group
SHM	Site Safety and Health Manager
SOP	Standard Operating Procedure
SPERP	Spill Prevention and Emergency Response Plan
SQL	Sample quantitation limit
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan/Accident Prevention Plan
STLC	Soluble Threshold Limit Concentration
SWPPP	Storm Water Pollution Prevention Plan
SWPs	Safe Work Practices
TCLP	Toxicity Characteristic Leaching Procedure
TLV-TWA	Threshold Limit Value- Time Weighted Average
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WP	Work Plan
WWMP	Waste Water Management Plan
XRF	X-ray fluorescence

1.0 INTRODUCTION

1.1 SCOPE OF SAMPLING AND ANALYSIS PLAN

This Sampling and Analysis Plan (SAP) is a component of the project Management Plan (MP). The SAP describes the field sampling procedures and quality assurance project procedures to be implemented by TPA-CKY Joint Venture (TPA-CKY) and its subcontractors in performing the contractor services described in the plans and specifications for Contract No. DACW67-03-D-1007, Task Order No. 0002. This SAP combines the information required in a Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP).

1.2 SITE LOCATION

The remediation areas are located on Fort Lewis. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The Former Evergreen Infiltration Range (AOC 4-6.3) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. Work activities will begin at the Evergreen Infiltration Range and then move operations to the Thompson Machine Gun sites. The remediation area at the Thompson Machine Guns sites is currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area. An addendum SAP will be produced for the Thompson sites.

Project vicinity and site maps are found in the Work Plan component.

1.3 PURPOSE AND OBJECTIVES

This remediation project is designed to recover bullets and bullet fragments from contaminated soil and to stabilize the filtered soil to prevent leaching of residual lead contamination. The purpose of sampling and analysis for this project is to confirm attainment of the cleanup goal and the fragment-removal and soil stabilization objectives.

Cleanup Goal: The cleanup goal at Evergreen Firing Range is 250 mg/kg (MTCA A Unrestricted Land Use Levels for Lead).

Confirmatory sampling and analysis criteria (see Section 5.0) address the completeness of the remediation action (excavation and on-site treatment) relative to the action level of 250 mg/kg of lead. The criteria apply to samples of unexcavated soil beyond (generally below or deeper cut than) the remediated area. The confirmatory sampling criteria are derived from the Washington Department of Ecology Guidance on Sampling and Data Analysis Methods, Publication 94-49.

In addition, the Army has imposed remediation objectives for the soil screening and soil stabilization processes:

- Soil screening is required to remove all bullets and bullet fragments greater than 0.1% by volume;
- The soil stabilization criterion is TCLP.

1.4 PROJECT ORGANIZATION AND PERSONNEL

Key positions and people involved in this project are shown in the table below. In some cases, more than one responsibility has been assigned to one person. Resumes are found at Appendix A.

Project Organization

Position	Staff Member	Quals	Phone
MARC Program Manager	Tim Yu, PE, Ph.D.	Named contract key person	310 519-4000
Project Manager/ Site Superintendent	Mark Hallock	Project Manager, 20 years of RI and RA	Project Office
Health & Safety Officer	Michael Ridosh, CIH	Corporate CIH	
QC Program Manager	Tan Phung, Ph.D.	Named contract key person	310 519-4026
QC System Manager	Noah Rivera	See resume at CQC Plan, Appendix A	Project Office
Site Safety Officer	Noah Rivera	See resume at CQC Plan, Appendix A	Project Office
Project Chemist	Michael DeKlotz	B.S. Chemistry 15 years SI and confirm-atory S&A; Niton XRF analysis trained	Project Office
XRF Analysis/ Field Sampling Tech	Howard Wittenberg	3 years confirmatory S& A; Niton XRF analysis trained	Project Office

The roles and responsibilities of key project members involved in sampling and analysis are as indicated in the table below.

Position	Roles and Responsibilities
Project Manager/ Site Superintendent	• Manages all field work • Reviews and signs Daily Chemical QC Report
QC Program Manager	• Approves the SAP • Provides oversight and assurance as to compliance with the SAP
QC System Manager	• Coordinates sampling and analysis efforts with the PjM/SS. • Reports directly to the QC Program Manager. • Directs field sampling and field QC procedures in accordance with this SAP. • Prepares Daily Chemical QC Reports and sample location tables and updates the field sample location map. • Reports daily sampling and analysis information to USACE.
Project Chemist	• Provides periodic monitoring of SAP implementation. • Validates all field and laboratory analytic data.
XRF Analysis/ Field Sampling Tech	• Procures and labels all sample containers. • Collects all required samples. • Prepares COC records. • Packages and transports samples for laboratory analysis. • Maintains and operates the field portable XRF instrument.

1.5 COMMUNICATION STRATEGY

Accelerated approaches to sampling and analysis, as required for this project, integrate various characterization tasks and measurements into a single coordinated effort. Accelerated approaches are conducted by a multidisciplinary group of experienced professionals, working as a team in the field to evaluate the data to further refine the CSM and plan the next measurement steps.

The TPA-CKY project t team will be in daily contact with the USCOE team regarding project progress and analytical results. This ensures timely discussion/review of data quality and interpretation, as well as identifying/deciding any areas that need further actions.

1.5.1 Data Interpretation Strategy

A Triad work strategy will be used to communicate and manage uncertainty associated with soil removal and confirmation decisions. The Triad approach starts with a key, well demonstrated premise: that 90% or more of the observed data variability are attributable to "sampling error." Sampling error includes true field heterogeneity plus errors introduced by variable sample preparation procedures. Triad has three legs:

a. identify uncertainties and an approach to mange these uncertainties through systematic planning;
b. establish a dynamic work strategy;
c. incorporate real-time measurement technologies to allow implementation of the dynamic work strategy.

1.5.2 Data Flow

Two primary categories of data will be generated for this project: field data and fixed laboratory data. The procedures to be used for each type of data are described below.

1.5.2.1 Field Data

The field sampling team will record field measurements/observations in logbooks and on the appropriate field data tracking forms. XRF and other field sampling data will be generated on a daily basis and reported in formats that can be interpreted by USACE technical personnel. Daily contractor quality control reports will be submitted by e-mail. The DCQCR will include all field data generated on a daily basis, chain-of-custody forms, and field sampling forms. Incoming project-related material, including correspondence, authorizations, chain-of-custody forms, or other information, will be marked with the date received and the project name. Updated maps and diagrams of sampling activity and digital photographs of site activities will be included.

Upon completion of remediation, the temporary file will be transferred from the TPA-CKY project office to the USACE Seattle District office project file. Copies of all field documents may be made and retained by the originator for use in report preparation and later reference. The originals will be filed in the office project file.

On-site field measurements and laboratory data will be input into Excel spreadsheets. The data will then be printed out and compared to the original field records to ensure input accuracy.

1.5.2.2 Fixed Laboratory Data

Fixed laboratory data will be transferred from the project laboratories to the Project Chemist in hard copy and Excel compatible electronic formats. Data will be loaded into an Excel spreadsheet. Hard copies of the laboratory deliverables will be used to verify the accuracy of electronic data. The original hard copies of laboratory deliverables will then be stored in the office project file.

The laboratories will maintain and follow their own detailed procedures for laboratory record keeping for support of the validity of all analytical work. Each data package submitted to the Project Chemist will contain the laboratory's written certification that the requested analytical method was run and that all QA/QC checks were within established control limits on all samples, with exceptions noted. The Project Chemist will be responsible for ensuring fixed-lab data quality and effective data management and also assist in interpreting data and integrating the results into the evolving site model and reports.

Severn Trent Laboratories (STL) will perform the analyses. The address and contact of the project laboratory is listed below.

STL Seattle
5755 8th Street East
Tacoma, WA 98424

Contact: Dawn Werner (253) 922-2310

1.5.3 QC Meetings

QC meetings or conference calls will be scheduled as needed to discuss project status updates, results from QC demonstrations and confirmatory sampling and analysis, and discussion of implementation of the appropriate action when data suggests deviations from QC objectives or confirmatory sampling decision criteria.

1.5.4 Daily Updates

Information on project status and available data will be reported daily by e-mailed Daily Chemical QC Reports. These submittals will include updated maps and diagrams of sampling activity and digital photographs of site activities.

1.5.5 Schedule and Project Completion Reporting

The proposed schedule for the fieldwork is presented in the table below.

Activity	Time of Completion (Calendar Days)
Submit SAP	-
USACE/Ecology Approval of SAP	TBD
Completion of Field Work	60 days after start of work[1]
Receipt of fixed laboratory results	ICP: 3 weeks after Lab receives samples TCLP: 3 weeks after Lab receives samples
Submit Closure Report	21 days after completion of field activities and receipt of final fixed laboratory confirmatory results
USACE Comments on Closure Report	14 days after receipt
Submit Written Comment Responses	14 days after receipt
USACE Approval of Responses	7 days after receipt of responses
Submit Final Closure Report	14 days after approval of responses

[1]Work to be completed no later than 31 May 2005.

Review of chemical data quality (precision, accuracy, representativeness, completeness, and comparability) shall be conducted by a qualified chemist to ensure that project goals will be met during the field investigation and acquisition of chemical data and their data quality indicators.

2.0 SAMPLE COLLECTION AND ANALYSIS

This project is being conducted under a performance-based task-order contract. Sample collection, handling, and analysis is critical to satisfying the remediation objectives. This section describes planned sampling and analysis. An annotated list of sample types is given in **Table 2-1**. See Section 3.1 for a discussion of sample labeling nomenclature.

2.1 SAMPLING SCREENED SOIL

For approximately every ton of soil a 5 kg treated subsample will be collected, sieved with a 6.7 mm sieve. The retained material will be hand searched for bullet material. The treated portion must contain <0.1% bullet material retained on the sieve for the total 5 kg sample (or about one bullet per 5 kg).

Screened soil sampling results will be recorded in the Daily Contractor Quality Control Report (DCQCR). Any batches that fail this test will be re-screened and re-tested.

2.2 TCLP SAMPLING AND ANALYSIS

Each 100-CY batch of stabilized soil will be composite sampled using a small hand trowel. Thirty trowel subsamples will be taken from each batch using a haphazard sampling method to represent the batch. All composite subsamples will be placed in a plastic, zip-loc bag and homogenized by hand shaking and kneading. A sample from the bag will be placed in a clean 16-oz wide-mouth sample jar, appropriately labeled, entered into a Chain of Custody (COC) form and sent to the laboratory for analysis. Laboratory sample preparation instructions will be submitted together with the samples.

10 percent of the stabilized batches will be sampled twice in the same manner as described above to derive field duplicate samples. Field duplicates and environmental samples will be labeled to prevent the laboratory from distinguishing between the two.

Each batch of stabilized soil will be maintained as a discrete stockpile entity until TCLP analytic results have confirmed passing the decision rule and the COR has approved the batch for disposal.

2.3 CONFIRMATORY SOIL SAMPLING

2.3.1 XRF Sampling and Analysis

X-ray fluorescence (XRF) sampling and analysis will be conducted as follows:

a. The excavated remediation area will be divided into a systematic grid that takes into account the total remediation area and different parts of this area. See Section 5.1.7.3 for an elaboration of the confirmatory sampling grid design. The points defining each grid cell will be located using surveyed offsets and installed stakes and string lines.

b. Five discrete bag samples will be collected from each grid cell. Each sample will be collected from a location selected using a field randomization procedure and will consist of a scoop of soil to 6 inches bgs placed in a labeled half-filled plastic zip-loc sandwich-size bag for analysis. Within-grid location (see Section 5.1.7.3) will be identified as part of the sample record. Field duplicates (separate bag samples) will be collected at 10 percent frequency and labeled to prevent field analytic or laboratory identification as QC samples.

c. Each bag sample replicate will be shaken to homogenize the soil matrix prior to taking a calibrated XRF meter probe reading of the bag. The results of XRF grid sampling will be tabulated for daily updates to the COR and review by TPA-CKY. XRF precision sample analyses will be taken by

taking seven separate readings from a single bag sample. Precision sampling will occur only when results are near the action level, up to a maximum frequency of 10 percent.

d. One of the five bags per grid cell will be randomly selected, retained and entered into the COC record for archiving. Archived bag samples will be retained to make them available for random selection for field XRF cup and fixed-laboratory (ICP) confirmatory analysis when the XRF sampling and analysis has resulted in a clean site indication.

Sample locations will be tabulated and entered onto a site map. XRF data, including QC samples, will be recorded on field data tracking forms exhibited in **Appendix B**. Each data point will be given a unique identifier and sample location. Sample locations will be entered on a site sample map. Field data tracking forms and updates to the site sample map will be attached to the DCQCR.

Sample means and 90% UCLs will be calculated for each grid cell and entered into the XRF data table together with a flag indicating passage or failure of the cell according to the XRF decision rule in Section X.1.5, above.

In the event one or more grid cells fails the XRF decision rule, TPA-CKY will confer with the COR as to what additional remediation is warranted by the XRF field data. (Only the Contracting Officer may authorize additional remediation effort.) It is expected that decisions regarding further remediation at this point will depend in part on their distribution over the remediation area, i.e., whether they are clumped into hot spots or more evenly distributed. Further action may include additional excavation and in situ treatment, additional XRF sampling, or a combination of the two. Any additional remediation will be followed by further XRF sampling before proceeding to fixed laboratory confirmation of cleanup goal attainment.

2.3.2 ICP Analysis

n (see Section 5.1.7, below) archived sample bags from the XRF samples previously collected will be randomly selected for ICP analysis, representing randomly selected sample grids. Field duplicates (second XRF cup subsample aliquot) will be included at a frequency of 10 percent. Selected samples will be screened onsite with a 10-mesh sieve. From each screened bag sample, an XRF cup subsample will be collected. Prior to sending the cup for offsite ICP analysis, a single XRF reading of each cup sample will be taken and recorded.

The 95% UCL will be calculated for the set of confirmatory XRF cup sample readings. If the 95% UCL is higher than 250 mg/kg lead, or if more than 10% of the readings are higher than 250 mg/kg, or if any reading is 500 mg/kg or higher, the COR will be consulted and the screened confirmatory bag samples will not be sent to the laboratory. This is essentially the full set of confirmatory decision rules applied to XRF samples directly comparable by the previous XRF DMA to fixed-laboratory ICP analysis. The result of this consultation could be further XRF sampling, further remediation, or a combination of the two. Only when all XRF data pass the decision rules and/or as directed by the COR, will bag samples be sent to the laboratory for ICP analysis.

2.4 ANALYTICAL METHODS

The CAP had selected analytical parameters for the confirmatory samples in this soil removal project. The following analytical methods will be used for this project. All cited EPA Methods are from *Test Methods for Evaluating Solid Waste, SW-846* (EPA, 1994c).

- Stabilization of Filtered, Excavated Soil – samples from stockpiled stabilized soil extracted using TCLP (EPA Method 1322) and analyzed for lead (EPA 6010).
- Confirmatory Sampling and Analysis – initial sampling and analysis using x-ray fluorescence (EPA Method 6200) and subsequent laboratory soil analysis by EPA Method 6010 (inductively coupled plasma, ICP).

Detailed information on analytical methods, calibration criteria, project-required reporting limits, and QC acceptance criteria are presented in Section 5.0.

2.5 FIELD DOCUMENTATION

Accurate documentation of field procedures will be guided by the procedure for field documentation. A detailed log of the soil materials encountered, XRF and other sampling and analysis data, and pertinent sampling and drilling details will be prepared in the field by the field personnel. A daily field report and DCQCR will also be prepared which summarizes the daily activities. Sample collection data and requested analyses will be recorded on Chain of Custody (COC) forms.

The following field forms will be maintained for this field activity at the Evergreen Range:

XRF and ICP sample location map
COC form (initiated with XRF samples and propagated for ICP samples)
Field Data Tracking forms
Daily quality control report form
Audit report form
Corrective action request form

These forms will be used as source documents in support of the Evergreen remediation database. Form specimens are found at **Appendix B**. The following general guidelines for maintaining field documentation will be followed:

- Documentation will be completed electronically (on laptop PC files) or in black ink.
- All entries will be legible.
- Errors on hardcopy field forms will be corrected by crossing out with a single line, and dated and initialed.
- Distribution will be made to project stakeholders.

Field personnel will use permanently bound field logbooks with sequentially numbered pages to maintain additional field information.

3.0 SAMPLE NAME DESIGNATIONS

A sample numbering system will be used to identify each sample collected and submitted for chemical analysis. The purpose of this numbering system is to assist in tracking samples and facilitate retrieval of sample data.

3.1 SAMPLE DESIGNATIONS

General sample nomenclature will consist of the sample type (CS for confirmatory soil, ST for TCLP composite, etc.), the sample number, and, for confirmatory samples, the location identifier (e.g., grid-subgrid 1-NW, 1-N, etc.; see Section 5.1.7.3, Figure 2-1, and field data tracking forms in **Appendix B**).

All soil sample containers will be labeled at the time of sampling. The sample identification numbers for each sampling effort will be used on sample labels, data tracking forms, field data forms, chain-of-custody forms, and all other applicable documentation. The QC System Manager will maintain a listing of all sample identification numbers in the project field logbook.

The Field Data Tracking Form sample identifiers will be designed to prevent the XRF analyst from distinguishing between QC and environmental samples. This will be accomplished by hiding selected columns in electronic forms or by printing hardcopy field forms *sans* appropriate columns. This procedure will also be followed in preparing COC forms for conveying samples to the fixed laboratory for analysis (ICP or TCLP).

3.2 QA / QC SAMPLE NUMBERS

In general, QA/QC samples collected will be labeled as follows:

- Field duplicate samples will be labeled in such a manner to prevent knowledge of the corresponding project sample. Field duplicate identifications will be maintained in the field logbook and on the DCQCR.

4.0 SAMPLE HANDLING AND CUSTODY PROCEDURES

The following section presents the sample handling, and custody procedures to be used for all samples. Sample custody and documentation procedures will include completion of chain-of-custody (COC) forms, tracking transportation methodologies, and laboratory acceptance procedures. Sample integrity will be maintained through strict adherence to these procedures.

4.1 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

The types of sample containers that will be used to store and ship samples are based on the analytical requirements. **Table 4-1** lists the type of analysis, sample preservation, storage, and holding time requirements that will govern the handling of each sample. The project laboratory will provide pre cleaned sample bottles for soil samples.

4.2 CHAIN OF CUSTODY

COC procedures are employed to maintain and document sample possession. A sample is considered under a person's custody if it is in that person's physical possession, within visual sight of that person after taking physical possession, secured by that person so that the sample cannot be tampered with, or secured by that person in an area that is restricted to unauthorized personnel.

Custody records completed by the sampler will accompany all shipments of samples. Each cooler will have a custody form listing the samples in the cooler. It is possible that more than one custody form will be needed per cooler to list all the samples contained in the cooler. The purpose of these forms is to document the transfer of a group of samples traveling together; when the group of samples changes, a new custody record is initiated. The original custody record always travels with the samples; the initiator of the record keeps a copy.

The following procedures will be followed when using custody record sheets.

1. The originator will fill in all requested information from the sample labels.
2. The person receiving custody will check the sample label and tag information against the custody form. The person receiving custody will also check sample condition and note anything unusual under "Remarks" on the custody form.
3. The originator will sign the "Relinquished by" box and keep a copy of the custody form.
4. After delivery by the commercial carrier, the person receiving custody will sign in the "Received by" box adjacent to the "Relinquished by" box (may also be filled in by recipient as "Federal Express" of other carrier name). All signatures and entries will be dated.
5. When custody is transferred to the analytical laboratory, blank signature spaces may be left and the last "Received by" signature box used. Another approach is to run a line through the unused signature boxes.
6. In all cases, it must be readily seen that the same person receiving custody has relinquished it to the next custodian.
7. If samples are left unattended or a person refuses to sign, this will be documented and explained on the custody form.

A copy of the COC form completed by the Field Sampling Team will be submitted to the QCPM. The laboratory will receive the original COC form plus a carbon copy. The COC forms will be retained in the master job file.

Since XRF bag samples will be retained on site until they are sent to the fixed laboratory for analysis, they are also subject to physical custody provisions. TPA-CKY will archive one of each 5-sample set of bag samples to be used as candidates for random XRF cup/ICP sample analysis. We will maintain archived

bag samples in a secure locker located in the project trailor or Conex box on site until they are selected for shipment to the laboratory. The COC records will reflect this archive status until samples are shipped. Archived bag samples that are not selected for laboratory analysis will either be delivered to the COR or will be disposed of on site. No remediation treatment will be performed on this material unless associated with a residual hot spot indicated by confirmatory sampling.

4.3 SAMPLE SHIPPING

Sample packaging and shipping procedures are based on EPA specifications, WSDOT regulations, and Corps ER 1110-1-263. All samples will be shipped as “Environmental Samples” and not as hazardous material. Ice will be placed in each cooler to maintain a temperature of 4* C to meet sample preservation requirements. All samples will be delivered to the laboratory within 24 hours of collection. The following are general packaging procedures:

1. Sample labels with adhesive backing will be securely attached to each sample container.
2. Labeled sample containers will then be sealed into plastic bubble-wrap bags or Ziploc-type bags prior to being loaded into the sample coolers.
3. Insulated plastic or metal-clad plastic coolers will be used as shipping containers. The drain plugs shall be taped shut (using strapping tape) on the inside and outside. Several plastic bubble-wrap sheets shall be placed on the interior bottom and sides of the coolers for shock absorption. One to three inches of Styrofoam pellet packing material may also be placed in the bottom of the coolers for additional shock absorption at the discretion of the QC System Manager.
4. Styrofoam pellets may also be placed between sample containers to protect the containers from breakage during shipment and handling.
5. The paperwork intended for the laboratory will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The original custody form will be included in the paperwork sent to the laboratory.
6. Two signed custody seals will be placed over the lid of the cooler, one on the right front and one on the upper left, and covered with clear plastic tape.
7. The cooler will be securely taped shut with strapping tape wrapped completely around the cooler at least once in a minimum of two locations.
8. "Up Arrow" symbols will be placed on all four sides of cooler.
9. The completed shipping label will be attached to the top of the cooler. The cooler will then be delivered to the overnight courier.

The project and QA laboratories will be notified, two weeks prior to sample collection and again two days prior to arrival of samples, of the approximate number of samples, matrix, and requested analyses. A key to field identification numbers will be provided to the QA laboratory only.

4.4 LABORATORY RECEIPT AND ANALYTICAL REQUESTS

When the samples arrive at the laboratory, the personnel receiving the sample cooler will sign the COC and enter a laboratory identification number on the form. Revisions to the analysis request forms transmitted by facsimile or via email. Copies of these requests will be provided by the laboratory with the hard copy data. The identification number will be used by the laboratory for internal tracking of the samples. In some cases, a separate analysis request form may be submitted to the laboratory. Both laboratory and sample numbers will be cited when analyses are requested (if the laboratory number is available) and the analytical results are reported.

Damaged sample containers, sample labeling discrepancies between sample container labels and COC forms, and analytical request discrepancies will be noted on a sample receipt form, and the QC System Manager and Project Manager will be notified for problem identification and resolution.

Contract Required Reporting Limits	
Parameter/Method and Matrix	**Reporting Limit (RL)**
Total Lead	20 mg/kg
TCLP	5 mg/L
Water	1 ug/L

5.0 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

The overall quality objectives of this SAP are to outline procedures for the collection and assessment of data that will be in accordance with acceptable ranges of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters to meet the data quality objectives and indicators DQO/DQI of the project. The data quality associated with environmental data is a function of the sampling plan rationale, the procedures used to collect the samples, and the analytical methods and instrumentation used, all in support of the decision process.

5.1 DATA QUALITY OBJECTIVES

TPA-CKY has followed the seven-step EPA systematic DQO development approach:

5.1.1 Step 1 – State the Problem

The objective of the Evergreen firing range remediation program is to separate and recycle or dispose of bullets and bullet fragments in soil excavated from contaminated areas of firing range embankment backstop, stabilize residual lead contamination in separated soils, and confirm that lead concentrations in unexcavated soils are below the cleanup level of 250 mg/kg.

5.1.2 Step 2 – Identify the Decisions

The action decision is comprised of the following factors:

1. Separation of Bullets and Bullet Fragments from Excavated Soil – A 5-gallon sample of screened soil will yield less than 0.1% by volume of bullet fragments.

2. Stabilization of Filtered, Excavated Soil – A sample from each 100 CY of stabilized soil must pass TCLP. If the 100 CY batch does not meet TCLP requirement action will be taken to enhance stabilization and retesting will be required.

3. Confirmatory Sampling and Analysis – Sampled, unexcavated soil must satisfy three criteria:

    a. The upper 95% confidence limit (UCL) of mean concentration calculated from sampling data cannot exceed the cleanup level;
    b. All samples will have measured concentrations less than twice the cleanup level, i.e., 500 mg/kg;
    c. Less than 10% of the samples can exceed the cleanup level.

    X-ray fluorescence (XRF) sampling and analysis will be performed to confirm whether soil excavation is complete (i.e., soil > 250 mg/kg has been removed). Once the XRF data set indicates that excavation is complete, a set of collaborative confirmation samples will be submitted for ICP analysis and the results evaluated against the three WA Department of Ecology specified closure requirements specified above.

5.1.3 Step 3 – Identify Inputs to the Decisions

The MTCA A Unrestricted Land Use Levels for Lead (250 mg/kg) is the cleanup goal for the site. This is the principal input driving the DQO decisions regarding whether excavation is complete. Inputs required to support decision criteria is obtained from the following sources to be provided by the contractor:

1. Separation of Bullets and Bullet Fragments from Excavated Soil – separated soil evaluated by reduction of bullet fragments to less then 0.1%.

2. Stabilization of Filtered, Excavated Soil – samples from stockpiled stabilized soil extracted using TCLP (EPA Method 1322) and analyzed for lead (EPA 6010).

3. Confirmatory Sampling and Analysis – initial sampling and analysis using x-ray fluorescence (EPA Method 6200) and subsequent laboratory soil analysis analyzed by EPA Method 6010.

   Consistent with currently accepted Triad-approach collaborative logic, both *XRF* and ICP data sets will be used to support post-confirmation decisions should there be failures of any of the confirmatory sampling criteria. The COR and Fort Lewis PW will make the decisions as to whether soil in excess of the initial excavation volumes defined based on the previously collected range characterization results will require excavation.

5.1.4 Step 4 – Define the Project Boundaries

The area to be remediated is a former bullet backstop berm that is located in a clearing on the south side of Evergreen Ave. on Fort Lewis. The berm is approximately 250 feet long by 144 feet wide. The work area is bordered in the north by Evergreen Ave and along the treeline on the other three sides.

The excavation will be from 0-7 feet below grade surface (bgs) or normal to the face of the range back stop. Post-excavation confirmatory sampling will be from 0-6 inches bgs on a systematic grid system to be superimposed on the remediated area (see Section 5.1.7 for further discussion of the confirmatory grid design).

The temporal boundary for expected completion of fieldwork is May 31, 2005.

5.1.5 Step 5 – Develop Decision Rules

The decision rules associated with the principal criteria presented in Section 5.1.2 are:

Separation of Bullets and Bullet Fragments from Excavated Soil – For approximately every ton of soil a 5 kg treated subsample will be collected, sieved with a 6.7 mm sieve. The retained material will be hand search for bullet material. The treated portion must contain <0.1% bullet material retained on the sieve for the total 5 kg sample (or about one bullet per 5 kg). Documentation will be provided that that the treated soil contains less than the maximum permissible volume of bullet fragments. If documented results indicate that this criterion is not met, additional treatment will be required.

Stabilization of Filtered, Excavated Soil – If any 30-sample composite of stabilized soil fails TCLP, then the corresponding treated batch of soil must be treated again until it passes TCLP.

Confirmatory Sampling and Analysis – Confirmatory sampling and analysis will be conducted in two phases, 1) real-time analysis of lead concentration by XRF fluorescence, and 2) fixed-laboratory ICP analysis of lead concentrations.

XRF Sampling and Analysis:

1. Any grid cell for which the 90% UCL of the XRF sample mean is less than 250 mg/kg lead will be recommended for *no* further remedial action, subject to passing the ICP confirmatory analysis decision rules (contract specification Section 01450A). Otherwise, TPA-CKY will request direction regarding further action for that cell from the COR and Contracting Officer. (See Section 5.1.7.3, below, for a discussion of optional actions.)

ICP Confirmatory Analysis:

The following decision rules will be applied to XRF cup subsamples before they are sent to the laboratory and to the results of laboratory ICP analysis. If the XRF cup sample results fail any of the decision rules, the COR will be so apprised and bag samples will not be sent to the laboratory for analysis.

1. If any sample lead concentration exceeds 500 mg/kg; or

2. If more than 10% of the samples exceed the cleanup level of 250 mg/kg; or
3. If the 95% UCL of the mean lead concentration among all samples exceeds 250 mg/kg, then further remedial action is indicated in the sampled area. Otherwise, *no* further action is indicated.

If the ICP analysis results do not pass all of the confirmatory decision rules, TPA-CKY will so apprise the COR. In addition, TPA-CKY will support the Seattle District's collaborative analysis of all pertinent XRF and ICP data in order to define the most logical and cost-effective remedial response. As in the case of XRF screening, further remedial action will only be by direction by the USACE Contracting Officer.

5.1.6 Step 6 – Specify Limits on Decision Errors

Under this DQO scheme, each QC, screening or confirmatory sample or set of samples is evaluated against its corresponding decision rules based on its result. Only two rules, the 90% UCL for initial XRF analysis results and the 95% UCL for chemically analyzed lead concentration levels, are statistical in nature and therefore amenable to limits on decision errors.

Statistical Metrics

For the UCLs on mean lead concentration, the Type-I error is given as 10% for XRF field sampling and 5% for the combined (XRF and ICP data), collaborative confirmatory analysis. The Type-I error measures the probability that the mean concentration of a set of samples is actually greater than the critical value (250 mg/kg) when the UCL indicates that it is below the critical value.

Nonstatistical Metrics

The nonstatistical (non repeatable) metrics in this DQO scheme include the following:

Metric	Limit on Error
QC sieve samples to verify removal of lead fragments	Intended to maximize stabilization effectiveness; Required by Washington Dept. of Ecology
TCLP analyses to verify lead stabilization in soil	Established by US EPA as a risk-based verification method
XRF or ICP results greater than 500 mg/kg	2X cleanup level; pre-calculated and approved by Washington Dept. of Ecology
ICP analytic results with more than 10% of the samples exceed the cleanup level	Required by Washington Dept. of Ecology

All of these metrics have value in that they are designed to directly verify or indicate the attainment or failure to attain the desired remediation result. They may be based on inference from risk assessment (e.g., TCLP), another body of evidence, or based on experience and judgment. They are pass/fail in character and are not amenable to quantitative error analysis as applied in field remediations.

5.1.7 Step 7 – Optimize the Design for Obtaining Data

The proposed confirmatory sampling design is based on the regulatory requirements for site closure and on a comprehensive set of inputs (Step 3) and decision rules (Step 5). TPA-CKY proposes to optimize the QC and confirmatory sampling design as follows:

5.1.7.1 Separation of Bullets and Bullet Fragments from Excavated Soil

Separation Effectiveness – The objective of this action is to reduce the potential for unstabilized lead fragments to be left in treated soil and to maximize the potential for recycling of recovered lead. TPA-CKY proposes to develop a soil-fragment process stream that terminates with a ¼-inch screen. In addition to initial (rock grate) and intermediate screening, all recovered soil will have passed through the critical mesh size. TPA-CKY believes that it can attain effective production rates and the QC objective using this

process design. Nonetheless, batch QC sampling will be implemented as described in Section 5.1.5. The frequency of QC sampling of screened soil may be reduced based on demonstrated attainment of the QC objectives and concurrence by the COR.

Disposal of Entrained Bullet Fragments – As indicated in the Work Plan component of the project Management Plan, excavated soils will be screened (filtered) prior to treatment. The purpose of the screening is to reduce the volume of waste and maximize recovery of lead bullets/fragments for recycling. All excavated soils will be placed into a vibratory multiple-screen separator.

Excavated soil will be moved by loader from the excavation areas to a *Grizzly* vibrating rock grate. The Grizzly is expected to remove large rocks and cobbles and to reduce the excavated material volume by approximately 30 percent. Separated rock material will be stockpiled on site as clean material (no sticking dirt). The soil fraction will be moved by loader as it is generated to a screening plant. Material input to the screening plant will be separated into four waste streams:

1. cobbles larger than the initial screen;
2. whole bullets, large bullet fragment, and incidental pebbles;
3. small bullet fragments and incidental pebbles; and
4. soil to be treated.

Our anticipated screen plant design is as follows; actual site conditions may require modifying screening operations to obtain required results:

1. Pre-filter – designed to remove rocks and cobbles greater than 1/2" in size (entrained cobble material larger than a bullet – i.e., not including bullets or bullet fragments - will be stockpiled and left on-site as clean material, i.e. no sticking dirt);
2. Intermediate Filter – 7/16" mesh screen intended to separate out whole bullets and bullet fragments (entrained material will be hauled off site and recycled as lead);
3. Final Filter – mesh size of 0.667cm (1/4”). Entrained material will be hauled off site and recycled as lead. Filtered soil will be fixated and hauled off-site for disposal.

Material retained on the intermediate and final screens may contain bullets or bullet fragments. TPA-CKY will dispose of the material according to the following case logic:

Case 1 – a recycler will accept the mix of bullet fragments and rocky material. In this case, TPA-CKY will dispose of material retained on the final screen at the recycler facility.

Case 2 – no recycler will accept the mix. In this case, TPA-CKY will stabilize the material retained on the final screen in batches separate from screened soil using the same stabilization process as will be used for soil. The stabilized fragment-rock mix will be disposed of off site as nonhazardous waste at an appropriate landfill facility if it meets TCLP. Otherwise, it will be disposed of as hazardous waste.

5.1.7.2 Stabilization of Filtered, Excavated Soil

TPA-CKY will take one 30-part composite sample from each 100 CY of stabilized soil and subject it to TCLP analysis, as specified by the Seattle District. This is a straightforward and conventional measure of goal attainment and we do not see any reason to embellish this design. See Section 2.2 and subsequent sections for a brief discussion of sample and stockpile tracking.

5.1.7.3 XRF Sampling and Analysis and ICP Confirmatory Analysis

X-ray Fluorescence Sampling and Analysis – The purpose of XRF sampling is to provide real-time sampling and analysis of remediated areas in order to reduce the likelihood of premature confirmatory analysis before the range is actually cleaned up and to provide additional ability to discriminate among “clean,” “dirty” and gray areas should fixed-laboratory confirmatory analysis fail to clear the site. To

support these objectives and in compliance with specification section 01450A, XRF sampling and analysis will be conducted as follows:

1. Initial XRF sampling and analysis will be concentrated into a brief period near the end of construction when most or all of the designated bank area has been excavated. Performing this procedure and the total confirmation sampling task at this juncture is done to optimize construction efficiency. This is a remediation project followed by confirmatory sampling and analysis, based on the delineation of contamination during a prior remedial investigation performed by others.

2. The excavated remediation area will be divided into a systematic grid system (see **Figures 2-1 and 2-2**). The grid layout will be tailored to remediation area (e.g., the excavation pit along the top of the berm). Grid size is 30 feet on a side or 900 sf (to accommodate irregular areas), which will generate approximately 65 to 70 grid cells. The proposed grid dimension is based on excavation efficiency and reflects a balance between representation of the remediation area and a logical minimum response to discovery of additional contamination, if any. Each grid-delineated area will be laid out from a random start point.

3. 5 discrete bag samples will be collected from each grid cell. Each sample will be collected from a location selected using a field randomization procedure and will consist of a scoop of soil to 6 inches bgs and placed in a labeled bag for analysis and archiving. Each bag sample will be shaken to homogenize the soil matrix and subjected to a calibrated XRF meter probe reading. (QC samples – field duplicates, blanks, calibration checks, precision samples) will also be collected from the grid system at the required frequencies.)

   The results of each XRF grid sampling, including environmental and QC samples, will be tabulated for daily updates to the COR and reviewed on site by the TPA-CKY QC System Manager and Project Chemist. Sample locations will be tabulated and entered onto a site map. Sample means and 90% UCLs will be calculated for each grid cell and entered into the XRF data table in Section 5.1.5, above.

   One of the five environmental sample bags per grid cell will be retained and entered into the COC record for archiving. The other four bags and any QC bags will be disposed of within grid cell after all XRF readings are properly recorded. Archived bag samples will be used as the pool from which *n* bag samples (see discussion under Confirmatory Analysis, below in this subsection) will be randomly selected for XRF cup/fixed-laboratory (ICP) confirmatory analysis when the XRF sampling and analysis has resulted in a clean site indication.

4. In the event one or more grid cells fails the XRF decision rule, TPA-CKY will confer with the COR as to what further remedial action is warranted by the XRF field data. (Only the Contracting Officer may authorize additional remediation effort.) Further action could include additional XRF sampling, additional remediation, or a combination of the two. Additional XRF sampling could be directed to 1) better understand within-sample heterogeneity (i.e., precision sampling), 2) improve understanding of within-grid-cell heterogeneity. Further remediation will in turn create a requirement for additional XRF sampling to verify that the action has had the intended effect. It is expected that decisions regarding further remediation at this point will depend in part on their distribution over the remediation area, i.e., whether they are clumped into hot spots or more evenly distributed.

5. XRF sampling will be repeated for individually re-remediated grid cells to demonstrate that follow-up action was effective. Only when the resulting XRF data pass the XRF decision rule will chemical confirmation sampling be initiated.

Confirmatory Analysis – XRF cup sample readings and laboratory ICP analysis will be conducted on XRF cup subsample aliquots from the archived grid system bagged samples from the XRF sampling procedure detailed above in this subsection. Following Specification Section 01450A, §1.4.3.1, TPA-CKY will use the pooled variance from XRF sample readings to calculate the standard deviation and determine the appropriate number of confirmatory samples *n*. We will use the fractional limit of the mean of ±0.4, as indicated in specification section 01450A will and select *n* grid cells at random from the grid system.

The number of samples *n* is estimated as:

$$n = \left[\frac{z * S.D.}{k * \overline{X}} \right]^2$$

where z = α/2 (upper confidence limit);
S.D. = sample standard deviation;
$\overline{X}$ = sample arithmetic mean; and
k = d/$\overline{X}$ and d = acceptable uncertainty interval of X at the UCL (X = $\overline{X}$ ± d).

Example:
Assuming a normal distribution[1] (z = t, which for the 95% limit ≈ 2), k=0.4, and, using the Corps of Engineers investigation-derived sample data for the interval 0-6 inches bgs, we get:

$$n = \left[\frac{2 * 336}{0.4 * 335} \right]^2 \approx 22$$

The data in this example were from samples taken in the pre-remediation, or contaminated, areas of the Evergreen project site. We expect to find much lower estimates of the mean and standard deviation after excavation of contaminated soils. We also expect that the number of samples we will need to be in the range of 20 to 40 samples, based on previously cited EPA guidance.

The archived sample bag from each randomly selected grid will be subsampled in an XRF cup and analyzed with the XRF meter. 10 percent of the archived sample bags will have two XRF cup samples collected; one will be the environmental sample and the other will be the QC field duplicate. The set of XRF cup sample readings will be evaluated according to the confirmatory analysis decision rules, as described in Section 5.1.5, above. When the XRF cup sample data have indicated passage of the decision rules, the selected sample bags will be sent to the fixed laboratory for ICP analysis.

As separate data sets, XRF cup sample readings and verified analytic data returned by the laboratory will be loaded into EPA's *ProUCL* software application by TPA-CKY personnel. The confirmatory sample data will be analyzed for goodness of fit to determine the most representative distribution of concentrations (i.e., normal, lognormal, gamma, etc.). We will then use *ProUCL* to calculate the corresponding 95% UCL and will compare this to the critical value of 250 mg/kg.

We will use the confirmatory analysis decision rules given in **Section 5.1.5** to evaluate the data, which will have two principal outcomes:

a. The area is confirmed to conform to the cleanup goals; or
b. The area fails one or more criteria and is recommended for further action.

Collaborative Analysis – If outcome a) occurs, there will be no requirement for further data analysis. However, if outcome b) is the case, then the ICP and XRF data will be used collaboratively by TPA-CKY and the Seattle District in determining the proper course of further action. In this way, the government will attain maximum leverage of all of its sampling and analysis effort, and be in the best position to defend its action/no action decisions.

[1] In practice, we will use *ProUCL* to determine the most appropriate distribution based on goodness-of-fit testing and will use the corresponding *ProUCL* estimate of the 95% UCL.

5.2 SAMPLING STRATEGY

5.2.1 Uncertainty Management Issues

Decision uncertainty intervals are set as: (1) the interval where it is judged that the field data results can be confidently trusted to declare areas as "clean" (i.e., no further investigation needed); (2) the interval where field results can be trusted to confidently declare an area "dirty" (i.e., remedial action needed); and (3) the interval where the field results are considered ambiguous (the window of decision uncertainty), and a confident decision of "clean" or "dirty" would require more data to manage the decision uncertainty. **Table 5-1** presents potential uncertainty issues and potential responses. The DMA performed during the site remedial investigation indicates that the interval of decision uncertainty for XRF bag results related to the 250 mg/kg action level is 200 mg/kg to 300 mg/kg.

Source: TIO - Considerations for Developing a Methods Applicability Study, March 2003

5.2.2 Confirmatory Sampling Strategy

A systematic grid will be used to conduct confirmatory sampling and analysis. Soil samples will be collected in the 0-6 inch interval bgs. Sample location density will be five discrete samples per grid. Field-portable XRF instrumentation will be used to provide real-time sample analysis of post-remediation soil lead concentration. Failure of the XRF decision criterion (Section 5.1.5) may result in further remediation effort to reduce lead contamination and additional confirmatory XRF sampling and analysis.

At each random sampling location, surface samples will be collected with a hand auger or appropriate equipment. One or more hand auger samples will be collected at each sample location. Enough soil volume must be collected for all analytical purposes including split samples for secondary XRF and ICP metals analysis.

Once XRF sampling and analysis has "cleared" the remediation area, archived bag samples will be randomly selected for sample cup aliquots to be taken for secondary XRF analysis and fixed laboratory ICP analysis.

5.2.3 Confirmatory Sample Collection

Confirmatory bag samples are collected during initial XRF sampling and analysis and archived for subsequent confirmatory analysis. The sampling depth at each sampling location is 0 to 6 inches.

Bag Sample Collection and XRF Analysis – Each sample will be collected as a discrete hand trowel sample. At each within-grid cell sampling location the following procedures will be used:

1. Place soil into an appropriately labeled zip-locked plastic baggie (see Section 3.1, above for a discussion of sample labeling and blind sample analysis). Homogenize the soil within the bag.
2. Analyze the soil directly through the plastic bag used for homogenization. The XRF analysis time interval will last at least 120 seconds in order to obtain the lowest limits of detection following EPA protocol of 99.7% confidence level for testing times. If the sample is chosen as a precision sample, 7 readings for lead will be taken from various locations on the bag to determine within-sample variability.
3. Record the XRF meter readings.

Confirmatory Sampling and Analysis – Once initial XRF analysis has indicated that the remediated area is clean, archived bag samples from randomly selected grids are subjected to the following procedures:

1. Subsample the archived bag sample from each grid cell selected for confirmatory analysis.
2. Place the subsample aliquot into a XRF sample cup, and analyze. The XRF analysis time interval will last at least 120 seconds.

3. Tabulate the XRF readings and calculate the 95% UCL. Evaluate the data according to the confirmatory sampling decision rules as indicated in Section 5.1.5.

4. If the results of evaluation in step 3 indicate that the remediated area is clean, the XRF cups are sent to the fixed laboratory for ICP analysis. If not, then the cups are *not* sent to the laboratory, and TPA-CKY will confer with the COR and project staff regarding possible additional XRF sampling and analysis and additional site remediation.

5. After the XRF cups have finally been determined to pass the decision rules and have been sent to the laboratory, review and evaluate the ICP analytic results according to the confirmatory sampling decision rules.

5.2.4 Quality control for onsite XRF Analyses

Field duplicate soil bag samples will be collected and analyzed by XRF at a frequency of 10 percent. In addition, 10 percent of bag samples selected for collaborative ICP analysis will be subsampled twice as XRF cup samples for field duplicates. A summary of the project quality control sampling scheme is described in **Table 5-2**. A detailed XRF instrumentation SOP is provided as Appendix C to this SAP. The quality of instrumentation and method detection limits will be expected to be equivalent or better than the Niton 300 series. **Table 5-3** presents method detection and reporting limits for Niton 300 series XRF instrumentation.

5.3 DATA QUALITY INDICATORS

The overall data quality objectives for this work are to determine the nature and extent of soil contamination and to produce data of known and appropriate quality to support the selection of remedial actions for soil at the former ranges. Appropriate procedures and quality control (QC) checks will be used so that known and acceptable levels of accuracy and precision are maintained for each data set. This goal is quantitatively expressed in terms of the Data Quality Indicators (DQIs) for the quality control checks performed. The quantitative requirements for accuracy measurements were established to ensure the data produced is shown to be effective for making defensible project decisions.

Accuracy. Accuracy is the agreement between a measured value and the true or accepted value. While it is not possible to determine absolute accuracy for environmental samples, the analysis of standards and spiked samples provides an indirect assessment of accuracy.

XRF accuracy will be established with a calibration check standard obtained from the XRF instrument manufacturer. A low, medium, and high concentration calibration standard will be used. Calibration verification checks will be conducted at the beginning and end of each day and after every 20 samples. The percent difference (%D) should be less than 20 percent. If this data quality indicator is not met, corrective actions as specified in the XRF User's Guide would be followed. Samples will not be analyzed until the calibration data are within acceptable range. Equipment blanks will be taken to verify absence of meter signal when lead is known not to be present in the sample.

Accuracy of ICP results will be established via standard laboratory quality control procedures and data review by TPA-CKY project chemist. Laboratory procedures are described fully in the *STL Seattle Laboratory Quality Manual for Chemical Analysis*, selected portions of which are included in Appendix D. Matrix spikes and blank spikes will be evaluated by the laboratory analyst; laboratory default quality control acceptable range for accuracy is 85 to 115 percent recovery of a calibration standard.

Precision. Precision is a measure of mutual agreement among replicate (or between duplicate) or co-located sample measurements of the same analyte. The closer the numerical values of the measurements are to each other, the more precise the measurement. Precision for a single analyte will be expressed as the relative percent difference for results of field and laboratory duplicate samples. Precision requirements for each sample type are presented below.

For FPXRF samples, a precision sample will be measured when the result approaches the action level, up to a maximum frequency of 10 percent of XRF samples. A precision sample will be a sample that has been analyzed seven times in replicate. The relative standard deviation (RSD) will be calculated for each of the precision samples using the following equation:

RSD = (SD/Mean)* 100

Where:

SD = standard deviation of the seven replicate results; and
Mean = mean concentration of seven replicate results.

The precision for the sample RSDs will below 20 percent. If this data quality indicator is not met, the data will be reviewed to determine appropriate corrective actions, if required.
Corrective actions will be conducted in accordance with this SAP.

Field Duplicate Samples. See Section 5.7.3 for a summary of collection and analysis of field duplicate soil samples.

Analytical Laboratory Duplicate Sample. Laboratory duplicate sample analyses are performed by taking aliquots of a well-homogenized sample from the same sample container to assess the precision of the analytical method. The RPD is calculated for the primary and replicate sample results. Laboratory duplicate sample analysis will be performed for soil and water analyses. Laboratory duplicate sample analysis shall be one per every 20 samples or one per analytical batch, whichever is more frequent. The RPD criteria for laboratory duplicates will be less than 35 percent for soils.

Representativeness. Representativeness is a qualitative parameter that expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations (including the impact on the data from an evaluation of duplicate samples, rinsate blanks, and field blanks) at a sampling point, or an environmental condition. The design of and rationale for the sampling program (in terms of the purpose for sampling, selection of sampling locations, the number of samples to be collected, the ambient conditions for sample collection, the frequencies and timing for sampling, and the sampling techniques) ensure that environmental conditions have been sufficiently represented. Discussion of the methods and approaches used to satisfy the representativeness criteria is found throughout the sampling plan.

Care will be taken in the design of the sampling program to ensure sample locations are selected properly, sufficient numbers of samples are collected to accurately reflect conditions at the site, and samples are representative of the sampling locations. A sufficient volume of sample will be collected at each sampling station to minimize bias or errors associated with sample particle size and heterogeneity.

Comparability. Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. The comparability goal will be achieved through the use of standard operating procedures to collect and analyze representative samples, and by reporting analytical results in appropriate and consistent units. Each analytical procedure selected from among the acceptable options will be used throughout the work assignment, unless a rationale is provided for an alteration. In essence, comparability will be maintained by consistency in sampling conditions, selection of sampling procedures, sample preservation methods, analytical methods, and data reporting units.

Split samples will be collected from well-homogenized discrete samples and submitted for ICP analysis. A correlation analysis will be performed on these samples between XRF and laboratory lead results to evaluate data comparability. It should be noted that numerical results might not be equivalent since XRF measures total lead in a bulk sample while laboratory analysis detects lead, which is extracted by nitric acid; i.e., one method may exhibit a high or low bias relative to the other. However, a linear regression correlation coefficient (r) greater than 0.75 is anticipated; evaluation of the correlation data will be conducted prior to using the information for subsequent field decision-making.

Completeness. Completeness is a measure of the number of valid measurements obtained in relation to the total number of measurements planned. The closer the numbers are the more complete the measurement process. Completeness will be expressed as the percentage of valid-to-planned measurements. An objective of the field-sampling program is to establish the quantity of data needed to support the investigation. This will be achieved by obtaining samples for all types of analyses required at each individual location, a sufficient volume of sample material to complete the analyses, samples that represent all possible contaminant situations under investigation, and quality control samples. Completeness will take into consideration environmental conditions and the potential for change with respect to time and location. Target levels for completeness are 90 percent. These levels are evaluated for individual analytes as well as for locations and matrices.

5.4 SAMPLE COLLECTION AND HANDLING

Sampling procedures are described in Sections 2.0 through 4.0. When a permanent modification of an approved sampling protocol is necessary, the modification will be included by addendum to the SAP. Temporary modifications caused by nontypical field conditions or equipment malfunction shall be recorded on the appropriate sample collection form for soil samples. Depending on the nature of the variation, a decision will be made whether to resample at the location where the modification occurred.

Sample containers, preservatives and holding times will be appropriate for the type of sample collected and the analytical method to be used (**Table 4-1**). Maximum sample holding times will be strictly adhered to. Each sample will be documented, labeled and identified as noted in Section 3.0 of this SAP. Complete documentation of sample collection and handling shall be maintained in the master job file. Specific records to be kept include sample collection forms, COC forms, geologic logs, analysis request forms, and a sample tracking database.

5.5 SAMPLE CUSTODY

A sample is under an individual's custody if one or more of the following criteria are met:

- it is in the sampler's possession
- it is in the sampler's view after being in possession
- it is in the sampler's possession and secured to prevent tampering
- it is in a designated secure area.

Strict custody procedures will be adhered to in order to maximize sample integrity and accountability. These procedures are detailed in Section 9.0 of this SAP.

5.5.1 Field Custody Procedures

The sampler will be personally responsible for completion of the COC Form and the care and custody of collected samples until they are transferred to another person.

5.5.2 Transfer of Custody

When samples transfer possession, the individuals relinquishing and receiving the samples will sign the COC Form and document the date and time of transfer. The sample collector will sign the form in the first signature space. The sample receivers will then sign the form in the subsequent signature space.

5.5.3 Laboratory Custody Procedures

A designated sample custodian in the laboratory will accept custody of the samples. The custodian will verify that the sample identification numbers match those on the chain-of-custody record. The laboratory will maintain sample security and custody as appropriate.

5.5.4 Archived Samples

Archived soil samples will be temporarily stored in a protected area at the Evergreen site. Samples will be archived in the labeled sample bag, with Chain-of-custody documentation, for further analysis if deemed necessary. Archived samples will be made available to the government at the end of the remediation project or at any time following confirmatory sampling and laboratory analysis.

5.6 LABORATORY QUALITY CONTROL

The laboratory's QC officers are responsible for ensuring that all routine internal QA/QC procedures are implemented by the laboratory. The laboratory QC procedures used for this project will consist of the following, at a minimum:

- Instrument calibration and standards as defined in EPA SW-846 Methods (EPA 1995 and updates);
- Laboratory blank measurements at a minimum frequency of 5 percent or one per 20 samples per matrix; and
- Accuracy and precision measurements as defined above, at a minimum frequency of 5 percent or one per 20 samples per matrix, or one in 10 samples per matrix for blind duplicates.

5.7 FIELD QUALITY CONTROL

Field QC procedures for this project will consist of the following:

5.7.1 Field Trip (Transport) Blank

No trip blanks are required for this project.

5.7.2 Equipment Rinsate Blanks

Rinse blanks are not required for this project.

5.7.3 Field Duplicates

Field duplicates will be collected and analyzed per matrix and method.

XRF Field Duplicate Sample. Co-located field duplicate soil bag samples will be collected to assess combined sampling, and field variability. The co-located field duplicate will be collected from 0.5 to 3 feet away from the primary sampling point. The relative percent difference (RPD) is calculated for the primary and replicate sample results. Field duplicate samples shall be collected for XRF analysis at a minimum frequency of one per every 10 samples collected during field screening. The RPD criterion for XRF results for field duplicates will be less than 50 percent.

Collaborative XRF/ICP Field Duplicates. 10 percent of selected bag samples will be subsampled twice for field duplicates. This will be accomplished by taking two XRF cup samples instead of the normal one sample from each bag. Duplicate cup samples will be analyzed by XRF and ICP methods.. The RPD criterion for XRF results for field duplicates will be less than 50 percent.

5.7.4 QA Samples

No Corps of Engineers QA samples will be involved in this project.

5.7.5 Field Instruments

Field instruments will be calibrated in the field as frequently as specified by the manufacturer, or more frequently if deemed necessary by the field sampling personnel.

Calibration results will be recorded in an instrument logbook dedicated to each field instrument. This logbook also will contain instrument preventative maintenance information, as appropriate.

5.8 DATA REDUCTION, REVIEW, REPORTING AND VALIDATION

5.8.1 Data Reduction

Data reduction procedures, whether performed by the instrument or manually, shall follow methodologies outlined within the laboratory SOP or analytical method. Project-specific variations of the general procedures, statistical approach, or formulas may be identified, depending on project-specific requirements. Automated procedures shall be verified as required by EPA's guidance on Good Automated Laboratory Practices (GALP), i.e., all software shall be tested with a sample set of data to verify its correct operation via accurate capture, processing, manipulation, transfer, recording, and reporting of data.

5.8.2 Data Review and Validation

All field and laboratory QC and confirmatory sampling data will be reviewed by TPA-CKY personnel prior to submittal to the COR for decision-making purposes. EPA data validation levels are not pertinent to this project.

5.8.2.1 Field Data

All XRF instrument readings will be reviewed on site daily by the Project Chemist prior to XRF data being submitted to the COR. All field data tracking forms and field QC sampling results will be reviewed on site by the QC System Manager prior to their submittal to the COR.

5.8.2.2 Laboratory Data

All analytical data generated by the laboratory shall be internally reviewed in accordance with laboratory QC procedures prior to data release to TPA-CKY to assure the validity of the reported data. This internal data evaluation process shall cover the areas of data generation, data reduction, and review documentation.

All laboratory data received by TPA-CKY will be reviewed by the Project Chemist prior to data being submitted to USACE.

5.8.2.3 QA Review

QA review is performed by the TPA-CKY QC Program Manager. This review is not part of the normal production data review process. The QCPM would typically review at least 10 percent of the data produced by the laboratory. The data packages reviewed will be randomly selected by the QCPM. Nonconformance reports would be required for any errors noted.

5.8.3 Data Reporting

5.8.3.1 Data Qualifiers

Data qualifiers shall be added by the laboratory during the data generation/review process. These qualifiers would be applied when QAOs were not met and corrective action was not successful or when corrective action was not performed. All flags used by the laboratory shall be defined completely within the chemical data reportable packages. The following example data qualifiers are suggested for use.

U - Non-detect when analyte concentration is below MRL.

J - Estimated concentration when analyte concentration falls below the lowest calibration standard.

B - Blank contamination when any associated blanks are above the "MDL check samples."

R - Data rejected due to the exceedance of method-specific holding times, or calibration of batch QC data associated with the samples do not meet method quality objectives.

These flags should also identify any suspected bias in the data, either low or high, and whether the estimation is related to the suspected identification (qualitative) or whether the value reported is an approximation (quantitative). The Project Manager or appropriate technical personnel, shall be notified as soon as possible to discuss possible corrective actions should data be qualified. Additional data flagging may be performed during external data review or validation.

5.8.3.2 Data Reporting Requirements

The chemistry data package should contain enough information to demonstrate that the project's data quality objectives have been fulfilled. In general, the type of data package required will fall into the Comprehensive Data Package category. A comprehensive data package contains sufficient information to completely reconstruct the chemical analyses that were performed. Hence, comprehensive data packages include all batch QC results, instrument QC results (e.g., initial calibration verification, continuing calibration verification, and instrument performance checks), method detection limit studies, and raw data (e.g., run logs, sample preparation logs, standard preparation logs, and printed instrumental output such as chromatograms).

5.8.4 Data Quality Reviews

will be performed on 100 percent of the data collected during remediation project. The following guidelines will be used to perform laboratory data quality reviews of the results:

- EPA540R94083, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis
- USACE EM 200-1-3, February, 2001, Requirements for the Preparation of Sampling and Analysis Plans, including Appendix I Shell for Analytical Chemistry Requirements

The following criteria will be evaluated in the process:

- Holding Times;
- Initial and Continuing Calibration;
- Method Blanks;
- Surrogate Recoveries;
- Blank Spike and Laboratory Control Sample Recoveries;
- Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries and Relative Percent Differences (RPD);
- Laboratory and Field Duplicate Relative Percent Differences (RPDs); and
- Reported Detection Limits.

A QA/QC memorandum will be generated for each data set and will outline all QA/QC criteria included in the review. Data qualifiers will be assigned to specific data according to the validation guidelines listed above and will be included on each sample data summary sheet and attached to QA/QC memoranda. Data qualifiers to be used may include but are not limited to the following:

U = The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.

J = The associated value is an estimated quantity because the quality control criteria were not met or the sample concentration is below the sample quantification limit.

UJ = The material was analyzed for, but was not detected. The associated value is an estimated quantity.

R = The data are unusable.

Completed QA/QC memoranda will be submitted to the Project Manager and copies will be retained on file by the QC Program Manager.

5.8.5 Field QA/QC Evaluation

Following the QA/QC review of each set of analytical data, field QA/QC samples will be evaluated. Field QA/QC sample results will provide information regarding the potential for introducing artificial contaminants during the sample collection process. The QCPM/Project Chemist will provide recommendations to implement sampling procedural changes to rectify the problem prior to additional sample collection efforts. Upon approval by the Project Manager, procedural changes will be documented and included as an addendum to this plan. The Project Manager will notify USACE of the procedure changes by sending a letter outlining specific changes.

5.9 CORRECTIVE ACTIONS

The sample collector is responsible for implementing and maintaining procedures outlined in the SAP and the SAP addendums. If a problem is detected during the field program and/or a routine audit, an investigation will be conducted immediately to evaluate the problem and to determine the most appropriate corrective action, if necessary. Similar action will also be conducted for off site laboratory analysis, if necessary.

If a corrective action is necessary, a memorandum will be prepared by either the sample collector or the QC System Manager to the Project Manager outlining the nature of the problem, an evaluation of the cause, and the recommended corrective action. Recommendations for corrective actions will be directed to the Manager of the audited program element for resolution in a specified and timely manner. The corrective action will be implemented following the approval of the Program Manager. The corrective action will require verification of problem elimination following the implementation of a corrective action. A file will be maintained of corrective actions implemented and problem elimination verification related to field activities or analytical laboratory. Documentation of quantitative QAOs used to evaluate analytical results, recommended corrective actions and verification of implementation of recommended corrective actions and problem resolution will be provided to USACE with progress reports as required. If USACE determines that appropriate corrective actions have not been implemented and sample analytical results are not compromised, resampling of the impacted soil may be necessary.

All audit procedures, audit and non compliance reports, audit findings, and acceptable resolutions are approved by the QCPM prior to issue. QA verification of acceptable resolutions may be determined by re-audit for documented surveillance of the item or activity. Upon verification of acceptance, the QCPM will close out the audit/noncompliance report and findings. It is the Project Manager's responsibility to ensure that all corrective actions to resolve non-compliance are acted upon promptly and satisfactorily by project personnel.

5.10 QUALITY ASSURANCE REPORTS TO MANAGEMENT

Quality Assurance reports that will be submitted to the Project Manager include the following:

- QA/QC memoranda
- Equipment calibration and preventative maintenance activities
- Evaluation of data quality objectives and contract compliance
- Field and/or laboratory QA problems and recommended and/or implemented corrective actions
- Results of QA audit findings.

5.11 DATA MANAGEMENT

All laboratory and field screening data will be maintained in Excel spreadsheet format. Electronic deliverables of chemistry data shall be provided by TPA-CKY for input into the Fort Lewis database. The electronic deliverables will be checked against hard copy deliverables at a frequency of 10 percent to verify accuracy of the electronic deliverables. Hard copies of all chemistry data, including raw data, shall be maintained in the project files.

6.0 SPECIAL TRAINING AND CERTIFICATION

6.1 XRF ANALYSIS TRAINING

A member of the TPA-CKY field project team will be given vendor-conducted training in the operation and maintenance of the selected x-ray fluorescence (XRF) meter to be used in pre-confirmatory sampling and analysis. This individual will have a minimum of three years experience in performing and documenting chemical sampling in the field. XRF training will cover the following topics at a minimum:

- Instrument field maintenance and care
- Field calibration
- Basic instrument operation
- Procedures for measuring lead in soil

The selected TPA-CKY staff member will be issued a certificate by the qualified firm conducting the training to demonstrate that he or she has attained the required level of competence in operating the XRF meter. This individual will also be thoroughly familiar with the DQO/DQIs presented in Section 5.0 to this SAP.

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Refer to* WORK PLAN *for Vicinity Map and Site Map

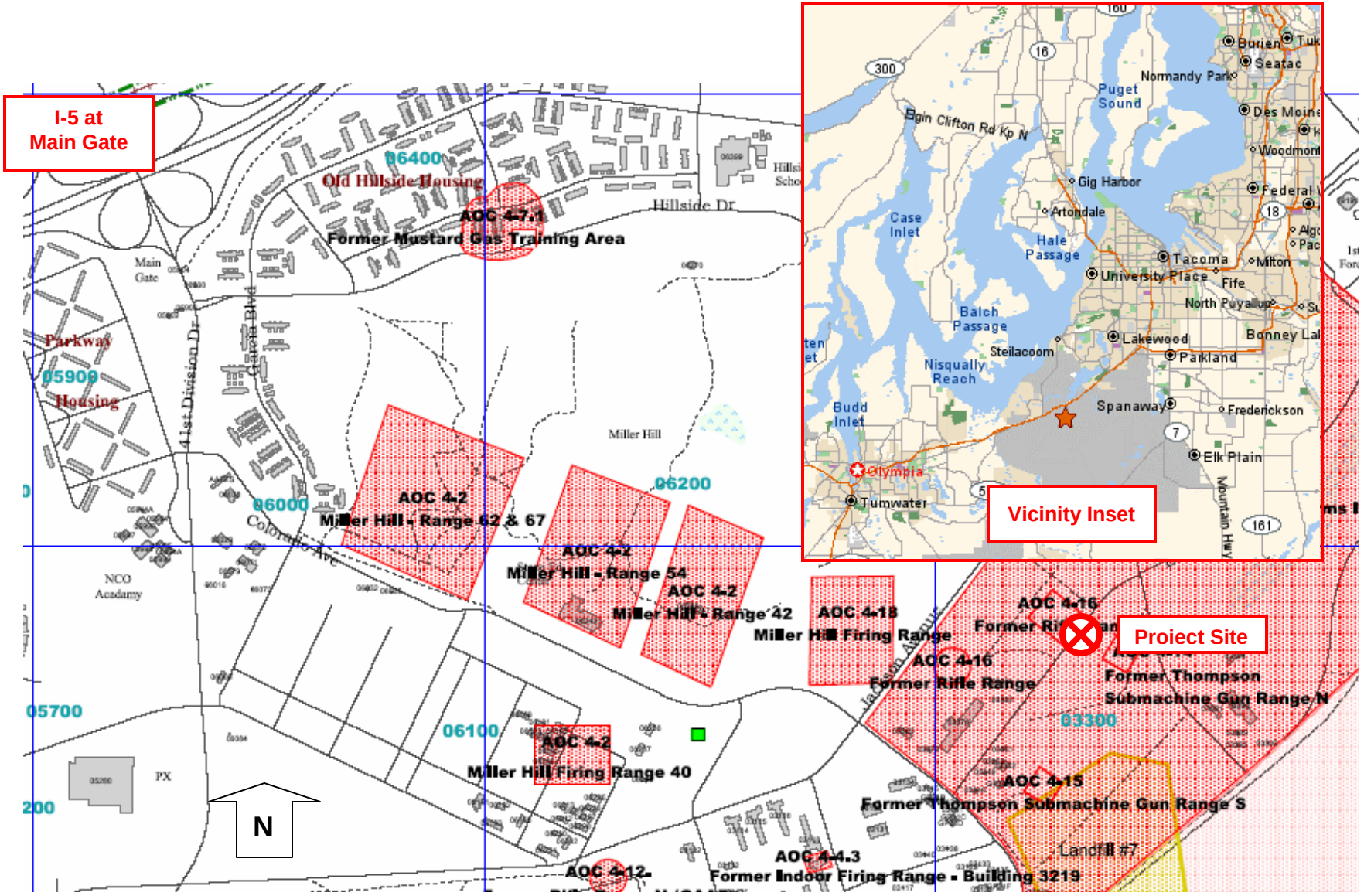
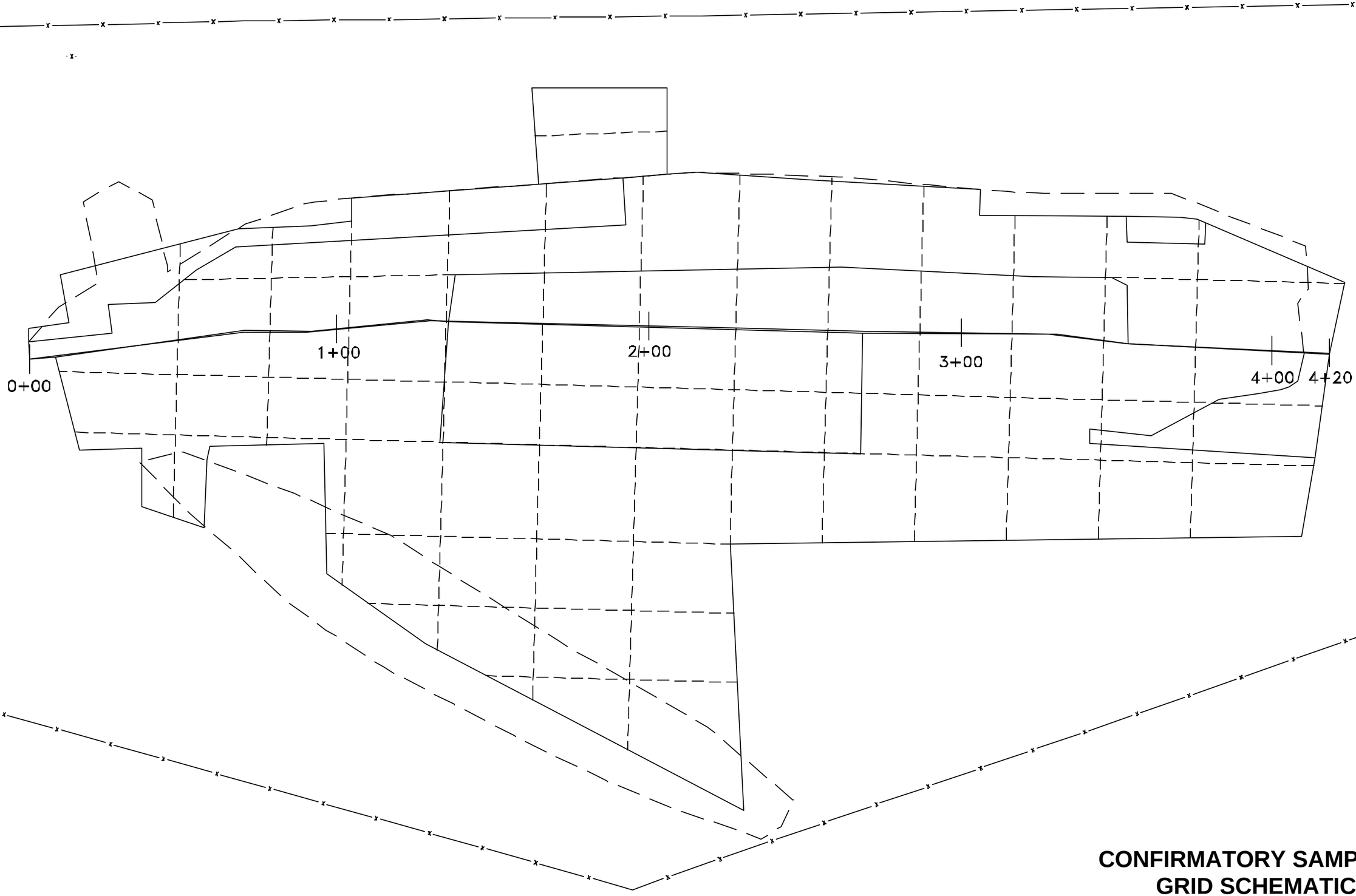


Figure 1-1. Fort Lewis Vicinity and Site Map



CONFIRMATORY SAMPLING
GRID SCHEMATIC
FIGURE 2-1

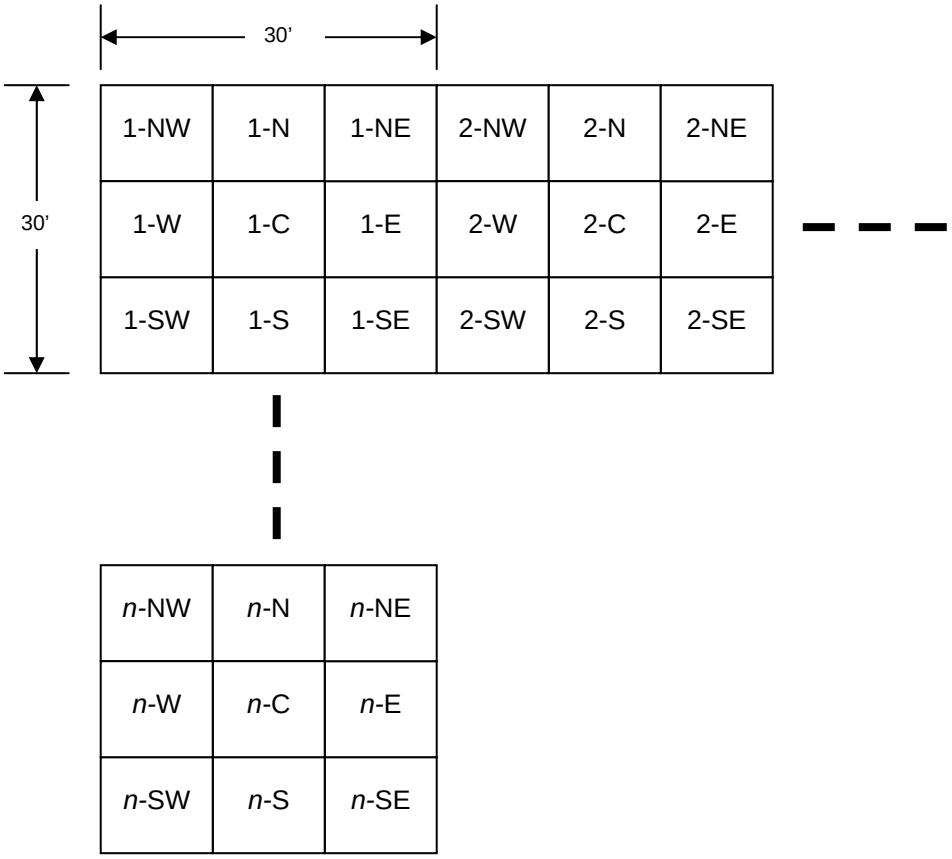


Figure 2-2. Schematic Within-grid Sampling Schematic
Sample locations will be by repeated random selection of subgrids (e.g., NW, N, etc.) to make five discrete samples per 30-ft-square grid.

TABLES

Table 2-1. Sample Types for Evergreen Range Remedial Action

Sample Description	Sample No. Scheme	Media	Depth	Analytical Method	Action Level	Required Reporting Limit	Frequency	Estimated No. of N Samples	Estimated No. of QC samples	Spec. Reference	Remarks
Background under stockpiles; X=stockpile no.	USBXnn	soil	0 - 6 in.	XRF	250 mg/kg	20 mg/kg	1/10 SY	360	36 FD (10%)	02111-3.6.3	
Under stockpiles (after); X=stockpile no.	USAXnn	soil	0 - 6 in.	XRF	250 mg/kg	20 mg/kg	1/10 SY	360	36 FD (10%)	02111-3.6.3	if >action level, remove, resample
Leachate from excavations, stockpile liners, decon, etc.	WWnnn	waste water	N/A	total lead EPA 6010	15 ug/L	1ug/L	1/500gal or 1/waste stream	5	1 FD (10%)	02111-3.6.2	if>action level, dispose offsite
Filtered soil, field	SSnnn	soil	N/A	6.7mm sieve, hand search	<0.1%	N/A	5 kg/1 ton	TBD	N/A	01110-1.4.1.1	changed per R0003
Stabilized soil, lab	STnnn	soil	N/A	pH	2 to 12	-				01110-1.4.1.2	changed per R0003
				TCLP lead	5 mg/L	-	1/100CY	50 (min.30)	5 FD (10%)	01450A-1.4.3.2	per EPA 530/F-93/004
Confirmation samples, field; XX = grid cell no.	CSXXnn	soil	0 - 6 in.	XRF	250 mg/kg	N/A	5/grid	350	up to 35 prec. (<=10%), 35 FD (10%)	01450A-1.4.3.1	to 90% confidence level; select prec. samples near action level, test 7X
Confirmation samples, cup	CSXXnn-n	soil	N/A	XRF	250 mg/kg	N/A	based on XRF results	40 (subset of field samples sel. from archived bags)	10% FD	N/A	no spec. requirement for cup sampling
Confirmation samples, lab; -n for normal or field dup.				total lead EPA 6010 (ICP)	250 mg/kg	20 mg/kg				01450A-1.4.3.1	must pass 3 rules; RL 20 mg/kg
IDW (stabilization bench test chemical/soil mix)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	01450A-1.4.3.3 02120A	material will be recycled into stabilization production process
Bullet waste	BWnnn	solid	N/A	N/A	N/A	N/A	N/A	N/A	N/A	01450A-1.5.5	no sampling required but must be manifested; assume profile based on book info.

Note: "N" = normal (non-QC) sample

Table 4-1. Sample Collection, Preservation, and Holding Time Criteria for Soil Samples

Parameter	Method	Container Type	Preservation	Extraction Holding Time	Analysis Holding Time (days)
Metals (FPXRF)	6200	Zip-loc plastic bag	Cool to 4ºC	N/A	N/A
Metals (laboratory)	7000/6010/ 6020	1 8-oz. Clear wide-mouth glass jar with TL[1] lid	Cool to 4ºC	N/A	180

[1] Teflon™
NA - Not applicable

Table 5-1. Uncertainty Management Issues and Potential Responses

Problem	How to Identify	Resolution
Matrix heterogeneity	Compare the results of samples collected at known distances from each other (co-located duplicates)	After determining the scale over which it is important to understand the impact of heterogeneity, increase the sampling density in those areas where incorrect decisions would be risky from a protectiveness or economic aspect
Inadequate sample preparation/ homogenization	Compare the precision of replicate sample prep + 7 XRF analyses on bag to the analysis performed on a single cup sample	Improve the consistency of sample preparation procedures, or select a procedure more appropriate to the matrix. Increasing sample size or the use of compositing might also need to be considered.
High analytical variability	Analytical QC sample results are outside required performance criteria or interferences are suggested by analysts observations	Apply additional sample cleanup steps or use an alternative peak to perform the analyte quantitations. For example, use an alternative spectral line for quantitation of arsenic when lead concentrations are high.
Detection limits are elevated due to the presence of interferences.	Non-detections are above the action level for the site resulting in the calculation of artificial risk	Same as above and selection of an alternative method that is more analyte specific. For example, use of a selective ion monitoring method for poly nuclear aromatics versus the standard SW-846 method 8270 for semivolatile organics
Detection frequencies are insufficient or the distribution of results so erratic that the maximum value has to be used for comparison to the action level	If detection frequencies are less than 50 percent and data distributions cannot be established as either normal or lognormal use of a UCL for determination of attainment may not be possible.	Block or stratify the data into different populations that could be more amenable to statistical analysis. Collect more data based on a geostatistical design to focus on where the highest uncertainty is predicted
Results are very close to the action level making decision making difficult	Based on the project limits of uncertainty the results fall in the category of too close to call	Decide that the result should be considered dirty, take a conservative approach, collect additional confirmation results and make a decision based on the average

Table 5-2. Quality Control Summary Table for XRF and Laboratory Analysis

QC Sample	Frequency	Acceptance Range	Purpose
XRF			
Calibration Check sample	Beginning/end of day, 1 for every 20 samples	%D < 20%	Evaluate accuracy of XRF instrument
Precision sample	Maximum 1 for every 10 samples.	%RSD <20%	Evaluate precision of XRF analysis
Blank	1 for every 20 samples	< Reporting Limit	Determine presence of contamination on XRF equipment
Lab duplicate	1 for every 20 samples at every stage of prep	RPD <20%	Evaluate precision of XRF prep at each step
Field duplicate	1 for every 10 samples	RPD< 50%	Evaluate overall precision of sampling effort
Laboratory			
Matrix Spike	1 for every 20 samples	75%<R<125%	Evaluate accuracy of XRF instrument
Equipment Blank	1 per day	< Reporting Limit	Determine presence of contamination on field equipment
Lab duplicate	1 for every 20 samples	RPD <20%	Evaluate precision of laboratory analysis
Field duplicate	1 for every 10 samples	RPD< 50%	Evaluate overall precision of sampling effort

Table 5-3. Detection/Reporting Limits for XRF

Analyte	Matrix	Method Detection Limit (ppm) in Matrix	
		120 SECOND TESTING TIME	
		Sand	Standard Reference Materials (STM)
Lead	Soil	35	45

Table 5-4. Reporting Limits for Metals EPA 6010/6020

Parameter/Method	Analyte	MTCA Method A/B (in mg/kg)	Soil	
			RL	Unit
ICP Screen for Metals SW6010/6020	Lead	250	2.0	mg/kg

APPENDIX A
RÉSUMÉS

K. TIMOTHY YU

EDUCATION

Ph.D., Environmental Engineering, 1979, University of Southern California
M.S., Engineering (Civil/Sanitary), 1974, University of Wisconsin
B.S., Chemistry, 1972, University of California

PROFESSIONAL REGISTRATIONS

Registered Professional Civil Engineer, California
Registered Environmental Assessor, California
Diplomate, American Academy of Environmental Engineers

EXPERIENCE

Dr. Yu is president of CKY Inc. He has over 25 years of experience in the environmental engineering and remediation field, including hazardous waste management, hazardous waste cleanup, soil and groundwater rmediation, industrial waste treatment, budgetary planning, and program management.

At CKY, he has served as both management and technical authority for all facets of major projects. Specifically, he is involved in proposal writing; manpower planning; contract negotiations; interface with clients and subcontractors; technical supervision; and estimation, control and reporting of costs and schedules.

Under the direction of Dr. Yu, CKY has conducted hazardous waste site investigations for over sixty separate sites, provided environmental audits for multiple-site manufacturing facilities and properties, and provided management of underground tank programs for government and industrial clients. He has also been responsible for permitting, construction, operation, and monitoring of several site remedial activities. His academic and technical background, coupled with his project management experience, have enabled Dr. Yu to provide expert witness testimony in the areas of ground and surface water quality and monitoring.

The following is a partial list of contracts for which Dr. Yu served as Program Manager:

- Louisville Corps of Engineers (DACA27-96-D-0037): $7.5 million CPFF task order Pre-Placed Remedial Action Contract (PRAC), including removal of PCB-contaminated soil at Detroit Arsenal in Warren, MI and remediation of low-level radioactive soil at a DOE FUSRAP site in Cleveland, Ohio. Dr. Yu intervened on the FUSRAP project to assuage schedule concerns associated with progress under incremental funding. He was able to communicate and implement corrective action so that the concerns were constructively mitigated. This project was ultimately finished on schedule.

- USAF AFCEE (F41624-94-D-8059): $24 million CPFF Task Order Remediation Contract for DoD Facilities in CA, NV, AZ, including a metal stabilization project at Norton Air Force Base.

- US Navy EFA West NAVFACENGCOM (N62474-96-D6085): $9 million FFP Remediation Contract (FRAC), including a task for cleaning and grouting of 8.5-mile fiberglass POL pipeline system at NAS Lemoore, O&M of two bioventing system at Camp Pendleton, RAO of stormwater diversion system at NCTS Stockton and a $2.2 million task for installation and startup of a dual phase vapor extraction system with infiltration gallery at NAS Lemoore.

- US Army Corps of Engineers, Sacramento District (DACW05-01-D-0007, DACA27-96-D-0037, DACA05-97-D-0003): $3 to $5 million Small Action Remediation Type (SmART) contracts. Directed over 40 FFP HTRW task orders at military facilities, including MCAS Yuma, AZ, Naval Station San Diego and SUBASE Point Loma, CA. Task orders ranged from removal actions to stormwater controls to in situ sludge pond remediation.

- U.S. Navy SouthwestDivision N68711-02-D-8310), Environmental Multiple Award Contract.(EMAC): $20 million Environmental Remediation Services for Northern California.Regioin. Directed four FFP task orders at Hunters Point Shipyard, San Franciso, CA: a) installation of an irrigation system and operation and maintenmance of a closed industrial landfill, b) maintenance actions for stormwater management at parcel E, c) excavation and removal of petroleum hydrocarbon-contaminated soil and site restoration for 22 sites, and d) transportation and diposal of PCBs-contaminated soils.

The following is a partial list of contracts for which Dr. Yu served as Project Manager:

- Several U.S. Navy Task Orders at Lemoore Naval Air Station for a closure of eight miles of fuel oil pipelines and construction and operation and maintenance of a multi-phase extraction and treatment system for jet fule contaminated groundwater.

- The removal and replacement of some fifteen USTs at six locations for the Los Angeles County Dept. of Public Works.

- three contracts, all over $1 million, for the California Department of Transportation. Over thirty task orders were issued under these contracts for providing environmental engineering and remediation services.

- a $3 million subcontract for a Navy CLEAN Prime Contractor, providing data validation and analytical services.

- All projects of the U.S. Bureau of Reclamation contract. The work included on-site hazardous waste characterization (HAZCAT), lab-packing of various wastes, and supervision of disposal and laboratory analysis.

- All project under the $1 million remediation contract for the United States Forest Service. The work involved remediation of at least eight sites with hydrocarbon contamination of soil and/or groundwater

- various tasks to provide technical review for EPA's listing of 16 pesticide treatment streams and a permit for removing PCBs through biological treatment. These tasks also involved the development of background documents for EPA to promulgate regulations under RCRA for Small Hazardous Waste Generators and under the Clean Water Act for the Effluent Guidelines for the Inorganic Chemical Industry.

MARK J. HALLOCK

EDUCATION

B.S. / Mathematics / 1978 / University of Santa Clara

QUALIFICATIONS SUMMARY

Mr. Hallock has been involved in remediation and construction projects since 1978. He is experienced in specifications review and has a broad knowledge of the requirements for manpower, materials and equipment, subcontracting, and quality control associated with large construction projects. Mr. Hallock was responsible for costing and supervising several major construction projects, including River Bank Protection, Colusa Basin Drain for the USACE Sacramento, Asbestos and Lead-based Paint Abatement at Fort Lewis for USACE Seattle, Installation of Sediment Traps at Rough & Ready Island, Storm Water Management and Remediation of Petroleum – Contaminated Soil for the U.S. Navy. He has also supervised construction of residential and commercial development projects, freeway overpasses, bridges, and sewer treatment plants.

CERTIFICATIONS

USACE, Construction Quality Management for Contractors (1996); New Mexico State Contractors License –Mechanical and Underground; Certified UST Decommissioning - International Fire Code Institute.

RELEVANT EXPERIENCE

He brings over 24 years of professional experience to the project team. He has conducted construction and hazardous waste remediation projects throughout the United States and Europe. United States clients have included US Army Corps of Engineers, Department of Transportation, Department of the Navy, Department of the Air Force, EPA, State and local governments, and private industry clients. The following is a partial list of recent projects Mr. Hallock has served as construction manager or site superintendent:

.

Sacramento River Bank Protection, Colusa Basin Drain, USACE Sacramento District, Contract No. DACW05-00-C-0034. This $3.86-million project consisted of performing levee bank protection as well as establishment of habitat areas for endangered species along five miles of the Colusa Basin Drain in Yolo County, California. In addition, a 60-acre wetlands area was established at the project borrow site at the completion of construction activities. This project was the first of its kind and introduced new and innovative design features to meet the needs of both the State of California Department of Water Resources and US Fish and Wildlife Service. The project is currently in the third of three years of maintenance of 5 miles of an experimental habitat area.

Indefinite Delivery Contract for Department of the Navy Contract No. N62474-96-D-0685. Mr. Hallock completed two construction task Orders. The first Task Order ($441,000) included Confined Space, Level B, fuel and sludge removal, cleaning and in-place-closure of three 2.5-million gallon fuel oil tanks at Point Molate, CA. The second Task Order ($685,000) entailed installing a storm water sediment trap collection system to collect surface contamination run-off at Naval Computer and Telecommunications Station, Rough & Ready Island, CA. Sediment Trap installations required continual dewatering of groundwater and pumping, diversion and management of storm water at each of the sediment trap site during high tides and winter storm water conditions.

Construction of An Irrigation System and O&M of A Landfill Cap at Hunters Point Naval Shipyard, CA, Navy Contract N68711-02-D-8310. Mr. Hallock is performing Task Order No. 0001. This is a high profile, environmentally sensitive construction and O&M project ($463,222). Activities included preparation of an irrigation plan and a landscape plan and construction of an irrigation sprinkler system for the 16-acre landfill cap. After completion of the system, Mr. Hallock is supervising irrigation and operation and maintenance of the landfill cap for two years. Maintenance (repair) work so far has included silt fencing, drainage ditch, power supply, and roads due to storm damage.

USACE Contract No. DACA05-93-D-0002. Mr. Hallock was responsible for management and execution of three task orders under this IDIQ contract. His duties also included: among others, preparation of project work plans, project close-out submittals; procurement of all required permits; coordination with all regulatory agencies; implementation of corporate and task order specific quality control plans and safety plans; selection of personnel and equipment; selection of subcontractors and suppliers; and contract administration including preparation of contract modification proposals and progress payments. Task orders included multiple underground storage tank removals and removal of a JP-4 fuel pipeline system from former Army Airfields.

Indefinite Delivery Contract for States West of the Mississippi River, Department of Transportation Contract No. DTRS57-01-D-30006. Mr. Hallock completed four task orders. Activities included inventory and appraisal of asbestos-contaminated properties in Libby, Montana, asbestos removal and property renovation, demolition of selected structures, site control, and control of fugitive dust during field activities.

Field Supervisor, Ensco Environmental Services, Inc. – Serving as Site Supervisor and Quality Control Officer for a variety of construction projects, including closures of treatment, storage, and disposal facilities, closures of refineries, building decontamination, UST and AST removal and installation, and hazardous materials remediation, fixation, and stabilization.

Dan Caputo Company, Inc. – Construction of sewer treatment plants, storm water and sewage pump stations, bridges and freeway overpasses, and installation of a city sewer system (45 miles of pipeline plus pump stations).

HANG-TAN PHUNG

EDUCATION

Ph.D., 1972, Soil Chemistry, University of Florida
M.S., 1969, Soil Science, Montana State University
B.S., 1966, Agricultural Chemistry, National Taiwan University

PROFESSIONAL REGISTRATIONS

Registered Environmental Assessor, California, No. 00170
Certified Hazardous Materials Manager, No. 11804

EXPERIENCE

Dr. Phung has been a Project Manager for the last 30 years, responsible for overall management and technical quality of hazardous waste and remedial construction projects. Dr. Phung has served as Quality Assurance Officer for all CKY federal projects and, in the last thee years, for TPA-CKY projects. These projects were delivery orders under contracts with the U.S. Navy, U.S. Air Force Center for Environmental Excellence (AFCEE), and the U.S. Army Corps of Engineers.

The following is a partial list of contracts for which Dr. Phung has served as Quality Assurance Officer. In all task orders, Dr. Phung supervised the preparation of the Sampling and Analysis Plans, Contractor QC Plans, and the implementation of QC procedures in the field; and reviewed final reports.

- **Louisville Corps of Engineers Contract (DACA27-96-D-0037):** Task orders included Pre-Placed Remedial Action Contract (PRAC), including removal of PCB-contaminated soil at Detroit Arsenal in Warren, MI, and remediation of low-level radioactive soil at a DOE FUSRAP site in Cleveland, Ohio.
- **USAF AFCEE (F41624-94-D-8059):** Task orders included removal of some 50 UST/AST and soil remediation at March AFB, CA; investigation and closure of Ontario Air National Guard; and fixation of lead-contaminated soil at Norton Air Force Base.
- **US Navy EFA West NAVFACENGCOM (N62474-96-D6085)** Task orders included cleaning and grouting of 8.5-mile fiberglass POL underground pipeline system at NAS Lemoore: O&M of two bioventing systems at Camp Pendleton, RAO of stormwater diversion system at NCTS Stockton; and installation, startup and O&M of a dual phase vapor extraction system with infiltration gallery at NAS Lemoore.
- **US Army Corps of Engineers, Sacramento District (DACW05-01-D-0007, DACA27-96-D-0037, DACA05-97-D-0003) Small Action Remediation Type (SmART) contracts**. Over 40 HTRW task orders at military facilities, including army depots and Nike sites in Northern CA, MCAS Yuma, AZ, Naval Station San Diego and SUBASE Point Loma, CA., and small ranges at Army National Guard Stations throughout CA. Task orders ranged from removal actions, stormwater controls, in situ sludge pond remediation, UST removal, to remediation of contaminated soils.
- **U.S. Navy Southwest Division N68711-02-D-8310), Environmental Multiple Award Contract.(EMAC): Environmental Remediation Services for Northern California Region.** Task orders at Hunters Point Shipyard, San Francisco, CA, include: a) installation of an irrigation system and operation and maintenance of a closed industrial landfill, b) maintenance actions for stormwater management at Parcel E, c) excavation and removal of petroleum hydrocarbon-contaminated soil and site restoration for 22 sites, and d) transportation and disposal of PCBs-contaminated soils.

MICHAEL RIDOSH, CIH

EDUCATION

MBA, 1981, California Lutheran University.
B.S., Chemistry, 1971, California State University, Northridge.

PROFESSIONAL REGISTRATIONS

Certified Industrial Hygienist (CIH) # 6027.
Registered Environmental Assessor (REA) # 989.

EXPEIENCE

Mr. Ridosh has 32 years of experience in hazardous waste management and safety and health in HTRW practices, including 10 years as CIH. Mr. Ridosh came to CKY as a Program Manager and CIH, managing the AFCEE contract and USACE contracts. He developed the Corporate Health and Safety Program and has been involved in all CKY HTWR investigation and remedial projects, conducting safety and health audits in the field, and consulting on safety and health issues to minimize the probability of accidents/incidents that might occur during the field activities.

During the last 10 years, Mr. Ridosh has participated in numeral projects, including:

- Prepared Health and Safety Plans for major U.S. Army Corps of Engineers, U.S. Navy, and AFCEE hazardous waste investigation, remedial and construction projects.
- Performed safety audit for a major oil company.
- Wrote IIPP, HazCom, and other safety plans for four petroleum storage terminals.
- Performed air and surface sampling for an electronics company experiencing employee illness.
- Prepared the manuals and presented OSHA 1910.120 training to the Lawrence Livermore National Laboratory.
- Prepared an OSHA training manual for a major petroleum company.
- Presented 1910.120 OSHA training to the U.S. Navy Norfolk and Pensacola Naval Air Stations.
- Presented Health and Safety training to several industrial and environmental companies.

The following is a partial list of projects in which Mr. Ridosh served as Site Health and Safety Officer:

- Cleanup of four 2-million gallon bulk fuel tanks at Naval Fuel Depot, Point Molate, California (Contract N62474-96-6085). This project involved confined space, air monitoring, use of Levels B and C PPE, setting up monitoring equipment inside the tanks, removal of petroleum bottom, and disposal of sludge and rinsate.
- Fuel tank repair, including cleaning, painting, restrapping, and installation of a corrosion protection system for a 1-million-gallon fuel storage tank at Marine Corps Air Station at Yuma, Arizona (Contract DACA05-97-D-0003). Work was conducted at night to avoid excessive heat, in confined space with continuing monitoring of heat stress and air inside the tank.
- Removal of over 30 underground storage tanks at March Air Force Base (Contract 41624-94-8059). Work involved excavation, air monitoring, removal and disposal of the tanks. Shoring was required at a number of locations.
- Site investigation and segregation and removal of 13,000 cubic yards of soil/construction debris at Site 19, Naval Computer Telecommunications Station, Stockton, California (N62474-96-D-6085). Project entailed sampling and analysis of soil and residue for semi-volatile organic compounds, pesticides, PCBs, metals; site traffic control; heavy equipment operations and associated safety measures; dust control; erosion control; and transport of materials off site.
- Emergency response, site assessment, and cleanups at chemical and hazardous waste sites throughout EPA Region 9. Sites included paint chemicals, solvents, oil, gasoline, diethylamine, acids, asbestos, cyanide, chlordimeform, PCBs, pesticides, and metals. Significant projects included removal of contamination from 39 sites on Guam and Saipan
- Asbestos abatement project in Libby, Montana (Contracts DTRS57-01-D-30006, DTRS57-96-D-00033, AND DTRS57-96-D-00036). Mr. Ridosh visited project sites, auditing safety work to ensure implementation of the safety and health procedures, including PPE, personal and air monitoring and decontamination during site activities.

NOAH M. RIVERA

EDUCATION

B.S. / Biology / 2003 / University of Northern Colorado

QUALIFICATIONS SUMMARY

Since joining TPA, Mr. Rivera has participated in a number of large-scale field remediation and construction projects. Mr. Rivera has received formal training; he practices as a Health and Safety Officer and Quality Control Officer. He has worked on government projects for the US Army Corps of Engineers and the Department of the Navy. While in the Hawaii and Colorado Army National Guard, he received medical training and later, as a field medical specialist and ambulance crew chief, he administered first-aid training in field operational safety.

CERTIFICATIONS

USACE, Construction Quality Management for Contractors (2003)

AHERA Supervisor Asbestos Course

Lead in Construction Supervisor Course

40-hr Hazardous Waste Operations and Emergency Response

8-Hr Supervision, Hazardous Waste Operations and Emergency Response

RELEVANT EXPERIENCE

Mr. Rivera has five years of professional experience in the areas of construction quality control on federal projects and private firms. He has demonstrated his leadership and capability in the hazardous waste and construction projects he participated. The following is a partial list of recent projects Mr. Rivera has participated:

.

Hazardous Material Abatement and Demolition for 15 Buildings at Vancouver Barracks, Vancouver, Washington (USACE). Mr. Rivera served as Site Safety Officer and QC Inspector, and was responsible for preparing the draft final closure report. The project entailed asbestos abatement, lead-based paint removal, air and personal monitoring during abatement, disposal of lead-contaminated soils, and painting of selected portions of buildings. Aside from implementing corporate and task order specific quality control plan, Mr. Rivera's duties also included: among others, preparation of daily QC reports; participation in preparation of project work plans, project close-out submittals; procurement of all required permits; and coordination with USACE, City of Vancouver, facility owners all regulatory agencies.

Removal of Petroleum-Contaminated Soils at Four Parcels, Hunter Points Shipyard, San Francisco, California (US Navy). Mr. Rivera is serving as Site Safety Officer and QC Inspector. Activities have included survey of the 22 contaminated locations, subsurface utility survey, excavation of 25,000 cy of contaminated soils, confirmatory sampling and analysis, off-site disposal, backfilling, resurface and final closure report preparation. Mr. Rivera supervised soil loading, collected confirmation sample, and performed daily inspection of field equipment and material deliveries. He performed the three-phase approach and provided daily QC data to the Site Superintendent.

Stormwater Management at Parcel E, Hunter Points Shipyard, San Francisco, California (US Navy). Mr. Rivera served as QC Inspector. Activities included grading area around a Superfund Landfill, construction of a raised access road and turn-around areas, construction of drainage system including v-ditches and culverts, cleanout of existing catch basins, replacement of torn silt fencing, installation of perimeter control around stockpiles, hydroseeding of large bare soil areas, and performing road repairs.

MICHAEL J. DeKLOTZ

EDUCATION

BS., Chemistry, 1985. University of California Irvine
BS., Biology, 1985, University of California, Irvine

Environmental Site Assessment and Remediation Certificate, UC Irvine, 1994
40 Hour Hazardous Material Course (29 CFR 1910.120)
8 Hour Supervisor Course (29 CFR 1910.120)
Construction Quality Management for Contractors, USACE - Sacramento

PROFESSIONAL AFFILIATIONS AND TRAINING

Association of Hazardous Materials Professionals
U.S. Army Corps of Engineers Contractor Quality Control Training

QUALIFICATIONS SUMMARY

Mr. DeKlotz has over 10 years experience as Project Chemist and Quality Control Inspector, including field sample collection, sample handling and documentation, and review of chemical data associated with environmental remediation projects. He has also served as Site Superintendent on remediation projects. He is familiar with applicable federal and state regulations on waste management and has completed a USACE CQC training course.

Mr. DeKlotz has direct experience with clean up of lead-contaminated soils at firing ranges, including a project involving stabilization of lead and other metals in soil. He is familiar with HAZ-CAT procedures and field screening methodologies to characterize potentially hazardous materials on site and to collect field confirmatory data. He is familiar with the usage, operation and calibration of a variety of field monitoring instruments.

RELEVANT EXPERIENCE

Soil Stabilization for Lead, Copper, Hexavalent Chromium, Greenfield Environmental/Solid Treatment Systems, Weiner Steel, Pico Rivera, CA
Mr. DeKlotz served as Project Chemist on this project, which consisted of treating/stabilizing approximately 110,000 cubic yards of soil contaminated with lead, copper, and hexavalent chromium, predominantly lead, at a scrap metal recycling plant. The remediation effort involved bench testing to determine the most cost effective mix for various levels of the three contaminants of concern. In general, 8 to 12% Portland cement and two poly-silicates, known as K-12 and K-20 were used to lower the leachable lead, copper, and hexavalent chromium levels to acceptable levels. Pilot-scale studies were done in the field. Production-phase remediation involved screening of ontaminated soil was screened on a Nordberg Triple Deck Screen. Fines received the bulk of the remediation attention due to their relatively high levels of contamination. The medium-sized fraction was also contaminated, but contained small rocks, gravel, etc. and needed less chemical/cement for treatment. The coarse fraction (boulders, cobbles broken concrete, and asphalt) did not receive treatment, as the fines could be separated from them during screening on a vibratory screen (Read Screen-All). Soil was stockpiled in approximately 1,000-ton lots. Each stockpile was characterized with a 4 to 1 composite. This determined how much chemicals and Portland cement was to be used for treating that stockpile. After treatment, the treated soil was again stockpiled, and after it was dry, it was sampled again. About 10 – 15% of the time a second treatment was necessary (only about 5% additional cement and a proportional amount of chemicals were used for re-treatment). The production phase included loading contaminated soil into a feed hopper. The soil fell onto a conveyor belt with a built in scale. Weight information was integrated into a system that metered cement out of a cement silo employing a screw auger. The two poly-silicates were also metered into the paddle-wheel mixing

chamber, using the inputs from the feed hopper scale. Actual production varied considerably, but with this setup, 100 tons per hour was the approximate production average, which factored in maintenance and breakdowns (sometimes the screw auger would pack up with cement, paddles would break, conveyor belts would tear or become separated).

Groundwater Monitoring, Lawrence Livermore National Laboratory, California
Mr. DeKlotz served as Project Chemist on this project to provide long-term groundwater monitoring services for a USDOE National Laboratory. The project involved monitoring a wide range of organic and inorganic analytes at 600 wells. Mr. DeKlotz was instrumental in designing and supervising the build out of specially equipped four-wheel-drive vehicles used to support high-quality sampling and sample handling in rough, remote terrain.

Bioventing O&M at MCB Camp Pendleton, California
Mr. DeKlotz served as Project Chemist on a bioventing remediation project involving two former UST sites. Contaminants included diesel fuel, gasoline, BTEX and MTBE. His duties included collection, documentation, and transporting groundwater well samples to an analytic laboratory. He also reviewed all laboratory data sets and resolved data issues prior to their submittal to the Navy as part of the Quarterly Monitoring Reports.

Multiphase Extraction of JP5 Jet Fuel from Contaminated Soil and Groundwater, NAS Lemoore, California
Mr. DeKlotz has served as Project Chemist and Site Superintendent on this remediation project. He was responsible for weekly and monthly inspection, maintenance and monitoring of a multiphase extraction (MPE) system involving liquid-ring-pump (LRP) extraction units and vapor-phase and liquid-phase treatment systems. Vapor was treated using catalytic oxidation technology, while liquid was treated by a combination of oil-water separation (OWS), dissolved-air floatation (DAF), carbon polishing and cartridge filtration. Mr. DeKlotz supervised the collection of PID vapor samples and water treatment system water samples, including field-screening turbidity instruments and Hanby test kits, in addition to conventional fixed-laboratory analysis. He also reviewed all field and laboratory data and prepared data summaries for the monthly OM&M reports.

Site Remediation at Remote FUDS Sites and Missile Silos, Northern CA.
Mr. DeKlotz provided Project Chemist services on this U.S. Army Corps of Engineers contract. The contract covered a wide scope of work, including removal of above-ground and underground storage tanks, removal of contaminated soil and water, asbestos containing materials, and PCB transformers, decontamination of hydraulic systems, and confirmatory sampling and analysis. Mr. DeKlotz used his sound judgment and technical proficiency to respond to on-call requirements to cleanup sites involving illegal dumping of hazardous waste and abandonment of premises containing chemicals of unknown content stored improperly. In the course of his duties, he established liaison contact with regulatory agencies, analytic laboratories, and specialized subcontractors required on site.

Sludge Pond Remediation at Naval Base Ventura County, Point Mugu, CA. This U.S. Army Corps of Engineers, construction project entailed mixing sewage sludge in the oxidation ponds with surface 3 ft of soil to bind elevated metals in the sludge to the resulting sludge-soil mix. The project also involved grading the 37-acre site to suitable elevations and topography in order to restore the area back to a functioning salt march habitat. Mr. DeKlotz was responsible for running the field operations that included a crew of heavy equipment operators, laborers, and environmental scientists. Under his supervision, this large construction project was completed in approximately 60% of the total allocated time.
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APPENDIX B
DATA TRACKING FORMS

DATA TRACKING FORM FOR SOIL SAMPLES FROM UNDER STOCKPILES														
Evergreen Range Interim Corrective Action, Fort Lewis, Washington														
Rec. No.	Sample No.	Stockpile Grid No.	Sample Type	Sampling Date	Analytical Method	Analysis Date	Parameter	Anal. Result Value	Validation Flag	Units	Report. Limit	<250 mg/kg?	Remarks	Data Review
1	*USBA001*	*A001*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
2	*USBA002*	*A001*	*FD*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*19*		*mg/kg*	*20*	*y*	*field dup. of USBA001*	*TP*
3	*USBA003*	*A002*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*50*		*mg/kg*	*20*	*y*	*background*	*TP*
4	*USBA004*	*A003*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
5	*USBA005*	*A004*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
6	*USBA006*	*A005*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
7	*USBA007*	*A006*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
8	*USBA008*	*A007*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*25*		*mg/kg*	*20*	*y*	*background*	*TP*
9	*USBA009*	*A008*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*36*		*mg/kg*	*20*	*y*	*background*	*TP*
10	*USBA010*	*A009*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
11	*USBA011*	*A010*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
12	*USBA012*	*A011*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
13	*USBA013*	*A011*	*FD*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*field dup. of USBA012*	*TP*
14	*USBA014*	*A012*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
15	*USBA015*	*A013*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
16	*USBA016*	*A014*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
17	*USBA017*	*A015*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*17*		*mg/kg*	*20*	*y*	*background*	*TP*
18	*USBA018*	*A016*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*16*		*mg/kg*	*20*	*y*	*background*	*TP*
19	*USBA019*	*A017*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
20	*USBA020*	*A018*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
21	*USBA021*	*A019*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*30*		*mg/kg*	*20*	*y*	*background*	*TP*
22	*USBA022*	*A020*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR SOIL SAMPLES FROM UNDER STOCKPILES

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

Rec. No.	Sample No.	Stockpile Grid No.	Sample Type	Sampling Date	Analytical Method	Analysis Date	Parameter	Anal. Result Value	Validation Flag	Units	Report. Limit	<250 mg/kg?	Remarks	Data Review
23	*USBA023*	*A021*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
24	*USBA024*	*A021*	*FD*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*field dup. of USBA023*	*TP*
25	*USBA025*	*A022*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*45*		*mg/kg*	*20*	*y*	*background*	*TP*
26	*USBA026*	*A023*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
27	*USBA027*	*A024*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
28	*USBA028*	*A025*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
29	*USBA029*	*A026*	*N*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*y*	*background*	*TP*
30	*USB-EB1*	*(rinsate)*	*EB*	*1-Mar-05*	*SW6010*	*20-Mar-05*	*PB*	*20*	*U*	*ug/L*	*2*	*y*	*equip. rinsate for 3/1/05*	*TP*

US=under stockpile, B=background, A=stockpile A

Stockpiles A, B, & C ea. divided into approx. 200 10SY cells

10% FDs, 1 EB/day

U=not detected above MDL

USBB001=first bkgrd. sample under stockpile B; USCA001=first confirmation sample under stockpile A; USB-EB2 for equip. rinsate for day 2

QC Review by _____

QC Review Date _____

DATA TRACKING FORM FOR SOIL SIEVE RESULTS								
Evergreen Range Interim Corrective Action, Fort Lewis, Washington								
Rec. No.	Sample ID	Sampling Date	Sample Type	Sampler	Wt. remaining on sieve in g.	<0.1%?	Remarks	Data Review
1	*SS001*	*15-Mar-05*	*N*	*TP*	*2.1*	*y*		*TP*
2	*SS002*	*15-Mar-05*	*N*	*TP*	*1.4*	*y*		*TP*
3	*SS003*	*15-Mar-05*	*N*	*TP*	*5.2*	*NO*	*>1%; batch re-sieved*	*TP*
4	*SS004*	*15-Mar-05*	*N*	*TP*	*3.8*	*y*	*resample*	*TP*
5	*SS005*	*15-Mar-05*	*N*	*TP*	*3.5*	*y*		*TP*
6	*SS006*	*15-Mar-05*	*N*	*TP*	*4.7*	*y*		*TP*
7	*SS007*	*15-Mar-05*	*N*	*TP*	*1.9*	*y*		*TP*
8	*SS008*	*15-Mar-05*	*N*	*TP*	*0.5*	*y*		*TP*
9	*SS009*	*15-Mar-05*	*N*	*TP*	*2.6*	*y*		*TP*
10	*SS010*	*15-Mar-05*	*N*	*TP*	*4.2*	*y*		*TP*
11	*SS011*	*16-Mar-05*	*N*	*MH*	*1.7*	*y*		*TP*
12	*SS012*	*16-Mar-05*	*N*	*MH*	*3.3*	*y*		*TP*
13	*SS013*	*16-Mar-05*	*N*	*MH*	*2.4*	*y*		*TP*
14	*SS014*	*16-Mar-05*	*N*	*MH*	*3.8*	*y*		*TP*
15	*SS015*	*16-Mar-05*	*N*	*MH*	*4.1*	*y*		*TP*
16	*SS016*	*16-Mar-05*	*N*	*MH*	*0.9*	*y*		*TP*
17	*SS017*	*16-Mar-05*	*N*	*MH*	*0.6*	*y*		*TP*
18	*SS018*	*16-Mar-05*	*N*	*MH*	*2.5*	*y*		*TP*
19	*SS019*	*16-Mar-05*	*N*	*MH*	*4.3*	*y*		*TP*
20	*SS020*	*16-Mar-05*	*N*	*MH*	*3.7*	*y*		*TP*
	SS=stabilized soil sieve sample							

QC Review Date _____

QC Review by _____

DATA TRACKING FORM FOR SAMPLING OF STABILIZED SOIL FOR TCLP

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

Rec. No.	Sample ID	Matrix	Sample Type	Sampling Date	Extract. Method	Anal. Method	Lab Analysis Date	pH	Parameter	Anal. Result Value	Valid. Flag	Units	Report. Limit	<5 mg/L?	Remarks	Data Review
1	ST001	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	100	U	ug/L	100	y		TP
2	ST002	S	FD	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	90		ug/L	100	y	field duplicate of ST001	TP
3	ST003	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	6	PB	120		ug/L	100	y		TP
4	ST004	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	8	PB	250		ug/L	100	y		TP
5	ST005	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	10	PB	180		ug/L	100	y		TP
6	ST006	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	100	U	ug/L	100	y		TP
7	ST007	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	9	PB	100	U	ug/L	100	y		TP
8	ST008	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	5	PB	80		ug/L	100	y		TP
9	ST009	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	8	PB	100	U	ug/L	100	y		TP
10	ST010	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	6	PB	100	U	ug/L	100	y		TP
11	ST011	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	9	PB	100	U	ug/L	100	y		TP
12	ST012	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	170		ug/L	100	y		TP
13	ST013	S	FD	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	160		ug/L	100	y	field duplicate of ST012	TP
14	ST014	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	6	PB	100	U	ug/L	100	y		TP
15	ST015	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	8	PB	100	U	ug/L	100	y		TP
16	ST016	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	10	PB	100	U	ug/L	100	y		TP
17	ST017	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	100	U	ug/L	100	y		TP
18	ST018	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	9	PB	120		ug/L	100	y		TP
19	ST019	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	5	PB	100	U	ug/L	100	y		TP
20	ST020	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	8	PB	100	U	ug/L	100	y		TP
21	ST021	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	6	PB	100	U	ug/L	100	y		TP
22	ST022	S	N	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	9	PB	100	U	ug/L	100	y		TP
23	ST023	S	FD	15-Mar-05	EPA 1322	EPA 6010	30-Mar-05	7	PB	100	U	ug/L	100	y	field duplicate of ST022	TP

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR SAMPLING OF STABILIZED SOIL FOR TCLP																
Evergreen Range Interim Corrective Action, Fort Lewis, Washington																
Rec. No.	Sample ID	Matrix	Sample Type	Sampling Date	Extract. Method	Anal. Method	Lab Analysis Date	pH	Parameter	Anal. Result Value	Valid. Flag	Units	Report. Limit	<5 mg/L?	Remarks	Data Review
24	*ST-EB1*	*W*	*EB*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*7*	*PB*	*100*	*U*	*ug/L*	*100*	*y*	*equip. rinsate for 3/15/05*	*TP*
25	*ST025*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*6*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
26	*ST026*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*8*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
27	*ST027*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*10*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
28	*ST028*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*7*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
29	*ST029*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*9*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
30	*ST030*	*S*	*N*	*15-Mar-05*	*EPA 1322*	*EPA 6010*	*30-Mar-05*	*5*	*PB*	*100*	*U*	*ug/L*	*100*	*y*		*TP*
	ST=stab. soil TCLP sample		10% FDs, 1EB/day												ST-EB2 for equip. rinsate for day 2	

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR CONFIRMATION SAMPLING OF SOIL

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

					Field XRF Testing for Pb in mg/kg									*XRF Cup Test (mg/kg)*			*Laboratory Confirmation Analysis*									
Rec. No.	Sample ID	Grid No.	Sample Type	Sample Collection Date	Field Test Date	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Mean	Cup Test Date	Cup Test Value	Dup. Test Value	Lab Anal. Method	Lab Analysis Date	Parameter	Anal. Result Value	Valid. Flag	Dup. Anal. Value	Units	Report. Limit	<250 mg/kg?	Remarks	Data Review
1	*CS0101*	*1-NW*	*N*	*25-Mar-05*	*26-Mar-05*	*120*								*30-Mar-05*	*130*	*140*	*SW6010*	*15-Apr-05*	*PB*	*140*		*130*	*mg/kg*	*2*	*y*	*dup sample ID CS0101-2*	*TP*
2	*CS0102*	*1-NW*	*FD*	*25-Mar-05*	*26-Mar-05*	*130*								*30-Mar-05*												*field duplicate of CS0101*	*TP*
3	*CS0103*	*1-NE*	*N*	*25-Mar-05*	*26-Mar-05*	*50*								*30-Mar-05*												*bag not archived*	*TP*
4	*CS0104*	*1-W*	*N*	*25-Mar-05*	*26-Mar-05*	*68*								*30-Mar-05*												*bag not archived*	*TP*
5	*CS0105*	*1-C*	*N*	*25-Mar-05*	*26-Mar-05*	*190*								*30-Mar-05*												*bag not archived*	*TP*
6	*CS0106*	*1-S*	*N*	*25-Mar-05*	*26-Mar-05*	*140*								*30-Mar-05*												*bag not archived*	*TP*
7	*CS0201*	*2-NW*	*N*	*25-Mar-05*	*26-Mar-05*	*100*								*30-Mar-05*	*90*		*SW6010*	*15-Apr-05*	*PB*	*95*			*mg/kg*	*2*	*y*		*TP*
8	*CS0202*	*2-N*	*N*	*25-Mar-05*	*26-Mar-05*	*76*								*30-Mar-05*												*bag not archived*	*TP*
9	*CS0203*	*2-W*	*N*	*25-Mar-05*	*26-Mar-05*	*22*								*30-Mar-05*												*bag not archived*	*TP*
10	*CS0204*	*2-C*	*N*	*25-Mar-05*	*26-Mar-05*	*240*	*260*	*250*	*250*	*240*	*260*	*250*	*250*	*30-Mar-05*												*bag not archived*	*TP*
11	*CS0205*	*2-SE*	*N*	*25-Mar-05*	*26-Mar-05*	*85*								*30-Mar-05*												*bag not archived*	*TP*
12	*CS0301*	*3-N*	*N*	*25-Mar-05*	*26-Mar-05*	*140*								*30-Mar-05*	*130*		*SW6010*	*15-Apr-05*	*PB*	*135*			*mg/kg*	*2*	*y*		*TP*
13	*CS0302*	*3-N*	*FD*	*25-Mar-05*	*26-Mar-05*	*130*								*30-Mar-05*												*field duplicate of CS0301*	*TP*
14	*CS0303*	*3-NE*	*N*	*25-Mar-05*	*26-Mar-05*	*210*								*30-Mar-05*												*bag not archived*	*TP*
15	*CS0304*	*3-W*	*N*	*25-Mar-05*	*26-Mar-05*	*220*								*30-Mar-05*												*bag not archived*	*TP*
16	*CS0305*	*3-E*	*N*	*25-Mar-05*	*26-Mar-05*	*71*								*30-Mar-05*												*bag not archived*	*TP*
17	*CS0306*	*3-SW*	*N*	*25-Mar-05*	*26-Mar-05*	*65*								*30-Mar-05*												*bag not archived*	*TP*
18	*CS0401*	*4-NE*	*N*	*25-Mar-05*	*26-Mar-05*	*99*								*30-Mar-05*	*110*		*SW6010*	*15-Apr-05*	*PB*	*120*			*mg/kg*	*2*	*y*		*TP*
19	*CS0402*	*4-C*	*N*	*25-Mar-05*	*26-Mar-05*	*170*								*30-Mar-05*												*bag not archived*	*TP*
20	*CS0403*	*4-SW*	*N*	*25-Mar-05*	*26-Mar-05*	*33*								*30-Mar-05*												*bag not archived*	*TP*
21	*CS0404*	*4-S*	*N*	*25-Mar-05*	*26-Mar-05*	*15*								*30-Mar-05*												*bag not archived*	*TP*
22	*CS0405*	*4-SE*	*N*	*25-Mar-05*	*26-Mar-05*	*110*								*30-Mar-05*												*bag not archived*	*TP*
23	*CS0501*	*5-N*	*N*	*25-Mar-05*	*27-Mar-05*	*170*								*30-Mar-05*	*160*		*SW6010*	*15-Apr-05*	*PB*	*170*			*mg/kg*	*2*	*y*		*TP*
24	*CS0502*	*5-N*	*FD*	*25-Mar-05*	*27-Mar-05*	*160*								*30-Mar-05*												*field duplicate of CS0501*	*TP*

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR CONFIRMATION SAMPLING OF SOIL

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

					Field XRF Testing for Pb in mg/kg									*XRF Cup Test (mg/kg)*			*Laboratory Confirmation Analysis*										
Rec. No.	Sample ID	Grid No.	Sample Type	Sample Collection Date	Field Test Date	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Mean	Cup Test Date	Cup Test Value	Dup. Test Value	Lab Anal. Method	Lab Analysis Date	Parameter	Anal. Result Value	Valid. Flag	Dup. Anal. Value	Units	Report. Limit	<250 mg/kg?	Remarks	Data Review
25	*CS0503*	*5-W*	*N*	*25-Mar-05*	*27-Mar-05*	*88*								*30-Mar-05*												*bag not archived*	*TP*
26	*CS0504*	*5-E*	*N*	*25-Mar-05*	*27-Mar-05*	*180*								*30-Mar-05*												*bag not archived*	*TP*
27	*CS0505*	*5-SE*	*N*	*25-Mar-05*	*27-Mar-05*	*230*	*240*	*250*	*220*	*230*	*250*	*240*	*237*	*30-Mar-05*												*bag not archived*	*TP*
28	*CS0506*	*5-S*	*N*	*25-Mar-05*	*27-Mar-05*	*260*	*250*	*230*	*260*	*250*	*260*	*250*	*251*	*30-Mar-05*												*bag not archived*	*TP*
29	*CS0601*	*6-NW*	*N*	*25-Mar-05*	*27-Mar-05*	*190*								*30-Mar-05*	*190*		*SW6010*	*15-Apr-05*	*PB*	*200*			*mg/kg*	*2*	*y*		*TP*
30	*CS0602*	*6-NE*	*N*	*25-Mar-05*	*27-Mar-05*	*120*								*30-Mar-05*												*bag not archived*	*TP*
	CS=confirmation sample; 01=grid no																										

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR XRF TESTING

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

Rec. No.	Sample ID	XRF Field Test Results in mg/kg of Pb								Field Test. Date	Test. Tech.	< 250 mg/kg?	Archive Bag?	Cup Test for Pb		Data Review
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Mean					Date	(mg/kg)	
1	CS0101	120								3/26/2005	MH	yes	Y	30-Mar-05	130	TP
2	CS0102	130								3/26/2005	MH	yes	Y	30-Mar-05	130	TP
3	CS0103	50								3/26/2005	MH	yes	N	30-Mar-05		TP
4	CS0104	68								3/26/2005	MH	yes	N	30-Mar-05		TP
5	CS0105	190								3/26/2005	MH	yes	N	30-Mar-05		TP
6	CS0106	140								3/26/2005	MH	yes	N	30-Mar-05		TP
7	CS0201	100								3/26/2005	MH	yes	Y	30-Mar-05	90	TP
8	CS0202	76								3/26/2005	MH	yes	N	30-Mar-05		TP
9	CS0203	22								3/26/2005	MH	yes	N	30-Mar-05		TP
10	CS0204	240	260	250	250	240	260	250	250	3/26/2005	MH	NO	N	30-Mar-05		TP
11	CS0205	85								3/26/2005	MH	yes	N	30-Mar-05		TP
12	CS0301	140								3/26/2005	MH	yes	Y	30-Mar-05	130	TP
13	CS0302	130								3/26/2005	MH	yes	Y	30-Mar-05	130	TP
14	CS0303	210								3/26/2005	MH	yes	N	30-Mar-05		TP
15	CS0304	220								3/26/2005	MH	yes	N	30-Mar-05		TP
16	CS0305	71								3/26/2005	MH	yes	N	30-Mar-05		TP
17	CS0306	65								3/26/2005	MH	yes	N	30-Mar-05		TP
18	CS0401	99								3/26/2005	MH	yes	Y	30-Mar-05	110	TP
19	CS0402	170								3/26/2005	MH	yes	N	30-Mar-05		TP
20	CS0403	33								3/26/2005	MH	yes	N	30-Mar-05		TP
21	CS0404	15								3/26/2005	MH	yes	N	30-Mar-05		TP
22	CS0405	110								3/26/2005	MH	yes	N	30-Mar-05		TP
23	CS0501	170								3/27/2005	MH	yes	Y	30-Mar-05	160	TP

QC Review by _____ QC Review Date _____

24	CS0502	160								3/27/2005	MH	yes	Y	30-Mar-05	170	TP
25	CS0503	88								3/27/2005	MH	yes	N	30-Mar-05		TP
26	CS0504	180								3/27/2005	MH	yes	N	30-Mar-05		TP
27	CS0505	230	240	250	220	230	250	240	237	3/27/2005	MH	yes	N	30-Mar-05		TP
28	CS0506	260	250	230	260	250	260	250	251	3/27/2005	MH	NO	N	30-Mar-05		TP
29	CS0601	190								3/27/2005	MH	yes	Y	30-Mar-05	190	TP
30	CS0602	120								3/27/2005	MH	yes	N	30-Mar-05		TP
	CS=confirmation sample; 01=grid no	up to 10% precision samples selected where initial result is near action level											select randomly			

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR SAMPLING OF WASTE WATER

Evergreen Range Interim Corrective Action, Fort Lewis, Washington

Rec. No.	Sample ID	Sampling Date	Sample Type	Anal. Method	Analysis Date	Parameter	Anal. Result Value	Valid. Flag	Units	Report. Limit	<15 ug/L?	Remarks	Data Review
1	*WW001*	*25-Mar-05*	*N*		*10-Apr-05*	*PB*	*1*	*U*	*ug/L*	*1*	*y*		*TP*
2	*WW002*	*25-Mar-05*	*N*		*10-Apr-05*	*PB*	*3*		*ug/L*	*1*	*y*		*TP*
3	*WW003*	*25-Mar-05*	*FD*		*10-Apr-05*	*PB*	*2*		*ug/L*	*1*	*y*	*field duplicate of WW002*	*TP*
4	*WW003MS*	*25-Mar-05*	*MS/MSD*		*10-Apr-05*	*PB*	*3*		*ug/L*	*1*	*y*	*MS/MSD for 3/25*	*TP*
5	*WW004*	*30-Mar-05*	*N*		*10-Apr-05*	*PB*	*5*		*ug/L*	*1*	*y*		*TP*
6	*WW005*	*30-Mar-05*	*N*		*10-Apr-05*	*PB*	*10*		*ug/L*	*1*	*y*		*TP*
7	*WW006*	*30-Mar-05*	*FD*		*10-Apr-05*	*PB*	*11*		*ug/L*	*1*	*y*	*field duplicate of WW006*	*TP*
8	*WW006MS*	*30-Mar-05*	*MS/MSD*		*10-Apr-05*	*PB*	*10*		*ug/L*	*1*	*y*	*MS/MSD for 3/30*	*TP*
9													
10													
11													
12													
13													
14													
15													
	WW=waste water (leachate, decon, etc.)		10% (per sampling event) FDs, 5% (per event) MS/MSDs										

QC Review by _____ QC Review Date _____

DATA TRACKING FORM FOR SAMPLING OF BULLET WASTE STREAM													
Evergreen Range Interim Corrective Action, Fort Lewis, Washington													
Rec. No.	Sample ID	Sampling Date	Sample Type	Sampler	Anal. Method	Analysis Date	Parameter	Anal. Result Value	Valid. Flag	Units	Report. Limit	Remarks	Data Review
1	*BW001*	*15-Mar-05*	*N*	*MH*	*SW6010*	*15-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*		*TP*
2	*BW002*	*15-Mar-05*	*FD*	*MH*	*SW6010*	*15-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*	*field duplicate of BW001*	*TP*
3	*BW003*	*15-Mar-05*	*N*	*MH*	*SW6010*	*15-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*		*TP*
4	*BW004*	*15-Mar-05*	*N*	*MH*	*SW6010*	*15-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*		*TP*
5	*BW005*	*15-Mar-05*	*N*	*MH*	*SW6010*	*15-Mar-05*	*PB*	*20*	*U*	*mg/kg*	*20*		*TP*
6													
7													
8													
9													
10													
11													
12													
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16													
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20													

QC Review by _____ QC Review Date _____

APPENDIX C
XRF METER STANDARD OPERATING PROCEDURE

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Section **Appendix Page B-**

FIELD PORTABLE
X-RAY FLUORESCENCE SPECTROMETER

FIELD LABORATORY STANDARD OPERATING PROCEDURES

1.0 INTRODUCTION

This attachment presents the Standard Operating Procedures (SOPs) for the field portable x-ray fluorescence (XRF) spectrometer methodologies used during the sampling activities discussed in the Fort Lewis Agreed Order Former Small Arms SAP Addendums. The purpose of this SOP is to ensure that standard protocols are being followed during preparation and analysis of soil samples using the Niton 309 Series XRF spectrometer. The procedures discussed in this SOP include sample log-in, sample preparation, and sample analysis.

The XRF uses radiation from one or more radioisotope sources to generate characteristic x-ray emissions from elements in a sample. To measure the fluorescence, a sample is placed in front of the source-detector window and exposed to the primary source x-ray by pulling a trigger on the probe that exposes the sample to radiation from the source. The sample fluorescent and back-scattered x-rays enter through a detector window and are converted into electric pulses in the detector. Within the detector, energies of the characteristic c-rays are converted into a train of electric pulses, the amplitudes of which are linearly proportional to the energy of the x-rays. An electronic multichannel analyzer measures the pulse amplitudes, which is the basis of qualitative x-ray analysis. The number of counts at a given energy over time is representative of the element concentration in a sample and is the basis for quantitative analysis.

2.0 SAMPLE LOG-IN AND STORAGE PROCEDURES

Samples will be delivered to the field laboratory at a minimum of once a day with the Monitoring/Sample Location Summary form, the Sample Collection Form, and chain of custody. Upon receipt, the laboratory custodian will sign off on the custody form, review the field forms for consistency, and enter the field information on the Sample Log-In Form in the laboratory notebook. The sample bags from each residence will be placed in separate boxes for storage. The boxes will be labeled with the Residence ID and the sample IDs and maintained in a locked room for archiving purposes.

3.0 SAMPLE PREPARATION PROCEDURES

Soil samples will be placed directly into labeled plastic sample bags using the hand trowel. Large, non-soil material such as rocks, cobbles and debris will be removed by hand prior to bagging, since these materials could reduce the effective sample volume. The following procedures are to be used for preparing soil samples for field screening XRF analysis.

1. Hand-remove large non-soil material.
2. Place the sample in a labeled zip-loc bag.
3. Homogenize the sample in the bag by shaking and kneading.
4. Place the sample probe directly on the soil for analysis or analyze the soil directly through the plastic bag.

For samples selected for laboratory ICP analysis, add the following steps:

5. Hand sieve bagged soil through a No. 60 mesh sieve stacked on top of a No. 80 mesh sieve.
6. Fill an XRF sample cup with the sieved soil
7. Analyze the cup sample by XRF.
8. Send the XRF cup off to laboratory with proper sample label and chain of custody form.

QC requirements during the sample preparation phase include laboratory duplicates. XRF duplicate sample analyses are performed by taking aliquots of a soil sample from the same bag and performing duplicate preparation steps on each aliquot. A sample splitter will be used to split samples at the different phases of analysis to create representative duplicate samples. The XRF reading will be recorded for each aliquot. The RPD is calculated for the primary and duplicate sample results. Duplicate sample analysis shall be one per every 20 samples. The RPD criteria should be 20 percent.

4.0 SAMPLE ANALYSIS PROCEDURES

4.1 Interferences and Potential Problems

The following interferences or user related errors could affect total error of the XRF analysis:

Sample Placement. Maintaining the same sample distance from the source will prevent changes in the X-ray signal.

Sample Representativeness. Homogenize all samples prior to analysis and select a representative aliquot for analysis.

Chemical Matrix Effects. Interferences from non-target analytes can appear as either spectral interference (peak overlap) or as x-ray enhancement/absorption phenomena. Establishing all chemical matrix relationships and increasing the number of standards during calibration can reduce the error used in quantitation modeling.

Physical Matrix Effects. Particle size, moisture content, and homogeneity of samples can lead to analytical variability. Sieving, homogenizing, and drying samples using the techniques described below will minimize these effects.

Inappropriate Pure Element Calibration. The instrument calibration should include all elements that can be presents at the site, even if it is not a target element.

4.2 Instrument Calibration

While the instrument is factory calibrated, an internal, self-calibration check must be performed whenever the instrument is turned on or instrument parameters are reset. In addition, the calibration check is to be performed once per hour or if ambient temperature changes by more than 10^{o} F since the previous calibration check. For detailed procedures for the instrument self-calibration check the User's Guide.

The high, medium, and low calibration check sample must be analyzed after every instrument internal self-calibration check according to the following procedure:

1. Turn the instrument on and allow it to warm up for 15 minutes.
2. Choose the "Bulk Sample" mode from the Setup screen.
3. Choose "Calibrate and Test" from the Main Menu. In about 1 minute the instrument will finish the internal self-calibration and display "ready to test."
4. Place the prepared soil sample in the testing platform and perform a 5-minute measurement. At the end of the test verify that the percent difference (%D) for each metal are below 20%.
5. If results are not within manufacturer's recommended ranges the instrument internal self-calibration must be performed and check samples reanalyzed. If, upon reanalysis, check sample results are still outside the acceptance range contact the instrument manufacturer technical service for diagnostic help.
6. One silicon sand blank sample will be analyzed for every twenty samples run. Place the silicon dioxide blank sample in the test stand and perform a one minute test**. Do not touch the surface of the blank or you may introduce contamination.** All elements should be reported as "less than limit of detection." If the instrument meets the acceptance criteria in step 4 above but reports a detected element in the silica blank, it is likely that the instrument window is

contaminated. Gently wipe the window with a Q-tip that has been moistened with distilled water and wipe dry with a Kimwipe. Repeat the blank measurement.

4.3 Determining Detection Limits and Quantitation Limits

A low concentration calibration sample will be measured 10 times without moving it, using the anticipated field analysis measuring time. The standard deviation of the mean for each element is calculated from the results. The definition of the detection limit is the value of the mean plus three times the calculated standard deviation value. The quantitation limit is the value of the mean plus 10 times the standard deviation value.

4.4 Intrusive Sample Analysis

1. Following calibration and blank analysis choose the "Bulk Sample" mode from the Setup screen.
2. Fill a XRF sample cup with a ¼ mil Mylar film window as described in the User's Guide. Label the outside of the cup using a marking pen.
3. Place the sample cup on the bulk testing platform and attach the XRF spectrometer.
4. Squeeze the instrument shutter release and press the instrument down to depress the shutter release plunger. The plunger must be fully depressed or the window will not be completely open and readings will be inaccurate. The back of the instrument must be flush with the test guard. **Caution! Do not put your hand on the end plate of the instrument or lift it off the test guard when the shutter is open.**
5. Observe the instrument readings to decide when the desired confidence level (95%) has been achieved (typically 0.5 to 1 minute). Record the result.
6. Lift the instrument. The plunger will back out of the bottom, closing the shutter. If not, push the plunger closed and call the Niton technical Service Department at (401) 294-1234.
7. The next sample is ready for testing.
8. A calibration check sample and blank sample analysis must be performed after every 20 samples or once per hour, whichever is more frequent. A calibration check sample analysis is also performed after the last sample is analyzed. If calibration acceptance criteria are not met, all samples analyzed since the last valid calibration must be reanalyzed.
9. A precision sample will be run at a minimum of one per day. For the first ten residences, three precision samples will be run. These samples will be a sample from the bulk measurement step, the drying step and the sieved step that has been and analyzed seven times in replicate. Following review of this data, the frequency of precision samples will be revised for the remaining sampling activities. The relative standard deviation (RSD) will be calculated for each of the precision samples.

4.5 Decontamination Procedures

All of the non-disposable equipment must be thoroughly decontaminated after each sample is processed to eliminate the possibility of sample cross contamination. Decontamination will be conducted according to the following procedure:

1. Brush off clumps of soil;
2. Scrub equipment in alconox and tap water wash;
3. Rinse with tap water;
4. Rinse with distilled water/nitric acid; and
5. Rinse with deionized water.

In addition, to prevent cross contamination, the technician will change into clean set of polyethylene disposable gloves during the handling of each sample for sieving and drying. Since contact with soil is not anticipated during actual XRF analysis portion, gloves do not have to be changed for each sample run.

4.6 Reporting

At the end of each day, all sample results and spectra are to be downloaded to a computer using manufacturer supplied software. The analyst will review the spectra to evaluate if overlapping peaks are present. The reported value for each analysis should be as follows:

1. Round all sample results to the same degree of significance contained in the calibration samples.

2. All values less than the detection limits will be reported as not detected at the detection limit value.

3. All values greater than the detection limit and less than or equal to the quantitation limit will be reported as estimated (J flagged).

4. All values above the quantitation limits will be reported as is.

5. Values above the calibration range are flagged with an *.

The results are then recorded on the XRF form presented in the laboratory notebook.

APPENDIX D
STL SEATTLE LABORATORY QUALITY MANUAL FOR CHEMICAL ANALYSIS
(*selected portions*)

STL SEATTLE

LABORATORY QUALITY MANUAL

for Chemical Analysis

Revision No. 17
January 14, 2004

LIST OF TABLES

LIST OF FIGURES

- external service contracts (if applicable);
- maintenance and service records, both internal and external.

Maintenance or manufacturer's instrument manuals are available to all analysts. All maintenance performed by the analyst or an outside service is recorded in the maintenance log assigned to that instrument. The in-house consumables list is used as a basis for supply of consumables used during maintenance. Instrument maintenance procedures are documented in laboratory SOPs.

11.0 QUALITY CONTROL SAMPLE ANALYSIS AND EVALUATION

Quality control samples are samples which are routinely added to the normal laboratory sample batch or sequence to demonstrate the laboratory is operating within prescribed requirements for accuracy and precision. Quality control samples are of known content and concentration so that precision, accuracy, and cleanliness of the system can be determined and control charts can be maintained.

Quality control samples are analyzed as recommended herein unless analytical procedures specifically prescribe different quality control sample analysis. If so, the procedure is followed as stated in the standard operating procedure.

11.1 Types of Quality Control Samples

Quality Control samples are analyzed to assess contamination, determine accuracy, or determine precision of the system or of the samples being analyzed. The types of quality control samples used at STL Seattle are described below.

11.1.1 Blank Analyses

Contamination can be introduced into a sample from many sources during the process of sample collection, transport, storage, and analysis. Contamination of the sample from the laboratory or the field can be determined by analysis of the appropriate blank. The blanks used by STL Seattle to determine laboratory contamination or field contamination are defined below.

Method Blank. A method blank is a volume of appropriate matrix, reagents, and solvents, carried through the entire analytical procedure. The volume or weight of the matrix used for the method blank must be approximately equal to the sample volume processed. A method blank is performed with each batch of samples (typically 20, or 10 for certain wastewater methods). The method blank measures combined contamination from the instrument, reagents, solvents, and the all other materials involved in the sample preparation steps. The method blank is critical in distinguishing between low-level field contamination and laboratory contamination. Ideally, a method blank should not contain contaminants greater than the method detection limit for the analyte. Method blank analysis results are maintained with the corresponding analytical data.

Instrument Blank. An instrument blank is a volume of appropriate laboratory solvent(s) or reagent(s) analyzed at the start of an analytical run. The instrument blank measures instrument contamination; detectable levels of target analytes indicate that instrument maintenance must be performed prior to proceeding with the analysis.

Instrument Carryover Blank. An instrument carryover blank is a volume of laboratory reagent and/or solvent that is analyzed following the analysis of a sample containing high concentrations of target analyte. The instrument carryover blank measures carryover contamination that may occur after sample analysis.

Reagent Blank. A reagent blank is an environmental sample containing all method reagents except for a color forming reagent. A reagent blank is used in colorimetric analysis to measure potential interferences derived from the sample matrix.

Refrigerator Blank. A refrigerator blank is a volume of laboratory reagent water that is analyzed for target volatile compounds after a specified length of time in the sample refrigerator. The refrigerator blank measures the amount of cross contamination from samples stored in the refrigerator.

Source Blank. A source blank is a volume of the reagent used to prepare blank samples. The source blank measures contaminants in the laboratory reagent.

Trip Blank. A trip blank is a volume of laboratory water which is sealed in a sample container and accompanies the sample containers during transit, collection, and storage. The trip blank measures the cumulative contamination derived from the source water, sample transit, the sampling site, and sample storage. Trip blank analysis (volatile parameters) results are reported with sample results and are maintained with the corresponding laboratory records.

Site Blank. A site blank is a volume of laboratory water which is sealed in a sample container and accompanies the sample containers during transit, collection, and storage. The site blank container is opened during the sample collection process, to measure background site contaminants that will not permeate a sealed blank, in addition to the parameters described for a trip blank.

Rinsate Blank. A rinsate blank is a volume of a pure water source that has been poured into or over clean field equipment prior to sample collection. This blank should be collected between sample points unless dedicated equipment is available at each site. The rinsate blank measures cumulative contamination (all parameters except volatiles) derived from field sampling equipment, rinsate blank source water, sample transit, the sampling site, and sample storage.

11.1.2 Alternate Source Standard Analyses

Check Standards. A standard of known concentration of target analyte(s) prepared in a controlled matrix. The check standard is analyzed routinely to measure laboratory performance in the absence of matrix interferences.

External Reference Standard. Nonroutine analysis of a standard to measure laboratory performance. Usually introduced as a sample of unknown concentration, as part of the internal quality assurance program.

11.1.3 Spiked Sample Analyses.

Spiked samples are analyzed to assess the accuracy of the analytical method on the spiked sample. The types of spiked samples analyzed at STL Seattle are defined below.

Surrogate Spike. The surrogate spike is a known concentration of a non-target analyte added to each sample prior to sample preparation and instrumental analysis. The surrogate spike recovery measures the efficiency of all steps of the analytical method in recovering the non-target analytes from an environmental sample matrix. The surrogate recovery is assumed to behave identically to the target analytes.

Surrogate standard determinations are typically performed for gas chromatographic analyses. Surrogate spiking compounds are added to all samples and blanks before purging or extraction to monitor sample preparation and analysis. Recoveries must meet established acceptance criteria as stated in the standard operating procedure for the method.

Matrix Spike. The matrix spike is a known concentration of target analytes added to a sample prior to sample preparation and instrumental analysis. The matrix spike recovery measures the efficiency of all steps of the analytical method in

recovering the target analytes from the environmental sample matrix. Typically, the full list of target analytes is spiked into the sample selected for matrix spike analysis. However, for certain organic methods, i.e., 8260B and 8270C, the analyte list is extremely long, components are incompatible, or components interfere with accurate assessment. Therefore, for non Corp. of Engineers samples a representative subset (minimum of 10% of the full analyte list) is chosen for the spiking solution. In these instances, a full analyte list will be spiked into a selected sample (or selected samples) on a semiannual basis to provide recovery data for all target analytes.

Samples may be selected for matrix spike analysis based on client request, or may be selected by the appropriate analyst at the time of sample preparation. Samples chosen by the analyst for matrix spike analysis shall be rotated among client samples in order to address various matrix problems.

The concentration of analytes spiked is approximately the mid range of the calibration, or as specified in the method. For organic analyses, matrix spike analyses are usually performed in duplicate (MSD). Percent recovery for each portion and relative percent difference between two recoveries are calculated and summarized on quality control result data sheets. If there is not enough sample to perform matrix spikes in duplicate, a blank spike may be performed in duplicate. The relative percent difference is charted on control charts. Matrix spike determinations are typically made at a minimum frequency of one for every preparation batch of samples processed (typically 20, or 10 for certain wastewater methods), when adequate sample is available. In the absence of sufficient sample volume for a matrix spike, a blank spike (and a blank spike duplicate) analysis must be performed.

Blank Spike. The blank spike is a known concentration of target analytes added to a blank solution prior to preparation and instrumental analysis. The blank spike recovery measures the efficiency of all steps of the analytical method in recovering the target analytes. Typically, the full list of target analytes is spiked into blank spike sample. However, for certain organic methods, i.e., 8260B and 8270C, the analyte list is extremely long, components are incompatible, or components interfere with accurate assessment. Therefore, a representative subset (minimum of 10% of the full analyte list) is chosen for the spiking solution. In these instances, a full analyte list will be spiked into blank spikes for a selected batch (or selected batches) on a semiannual basis to provide recovery data for all target analytes.

11.1.4 Laboratory Duplicate Analyses

To evaluate precision, duplicate analyses are performed. The types of duplicate analysis performed at STL Seattle are defined below.

Duplicate Sample Analysis. When required by the method two portions of a field sample are simultaneously extracted and analyzed for all target analytes. Duplicate samples are randomly chosen and are analyzed at a minimum frequency of once per sample batch (typically 5%, or 10% for certain wastewater methods). The relative percent difference (RPD) between the two results is calculated and must meet method-specified acceptance criteria. Duplicate RPD is a measure of analytical precision and sample homogeneity. Samples may be selected for duplicate analysis based on client request, or may be selected by the appropriate analyst at the time of sample preparation. Samples chosen by the analyst for duplicate analysis shall be rotated among client samples in order to address various matrix problems.

Matrix Spike Duplicate Analysis. Analysis of two additional aliquots taken from a single field sample and spiked with target analyte(s) prior to sample preparation and analysis. The RPD between the matrix spike analysis and the matrix spike duplicate analysis is a measure of analytical precision and to some extent sample homogeneity.

Blank Spike Duplicate Analysis. Analysis of two separate aliquots taken from a laboratory blank solution and spiked with target analyte(s) prior to sample preparation and analysis. The RPD between the blank spike analysis and the blank spike duplicate analysis is a measure of analytical precision.

11.1.5 Performance Evaluation Sample Testing

Performance evaluation (PE) samples are analyzed on a scheduled routine basis, as well as on a project or client-specific basis. PE samples are also analyzed when new methods are developed. PE samples are analyzed in a manner as similar as possible to routine samples. STL Seattle participates in the following PE sample analysis programs:

- ERA/APG WS
- ERA/APG WP
- ACOE
- State of California/NELAP-specific (ERA)
- NIST

STL Seattle participates in water pollution performance evaluation studies and water supply performance evaluation studies on a semi-annual basis for all accredited/certified parameters as available. Supplemental PE samples are analyzed for additional accredited parameters on a semi-annual basis. When deemed necessary by the quality assurance manager or the laboratory management, additional performance evaluation samples from commercial sources or from individual clients may also be introduced. Performance Evaluation samples are typically purchased from Analytical Products Group or Environmental Resource Associates. The data are reported to and summarized by the quality assurance manager. Data results are then evaluated and presented to laboratory management and any associated accreditation agencies for review and corrective action, if needed. Additional PE samples may be analyzed as part of corrective action. When deemed necessary, reference materials are also available for analysis.

11.1.6 Single and Double Blind Performance Evaluation Sample Testing

Double blind PE samples are submitted the STL Seattle laboratory for analysis once yearly by the Corporate QA Director. Single blind PE samples may also be submitted by the STL Seattle QA manager; the results are calculated and the results made available to the analysts and department supervisors. Results outside the method limits will be evaluated and corrective action initiated if necessary.

11.2 Routine Procedures Used To Assess Data Precision, Accuracy, and Representativeness.

The routine procedures used to assess data precision, accuracy, and representativeness used at STL Seattle are described below.

Precision. Precision is expressed as relative percent difference (RPD) or as percent difference (%D) based on duplicate analyses of a sample, a MS, or a BS. The relative percent difference is calculated as:

$$\text{Relative Percent Difference} = \left[\frac{(X_1 - X_2)}{(X_1 + X_2)/2} \right] * 100$$

where X_1 and X_2 are, respectively, the first and second values obtained for the analysis.
Percent difference is calculated as:

$$\text{Percent Difference} = \left[\frac{(X_S - C_T)}{(C_T)} \right] * 100$$

where X_S is the observed concentration of the continuing calibration sample and C_T is the true concentration of the continuing calibration sample. When not specified by method or regulation, a default criteria for RPD will be used until there are sufficient data points to establish laboratory historical mean ± 3 standard deviations using control chart results. STL Seattle default quality control acceptance level for sample precision is ± 20 % D or RPD =20, for water matrix, and ± 30% for soil and wipe matrix, as determined by duplicate analyses. It must be recognized that for analytes at concentrations of less than five times the method detection limit, it may be difficult to meet this objective.

Accuracy. Accuracy is usually expressed as percent recovery (%R), which is calculated as:

$$\text{Percent Recovery} = \left[\frac{X_S}{C_T} \right] * 100$$

where X_S is the observed concentration of the continuing calibration sample and C_T is the true concentration of the continuing calibration sample. Standard reference materials or certified quality control samples, such as are available from NIST, the Environmental Protection Agency, and various commercial sources, may also be analyzed to assess accuracy if such are available with a composition similar to the samples of interest.

When not specified by method or regulation, a default criteria for MS and BS will be used until there are sufficient data points to establish laboratory historical mean ± 3 standard deviations using control chart results. STL Seattle default quality control acceptable range for accuracy is 85 to 115% percent recovery of a calibration standard. Recoveries of matrix spike compounds are method and matrix dependent; acceptable ranges are provided in the method SOPs.

Representativeness. In order that the reported results are representative of the sample received, STL Seattle makes a reasonable effort to assure that the samples are adequately homogenized prior to sampling for analysis when appropriate. STL Seattle cannot control factors in the field that may affect sample representativeness.

11.3 Continuing Calibration Evaluation

The calculated concentration of the standard versus the actual concentration of the standard is calculated as percent recovery (%R) for each parameter. Unless otherwise specified in the method procedure, control limits are set at 15% from the expected value, or %R = 85-115%, or <15% drift. If the continuing calibration verification is outside control limits, a new initial calibration curve must be established.

11.4 Evaluation of Quality Control Data

STL Seattle applies acceptance criteria to all quality control data. When a sample analysis is complete, the quality control data are reviewed and evaluated by using acceptance criteria as given in the standard operating procedure or as specified by the client. This evaluation is used to validate the corresponding data set. Evaluation is based on the criteria described below. Data evaluation procedures for specific instrument systems/methodologies are detailed in Appendix E of this Manual.

11.4.1 Check Standard Evaluation

The measured concentration of the standard versus the actual concentration of the standard is calculated for each parameter. Unless otherwise specified in the method procedure, control limits are set at 15% from the expected value. If the check standard is outside control limits, values outside the acceptable ranges require investigation to determine the source of error and provide corrective action. Following problem correction, the check standard or the standard reference material is reanalyzed if possible.

15.1.2 QC Review

A data review specialist is responsible for reviewing all reports (hardcopy and electronic) generated at the laboratory. Quality control review of data reports, in general the following items are reviewed:

- Check that the data has been reviewed and released by the department.
- Check that transcription of raw data is correct, 10%.
- Check at least 10 percent of all calculations, if errors are found all calculations are checked
- Check that raw data is complete and in order reported.
- Check that the matrix units are correct, and match the sample matrix.
- Check that QC (blanks, duplicates, spikes) are present and within limits (or check flags).
- Review surrogate recoveries; make sure they are within QC limits (or check flags).
- Check that PQLs are correct.
- Check for comments or nonconformances that should be noted in the narrative.
- Check holding time for method against extraction/analysis dates.
- Check that everything is present to meet the deliverable requirement.

15.1.3 Reporting Data Outliers and Anomalies

The project manager is responsible for preparing the final data report. The project manager insures that the project is complete and that the client name, project name and client IDs are correct. The report writer checks the batch file for any corrective action memos or comments that should be included in the report. If it is necessary to flag any data or discuss anomalies or outliers with the client, the report writer includes this information by either selecting the appropriate data flags or writing an explanatory narrative.

15.2 Initial and Signature Identification

The quality assurance manager maintains a list of employees with their printed names, initials, and dates of employment so their work can be positively identified.

16.0 DATA REPORTING

Data reports are the final product of any laboratory effort. Data must be presented in a format that satisfies project requirements and presented clearly and completely in order to avoid confusion or miscommunication.

16.1 Format and Content

The format and content of a data report are dependent upon project needs, such as client or contract requirements or the need for explanatory text. The STL Seattle quality assurance program does not specify an exact report format. However, several components are required for final data presentation. The final data report is reviewed in accordance with data verification requirements of Section 14 and approved by the project manager.

As a minimum, the final report submitted to the client consists of a transmittal memo, analysis reports for each test performed, and quality control information. The format for each of these components is discussed in the following subsections.

TABLE 17-1. PROJECT FILE CATEGORIES

Proposal and Costing
Contract/Purchase Order
Correspondence
Statement of Work
Quality Assurance Project Plan
Project Specific Methods, Regulations, or Protocols
Project Specific Audit Records

TABLE 17-2. WORKORDER FILE CATEGORIES

Chain-of-Custody
Request for Analysis/Work order
Airbill
Phone Notes/Client Contact Record
Nonconformance Record/Corrective Action Form
Analytical Data Sheets
Raw Data
Batch QC Summary Sheets
Final Hardcopy Report
Final Electronic Deliverables
Invoice

TABLE 17-3. QUALITY ASSURANCE FILE CATEGORIES

Periodic Calibration Logs
Instrument Preventive Maintenance Records
Performance Evaluation Records (external and internal)
Certification Program Records
Retired Log Books
Control Charts
Quality Assurance/Quality Control Reports to Management
Standard Operating Procedure and Laboratory Quality Manual Distribution Records
Standard Operating Procedure and Laboratory Quality Manual Originals
Corrective Action Forms
Analytical Methods
Audit Records
Training Records

narrative to accompany reporting of the nonconformance. For some nonconformance events, a second signature from the QA department is required in addition to the analyst signature.

Nonconformance memorandum forms for sample receiving and for extraction, analysis, and reporting are available; however, a client contact record may serve to document a problem and the associated corrective action. Employees identifying a problem that may affect data quality are responsible for initiating a nonconformance/corrective action memo or other record of the event.

Broken bottles, improper preservation, improper labeling, headspace, or other nonconformance detected at the time of sample receipt will initiate action; generally, the client will be contacted before work can proceed.

Many nonconformances can be corrected at the analyst/technician level; however, if the person initiating the corrective action form is not able to take corrective action, it is the responsibility of that person to inform someone who can do so. All nonconformance documentation and subsequent corrective actions are placed in a relevant workorder data file and a copy provided to the QA department. The quality assurance manager keeps a file documenting nonconformances, and summarizes the overall findings in the monthly quality assurance report.

18.3 Authority

If nonconformance events compromise reported results, QC personnel or project managers have the authority to not report the results, or to report the results with qualification. The samples may be reanalyzed by the laboratory, or the client will be contacted to obtain additional sample, or to continue "as is" if that is a feasible solution to the problem. If an analyst observes a sample nonconformance that requires a "stop work" action, the analyst will notify the project manager.

18.4 Preventative Action

Preventative action is defined as noting and correcting a problem before it happens, because of a weakness in a system, method, or procedure. Preventative actions include analysis of quality system to detect, analyze, and eliminate potential causes of nonconformances. When potential problems are identified, preventative action is initiated to effectively address the problem and alleviate the identified risk. Preventative action measures are reviewed during annual management reviews. Preventative actions are documented by the initiator, and documentation is maintained by the QA department.

19.0 INTERNAL QUALITY ASSURANCE AUDITS AND SURVEILLANCE

19.1 Routine Surveillances

Routine laboratory surveillances are performed by the quality assurance manager or qualified designee, to provide ongoing monitoring of laboratory operations. These surveillances are considered "spot checks" and can focus on one or more of the following subjects:

- sample maintenance (holding times, storage issues);
- calibration (frequency, standard sources, acceptance criteria issues. Are calibrations properly documented in instrument logbooks, on data sheets, or, if required, as part of project data? Do calibration results indicate a trend in instrument performance?);
- preventative maintenance (Are adequate spare parts available? Is preventative maintenance performed and properly documented?);

- receipt and storage of standards, chemicals, and gases (standard certification issues. Are all reagents, chemicals, and gases purchased for use in the laboratory of adequate grade for the intended use? Are materials adequately stored to prevent degradation? Are materials kept beyond stated shelf life? Are internal standards properly prepared and stored? Are internal standards kept beyond stated shelf life?);
- data validation (Are data processed and peer reviewed as prescribed?); and,
- records management (Are the analysis records complete and properly identified? Are documents submitted to the record system in a timely manner and are they properly maintained?).

Nonconformances observed during routine surveillances are reviewed by the quality assurance manager and discussed with the involved parties; recommendations may be forwarded to the department supervisors for corrective action. The quality assurance manager keeps a file documenting nonconformances, occurrence date, reason for occurrence, corrective action date, the corrective action taken and other observations or comments.

19.2 System Audits

An appropriately trained and qualified internal auditor conducts system audits. The audits are conducted once per year and provide a thorough overview of the quality assurance program and technical operations within the laboratory. The audit is external to the QA program, with reporting directly to the company officers. System audits review laboratory operation and resulting documentation, including all items reviewed during routine surveillances.

Audits by the internal auditor are performed in the following manner:

- an audit plan is prepared, reviewed and updated for every routine audit with consideration to information gained during previous audits. The audit plan defines participants, applicable documents, schedule, and scope of laboratory activities:
- based on the audit plan, a detailed checklist is prepared;
- a pre-audit meeting takes place with the QA manager to discuss the audit plan;
- performance of the audit;
- at the close of the audit, a post-audit meeting is held to discuss the audit findings; and,
- an audit summary report is prepared by the quality assurance manager to discuss details such as the audit date, the audit team members and persons contacted in the laboratory, the laboratory operations audited, a summary of findings and observations requiring corrective action and, if possible, the means for correction.

The laboratory analysts are responsible for responding to findings and observations for their area. Responses are in writing to the quality assurance manager and state the corrective action taken or the action underway. If correction can be verified through documentation, the section leader attaches corrective action documentation to the audit response. Upon receipt of the audit response, the quality assurance manager verifies corrective action completion and then closes the particular finding.

During the course of system audits, the internal auditor is cognizant of recurring nonconformances in the laboratory or trends that affect quality. Recurring nonconformances and trends are addressed in the audit report. Correcting such events may require reviewing the quality assurance program. If the inherent problem lies within the program, the program is amended through appropriate revision of quality assurance documents.

19.3 Documentation

All documentation pertaining to each system and technical operations audit is maintained in a dated folder in the "Audit" category of the quality assurance files. The routine surveillance log is also maintained in the "Audit" section within the

quality assurance files. All quality assurance records are open to all employees. All records are also available for client review on the premises of STL Seattle.

19.4 Authority

If surveillance or audit findings compromise the quality of sample results, the internal auditor and quality assurance manager have the authority to stop the reporting of results, or to qualify any results associated with the finding. The samples may also be reanalyzed by the laboratory, or the client contacted to obtain additional sample for analysis.

20.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The quality assurance manager is responsible for preparing various reports to the laboratory officers indicating the effectiveness of the quality assurance program.

20.1 Audit Reporting

Audit reports generated from the annual system and technical operations audits are prepared and distributed as per Section 19 of this manual.

20.2 Monthly Quality Assurance/Quality Control Report

The STL Seattle quality assurance manager prepares a monthly quality assurance/quality control summary. This report is submitted to laboratory department supervisors, laboratory general and operations managers, and the STL Corporate QA manager at the beginning of the following month. The report includes, but is not limited to, the following sections:

- Audits and Routine Surveillances - including auditing party or individual, dates, reason for audit, and reference to summary findings.
- Nonconformances/Holding time violations - summary of nonconformances and associated corrective action.
- Revised reports/client complaints.
- Certification/Accreditation/scope changes
- Performance Evaluation/Proficiency Testing Samples - including certifying agency, expiration date, and approved parameters.
- Standard Operation Procedures - a summary of SOP status.
- Internal issues – improvements, regulatory compliance issues, general concerns, interactions with Corporate QA.
- Goals - a discussion of future plans for new standard operating procedures, quality assurance plan revisions, etc.

20.3 Management Review of the Quality Assurance Program

Review of the quality assurance program is ongoing. At any time, a department supervisor may present recommended changes to the quality assurance manager. Documented management review is conducted annually at a minimum for each department. Typically, the management review is accomplished through monthly quality assurance reporting, goal setting, and annual LQM review. Management reviews consider the suitability and effectiveness of the quality assurance program, review laboratory audits and corrective actions, evaluate laboratory operations as they pertain to the department. Suggestions for changes and/or improvements and preventative action measures are documented. The STL Corporate Quality Management Plan and STL Seattle's management review SOP provide further guidance to department supervisors on this topic. During system audits, the quality assurance program is discussed. The audit report documents recommendations made by either the department supervisor or the audit team for revision.

- Samples are examined for analytes with concentrations that exceed the instrument calibration range. If the sample has been diluted based on previous analysis or screening results that indicate a high level of contamination, a target analyte should be within the upper half of the initial calibration range. This may not be possible, however, for samples that contain high concentrations of non-targeted compounds.
- The reported value for each analyte is flagged with any applicable QC qualifiers.
- The calculated results for the sample are peer-reviewed at a frequency of at least 10 percent. Units and reporting limits are also verified.

Instrument System: ICP, Simultaneous and Sequential/ICP-MS

- If matrix interferences are suspected for any element, the sample scan for that element is reviewed by the analyst prior to reporting results.
- The concentrations of the target elements are reviewed to determine if concentrations exceed the instrument linear range.
- Batch QC, which is performed at a minimum frequency of five percent (10% for Method 200.7 and 200.8) is evaluated to determine acceptability. The matrix spike or blank spike and duplicate results are compared to method and matrix specific QC limits. Quality control check standards are evaluated for acceptable recoveries, based on the method-specified QC limits.
- Method blanks are examined for the presence of target elements above half the reporting limit.
- The reported value for each element is flagged with any applicable QC qualifiers.
- The calculated results for the sample are peer-reviewed at a frequency of at least 10 percent. Units and reporting limits are also verified.

Instrument System: CVAA (Mercury)

- The concentrations of the target elements are reviewed to determine if concentrations exceed the instrument calibration range.
- Batch QC, which is performed at a minimum frequency of five percent is evaluated to determine acceptability. The matrix spike or blank spike and duplicate results are compared to method and matrix specific QC limits. Quality control check standards are evaluated for acceptable recoveries, based on the method-specified QC limits.
- Method blanks are examined for the presence of target elements above half the reporting limit.
- The reported value for each element is flagged with any applicable QC qualifiers.
- The calculated results for the sample are peer-reviewed at a frequency of at least 10 percent. Units and reporting limits are also verified.

Instrument System: IC (Anions)

- Peak retention times are evaluated by the analyst to determine the presence of target analytes based on the established method. Chromatographic peaks are evaluated for signs of matrix interferences or poor integration.
- Batch QC, which is performed at a minimum frequency of ten percent for spikes and five percent for duplicates and method blanks is evaluated to determine acceptability. The matrix spike or blank spike and duplicate results are compared to method and matrix specific QC limits. Quality control check standards are evaluated for acceptable recoveries, based on the method-specified QC limits.
- Method blanks are examined for detectable levels of target analytes.
- Samples are examined for analytes with concentrations that exceed the instrument calibration range.
- The reported value for each analyte is flagged with any applicable QC qualifiers.
- The calculated results for the sample are peer-reviewed at a frequency of at least 10 percent. Units and reporting limits are also verified.

FINAL

WASTE MANAGEMENT PLAN

Former Evergreen Infiltration Range
Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

FINAL

WASTE MANAGEMENT PLAN

Former Evergreen Infiltration Range Remedial Action Fort Lewis, Washington

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Submitted to:

U. S. Army Corps of Engineers – Seattle District
Attn: Matt Allen (PM-EM)
4735 East Marginal Way South
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Submitted by:

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Project No. J202
January 2005

Reviewed and Approved by:

_____

Timothy Yu, Ph.D., PE
Program Manager

TABLE OF CONTENTS

APPENDICES

List of Acronyms and Abbreviations

APP	Accident Prevention Plan
BMP	Best Management Practices
CFR	Code of Federal Regulations
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
DERA	Defense Environmental Restoration Permit Program
DOT	United States Department of Transportation
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	Exclusion Zone
FIO	For Information Only
GA	Government Approved
LRI	Land Recover Inc.
MLLW	Mean Low Level Water
MP	Management Plan
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
QCSM	Contractor Quality Control System Manager
RORO	Roll-On, Roll-Off
SAP	Sampling and Analysis Plan
SHM	Site Safety and Health Manager
SPERP	Spill Prevention and Emergency Response Plan
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan/Accident Prevention Plan
SWPPP	Storm Water Pollution Prevention Plan
SWPs	Safe Work Practices
TLV-TWA	Threshold Limit Value- Time Weighted Average
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WP	Work Plan
WWMP	Waste Water Management Plan

1.0 INTRODUCTION AND BACKGROUND

This Waste Management Plan (WMP) is a component of the project Remedial Action Management Plan (RAMP). The WMP describes the waste management and disposal procedures to be implemented by TPA-CKY Joint Venture (TPA-CKY) and its subcontractors as part of the contractor services described in the plans and specifications for Contract No. DACW67-03-D-1007, Task Order No. 0002.

1.1 SITE LOCATION

The remediation areas are located on Fort Lewis. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The Former Evergreen Infiltration Range (AOC 4-6.3) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. Work activities will begin at the Evergreen Infiltration Range and then move operations to the Thompson Machine Gun sites. The remediation area at the Thompson Machine Guns sites is currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area.

1.2 SITE BACKGROUND

The former Evergreen Infiltration Range was identified from a 1951 aerial photograph and appears to have been in use until 1965. This site was used to condition soldiers to move under live fire and under combat type situations. Fixed-position machine guns firing into an impact berm provided live fire training. The ammunition associated with infiltration range training during this era was the .30 caliber cartridge. Soil contamination was documented in the impact berm. The primary contaminate of concern is lead. The maximum detected concentration was 62,500 mg/kg. Antimony and copper were also detected, but only when lead was above the action level of 250 mg/kg.

The former machine gun sites (AOC 4-6.1 and 4-6.2) were identified on a 1944 map. Preliminary assessment activities did not confirm site use. Recent magnetometer work confirmed the presence of .45 caliber bullets in isolated pockets. Site assessment is currently being performed by USACE to delineate remediation areas.

1.3 PLAN OBJECTIVE

This WMP has been developed in accordance with Section 02120 of the contract specifications.
The intent of the WMP is to detail the specific field and administrative activities required to complete this contract in accordance with project plans and specifications. The overarching objective of this project is to perform on-site remediation and to minimize off-site waste disposal. However, the potential need for disposal of non-hazardous (e.g., cleared debris and stabilized rocky soils) and hazardous (e.g., material failing TCLP) exists and must be planned for. This plan contains the following:

- The job titles, duties, and training qualifications of key personnel working on this project.
- Equipment, methods and procedures for transportation and disposal of project waste.
- The names, addresses and point of contact of companies associated with transportation and final disposal of project waste. This information also includes U.S. Environmental Protection agency (EPA) identification number, verification of Hazardous Waste Transporter license in accordance with DOT regulations and Notice of Violation status.
- Written commitment to verify direct transportation of the waste to an approved recycling/reuse and disposal facility, and for expeditious final disposal of waste.

- Description of waste transport routes, both non-hazardous and hazardous wastes.
- Method for measuring on-site stockpiled debris.
- Unit cost for transportation and disposal of applicable waste.
- List of generated wastes.

This WMP will provide for the transportation and disposal of specified materials. The Work Plan (WP) details the handling and placement of those materials in the approved staging areas. The disposal of these materials will be in accordance with the appropriate specification and the U.S. Army Corps of Engineers (USACE) will be notified in writing two weeks prior to disposal.

1.4 CONTRACTOR REQUIREMENT

TPA-CKY shall supply all labor, equipment and materials to load, transport and dispose of all wastes. TPA-CKY shall be required to provide appropriate means for transferring or loading wastes into the transportation vehicles. Care shall be taken to prevent spillage or leaks during the transfer operation. TPA-CKY shall have sufficient spill equipment on hand during the transfer process. TPA-CKY shall observe and be on hand throughout the transfer operations to ensure safe and sound transfer.

TPA-CKY shall provide 24-hour emergency contact during transportation. The contractor may employ one or more transportation contractors. The transporter shall have all appropriate licenses, medical certifications, permits and registrations for hauling the waste.

1.5 FORT LEWIS SPECIFIC DOCUMENTATION REQUIREMENTS

This plan will be implemented in accordance with all provisions of Fort Lewis (FL) Reg. 200-1 and WAC 173-303.

Each waste profile shall be recorded separately on a FL-approved hazardous waste profile packet (available from PW ENRD Operations (HW) section, Bldg.1210). Completed Waste Profiles shall be turned in to PW ENRD Operations, (HW) Section, Bldg. 1210, Fort Lewis.

The Contractor shall not contract, manifest or dispose of any Regulated, non-RCRA, or State listed wastes, if any. Only PW ENRD, Operations (HW) section personnel, shall dispose of wastes, which are collected in FL-issued containers.[1]

[1] The specification calls for the contractor to "appoint in writing and provide to the PW ENRD Operations (HW) no later than (NLT) 60 days before commencement of contract the names of both the Environmental Compliance Officer (ECO) and the Hazardous Waste Technician (HWT). TPA-CKY does not anticipate the accumulation of hazardous waste other than stockpiled bullets/bullet fragments and will therefore not require FL-issued containers. This requirement is recognized as not applicable to this project.

2.0 KEY PERSONNEL

- Transportation and Disposal Coordinator (TDC): Mark Hallock
- Site Superintendent (SS): Mark Hallock
- Quality Control System Manager (QCSM): Noah Rivera
- Project Chemist: Mike DeKlotz

Resumes of Messrs Mark Hallock, Noah Rivera, and Mike DeKlotz are provided in the SAP.

The TDC or his designee, the QCSM, shall have the following duties and responsibilities:

- Meeting all regulatory matters, manifest compliance issues, and permit requirements in accordance with the project specifications, CQCP, WMP, SSHP, and all Federal, State, and local regulations. In addition, the TPC will coordinate the review of all manifests and related documentation.
- Ensuring that all waste disposed of during this contract will be properly managed, transported, and disposed of at a State - approved facility.
- Coordinating with COR and TPA-CKY Project Manager before performing any additional analysis necessary to ensure compliance with the treatment and disposal requirements of the disposal facility.
- Performing quality control reviews and ensuring completeness of all manifests, waste profile sheets, land disposal restriction notification and certification forms, and any other documents required by Federal, State, and local regulations.
- Tracking shipments to ensure receipt of waste in required time frames.
- Completing discrepancy and/or exception reports as required in accordance with 40 CFR.
- Performing site quality control checks to verify proper packaging, marking, labeling, handling, placarding, and shipping phases of project.
- Maintaining knowledge of applicable Federal, State, and local laws and regulations pertaining to the handling and disposal of site specific solid and waste. The CRS will become informed of new or changed requirements and disseminate information appropriately.
- Preparing in draft form all required Federal, State, and local waste reports and manifest packages, and certify as complete before submittal to government.
- Providing proper notifications to the USACE through TPA-CKY's site superintendent two weeks prior to the packaging, transportation and disposal of specified materials.

The alternate TDC shall perform the duties of the TDC in his absence.

3.0 HANDLING, STORAGE, TRANSPORTATION AND DISPOSAL OF WASTES

Soils excavated from the impact berm will be screened and remediated. The initial design screening process will divide the material into four waste streams:

1. rocks and cobbles;
2. whole bullets, large bullet fragment, and incidental pebbles;
3. small bullet fragments and incidental pebbles; and
4. soil to be treated.

The rocks and large cobbles are non-hazardous. They will be left on-site or placed as directed by the COR. Whole bullets and bullet fragments will be containerized and then transported to a local recycler and recycled as lead (see Section 5.5, below, for recycler acceptance criteria and a list of recycler facilities that may be used on the project). Bullet fragments and incidental pebbles will be recycled or fixated and disposed of as non-hazardous material. After fixation, TCLP confirmation samples will be collected per the SAP and a disposal profile will be obtained. The material will then be transported off site and disposed of as non-hazardous material. Although not anticipated, if the confirmation samples indicate that the material is still hazardous then the material will be profiled and transported off site as a hazardous material. The remaining soil will be fixated on site. After fixation confirmation samples will be collected to verify that the material is non-hazardous. The material will then be transported to active ranges on Fort Lewis. The material will be placed at the ranges as directed by the COR.

Prior to transportation, the material will be stored in stockpiles. The stockpiles will be located in the work area. All work areas will be fenced to prevent unauthorized entry. Appropriate warning placards will be posted. Visitors will be directed to sign in at the field office. No unauthorized personnel will be allowed in the work area. The Fort Lewis MP office will be notified of activities, work area locations, equipment, working and non-working hours.

The on-site transportation of the non-hazardous treated soils will be performed by a licensed transportation firm. The material will be transported in end dumps. Trucks will be equipped with identification placards.

The off-site transportation of non-hazardous and hazardous materials will also be performed by a licensed transportation firm. All material will be properly shipped in accordance with Federal, state and local regulations, including weight limits. Sampling, profiling and manifesting and support documentation will be completed prior to any material being shipped off site. Copies of manifests, bills of lading and weight certificates will be provided to the COR in the project close-out documents.

No manifest is required for stabilized soil. Contaminated water and potentially the bullet waste stream if it is to be sent off-site will require manifesting. Material shipping manifesting shall be in accordance with 40 CFR 261, 40 CFR 262, 40 CFR 268, 49 CFR 172, and 49 CFR 178.

4.0 SCHEDULES FOR TRANSPORTATION AND DISPOSAL OF WASTE

The scheduled start and completion dates for specific features of work are given in the project schedule included in the MP. The schedule allows for the complete and proper disposal of these materials in a manner consistent with the contract documents.

TPA-CKY will finalize scheduling with the transportation and disposal companies shortly after project starts. Non-contaminated soil and debris will be scheduled for removal as it is excavated or shortly thereafter. Potentially contaminated soils will be segregated and stockpiled. Samples will be collected and waste profiles will be obtained for appropriate disposal. The contaminated material will then be scheduled for disposal. Due to limited space for stockpiling, contaminated and non-contaminated soil and debris will be scheduled for off-site disposal as soon as practicable.

5.0 COMPANIES ASSOCIATED WITH WASTE AND DISPOSAL

As the material has not yet been profiled we have not finalized disposal facilities. Listed below are potential transportation and disposal companies. Also due to variances in trucker workloads we may use some or all of the transportation companies listed below.

5.1 TRANSPORTERS FOR SOIL AND DEBRIS

Name: Maplewood Construction, Inc.
Address: PO Box 927
Lakebay, WA 98349
Contact: Kerri Kilfoyle
Phone: (253) 377-4175
EPA I.D. No.: WAR000007252

Name: Cokamar Trucking, Inc.
Address: 16952 Clear Creek Road
Polsbo, WA 98370
Contact: Mary Webster
Phone: (360) 697-4622
EPA I.D. No.: WAR000007252

Although we do not anticipate handling or disposing of hazardous waste, the principal transporter for hazardous waste, if deemed necessary, will be:

Name: Waste Management
Address: 13225 NE 126th Place
Kirkland, WA 98034-8701
Contact: Mark Wells
Phone: 425-823-6164
EPA I.D. No.: ORD089452353

5.2 TRANSPORTOR FOR WASTE WATER

Residual wastewater may be generated during remediation. If off-site disposal is necessary, wastewater samples will be collected and submitted for laboratory analysis. Analytical results of methods requested by Port of Tacoma will be forwarded to City of Tacoma POTW for disposal approval. Should the waste water not be approved for disposal by the City of Tacoma POTW, TPA-CKY will immediately locate the most cost-effective alternative based on the waste classification and submit the information to the USACE.

Transporter(s) for waste water from this project will be:

Name: Certified Cleaning Services, Inc.
Address: 2103 East 112th Street
Tacoma, WA 98445
Contact: Dan F. Nobel
Phone: (253) 536-5500

EPA I.D. No.: WAR000011122

5.3 NON-HAZARDOUS WASTE DISPOSAL FACILITIES

Name: LRI
Address: 30919 Meridian Street East
Graham, WA 98338
Contact: Ray Thompson
Phone: 253-414-0362
EPA I.D. No.

Name: Waste Management
Address: 13225 NE 126th Place
Kirkland, WA 98034-8701
Contact: Mark Wells
Phone: 425-823-6164
EPA I.D. No. ORD089452353

5.4 HAZARDOUS WASTE DISPOSAL FACILITIES

Name: Waste Management (Sales Office)
Address: 13225 NE 126th Place
Kirkland, WA 98034-8701
Facility: Arlington, Oregon
Contact: Mark Wells
Phone: 425-823-6164
EPA I.D. No. ORD089452353

5.5 LEAD RECYCLER ACCEPTANCE CRITERIA AND FACILITIES

As indicated in the Work Plan and the SAP, whole bullets, large and small bullet fragments, and incidental pebbles will be separated by mesh size in a screening plant. It is anticipated that waste streams containing these components will be recycled at General Commodity Company (GCC) of 320 E. 32nd Street, # 410, Tacoma, WA 98404-1609 (POC Jerry Hyman 253-964-3690). GCC indicates it will accept a sliding-scale percentage of foreign material with whole bullets and bullet fragments.

The recycling waste profiling process will consist of submitting samples of each of the screened waste streams. GCC has a sliding-scale set of acceptance criteria, based on volume of material and metal-to-foreign-material percentages. TPA-CKY will submit preliminary samples to GCC obtained during bench testing and waste profile samples collected during full-scale operations. TPA-CKY will closely monitor and adjust the screening process to maximize the amount of recycled material.

Any material that is not accepted by the recycler will be included with the input to the stabilization process or, as a last resort, disposed of as hazardous waste.

6.0 VERIFICATION OF TRANSPORTATION OF WASTES

As part of this WMP, TPA-CKY shall verify that the specified waste shall be directly transported only to State-approved disposal/recycling facilities. The waste generated by this contract shall be disposed of as expeditiously as possible. TPA-CKY will only use properly permitted, licensed, bonded and insured subcontractors. These companies will be required by their subcontracts to provide all necessary representations and certifications before any transportation or disposal activities are initiated. In addition, they will be required to provide certificates of final disposal and manifesting documentation in accordance with all applicable Federal, State and local regulations and the contract specifications.

7.0 TRANSPORTATION ROUTES

Appendix A includes the routes that will be used to transport the soil and debris, petroleum-impacted soil (Subtitle D Waste), and hazardous waste (Dangerous Waste) from the Evergreen and Thompson sites to the LRI facility and Waste Management facility. This will be done in accordance with the project specifications. The USACE shall be given two weeks prior notice prior to off hauling any material. The majority of cleared and excavated material is expected to be non-contaminated, and most likely will be hauled to LRI.

The route to LRI is as follows:

1. Starting in FORT LEWIS, WA on NEVADA AVE – go 0.1 mi
2. Turn Left on 41ST DIVISION DR S – go 0.7 mi
3. Bear Right to take I-5 NORTH towards TACOMA/SEATTLE – go 6.2 mi
4. Take exit #127 towards PUYALLUP/MT. RAINIER onto WA-512 EAST – go 2.2 mi
5. Take the PACIFIC AVE./WA-7 exit towards PARKLAND/SPANAWAY – go 13.7 mi
6. Turn Left on 304TH ST E – go 2.8 mi
7. Turn Right on WA-161 – go 0.4 mi
8. Arrive at 30919 MERIDIAN AVE E, GRAHAM, on the Left

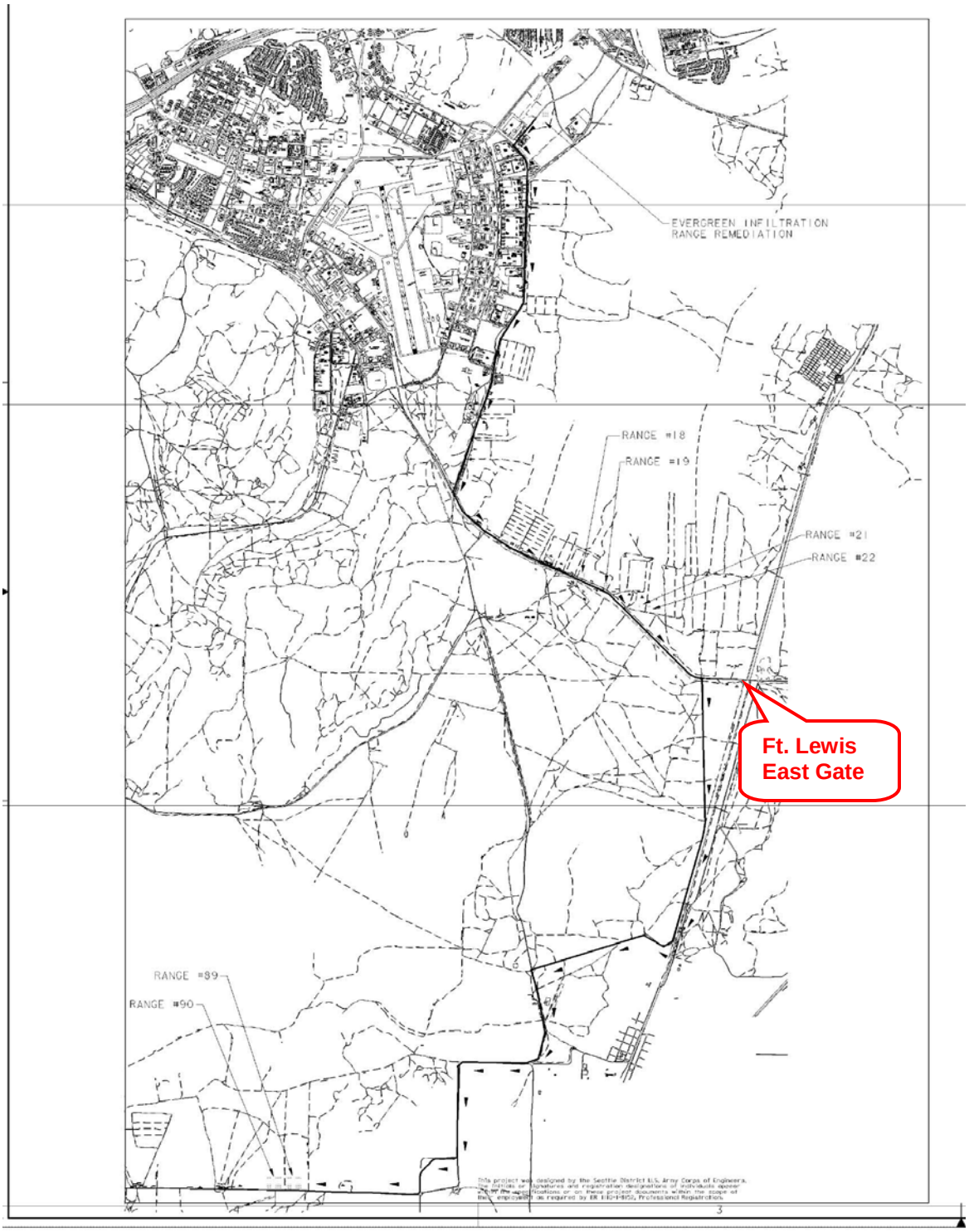
8.0 WASTE MINIMIZATION, RECYCLE AND REUSE

TPA-CKY shall minimize the generation of hazardous waste to maximum practical extent. TPA-CKY shall take all necessary precautions to avoid mixing clean and contaminated wastes. TPA-CKY shall identify and evaluate recycling and reclamation options as alternatives to land disposal, particularly for bullets, bullet fragments, and associated cobbles or pebbles recovered. Requirements of 40 CFR 266 shall apply to hazardous wastes recycled in a manner constituting disposal.

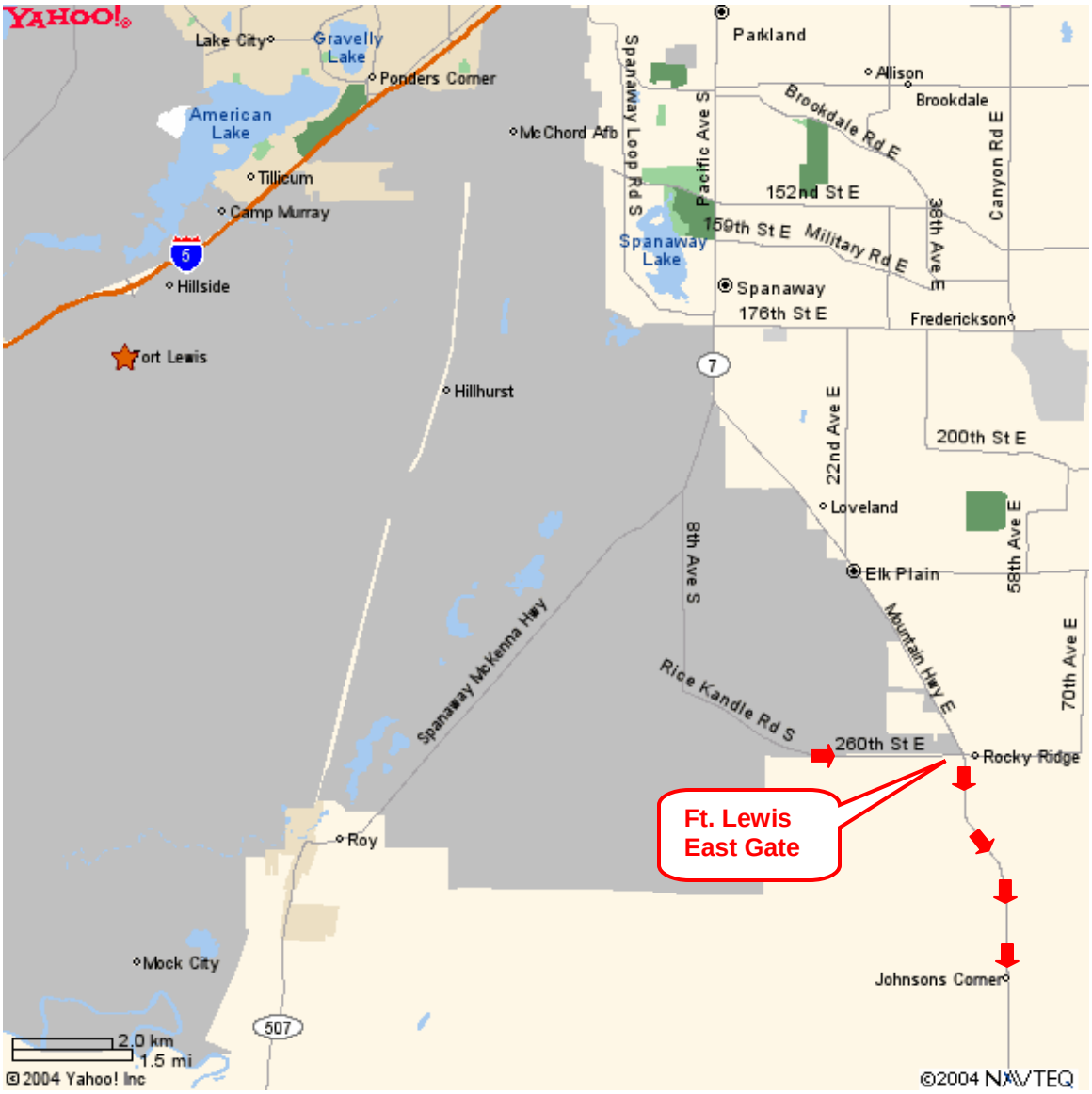
9.0 MEASUREMENT OF WASTE MATERIALS

In general, off-site disposal will be via truck hauling to a permitted landfill and/or treatment facilities. All trucks will be weighed on certified truck scales at the landfill or treatment facilities. Weight slips will be available to track the overall material leaving the project site. The CQC System Manager will track the weight slips and copies will be included on Daily QC log Report. Complete records of the weights and volumes of waste materials will be kept in the daily field reports and summarized in the final contract report.

APPENDIX A
TRANSPORTATION AND DISPOSAL ROUTES



On-Base Haul Routes



Off-Base Haul Route

FINAL

CONTRACTOR QUALITY CONTROL PLAN

Former Evergreen Infiltration Range Remedial Action Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202

January 2005

FINAL

CONTRACTOR QUALITY CONTROL PLAN

Former Evergreen Infiltration Range Remedial Action
Fort Lewis, Washington

Contract No: DACW67-03-D-1007 CTO 0002

Submitted to:

U. S. Army Corps of Engineers – Seattle District
Attn: Matt Allen (PM-EM)
4735 East Marginal Way South
Seattle, WA 98134

Submitted by:

TPA-CKY Joint Venture
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Project No. J202
January 2005

Reviewed and Approved by:

_____

Timothy Yu, Ph.D., PE
Program Manager

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APPENDICES

List of Acronyms and Abbreviations

APP	Accident Prevention Plan
BMP	Best Management Practices
CFR	Code of Federal Regulations
CQC	Contractor Quality Control
CQCP	Contractor's Quality Control Plan
CRC	Contamination Reduction Corridor
CRZ	Contamination Reduction Zone
DERA	Defense Environmental Restoration Permit Program
DOT	United States Department of Transportation
EPA	Environmental Protection Agency
EPP	Environmental Protection Plan
EZ	Exclusion Zone
FIO	For Information Only
GA	Government Approved
LRI	Land Recover Inc.
MLLW	Mean Low Level Water
MP	Management Plan
MSDS	Material Safety Data Sheets
NIOSH	National Institute of Safety and Health
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Level
PID	Photo Ionization Detector
PPE	Personal Protective Equipment
QCSM	Contractor Quality Control System Manager
RORO	Roll-On, Roll-Off
SAP	Sampling and Analysis Plan
SHM	Site Safety and Health Manager
SPERP	Spill Prevention and Emergency Response Plan
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan/Accident Prevention Plan
SWPPP	Storm Water Pollution Prevention Plan
SWPs	Safe Work Practices
TLV-TWA	Threshold Limit Value- Time Weighted Average
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers (Corps of Engineers)
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds
WAC	State of Washington Administrative Code
WMP	Waste Management Plan
WP	Work Plan
WWMP	Waste Water Management Plan

1.0 INTRODUCTION AND BACKGROUND

This Contractor Quality Control Plan (CQCP) is a component of the project Management Plan (MP). The CQCP describes the quality control (QC) program and definable features of field activities to be implemented by TPA-CKY Joint Venture (TPA-CKY) and its subcontractors to perform the contractor services described in the plans and specifications for Contract No. DACW67-03-D-1007, Task Order No. 0002.

The QC Plan contains QC objectives, QC organization, subcontractor management, and control practices that provide three-phase inspection procedures and guidelines. The control practices also cover field compliance, and inspections; control. The last three sections of the plan present change/modification control, non-conformance/corrective action, QC auditing, and documentation.

QC reporting document forms that are generally used in TPA-CKY remedial construction projects are included in Appendix A.

1.1 SITE LOCATION

The remediation areas are located on Fort Lewis. Fort Lewis is a major military facility located 6 miles south of Tacoma, Washington. The Former Evergreen Infiltration Range (AOC 4-6.3) and former Thompson Machine Gun sites (AOC 4-6.1 and AOC 4-6.2) are located off Evergreen Ave near 4th Division Drive. Work activities will begin at the Evergreen Infiltration Range and then move operations to the Thompson Machine Gun sites. The remediation area at the Thompson Machine Guns sites is currently under assessment by the USACE. It is expected that this assessment will be completed prior to completion of activities at the Evergreen area.

1.2 SITE BACKGROUND

The former Evergreen Infiltration Range was identified from a 1951 aerial photograph and appears to have been in use until 1965. This site was used to condition soldiers to move under live fire and under combat type situations. Fixed-position machine guns firing into an impact berm provided live fire training. The ammunition associated with infiltration range training during this era was the .30 caliber cartridge. Soil contamination was documented in the impact berm. The primary contaminate of concern is lead. The maximum detected concentration was 62,500 mg/kg. Antimony and copper were also detected, but only when lead was above the action level of 250 mg/kg.

The former machine gun sites (AOC 4-6.1 and 4-6.2) were identified on a 1944 map. Preliminary assessment activities did not confirm site use. Recent magnetometer work confirmed the presence of .45 caliber bullets in isolated pockets. Site assessment is currently being performed by USACE to delineate remediation areas.

2.0 QUALITY CONTROL OBJECTIVES

The objective of this QC Plan is to provide a framework and to establish QC procedures applicable to the excavation, soil screening, and soil stabilization activities comprising this task order scope of work.

QC procedures or activities refer to the actions taken by the project team on a regular basis to “build in” quality at every phase of the project and include provisions for standards, compaction, inspection, corrective action, and documentation control.

Adherence to specifications and project requirements will be assured by implementing the three-phase QC approach. This approach includes inspections of work elements during the preparatory phase, initial phase, and follow-up phase. These phases, as they apply to this project, are discussed in Section 5.0.

3.0 ORGANIZATION

Overall QA/QC responsibility at TPA-CKY is vested in the Joint Venture QA Officer, Dr. Tan Phung. Dr. Phung is a Managing Director of TPA-CKY and is independent of both the MARC Program Manager and the Task Order Project Manager. The QA Officer delegates management of the task order QC program to the Contractor Quality Control (CQC) System Manager. If there is a change in the QC personnel, TPA-CKY will notify the Contracting Officer's Technical Representative (COTR) and provide the government with résumés of the new personnel for review and approval.

CQC System Manager

Mr. Noah Rivera has been assigned CQC System Manager for this project. Mr. Rivera reports directly to the TPA-CKY QA Officer and will be responsible for the QC program for field activities. An appointment letter of Mr. Rivera as CQC System Manager is attached as Appendix B.

As CQC System Manager, Mr. Rivera is also responsible for ensuring that needed information regarding QA/QC issues is supplied to the COTR. He will check to ensure that all aspects of field procedures and materials meet the requirements of the contract specifications before these items are inspected by or submitted to the COTR for review. Additionally, he will review all reports and submittals before forwarding them to the COTR.

The CQC System Manager will perform the following report-related tasks:

- Complete and/or compile the Daily Chemical QC reports covering the work performed.
- Deliver these reports to the COTR the following day.
- Preside over all 3-phase inspections and document results.
- Complete the field logbook.
- Complete non-routine occurrence reports.
- Complete inspection checklists.
- Collect all information and documentation required for the completion of field reports and closure reports.
- Maintain the photographic record of the work progress.

Other responsibilities of the CQC System Manager will include acting as a liaison between vendors and suppliers and the project, ensuring that all materials, equipment, personnel, and procedures comply with the terms of the contract, and, in the event of a discrepancy, all matters are immediately corrected. He is responsible for resolution of all conflicts and discrepancies.

Supplemental Personnel

TPA-CKY will augment the QC organization, as site-specific conditions and work requirements warrant, with additional personnel having expertise in areas such as regulatory compliance, safety, health, and environmental engineering. These personnel will receive responsibilities from and report to the CQC System Manager.

The project QC organization is shown below in **Figure 3-1**.

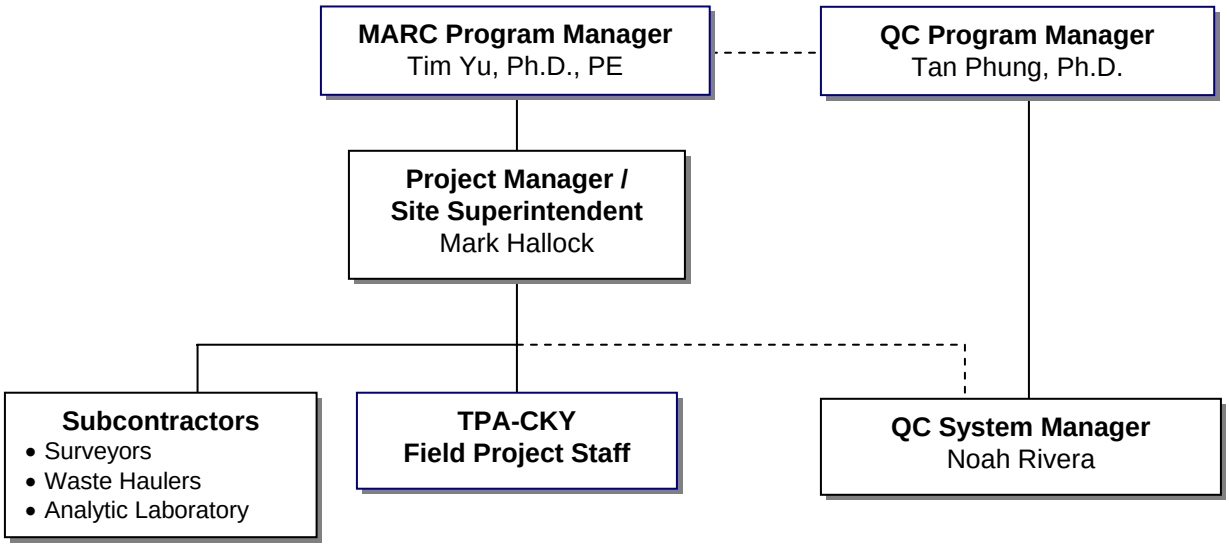

Figure 3-1 Project QC Organization

4.0 SUBCONTRACTOR MANAGEMENT

Subcontractors will be selected as needed based on the scope of work. Subcontractors are regarded as team members and as such, will be working under the direction of the Project Manager /Site Superintendent, following the same standard operating procedures as practiced by TPA-CKY field personnel.

TPA-CKY plans to use the following subcontractors for this phase of the project:

- Surveying – Thornton Land Surveying, 8803 State Highway 16, Gig Harbor, WA 98335; POC: Rick Nielson, License # 35980
- ICP Analysis – Severn Trent Laboratories (STL) 5755 8 th St. East, Tacoma, WA 98424; POC Tom Boyden, (253) 922-2310
- Waste Transport and Disposal – Haulers, disposal facilities and recyclers (see WMP Section 5)

A subcontract agreement will be developed and signed by authorized representatives of the subcontractor and TPA-CKY. The scope of services and terms and conditions will be clearly spelled out in the agreement. Administratively, the Project Manager will work with his subcontractor counterpart in the delineation of services and responsibilities, scheduling, coordinating, reporting, and payment. In field operations, the subcontractor's crew will work under the supervision of the Site Superintendent. As part of quality control, the CQC System Manager will document daily the time and work performed by the subcontractor. Under no circumstances will the subcontractor be permitted to change field personnel, equipment, procedures, or schedule without prior approval by the Site Superintendent or the Project Manager.

5.0 CONTROL PRACTICES

Quality control is the means by which compliance with contract requirements is ensured. Quality control practices will cover both onsite and offsite activities that are relevant to the project. The CQC System Manager will be responsible for conducting quality control on all definable features of work (DFOW) in the following three-phase approach. A listing of DFOW and associated QC activities are presented in **Table 5-1**. These phases will be repeated to demonstrate that the work is proceeding in compliance with contract specifications, or to show that deficiencies have been corrected.

5.1 PREPARATORY PHASE

The Preparatory Phase commences with actions in advance of field activities. In this project, TPA-CKY will notify the Contracting Officer (CO) at least 48 hours prior to any field work. The purpose of this phase is to oversee the advanced preparations and planned field activities. TPA-CKY will make sure that field activities are conducted in accordance with contract design specifications, and that all materials supplied to the project are of the type and quality specified in the contract. In addition, a review of the appropriate activity hazard analysis will be performed to assure safety requirements are met.

5.1.1 Review of Drawings and Specifications

For each definable feature, a review of contract drawings, specifications, reference codes and standards will be performed with the subcontractor. TPA-CKY will make a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. We will review provisions that have been made to provide required control inspection and testing and discuss the initial control phase.

5.1.2 Material Inspections

Inspections will be performed when construction materials are delivered to the project site to ensure the materials are new and meet all specifications. Materials will include fixation agents, PPE, and decontamination equipment. The CQC System Manager or Site Superintendent will perform these inspections.

5.1.3 Equipment Inspections

Inspections will be performed daily on all equipment before and during their use to ensure the equipment is in safe operating condition. Field equipment will include excavation equipment, fixation equipment (screen, hopper, mixer), and decon equipment. The CQC System Manager or Site Superintendent will perform these inspections.

All preventative maintenance procedures recommended by the manufacture will be followed. Any equipment found to be unsafe will be flagged and its use prohibited until unsafe conditions have been corrected.

Table 5-1. Definable Features of Work and Associated QC Activities

Definable Features	QC Activities	Reference Sections
Mobilization, Site Inspection, and Site Preparation	• Notify COR at least one week before starting mobilization. • Inspect staging area, office trailer location, and equipment lay down area. • Inspect equipment and field supplies. • Inspect site access and control. • Implement traffic control as necessary. • Perform preliminary site inspection, including photographs of preconstruction conditions, and preparation of construction areas (excavation areas, stockpile areas, etc.).	Section 01501 Section 02231
Excavation	• Submittals completed and documented as required by specification. • Notify Contracting Officer 48 hours prior to start of excavation. • Surveys performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. Cross-sections provided on 25-foot intervals and at break points for all excavated areas. • Utilities located • Clearing and grubbing to specified limits. • Excavation logs prepared in accordance with ASTM D 5434. • Soil stockpiling/temporary storage IAW Section 02111 §3.5. • Drainage controlled and soil maintained in dry working condition. • Air emissions monitored and controlled.	Section 01355A Section 01450A Section 01720 Section 02111 Section 02120A Section 02231 Section 02300
Soil Screening	• Separated bullet fragments less than 0.1% by volume. • Air emissions monitored and controlled.	Section 01450A Section 02111 Section 02120A Section 02300
Soil Stabilization	• Composite batch samples pass TCLP. • Air emissions monitored and controlled.	Section 01450A Section 02111 Section 02120A Section 02300
Confirmatory Sampling and Analysis	• Chemical data acquired, documented, verified and reported to ensure that specified precision, accuracy, representativeness, comparability, completeness and sensitivity requirements are achieved. All data quality and sampling and analysis procedures performed according to FSP and QAPP sections of the Sampling and Analysis Plan (SAP). • Locations of confirmation samples mapped and recorded. • Investigation derived waste (IDW) samples collected and analyzed.	Section 01450A SAP Section 02111 Section 02120A
Transportation and Disposal of Waste Material	• Handling, transportation, disposal and documentation IAW WMP and Attachment B to specification section 02120A (specific requirements for Fort Lewis). • Max. quantity of recovered bullet fragments and incidental rock material disposed of off site by recycling.	Section 02120A

Table 5-1. Definable Features of Work and Associated QC Activities

Definable Features	QC Activities	Reference Sections
Final Inspection and Demobilization	• Initial site inspection by Site Superintendent for deficiencies. • Final site inspection by COTR accompanied by Site Superintendent. • Closure report submitted per Section 02111 §3.10. • Correct additional deficiencies as found. • Demobilize equipment and personnel. • Check site security. • Return keys to COTR.	Section 01451 Section 02111

5.2 INITIAL PHASE

At the start of each new task, the CQC System Manager will hold a briefing with the COTR, Site Superintendent, and subcontractor personnel involved to review work areas and planned procedures to ensure complete understanding of that task and its contract specifications. Any questions or concerns regarding this segment of work will be aired and resolved at this time. The types of items that would be on the agenda of the Initial Phase meeting would be proposed methods for the task, schedule, special environmental concerns, and precautions needed to ensure worker safety, etc. Minutes of this meeting will be recorded and distributed to all persons in attendance.

The CQC System Manager and Site Safety Officer (SSO) will verify that dust control and air monitoring measures are in placed before any of the field tasks in accordance with the Safety and Health Plan (HASP). This verification will also include proper use of the equipment and safety gear during demolition and abatement operations. The SSO will check safety to include compliance with and upgrading the HASP and activity hazard analysis. He will review the activity hazard analysis with each worker.

TPA-CKY will establish level of workmanship and verify that it meets minimum acceptable workmanship standards.

TPA-CKY will notify the COTR at least 48 hours in advance of beginning initial phase. The CQC System Manager will prepare separate minutes of this phase, and will submit them as an attachment to the daily QC report. The exact location of the initial phase will be indicated for future reference and comparison with follow-up phases. The initial phase will be repeated for each new crew to work on site, or any time acceptable specified quality standards are not met.

5.3 FOLLOW-UP PHASE

The purpose of the follow-up phase is to ensure that the levels of workmanship previously established are met throughout task performance. The CQC System Manager will ensure that the procedures utilized comply with contract specifications. He will also ensure that any rework items are being corrected, and that any required inspections are being performed.

Field verification of this phase of work will consist of daily inspections of work both in progress and completed, field equipment, personal protection equipment, dust control, air monitoring, waste handling, and other safety procedures to ensure that all operational and safety procedures are being followed. Results of the inspections will be documented on the Daily QC Report and logbook.

At the start of each workday, the Site Superintendent will review planned procedures and applicable contract specifications as part of the daily “tailgate” safety meeting. The SSO will keep a diary of these meetings along with a daily sign-in sheet. These daily sheets will be collected by the Site Superintendent and kept on the job site for the duration of the project.

6.0 CHANGE/MODIFICATION CONTROL

A purchase order modification is required for changes that affect project requirements. This modification may be necessary due to a changed condition on site that affects the performance of work against the Task Order, or because of a request by the COTR for additional work that was not identified in the original or previously modified scope of work. TPA-CKY and the COTR may indicate a requirement for change in scope, but only the CO may issue a task order modification for such work. When a modification to the scope of work is communicated by the COTR, TPA-CKY will submit schedule and cost impacts for each proposed change as quickly as possible after identification of the changed conditions.

The steps for initiating a purchase order modification from a changed condition in the field are summarized below:

- Field personnel will immediately notify the Site Superintendent of any changed conditions.
- The Project Manager will direct the preparation of a detailed description of the changed condition and its anticipated effect on performance and cost of the task or delivery order. This information will be promptly forwarded to the Project Manager.
- The Project Manager and Contract Administrator will provide a written notification that a changed condition has occurred or will occur to the COTR for review and concurrence.
- A detailed cost estimate for the change will be prepared and submitted to the CO in response to a request for proposal.

No out-of-scope work will be performed without approved task order modification.

7.0 NON-CONFORMANCE/CORRECTIVE ACTION

Non-conforming items and activities are those that do not meet the project requirements. When such a condition is identified, we will implement our Corrective Action Program to:

- document the non-conforming item or procedure and determine the cause of the non-conformance and its effect on project performance and the integrity of completed work;
- correct or replace the non-conforming item in the most efficient and effective manner; and
- verify and document that the corrective action taken is successful.

7.1 DOCUMENTATION OF NON-CONFORMING ITEMS

The CQC System Manager will document any non-conformance item on both the Daily QC Report and on the Noncompliance Check-Off List. This list will clearly state what is not complying, the date the noncompliance was originally discovered, and the date the work was corrected. The CQC System Manager will deliver a copy of the check-off list of non-complying work items to the COTR on a daily basis.

7.2 IMPLEMENTATION OF CORRECTIVE ACTION

TPA-CKY will stop work on any item or feature pending satisfactory correction of the deficiency noted by the Site Superintendent, CQC System Manager, SSO, subcontractor, or the COTR. The Site Superintendent or CQC System Manager will have the authority to stop work until corrective actions are implemented. In some cases, the corrective action may be obvious and may be implemented immediately upon identification of the non-conformance. Others may require additional input from technical and/or operations staff, additional equipment and/or materials, or changes in existing structures or completed work. The CQC system Manager will not allow work to be added to or built upon non-conforming work unless the COTR concurs that the correction can be made without disturbing continuing work.

7.3 VERIFICATION AND DOCUMENTATION OF CORRECTIVE ACTION

The CQC System Manager will verify successful completion of corrective actions for non-conformances on a follow-up inspection. The Daily QC Report will reflect all corrective actions completed. The CQC System Manager will also update the Non-conformance Check-Off List with the corrective action taken and the date the corrective action was completed. Recurring non-conformances of similar nature will be investigated to determine the root cause of the problem to eliminate or minimize future occurrences of the non-conformance.

The CQC System Manager will ensure that all items on the Pre-Final Inspection punch list are corrected in a timely manner and that all items have been corrected prior to notifying the Government for scheduling of the Final Acceptance Inspection. TPA-CKY will notify the Government at least 14 days prior to the date of the Final Acceptance Inspection and will ensure that all remaining work to be performed under the contract will be complete and acceptable by the scheduled date of the Final Acceptance Inspection.

8.0 QUALITY ASSURANCE

TPA-CKY's quality assurance auditing and corrective action program provides a mechanism for QA personnel to perform planned and documented QA audits and provides an objective and independent evaluation of compliance with established corporate policies and procedures.

TPA-CKY's Program QA Officer serves as QA Auditor and conducts a QA audit of the project. The QA auditor reviews the QC Plan and related documents before the audit and informs the Project Manager of the impending audit with a written audit notice. An audit scope of work and checklist is prepared which, at a minimum, addresses the following topic areas:

- Project Organization
- Personnel Qualifications and Training
- Drawing and Calculation Documentation
- Lead Hazard Control Activities
- Regulatory Compliance Data
- Hazardous Generation and Disposal Record
- Subcontractor Quality Control
- Operating Procedures
- Procurement
- Document Control and Record-keeping

An Audit Report will be written for the audit discussing the audit scope, findings and corrective action recommendations. Copies are given to the Project Manager, Program Manager, and corporate management. Deficient items are monitored by the CQC System Manager to verify that corrective actions are taken within the schedule agreed upon by the Project Manager. Reports on outstanding audit findings are issued at an appropriate interval during the project.

9.0 DOCUMENTATION

Reports and documents generated during this project will undergo review by the CQC System Manager and at least one other knowledgeable member of the project staff. Appendix A includes the TPA-CKY Peer Review form. The Project Manager will coordinate the reviews.

9.1 DAILY FIELD RECORDS

TPA-CKY field staff maintains the Daily QC reports (specimen found at **Appendix A**) that cover the QC operations, activities, and tests performed, including the work of subcontractors and suppliers. The records will include the following information:

- Contractor/Subcontractor(s) and areas of responsibility.
- Equipment used with hours working, idle, and down.
- Description and location of activities performed, including task identifier and names of workers.
- Test and control data, including results and corresponding contract requirements.
- Efficiency and cost control measures, including phase identification, and deficiency and corrective actions.
- Material received with statement of acceptability and storage.
- Submittals reviewed, with contract reference, name of reviewer, and appropriate actions.
- Instructions given/received and conflicts with plans or specifications.
- Verification of submittal accuracy.

Daily QC reports will also identify the trades working on the project, the number of workers, weather conditions, and delays encountered. The records will include both conforming and deficient features and include a statement of contract compliance.

The Daily QC report will be submitted daily to the COR in electronic format. A report will be prepared and submitted for every 7 days in which no work is done, and on the last day of a no-work period.

9.2 FIELD LOGBOOK

Throughout the field activities, we will maintain field notes in a field logbook. The field logbook will be bound with serially numbered pages, and assigned to a specific person who is responsible for entry of information into the logbook. All entries must be inscribed by indelible ink, legible, and dated. Entries made by individuals other than the person to whom the logbook was assigned will be dated and signed by the individual making the entry. Drawing a line through the entry and entering the correct information will make Corrections to erroneous data. The correction will be initialed and dated by the person making the entry. We will document all field activities, including excavation, screening, fixation, field sampling/analysis, and recycling/disposal of waste disposal. If requested, we will submit a copy of the field notes to the COTR immediately after the fieldwork has been completed.

The field notes will contain a daily log of all contractor personnel on site by name as well as a description of the field activities performed that day.

9.3 PHOTOGRAPHIC DOCUMENTATION

TPA-CKY will maintain photographic documentation adequate to describe the work effort. We will use digital JPEG format, with a resolution of 1024x768 pixels or better, and size limit to less than 300 KB.

Progress photographs will be taken between the first and 15th of each month of the main features of work and of special conditions. Construction completion photographs will be taken upon completion of construction work. Photographs will be in a Word format, with a caption under each photo showing date taken, project location, contract title and number, and a brief description of what the photo depicts. The photos will be submitted on a 133 mm ISO-9960- CD-ROM.

Progress photographs will be submitted with monthly invoices, and completion photographs 15 days prior to completion of project.

9.4 SUBMITTAL MANAGEMENT

TPA-CKY will prepare all submittals as defined in the Contract Specification, including maintenance of the Submittal Register. Submittals will be sent to the COTR or Government's oversight contractor, along with Technical Form 4025. Submittals may be either electronic for an RFI with no drawings or other attachments, or hard copy. Electronic submittals must include electronic signature. The original and five (5) copies of hardcopy submittals will be mailed to the CORT or oversight contractor.

APPENDIX A
QC REPORTING DOCUMENT FORMS

DAILY CONSTRUCTION QUALITY CONTROL REPORT

Daily Report No.: _____ Date: _____

Contract No.: DACW67-03-D-1007, Contract Task Order No. 0002

Project Title & Location: Former Evergreen Infiltration Range Remedial Action – Ft. Lewis WA

_____

Weather:_____ Precipitation:_____in. Temp:____min. _____max.

1. Contract/Subcontractors and Area of Responsibility:

Number	Trade	Hours	Employer	Location/Description of Work

2. Operating Equipment (Not hand tools)

Equipment	Date of Arrival/Departure	Date of Safety Check	Hours Used	Hours Idle	Hours Rep./Maint.

1. Work performed today: (Indicate location and description of work performed by prime and/or subcontractors by letter in table above).

_____

_____

_____

_____

2. Results of control activities: (Indicate whether P - Preparatory, I - Initial, or F - Follow-up Phase. When a P or I meeting is conducted, complete attachment 1A or 1B, respectively. When network analysis system is used, identify work by use of I - J numbers).

3. Test performed as required by plans and/or specifications:

4. Material received:

5. Off-site disposal activities:

6. Demolition debris stockpile conditions:

7. **Contractor's Verification:** I certify that to the best of my knowledge the above report is complete and correct, and all material and equipment used and work performed during this reporting period is in compliance with the contract plans and specifications except as noted above.

Contractor Quality Control Representative

PREPARATORY PHASE CHECKLIST

Contract No: DACW67-03-D-1007, Contract Task Order No. 0002 Date: _____

Definable Feature: _____ Spec Section: _____

Government Rep Notified _____Hours in Advance _____Yes _____No

I. Personnel Present:

	Name	Position	Company/Government
1.			
2.			
3.			
4.			
5.			
6.			
7.			

(List additional personnel on reverse side)

II. Submittals

1. Review submittals and/or submittal log 4288. Have all submittals been approved?
_____Yes _____No If No, what items have not been submitted?

a. _____
b. _____
c. _____

2. Are all materials on hand? _____Yes _____No If No, what items are missing?

a. _____
b. _____
c. _____

3. Check approved submittals against delivered material. (This should be done as material arrives)

Comments _____

4. Submittals Reviewed:

Submittal No.	Spec/Plan Reference	Reviewer	Action

5. Off-site surveillance activities, including action taken:

6. Job Safety: (Report violations, corrective instructions given and corrective actions taken)

7. Remarks: (Instructions received or given. Conflict(s) in plans and/or specifications)

III. Material Storage

Are materials stored properly? ___Yes ___No If No, what action is taken? _____

IV. Specifications

1. Review each paragraph of specifications.

2. Discuss procedure(s) for accomplishing the work.

3. Clarify any differences.

V. Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file. If not, what action is taken? _____

_____

_____

VI. Testing

1. Identify test to be performed, frequency, and by whom.

Test	Test Facility	Sample Location	Frequency	Responsible Individual

2. Review Testing Plan. Comments: _____

_____

3. Has test facilities been approved? _____Yes _____No
(Test facilities must be approved prior to testing)

VII. Safety

1. Review applicable portion of EM 385-11. _____

_____

2. Activity Hazard Analysis approved? ___Yes ___No If No, what actions will be taken? _____

_____

_____

Contractor's Verification: On behalf of the Contractor, I certify to the best of my knowledge this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, except as noted above.

_____
Contractor Quality Control Representative

VIII. Corps of Engineer comments during meeting:

INITIAL PHASE CHECKLIST

Contract No: DACW67-03-D-1007, Contract Task Order No. 0002 Date: _____

Definable Feature: _____ Spec Section: _____

Government Rep Notified _____ Hours in Advance __ Yes ___ No

I. Personnel Present:

Name	Position	Company/Government
1.		
2.		
3.		
4.		
5.		
6.		
7.		

(List additional personnel on reverse side)

II. Identify full compliance with procedures identified at preparatory. Coordinate plans, specifications and submittals. Comments: _____

_____

_____

III. Preliminary Work. Ensure preliminary work is complete and correct. If not, what action is taken?
Comments: _____

_____

_____

IV. Establish Level of Workmanship.

1. Where is work located? _____

2. Is a sample panel required? _____Yes _____No

3. Will the initial work be considered as a sample? _____Yes _____No
(If yes, maintain in present condition as long as possible)

V. Resolve any differences.

Comments: _____

_____

_____

VI. Check Safety.

Review job conditions using EM 385-1-1 and job hazard analysis.
Comments:

Contractor's Verification: On behalf of the Contractor, I certify to the best of my knowledge this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, except as noted above.

Contractor Quality Control Representative

PERMANENT MATERIALS REPORT

Project: Former Evergreen Infiltration Range Remedial Action

Location: Fort Lewis, Washington

Materials: _____

Supplier: _____

Subcontractor: _____

Freight Line: _____

Damage Report: _____

Inspected By: _____

_____

Contractor Quality Control Representative

DEFICIENCY REPORT NO._____

Contractor: TPA-CKY

Date: _____ Contract No: DACW67-03-D-1007, Contract Task Order No. 0002

Location: Fort Lewis, Washington

Reference Specifications Paragraph: _____

Reference Contract Drawing Sheet No: _____

Deficiency: _____

Corrective Action: _____

Acknowledgment: _____

_____ _____

Area Representative & Date Corps of Engineers Field Representative

TPA-CKY JOINT VENTURE

ROUTING AND PEER REVIEW DOCUMENTATION

Project Name _____ Project/Task Number _____ Proposal Number _____

Type of Document _____ Subject _____

Issue Date _____ Author _____ Project Mgr. _____

ROUTING

To	Purpose	Date Due	Sign	Date Completed

PEER REVIEW

THIS PART MUST BE COMPLETED FOLLOWING DOCUMENT REVIEW.

A. A peer review is NOT required for the following reason:

__ Construction Observations __ Site Inspection __ Boring Logs

__ Expert Testimony __ Laboratory Tests _____

Senior Manger (Approval) _____ Date _____

B. Scope of Review

___ Letter

___ Complete Report

Following Section of the Report Only:

REVIEWERS CHECK LIST

		Satisfactory	Not Applicable	See Comment Number
1	Conformation to required scope and definition of services.			
2	Basic field and laboratory data.			
3	References, documents and correspondence in files.			
4	Assumptions, technical approaches and solutions.			
5	Checking of calculations, drawings, graphs, and tables.			
6	Organization, clarity and completeness of report.			
7	Applicability and completeness of stated limitations of the technical work.			
8	Specifications, opinions, judgments, conclusions, and recommendations.			

I have reviewed the subject project document dated _____ prepared by ____ in accordance with the noted scope and applicable check list items. In my opinion, the material reviewed is professionally adequate and satisfies the Agreement between CKY and the client. Further, my comments have been discussed with the author(s) and all significant issues have been resolved, except Nos. _____.

Reviewer's Signature _____ Date _____

NOTES

REVIEWER'S COMMENTS AND/OR GENERAL DOCUMENT INFORMATION

_____

_____

_____

_____

RESOLUTION OF COMMENTS

Significant issues not resolved between _____ and author(s) have been resolved by me.

Senior Manager _____

Date _____

NON-COMPLIANCE CHECK-OFF LIST

Contract No. &Task Order: DACW67-03-D-1007 TO 0002
Contractor TPA-CKY

Date Non-Compliance Identified	Item	Contract Requirements (Spec, Sect. & Para. No., Drawing No., Etc.)	Action Taken by QC Manager	Resolution	Date Resolved

FIELD CHANGE REQUEST

To:.	Contract No.: DACW67-03-D-1007 TO 0002 Contract Title: Field Change No.: Date:

Brief Description of Change:

Section of Specification or Drawing Affected:

Reason for Change:

This change will not result in a change in contract price or the time for completion

COTR	Contractor
☐ Approved ☐ Disapproved By: Title: Date:	Name or Prime Contractor By: Title:
Distributed by COTR	Name of Subcontractor By: Title:

REWORK ITEMS LIST

Contract No. and Title: DACW67-03-D-1007 TO 0002, Evergreen Former Infiltration Range, Remediation Action

Contractor: TPA-CKY

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRCT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

APPENDIX B
CQC SYSTEM MANAGER APPOINTMENT LETTER

TPA-CKY
JOINT VENTURE

302 W. Fifth Street, Suite 310
San Pedro, CA 90731
Tel: (310) 519-4026
Fax: (310) 519-4029

17-November 2004

Mr. Noah Rivera
TPA-CKY
302 W. 5th Street, Suite 310
San Pedro, CA 90731

Re: CQC System Manager Appointment
U.S. Army Corps of Engineers – Seattle District
Contract No. DACW67-03-D-1007, CTO 0002
Evergreen Former Infiltration Range Remedial Action
Fort Lewis, Washington

Dear Mr. Rivera:

This letter formally describes your duties and responsibilities as Contractor Quality Control (CQC) System Manager during activities undertaken as part of Contract Task Order 0002, Contract No. DACW67-03-D-1007.

As CQC System Manager, you are in charge of the quality control program for field operations, including survey; excavation, screening and fixation of soil; field confirmation sampling, transportation and disposal/recycling of waste material. Responsibilities of the CQC System Manager include ensuring that all work are conducted according to contract specifications, needed information regarding QA/QC issues is supplied to the TPA-CKY Project Manager, proper control activities are conducted for each definable work feature, and daily quality control reports are delivered daily to the government QA representative. You will be responsible for inspecting work in progress and completed, identifying deficiencies and making corrections, reviewing all reports prepared or reviewed by the Quality Control Inspector. Should deficiencies occur or non-conforming items are discovered, you have the authority to stop work until appropriate corrective actions have been implemented.

If you have any questions or require further clarification of your responsibilities, please call me.

Very truly yours,

K. Timothy Yu, Ph.D., PE
Managing Director

APPENDIX C
RÉSUMÉ OF CQC SYSTEM MANAGER

NOAH M. RIVERA

EDUCATION

B.S. / Biology / 2003 / University of Northern Colorado

QUALIFICATIONS SUMMARY

Since joining TPA, Mr. Rivera has participated in a number of large-scale field remediation and construction projects. Mr. Rivera has received formal training; he practices as a Health and Safety Officer and Quality Control Officer. He has worked on government projects for the US Army Corps of Engineers and the Department of the Navy. While in the Hawaii and Colorado Army National Guard, he received medical training and later, as a field medical specialist and ambulance crew chief, he administered first-aid training in field operational safety.

CERTIFICATIONS

USACE, Construction Quality Management for Contractors (2003)

AHERA Supervisor Asbestos Course

Lead in Construction Supervisor Course

40-hr Hazardous Waste Operations and Emergency Response

8-Hr Supervision, Hazardous Waste Operations and Emergency Response

RELEVANT EXPERIENCE

Mr. Rivera has five years of professional experience in the areas of construction quality control on federal projects and private firms. He has demonstrated his leadership and capability in the hazardous waste and construction projects he participated. The following is a partial list of recent projects Mr. Rivera has participated:

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Hazardous Material Abatement and Demolition for 15 Buildings at Vancouver Barracks, Vancouver, Washington (USACE). Mr. Rivera served as Site Safety Officer and QC Inspector, and was responsible for preparing the draft final closure report. The project entailed asbestos abatement, lead-based paint removal, air and personal monitoring during abatement, disposal of lead-contaminated soils, and painting of selected portions of buildings. Aside from implementing corporate and task order specific quality control plan, Mr. Rivera's duties also included: among others, preparation of daily QC reports; participation in preparation of project work plans, project close-out submittals; procurement of all required permits; and coordination with USACE, City of Vancouver, facility owners all regulatory agencies.

Removal of Petroleum-Contaminated Soils at Four Parcels, Hunter Points Shipyard, San Francisco, California (US Navy). Mr. Rivera is serving as Site Safety Officer and QC Inspector. Activities have included survey of the 22 contaminated locations, subsurface utility survey, excavation of 25,000 cy of contaminated soils, confirmatory sampling and analysis, off-site disposal, backfilling, resurface and final closure report preparation. Mr. Rivera supervised soil loading, collected confirmation sample, and performed daily inspection of field equipment and material deliveries. He performed the three-phase approach and provided daily QC data to the Site Superintendent.

Stormwater Management at Parcel E, Hunter Points Shipyard, San Francisco, California (US Navy). Mr. Rivera served as QC Inspector. Activities included grading area around a Superfund Landfill, construction of a raised access road and turn-around areas, construction of drainage system including v-ditches and culverts, cleanout of existing catch basins, replacement of torn silt fencing, installation of perimeter control around stockpiles, hydroseeding of large bare soil areas, and performing road repairs.