12/30/16 ENTERED

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS CIVIL ENGINEER SQUADRON (AFSOC)
CANNON AIR FORCE BASE NEW MEXICO

RECEIVED JAN 2012 NMED Hazardous Waste Bureau

Ronald A. Lancaster
Chief, Asset Management Flight
506 N DL Ingram Blvd
Cannon AFB NM 88103

Ms. Lane Andress
Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East Bldg 1
Santa Fe NM 87505-6063

Dear Ms. Andress

Attached is the December 2011 Final Sampling and Analysis Plan for Remedial Action Construction at Solid Waste Management Unit (SWMU) 107 Cannon Air Force Base, New Mexico, for your review and approval.

If you have any questions regarding this submittal, please contact Mr. Matthew Higginbotham, Restoration Program Manager at (575) 784- 1092.

Sincerely

RONALD A. LANCASTER
Chief, Asset Management Flight

Attachment:
December 2011 Final Quality Program Plan for Remedial Action Construction at Solid Waste Management Unit (SWMU) 107

cc:
New Mexico Environment Department, Mr. David Cobrain w/o Attachment

QUALITY PROGRAM PLANS

FINAL - REVISION 3

REMEDIAL ACTION – CONSTRUCTION AT SITE FT-08 (SWMU 107)
CANNON AIR FORCE BASE, NEW MEXICO

CONTRACT NUMBER: FA8903-09-8562, TASK ORDER #003

DECEMBER 28, 2011

Prepared By:

EMR INCORPORATED
INFRASTRUCTURE AND ENVIRONMENT

3200 Haskell Avenue, Suite 140
Lawrence, KS 66046
Contact: Jeffrey A. Humenik, PG
785.842.9013
jhumenik@emr-inc.com
www.emr-inc.com

Prepared For:

AFCEE

Air Force Center for Engineering
and the Environment (AFCEE)
2261 Hughes Ave.
Building 171, Suite 163
Lackland AFB, Texas 78236-9861
Attn: Eliud Burgos

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LIST OF ACRONYMS

AFB	Air Force Base
AFCEE	Air Force Center for Engineering and Environment
ASTM	American Society for Testing Materials
bgs	Below Ground Surface
BPM	Beats per Minute
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
°C	Degrees Celsius
CFR	Code of Federal Regulations
CHSM	Corporate Health and Safety Manual
CHSO	Corporate Health and Safety Officer
CO	Contracting Officer
COC	Chain of Custody
COR	Contracting Officer's Representative
CPR	Cardiopulmonary Resuscitation
DQO	Daily Quality Objective
DRO	Diesel Range Organics
EDD	Electronic Data Deliverables
EMR	EMR, Inc.
ERPIMS	Environmental Restoration Program Information Management System
EPA	United States Environmental Protection Agency
°F	Degrees Fahrenheit
FSP	Field Sampling Plan
ft	Foot/Feet
FT-08	Fire Training Area No. 8
GFCI	Ground Fault Circuit Interrupter
H:V	Horizontal Run : Vertical Rise
HAZCOM	Hazard Communications Program
HAZWOPER	Hazardous Waste Operations and Emergency Response
HR	Human Resources
IDW	Investigative Derived Waste
LIMS	Laboratory information management system
MDL	Method detection limit
mg/kg	Milligrams per Kilogram
MQL	Method quantitation limits

LIST OF ACRONYMS (Continued)

MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSDS	Material Safety Data Sheets
NIOSH	National Institute for Occupational Safety and Health
NMED	New Mexico Environment Department
OSHA	Occupational Safety and Health Administration
PE	Licensed/Registered Professional Engineer
PG	Professional Geologist
PID	Photoionization Detector
PM	Project Manager
POC	Point of Contact
PPE	Personal Protective Equipment
ppm	Parts per Million
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RG	Registered Geologist
SAP	Sampling and Analysis Plan
SSHO	Site Safety and Health Officer
SHSP	Site-Specific Health and Safety Plan
SOP	Standard Operating Procedure
SOW	Statement of Work
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit
T&D	Transport and Disposal
TCLP	Toxicity Characteristic Leaching Procedure
TO	Task Order
TPH	Total Petroleum Hydrocarbons
tsf	Tons per Square Foot
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
UV	Ultraviolet
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 Cannon Air Force Base Location and History

Cannon Air Force Base (AFB) occupies approximately 4,000 acres south of U.S. Highway 60/84 in Curry County, New Mexico. The Base is situated 6 miles west of the city of Clovis, near the New Mexico-Texas border (Site Vicinity Map - Figure 1). The area surrounding Cannon AFB is used mainly for farming and ranching. Cannon AFB also maintains several satellite facilities.

In 1942, the Department of Defense established the Clovis Army Air Base, a training facility for B-17, B-24, and B-29 air crews. The Base was renamed Clovis Army Airfield in 1945 and eventually closed in 1947. Reactivated in 1951, the Base was reassigned to the Tactical Air Command and was renamed Cannon AFB in 1957. In 1975, the 27th Tactical Fighter Wing became the principal United States Air Force unit at Cannon AFB. The Base was reassigned to the Air Combat Command in 1992 and currently maintains a combat-ready force and provides replacement training of combat air crews for tactical organizations worldwide. More recently the Air Force successfully completed an Environmental Impact Statement in "record" time to support the Department of Defense decision transferring ownership of Cannon AFB, N.M., from ACC to AFSOC, effective Oct. 1, 2007; in coordination with the 27th Fighter Wing and the offices of the Secretary of the Air Force and The Air Force Civil Engineer, AFSOC Civil Engineers completed the entire National Environmental Protection Agency process in less than 12 months.

2.0 TITLE AND APPROVAL PAGE

REMEDIAL ACTION - CONSTRUCTION AT SITE FT-08 (SWMU 107)

Document Title

EMR, INC.

Lead Organization

Jeffrey A. Humenik, PG, RG EMR, Inc.

Preparer's Name and Organizational Affiliation

3200 Haskell Avenue, Suite 140, Lawrence, Kansas 66046, jhumenik@emr-inc.com

Preparer's Address, Telephone Number, and E-mail Address

12/28/2011

Preparation Date (Day/Month/Year)

Project Manager: Jeffrey A. Humenik, PG, RG / EMR

J. A. Humenik 12/28/11

Signature/Date

Project Chemist/
Quality Control (QC) Validator: Cathy Larson / AECOM

C Larson 12/28/11

Signature/Date

Project Manager (Laboratory): Mark Gudnason / PEL – Spectrum Analytical

Mark Gudnason 12/28/11

Signature/Date

3.0 PROBLEM BACKGROUND AND DEFINITION

Based upon the Statement of Work (SOW) supplied to EMR, Inc. (EMR), an excavation of contaminated soil is required for former Fire Training Area No. 3 Solid Waste Management Unit (SWMU) 107 located at Cannon AFB, New Mexico (Figure 2 – Remediation Area Map). Based on a previous Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Report for this site and with the presence of a Total Petroleum Hydrocarbons-Diesel Range Organics (TPH-DRO) plume, EMR has developed a technical approach to complete the characterization, excavation, and transport and disposal (T&D) of the contaminated soils at SWMU 107.

The vertical and horizontal extent of the TPH-DRO plume will be determined during the soil assessment phase where the installation of 10 soil borings will occur. The proposed soil borings locations are presented in Figure 3.

The extent of the excavation from SWMU 107 will be determined after receiving laboratory analytical results from the soil assessment phase. During excavation, soils will not be directly loaded onto trucks, but will be segregated into two stockpiles (clean and contaminated) based upon field screening. A fully calibrated photoionization detector (PID) will be utilized to aid in the field screening of soils and help refine the vertical and horizontal limits to excavation.

In addition to the excavated contaminated soil, approximately 30 cubic yards of Arsenic contaminated soil, which is currently stockpiled on Cannon AFB, will be disposed of. The source of the Arsenic contaminated soil is unknown at this time.

4.0 WORK PLAN

This section describes the methods that will be used to determine the limits of the excavation through a soil assessment, excavate the contaminated soil, collect confirmation sidewall and bottom samples prior to backfilling, and characterize excavated soils for disposal. EMR personnel, including subcontractors, will follow the procedures outlined within this work plan at all times.

This project will be conducted in accordance with the SOW provided under Task Order (TO) 0003, in accordance with discussions between EMR, Cannon AFB, Air Force Center for Engineering and Environment (AFCEE) personnel, and with applicable New Mexico Environmental Department (NMED) guidance. Based on the SOW, the following is a general description of the projects relating to remedial action (RA)/construction at SWMU 107.

SWMU 107 is the former Fire Training Area No.3. Based on a previous RFI Report and with the discovery of TPH-DRO plume on-site, EMR has developed a technical approach to complete the characterization, excavation, and T&D of the contaminated soils at SWMU 107.

The soil assessment, soil boring drilling, soil excavation, and restoration of the subject site will be accomplished during the hours of 0630 to 1730, during which AFB activities will be ongoing. The work will be conducted such that the activity minimally disrupts facility operations. The general sequence of RA construction of SWMU 107 is as follows:

- Soil assessment – Drilling of 10 soil borings / soil data collection activities
- Site preparation for soil excavation:
  - Initial land survey
  - Implementation of erosion controls
  - Construction of temporary decontamination pad
  - Construction of temporary soil staging area
  - Establishment and markings for safety zones
- Excavation activities with continued segregation of clean and contaminated soils using field screening methods (PID).
- Stockpiling of soils

- Collection of analytical samples for confirmation data
- Manifesting and transportation of non-hazardous special waste
- Surface restoration
- Removal of Arsenic contaminated stockpile
- Final survey of completed work

4.1 Site Security

Contractor and subcontractor vehicles will access the construction site through the main Base gate. All vehicles will travel along improved roads and will not enter areas marked as secure without receiving prior clearance. The Site Superintendent, required EMR personnel, and subcontractors will receive vehicle passes valid for the duration of the project. A valid driver's license, proof of vehicle insurance and valid vehicle registration will be required to obtain a pass. The site security procedures are as follows: security briefings, personnel access, vehicular access, ingress and egress from the project site, deliveries and storage of materials and supplies, construction work areas, and general conduct within the Cannon AFB facilities.

4.2 Site Preparation

To prepare the site for construction activities, a Cannon AFB dig permit will be completed and a survey of the excavation area will be conducted to determine the presence of utilities. If utility locating services are provided by Cannon AFB, those services will be used. EMR will notify the Cannon AFB Point of Contact (POC) if any utilities are detected in the proposed drilling and soil excavation areas. In addition, staging, storage, and decontamination locations will be marked out during this time.

4.3 Soil Assessment

The vertical and horizontal extent of the TPH-DRO plume will be determined during the soil assessment phase. A total of 10 soil borings will be advanced to a depth of 60 feet using a CME 75 drill rig with hollow stem augers. A five feet split barrel sampler will be used to obtain soil samples. One soil sample will be collected every 10 feet at each boring location. A maximum of two samples per boring will be submitted to PEL Spectrum for laboratory analysis

and analyzed for volatile organic compounds (VOCs) using the United States Environmental Protection Agency (EPA) Method 8260B and TPH using EPA Method 8015B. Samples with the highest PID readings will be submitted for laboratory analysis.

An EMR Geologist will log, field screen (PID), and sample soils from each borehole to determine the extent of petroleum contamination on site. Soil samples will be submitted for laboratory analysis to determine the volume of contaminated soil for removal and disposal. Prior to installation of the 10 soil borings, a dig permit will be obtained. The proposed soil boring locations are presented in Figure 3. EMR will summarize the assessment data and provide recommendations for soil excavation to AFCEE, the Cannon AFB POC, and NMED.

Based on the proposed soil excavation activities, all drill cuttings will be placed back into each borehole to eliminate investigative derived waste (IDW).

4.4 Excavation Plan

An excavator will be used to remove the contaminated soil from the excavation area in SWMU 107. The excavation limits at SWMU 107 will be determined from laboratory analyses of soil samples collected during the soil assessment in which 10 soil borings will be installed. The excavated soil will be continually field screened using a PID and segregated into clean and contaminated stockpiles and placed into a bermed and lined area for storage. PID readings taken during the excavation will be correlated with analytical results from the soil borings installed during the soil assessment. Following completion of the excavation activities, confirmation sidewall and bottom soil samples will be collected to determine the presence of Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) using EPA Method 8260B and TPH using EPA Method 8015B prior to backfilling. Soil samples exceeding the NMED soil screening levels (SSLs) for Benzene (25.8 milligrams per kilogram (mg/kg)), Toluene (252 mg/kg), Ethylbenzene (128 mg/kg), Xylenes (82 mg/kg), and/or TPH (940 mg/kg) will be disposed of in accordance with local, state, and Federal regulations. Soils with PID readings less than 50 ppm will be used as backfill on site. The applicable NMED soil screening levels are provided in Section 6.1.4.2.

In addition to the excavated contaminated soil, approximately 30 cubic yards of Arsenic contaminated soil will be disposed of, which is currently stockpiled on Cannon AFB. The source of the Arsenic contaminated soil is unknown at this time. Additional information on the hazard analysis and required PPE are included as Appendix 4.

4.4.1 Backfill

Following approval from the AFCEE and Cannon AFB and receipt of the soil characterization results, the excavation area will be backfilled with excavated clean soil and an aggregate-base material. Laboratory analyses and PID readings of soil samples collected during the investigation phase of the project will be used as confirmation that excavated soils from areas and depths previously determined not to be contaminated, can be used as backfill. A sample of the off-site source aggregate-base material will be collected and submitted for laboratory analysis of the applicable contaminants of concern prior to delivery to the site. Upon confirmation that the fill material is clean, the fill will be transported to the site and used as backfill. Additional information on the hazard analysis and required PPE are included as Appendix 4.

4.4.2 Site Restoration Activities

Site restoration activities include backfilling of the excavated area above initial grade, sloping away from the center of the excavation. All materials and debris associated with the excavation will be removed and disposed of properly. If necessary, permanent erosion control measures will be implemented in accordance with the requirements of Cannon AFB and AFCEE.

4.5 Spill and Discharge

To prevent spill or discharge of equipment fluids and other hazardous materials, daily inspection of all equipment and containers will be conducted. Inspections will be conducted before, during, and after use of equipment. In the event of a spill or discharge, the Site Superintendent will notify the Cannon AFB POC, Fire Department, and the AFCEE. Spill response will be conducted in accordance with Federal, state, local, and Cannon AFB regulations. Emergency response procedures are specified in the Site-Specific Health and Safety Plan (SHSP).

4.6 Surface Water Management

Provisions will be placed around the excavation limits to prevent surface water from entering the excavation area. These will include diversion dikes, sand bags, or other berm materials. Also, the area surrounding the excavation will be properly graded away from the excavation to prevent surface water from entering. In addition, the clean and contaminated soil stockpiles will be bermed and lined to prevent runoff around these areas.

4.7 Ground Water Management

Due to the depth to groundwater at Cannon AFB (>300 feet), groundwater management is not applicable to this project.

4.8 Erosion Control

Erosion control measures will be implemented to minimize or eliminate the discharge of contaminated surface water from entering waterways during excavating, soil stockpiling and backfilling activities. Earthen berms, diversion ditches, plastic sheeting, silt fencing and hay bales may be used as erosion control measures. These measures will be inspected on a daily basis and throughout rainfall events.

4.9 Dust Control

The construction site will be maintained to minimize the generation of any dust emissions. Watering equipment will be used as needed to control dust throughout construction activities.

4.10 Transportation and Disposal

The contaminated soil will be transported offsite to the Gandy Marley soil treatment facility located on Highway 380 in Roswell, New Mexico. Gandy Marley is a NMED approved waste disposal facility. The contaminated soil will be transported using semi-trailer end dump trucks or tandem dump trucks. The trucks will utilize a flip arm tarp system to prevent the soil from exiting the dump bed during transport. Additional information on the hazard analysis and required PPE

are included as Appendix 4. The manifests for all waste disposed of offsite will be completed by EMR and signed by the Cannon AFB POC. The manifests will be accompanied by load tickets. The load tickets will show the amount of soil being disposed of for that particular dump truck. The trucks will be weighed using a scale at the Gandy Marley facility to determine accurate soil tonnage. Copies of these manifests will be provided to the AFCEE and Cannon AFB.

4.11 Remediation Management

Remediation management activities include the excavation and removal of all petroleum contaminated soils, in excess of the NMED soil screening criteria, from the excavation area in SWMU 107.

- The excavation limits at SWMU 107 will be determined from laboratory analysis collected during the confirmation soil sampling event.
- The site manager will be onsite to ensure that all contaminated soils are removed from the excavation area.
- An excavator will be used to remove soil from the excavation area.
- The excavated soil will be continually field screened using a PID and segregated into clean and contaminated stockpiles and placed into a bermed and lined area for storage. Refer to Section 4.4 for details on field determination of clean and contaminated soils.
- A loader will be used to load contaminated soils to be transported offsite.
- Loaded trucks will transport the soil to a waste disposal facility that has been approved by NMED, AFCEE and Cannon AFB. Each truck will receive a manifest for documentation.
- Trucks will receive load tickets from the approved waste disposal facility. These load tickets will be kept onsite for record-keeping.
- Following completion of the excavation activities, confirmation sidewall and bottom soil samples will be collected to determine the presence of Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) using EPA Method 8260B and TPH using EPA Method 8015B prior to backfilling. Soil samples exceeding the NMED SSLs for Benzene (25.8 mg/kg), Toluene (252 mg/kg), Ethylbenzene (128 mg/kg), Xylenes (82 mg/kg), and/or TPH (940 mg/kg) will be disposed of in accordance with local, state, and Federal regulations. In the event confirmation soil samples exceed the NMED soil screening criteria, additional soil excavation and disposal will be conducted from those applicable

areas. Additional confirmation soil samples will be collected following any secondary soil excavation activities.

- Laboratory analyses of soil samples collected during the soil assessment and field screening using a PID will be utilized for disposal of the contaminated soil stockpile. PID readings equal to or greater than 50 ppm will be considered contaminated. PID readings taken during the excavation will be correlated with analytical results from the soil borings installed during the soil assessment.

4.12 Demobilization and Closure

Demobilization activities will include decontamination of equipment, site cleanup and disposal of debris, removal of temporary facilities, and personnel and equipment demobilization. If necessary, permanent erosion control measures will be implemented in accordance with the requirements of Cannon AFB. The Site Superintendent will conclude demobilization activities ensuring all equipment, materials and debris are offsite, and that the excavation area has been returned to pre-construction conditions.

5.0 REFERENCES

URS, 2008, *Work Plan Addendum – RCRA Facility Investigation for SWMUs 34, 78, 85, 91, 95 and 107, Cannon AFB, New Mexico,* February 2008.

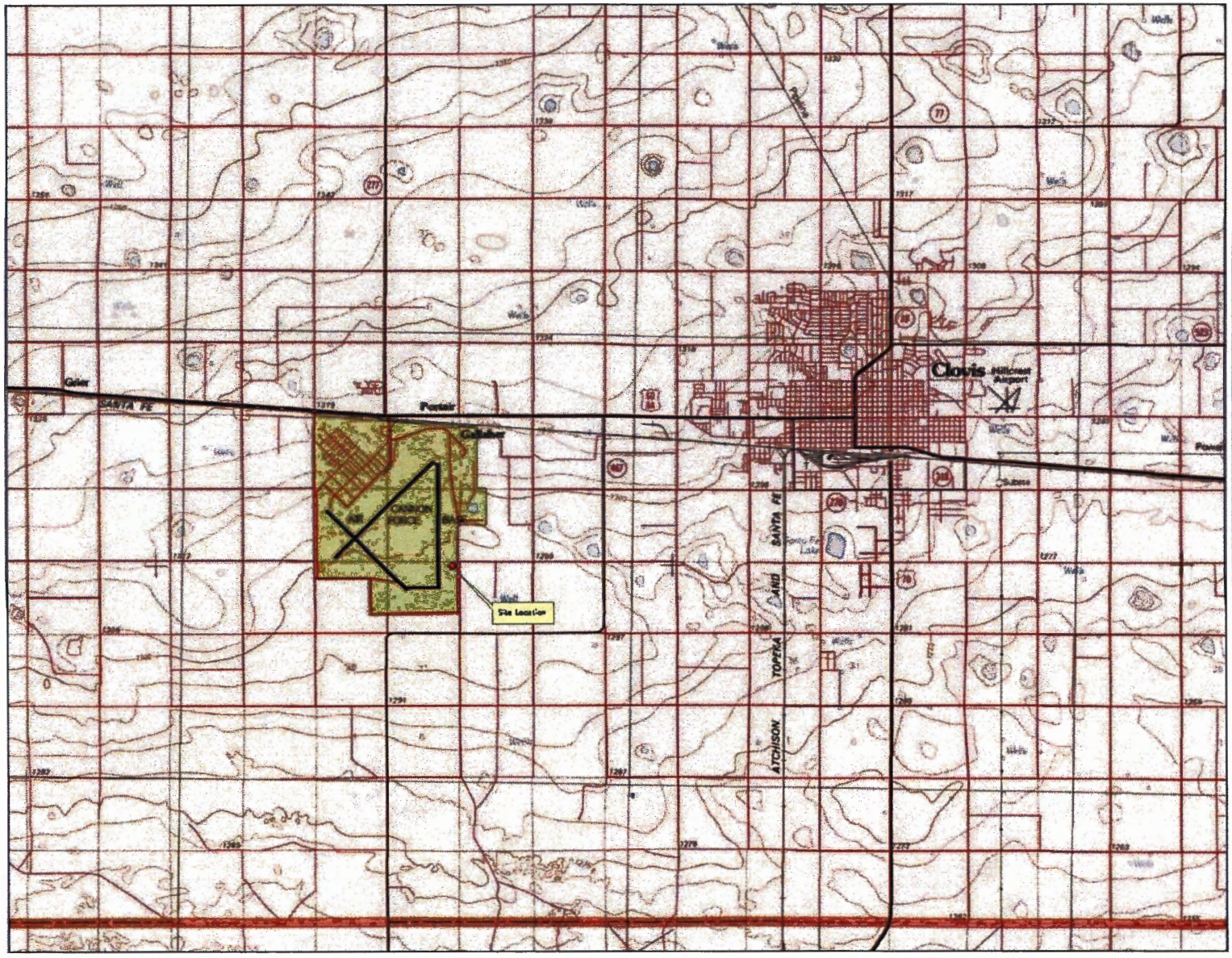
Tetra Tech, 2008, *Accelerated Corrective Measures Work Plan for the Removal of Soil Contamination at SWMU 109, Cannon AFB, New Mexico,* November 2008.

ESRI, 2009, *USA Topo Maps,*December 2009.

NMED (New Mexico Environmental Department)
2006 Total Petroleum Hydrocarbon (TPH) Screening Guidelines. October.

FIGURES

Figure 1 – Site Vicinity Map



N
W E
S

Figure 1

Site Vicinity Map

Remedial Action
Construction at Site FT-06 (SWMU 107)

Cannon Air Force Base
New Mexico

Feet
0 8,000 16,000

Project Number: 9628-001
Drafted By: CE
Reviewed By: SL
Date: August 1, 2011
Reference: ESRI USA Topo Maps

EMR
316 Garfield Ave.
Duluth, MN 55802
Phone: 218.625.2332
Fax:218.625.2337
www.emr-inc.com

Figure 2 – Remediation Area Map

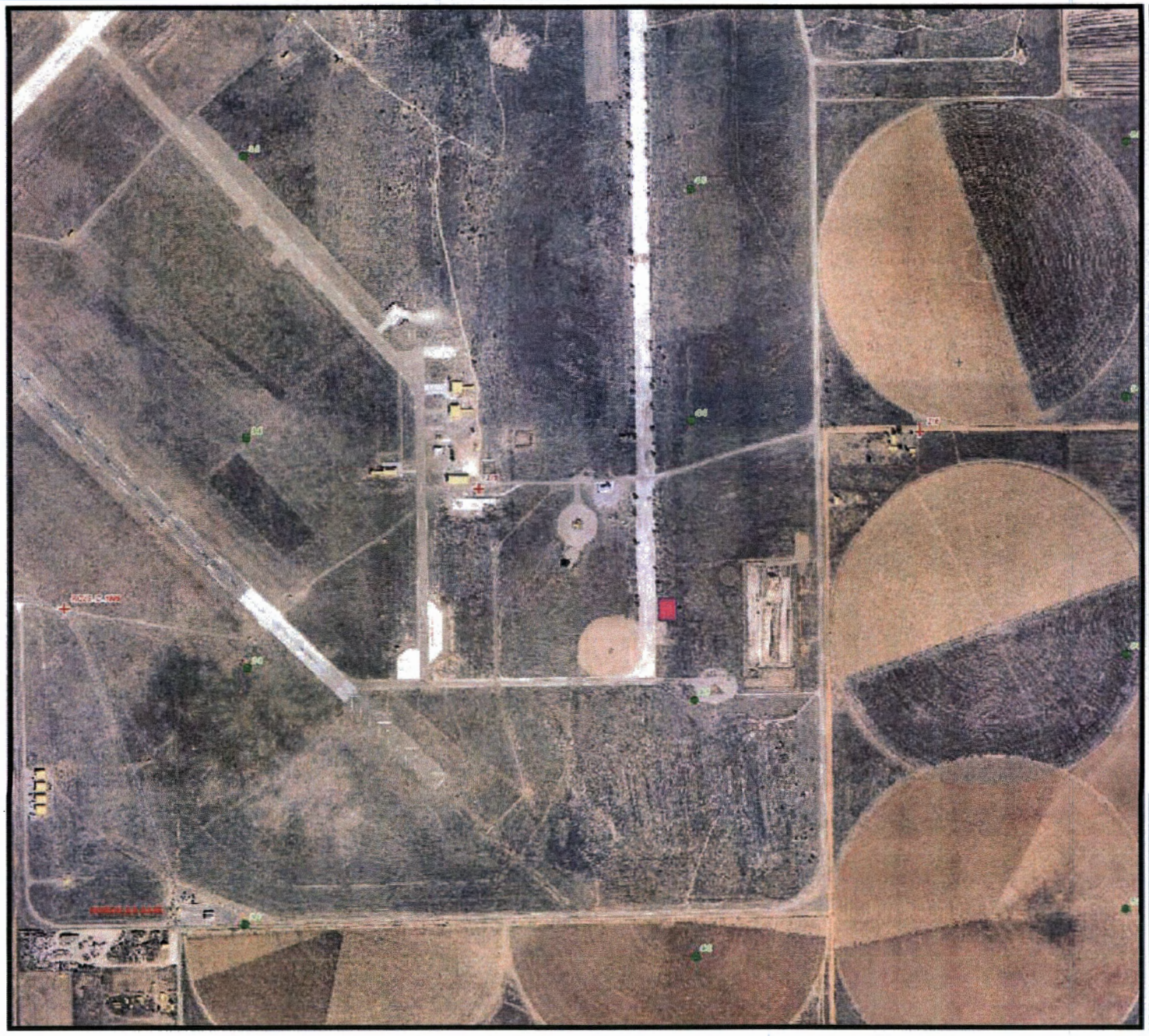


Figure 2
Soil Remediation
Area Map

REMEDIAL ACTION
SITE FT-08 (SWMU 107)
CANNON AFB, NEW MEXICO

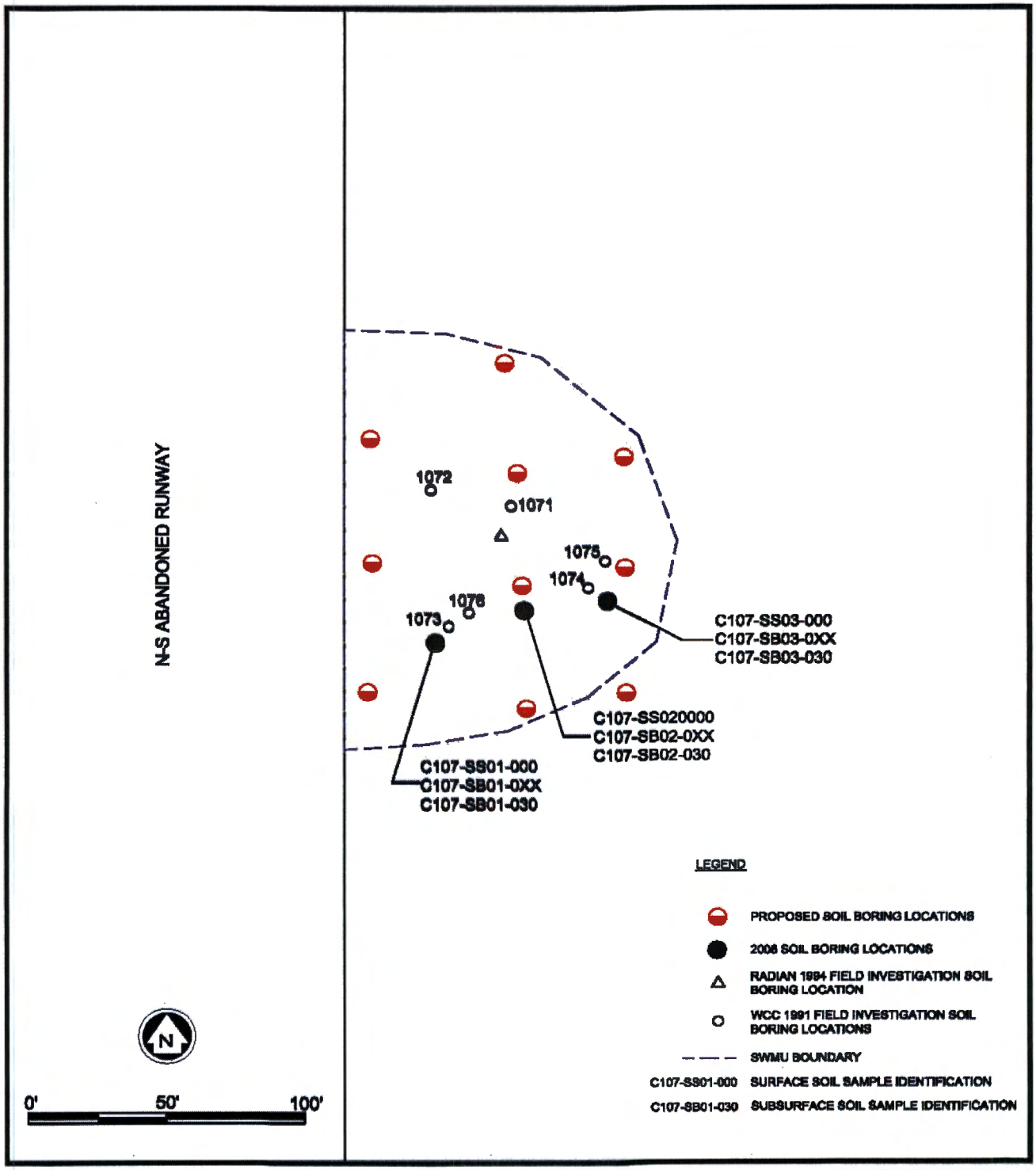
Legend

Remediation Area

Project #: 9428-001
Drafted by: TJL
Reviewed by: JAH
Date: 1/05/12
Ref: Cannon AFB Aerial Photography

EMR INCORPORATED
INFRASTRUCTURE AND ENVIRONMENT

Figure 3 – Proposed Boring Location Map



EMR INCORPORATED INFRASTRUCTURE AND ENVIRONMENT	Figure 3 Proposed Soil Boring Location Map	REMEDIAL ACTION SITE FT-08 (SWMU 107) CANNON AFB, NEW MEXICO	REF: Proposed Additional RFI Sampling Locations at SWMU 107 - Fire Department Training Area No. 3 Cannon AFB, New Mexico (Dec. 2007)	DRAWN BY: T. Landers
			DATE: 08/04/2011	PROJ. MANGR: J. Humenik

Figure 4 – Project Organization Chart

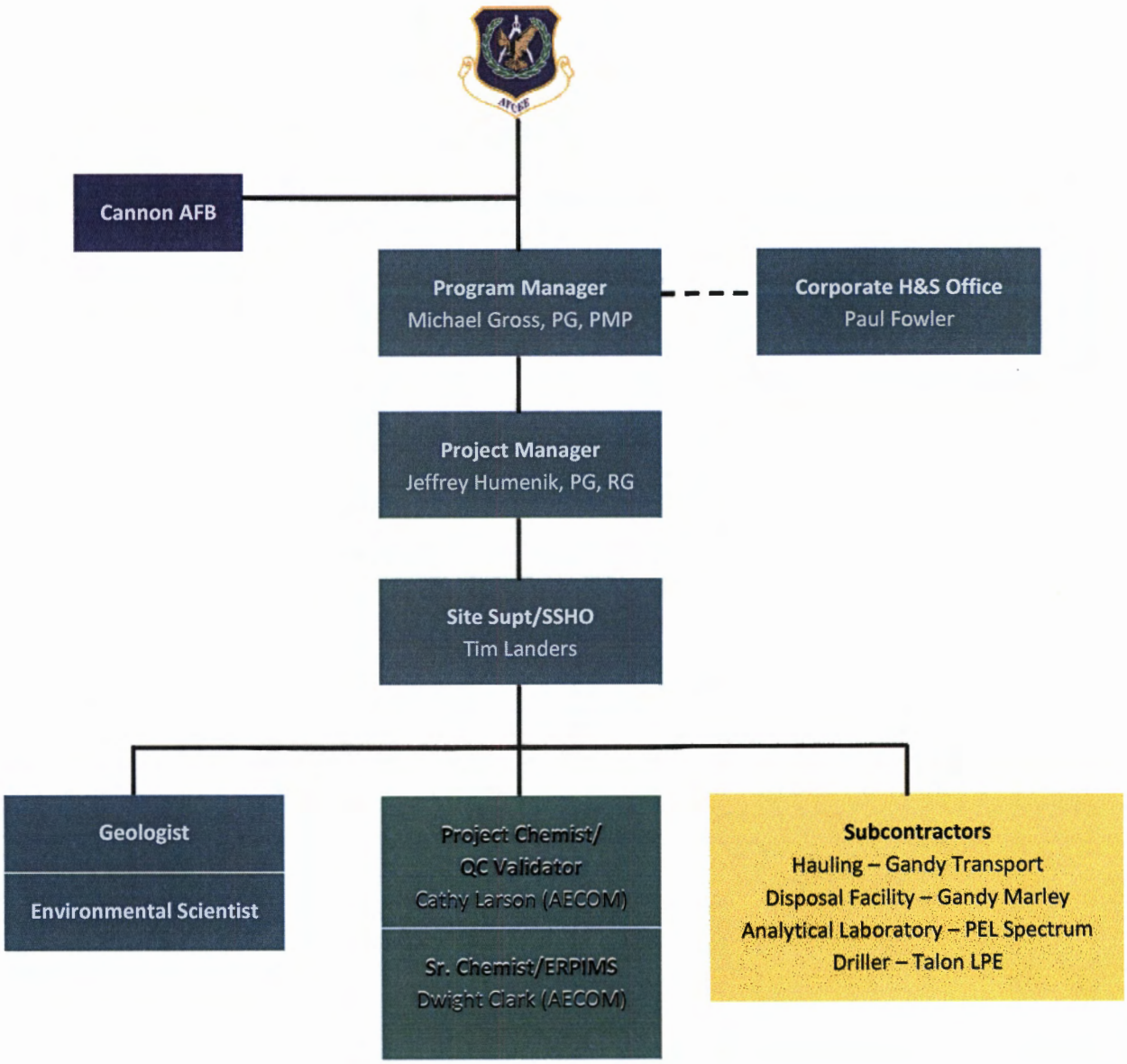


Figure 5. Sample Label

8015

Sampler _____

Sample_____

Date/Time _____

Sampling Point _____

PEL

CHAIN OF CUSTODY RECORD

Page _____ of _____

Special Handling:

TAT- Indicate Date Needed: _____

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: _____

Project Mgr.: _____

Invoice To: _____

P.O. No.: _____ RQN: _____

Project No.: _____

Site Name: _____

Location: _____ State: _____

Sampler(s): _____

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8=$NaHSO_4$ 9=_____ 10=_____ 11=_____

List preservative code below:

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic									

Containers:

Analyses:

QA/QC Reporting Level

☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

☐ E-mail to _____

EDD Format _____

Condition upon receipt: ☐ Iced ☐ Ambient ☐ °C _____

Relinquished by:	Received by:	Date:	Time:

8405 Benjamin Road • Tampa, Florida 33634 • 813-888-9507 • FAX 813-889-7128 • www.pelab.com

Figure 6. Chain-of-Custody

SPECTRUM ANALYTICAL, INC.
Featuring
HANIBAL TECHNOLOGY

CHAIN OF CUSTODY SEAL

Initials _____ Date _____

Figure 7. Custody Seal

QUALITY PROGRAM PLANS

REVISION NUMBER: 3

REMEDIAL ACTION - CONSTRUCTION AT
SITE FT-08 (SWMU 107)
CANNON AIR FORCE BASE, NEW MEXICO

EMR, INC
for

27 SOCES/CEAN
Cannon Air Force Base, NM

HQ AFSOC/A7AV
Langley Air Force Base, VA

USAF DoD AFCEE/EXEE

Contract No.: FA8903-09-8562
Delivery Order No.: 003

December 2011

APPENDIX 1 – HEALTH AND SAFETY PLAN

1.0 HEALTH AND SAFETY PLAN

1.1 Signature Sheet

Plan Prepared By: _____

Tim Landers, Site Safety and Health Officer
Telephone: (785) 842-9013 Ext. 120

Plan Approval By: _____

Paul Fowler, Corporate Health & Safety Officer
Telephone: (785) 842-9013 Ext. 128

Plan Concurrence By: _____

Jeffrey A. Humenik, PG, RG, Project Manager
Telephone: (785) 842-9013 Ext. 141

1.2 Emergency Contact List

FIRE, POLICE, OR AMBULANCE	911

EMR

Program Manager/Exec VP: Mike Gross	(913) 706-4347 (cell)
	(785) 842-9013 ext 144 (office)
	(785) 842-3863 (fax)
Project Manager: Jeffrey A. Humenik, PG, RG	(785) 766-6474 (cell)
	(785) 842-9013 ext 141 (office)
	(785) 842-3863 (fax)
Site Superintendent/SSHO: Tim Landers	(256) 509-7839 (cell)
	(785) 842-9013 ext 120 (office)
	(785) 842-3863 (fax)
Corporate Health & Safety Officer: Paul Fowler	(785) 764-0186 (cell)
	(785) 842-9013 ext 128 (office)
	(785) 842-3863 (fax)
Human Resources: Tom Oberzan	(785) 842-9013 ext 171 (office)
	(785) 832-1501 (fax)
Lawrence, Kansas Office: Sheri Wood	(785) 842-9013
	(785) 842-3863 (fax)

Cannon Air Force Base, New Mexico

Anita M. Lafuente, GS-11, CES	Main Point of Contact (POC)
	(575) 784-1092
	anita.lafuente@cannon.af.mil
Fire, Ambulance:	Emergency – Dial 911

Occupation Safety and Health Administration (OSHA)

Region 6 OSHA Office (Dallas, TX)	214-767-4731
	214-767-4693 FAX
OSHA Federal Emergency Hot Line	800-321-OSHA (800-321-6742)

1.3 Key Site Personnel

The key personnel for this project are listed in Table 1-1 with further discussion of roles and responsibilities provided in Section 1.11

Table 1-1 Project Team

NAME	COMPANY	PROJECT TITLE
Jeffrey A. Humenik, PG, RG	EMR	Project Manager
Tim Landers	EMR	Project Scientist/Site Superintendent/Site Safety and Health Officer
Brian Pierce	EMR	Equipment Operator
Justin Combs	EMR	Equipment Operator
TBD	Gandy Transport	Soil Transportation
TBD	Talon LPE (Licensed New Mexico Driller)	Drilling

SCHEDULED ON-SITE PERSONNEL*

*Note that all personnel arriving or departing the site should log in and out on the Employee/Visitor Daily Roster (Appendix 1). All personnel requiring access to controlled work areas must have completed the training and medical administrative control requirements.

(1) Responsibilities of listed personnel are provided in the Project General Activities Work Plan.

1.4 Project Information

Contractor: EMR, Inc.
3200 Haskell Avenue, Suite 140
Lawrence, KS 66046
Phone: (785) 842-9013
Fax: (785) 842-3863

Contract No.: FA8903-09-R-9999-R077

Task Order No.:0003

Subcontractors: Gandy Transport (Soil Hauling)
Talon LPE (Licensed New Mexico Driller)
PEL Spectrum (Analytical Laboratory)
Lydick Engineering & Surveyors (Licensed Surveyor)

Projects: RA - FT-08 (SWMU 107)

Project Location: Cannon Air Force Base
New Mexico
(Closest city near AFB – Clovis, New Mexico)

1.5 Introduction

It is a condition of the construction contract that the planned work shall not require any laborer, mechanic, or other personnel employed in the performance of the contract nor cause any Government military, civilian, or other contractor's personnel to be exposed to any unsanitary, health, or safety hazard or condition. The purpose of this SHSP is to detail administrative procedures for accident prevention, health protection, and other safety precautions such that the construction work is performed in a safe manner. Construction work for this contract will not occur within 1000 feet (ft) on each side of the centerline of an active runway nor will authorization for crossing of active runways be needed.

1.6 Project Location and Meteorological Information

The site is located on Cannon AFB, New Mexico, approximately 215 miles east of Albuquerque, NM. Temperatures at Cannon AFB range from the high 90s in the summer to the mid 30s in the winter. The peak rainfall months are July and August. Snow and other forms of frozen

precipitation are rare or non-existent. Heat Indexes are high throughout the year and ultraviolet (UV) indexes are elevated through the summer months.

1.7 Corporate Accident Experience

EMR will maintain accident report logs, OSHA recordkeeping and other corporate safety documents. These documents will be furnished upon request.

1.8 Listing of Site Work Tasks and Potential Hazardous Activity

The following work tasks are included in the project scope:

Site Work Tasks

- Soil assessment – Drilling of 10 soil borings / soil data collection activities
- Site preparation for soil excavation
- Excavation activities with continued segregation of clean / contaminated soils
- Stockpiling of soils
- Collection of analytical samples for confirmation data
- Removal of Arsenic contaminated stockpile
- Manifesting and Transportation of non-hazardous special waste
- Surface restoration

1.9 Hazard Analysis of Site Work Tasks

Hazard analysis is completed by each of the subcontractors responsible for the site work task being performed. Job hazards should be reviewed daily before start of any tasks and should take place with the daily safety meetings. All hazard analyses are subject to review by EMR. Potential hazards should be identified and appropriate discussions regarding avoidance of hazards with all employees working on the site for the day. As additional hazards of the job are recognized, a hazard analysis may need to be required prior to beginning that task. In all cases, hazard analysis will be performed by the subcontractor responsible for performing the task and hazard analysis will be coordinated with OSHA Competent Persons identified in the subcontractor's SHSP. All hazard analysis will be performed in accordance with the safety

standards of the U.S. Army Corps of Engineers (USACE) Publication Number EM 385-1-1, "Safety-Safety and Health Requirements, dated 3 November 2003; OSHA Safety and Health Regulations for Construction (29 Code of Federal Regulations (CFR) 1926), and EMR's Safety, Health, and Emergency Response Policies and Standard Operating Procedures (SOPs). Additional information on hazard analyses is included as Appendix 4.

1.10 Statement of Safety, Health and Environment Policy

1.10.1 Corporate Policy

EMR considers effective safety, health and environmental management to be of prime importance to its business and is committed to continual improvement in safety, health, and environmental performance.

EMR assigns the highest priority to the safety and health of personnel assigned to work for EMR or at our projects, and to the protection of the general public and environment. The prevention of occupationally induced injuries and illnesses is of such value that it will be given priority over operating productivity where necessary.

EMR strongly believes ***that every accident, injury and occupational illness is preventable***. EMR's overall goal is to protect both people and the environment and to have zero accidents, injuries and occupational illnesses.

OUR GOAL IS ZERO ACCIDENTS, INJURIES AND OCCUPATIONAL ILLNESSES

EMR will:

- Comply with legislative requirements pertaining to safety, health, and the environment as its minimum standard
- Pursue standards of safety, health, and environmental management as an integral part of efficient management of the business ensuring that business decisions take proper account of safety, health, and environmental implications

- Work with clients to minimize negative and maximize positive environmental impacts from their operations and will conduct its own operations and offer its services in an environmentally responsible manner
- Employ a consistent framework for the management of safety, health and environmental issues across all its operations
- Maintain, review, and report on safety, health, and environmental performance indicators including:
    - Accident and incident performance rates
    - Attainment of annual safety, health, and environmental objectives
    - Training achievement
    - Results of safety, health and environmental inspections and audits
- Review and, if necessary, revise this policy on an annual basis:
    - Revise when SOW is changed or other changes in work deem revisions need to be made

To be successful, this policy requires proper attitude toward injury and illness prevention on the part of management, supervisors, and employees. Cooperation in health and safety matters, not only between supervisors and employees but also between each employee and his or her co-workers, is essential for attaining the goal of this policy. Only through such cooperation can this policy be successfully implemented in the best interest of the employees and the company.

The EMR President has overall responsibility for implementing this policy. It is the responsibility of all employees to be aware of and implement this policy together with their collective and individual responsibilities.

THE SAFETY PROGRAM AT EMR IS A CONTRACTUAL RESPONSIBILITY AND WILL BE STRICTLY ENFORCED

1.10.2 Scope of this Health and Safety and Accident Prevention Plan

This plan is developed for the specific referenced project with the intent of supplementing the EMR Corporate Health and Safety Manual (CHSM). The CHSM will be available onsite and available to any party for review upon request. References to the CHSM are made herein under

the direction that pertinent aspects of the CHSM pertain to all EMR operations except in those cases where specific local, state, or Federal government policies directs otherwise.

OSHA Safety and Health Regulations for Construction (29 CFR 1926), and EMR's safety, health, and emergency response policies and SOPs will be applied to all phases of this construction job. However, as the situation or conditions of the jobsite warrant, stricter controls on issues of health, safety, and environmental protection may be applied at the Project Manager's (PM) discretion.

1.11 Responsibilities and Lines of Authority

1.11.1 Duties of the Project Manager

The PM is responsible for the administration and implementation of the safety program at the job site, including to:

- Manage the project in such a way to facilitate the delivery of the product and/or service while maintaining compliance with EMR's corporate safety policy
- Respond to unsafe conditions and/or acts reported by the Site Safety and Health Officer (SSHO) in accordance with this document
- Investigate the cause of accidents, injuries, and near misses reported by the Corporate Health and Safety Officer (CHSO) and modify the work practices in conjunction with the CHSM to avoid future incidents. This would also include notify the CHSO immediately of an incident. It would be determined by the CHSO if the site should be shut down. If warranted the CHSO would travel onsite to conduct an inspection of the site.
- Monitor employee and subcontractor compliance with safety regulations.
- Provide for safety planning in the scheduling and coordination of the work.
- Conduct regular safety inspections and initiate corrective actions for hazards found.
- Implement recommendations of authorized safety personnel.
- Implementation of EMR's Hazard Communication Program (HAZCOM) (29 CFR 1910.1200).

1.11.2 Duties of Site Health and Safety Officer (EMR & Subcontractors)

- Will not permit employees and or subcontractors to engage in unsafe acts or work in unsafe conditions.
- Will set a good example for employees by attitude, conduct, and compliance with safety regulations.
- Include safety planning, pre-task hazard analysis, and issue safety instructions to employees in all work assigned.
- Instruct all new employees in safe work practices and company safety requirements.
- Investigate and correct all unsafe conditions and unsafe acts.
- Report all under-acted, unsafe conditions and unsafe acts to the EMR's CHSO and PM.
- Report all accidents, injuries (*including direct subcontractors*), and near misses (*EMR employees only*) to EMR CHSO, PM, and corporate Human Resources (HR).
- Issue required personal protective equipment (PPE) to employees and enforce its use. Maintain equipment in safe condition.
- Inspect all tools, equipment, and machinery issued to employees and remove unsafe items from use.
- Conduct or coordinate and attend safety meetings daily. EMR will keep daily meeting notes within a binder.
- Assist the PM to implement EMR's HAZCOM Program. Make sure that PPE to wear. Consult with EMR Industrial Hygienists when necessary.
- Request and secure from all subcontractors at the project site material safety data sheets (MSDSs) on all products used at the site. Maintain a bi-fold loose-leaf book that will keep all of the MSDS on products being used at the project site. The first part will maintain MSDS in alphabetical order by contractor. The second part will maintain MSDS in alphabetical order by MSDS.
- Prepare, distribute, and maintain all safety reports and records as required by the corporate policy.
- Inspect and maintain first aid supplies.
- Inspect fire extinguishers.
- Post all safety notices and posters.
- Issue notices of safety meetings.
- Keep all safety related trainings, talks, walk through, etc. in a binder

1.11.3 Duties of Employees

- Comply with safety regulations applicable to his/her conduct.
- Be familiar with and know the location of the SHSP.
- Comply with safety orders and instructions issued by his/her supervisor.
- Report injuries, accidents, and recognized safety hazards to his/her supervisor **IMMEDIATELY**.
- Attend safety meetings as required.
- Report any unlabeled items that may come on to the site.
- Assist the EMR and SSHO to initiate and implement EMR's CHSM.

1.12 Subcontractors and Suppliers

1.12.1 Subcontractors

EMR intends to subcontract major portions of the work and will need onsite presence of vendors or material suppliers for the execution of this contract.

The subcontractor is responsible for participating in and enforcing the safety and loss prevention programs established for the project that will cover all work performed by the subcontractor and their subcontractors. Each subcontractor will designate a responsible member of its organization whose duties will include loss and accident prevention and who will have the responsibility and full authority to enforce the program. This person will ensure that all Subcontractor and Sub-tier employees understand and comply with applicable health & safety regulations. Subcontractors will cooperate fully with EMR, EMR's client, and all insurance carriers and loss prevention engineers on loss and accident prevention.

In order to maintain a safe work place for individuals working and visiting the project site, the following items establish the minimum subcontractor responsibilities toward achieving the project safety goals. Each subcontractor is responsible for the content listed in this policy:

1. Subcontractor will perform all parts of its contract while assuming total responsibility for complying with all applicable federal, state, local and USACE health, safety, and environmental standards, regulations, rules, or guidelines.

2. Subcontractor will maintain documentation at the project site and/or home office that verifies that its health, safety, and environmental program is on-going and is in current compliance with applicable federal, state, local, and project safety regulations, rules or guidelines. Documentation will be made available upon request by EMR.

3. Subcontractor will ensure that all places where members of the project work force are directed or permitted to perform Work will be constructed, equipped, arranged, operated and conducted so as to provide reasonable and adequate protection to the lives, health and safety of employees and others and protection of the environment.

4. Subcontractor will not direct or permit an employee to work under conditions that are not in compliance with or that are prohibited by any applicable federal, state, and local safety standards, regulations, rules, or guidelines.

5. Subcontractor will initiate and maintain an accident (injury and illness) prevention program for the duration of the project that will include, but not be limited to, active participation by the subcontractor's project managers, superintendents, office staff and foremen. Subcontractor is required to communicate any incident and/or injury to the EMR SSHO so they are aware and can inform the CHSO so that individual can review cause of incident.

6. Subcontractor will be responsible for this program's implementation and continued compliance.

7. Subcontractor will provide initial safety orientations to new employees upon arrival to the jobsite. At a minimum, such orientations will include training on principle safety hazards, PPE requirements, rules and limitations on equipment operations, and what to do in case of injury or illness and location of medical station(s). Such orientations will also advise of each employee's required attendance at weekly (at a minimum) safety meetings and each employee's obligation to report observed or known unsafe conditions or practices to the employees' immediate supervisors and to EMR. Depending on a subcontractor's chain of command, subcontractor employees will report their safety findings to the next level of supervision or management.

8. Investigation into an incident will be conducted by the subcontractor in conjunction with the EMR SSHO. An immediate corrective action to prevent similar re-occurrences will be addressed by both parties. A report will provide all relevant information regarding the accident in question, including but not limited to, a fully detailed description of the incident and all relevant statements of witnesses. The investigation will also include, at a minimum, all incidents resulting in personal injury and/or hospitalization as well as all incidences of property damage, fire, and any third-party claim in an effort to determine the causes thereof.

9. Subcontractor and EMR will maintain documentation related to injuries and all other pertinent information regarding an incident.

10. Subcontractor will evaluate accident exposures that may arise from every portion of the work prior to the start of the operation and follow-up with appropriate action where required. Subcontractor will submit to EMR a written site-specific job safety hazard analysis or SHSP that will include a safety means and methods and emergency response practices prior to the start of operations.

11. Subcontractor will establish safety methods and good practices to be carried out by its workers. Subcontractor will have a written safety program and have it made available to all of its employees. This written safety program will be available for review by the EMR SSHO.

12. Subcontractor will conduct inspections of its contracted activities utilizing a pre-determined checklist. Safety compliance issues, unsafe practices and/or unsafe conditions, corrective recommendations, corrective action taken and all previous recommendations that may not have been complied with at the time of inspection will be included on the checklist. Copies of the inspection reports will be available for review by the EMR SSHO.

13. Subcontractor will provide adequate safety measures against occupational disease exposures such as gases, fumes, dusts and chemicals that may be injurious to the project workforce.

14. Subcontractor will provide PPE at the work area where needed and required. Subcontractor personnel who have been provided PPE by the subcontractor will be instructed in proper equipment use and be mandated by the subcontractor to utilize all such equipment. Subcontractor will be prepared to take immediate corrective action for noncompliance that will include dismissal if subcontractor's employee(s) refuses to utilize the provided safety equipment.

15. Subcontractor will not direct or permit an employee to use machinery or equipment that the employee is not qualified to operator. Only employees trained and qualified to use a piece of machinery or equipment will be permitted to do so. All employees qualified to use machinery or equipment will have a record of such training documented in his/her personnel training records. Daily equipment checks are mandatory and all subcontractors and employees operating equipment will be required to complete an equipment checklist to be submitted to EMR.

16. Subcontractor will ensure that all safety devices and safeguards in use are sound and operable.

17. Subcontractor will ensure that damaged or unsafe equipment is removed from service until it is repaired and restored to a safe operating condition. Unsafe operations will immediately be corrected to ensure protection of personnel and property.

18. Subcontractor will include all of its personnel (including office staff) in the project's safety program. The subcontractor will inform EMR when it requires switching out employees for emergency, vacation, time off, etc. The subcontractor will also provide, in either hard copy or electronic format, verification of training and job knowledge of the replacement employee.

19. Subcontractor will designate a competent and responsible member of its organization whose duties will include loss and accident prevention and who will have the obligation and full authority to enforce the program. Subcontractor will be required to provide a specific name of that individual for each project. (For definition purposes, "competent" will mean one who is trained and capable of identifying existing hazards in the surrounding working conditions which are hazardous or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.)

20. Federal and state regulations require each employer to have a HAZCOM program in place. The project requires a complete library of manufacturer's MSDSs for all material incorporated into the project process. The subcontractor will submit all MSDSs for materials provided/used in the performance of this subcontract to EMR to ensure completeness of this library. The subcontractor will maintain onsite a copy of their HAZCOM program and a library of MSDSs for materials provided/used in the performance of this subcontract. Subcontractor will submit its written HAZCOM program to EMR for record keeping purposes. Subcontractors need to provide their specific spill and cleanup response guidelines and processes to EMR.

21. In connection with all work performed hereunder, subcontractor will include provisions for and will comply with all Safety and Health Regulations of the OSHA of 1970 (29 CFR 1926 and 1910), including all amendments and modifications thereto. In the event there is a conflict between the safety and health provisions of federal, state or local regulations, the more stringent applicable provision will prevail. Subcontractor acknowledges and agrees that with respect to the scope of its work under their subcontract, they will comply with all obligations and assume all responsibilities imposed upon the "controlling contractor" as such term is defined and construed under all OSHA rules and regulations.

22. EMR reserves the right to withhold payment or to take other action as may be necessary when the subcontractor or any tier of a sub-subcontractor is not in compliance, with the applicable safety & health regulation. Any and all direct or indirect costs associated with any action taken by EMR as a result of subcontractor or second tier subcontractor non-compliance with these safety requirements will be at the subcontractor's expense.

23. Subcontractor's principles, Project Manager, Superintendent, or Foreman to whose attention the existence of any unsafe device, operation, safeguard, or equipment is called, will take immediate steps to remedy or remove the unsafe condition in question.

In an emergency affecting the safety of life, the work, or adjoining property, the subcontractor, without special instructions or authorization from EMR, Client, Architect or Owner, will take any action necessary to prevent such threatened loss or injury. The subcontractor will communicate to others on the jobsite if there is an emergency either by verbal, hand signals, cellular phone, walkie talkies, or 2-way radios.

Prior to the start of work, all subcontractors will submit the names of their authorized and qualified Project Safety Representatives to the EMR PM.

All subcontractor Project Safety Representatives will be held accountable by their companies for the immediate correction of hazards and unsafe acts and compliance with their company Safety and Health and HAZCOM Programs, the project documents, standards and all other federal, state, provincial and local codes, laws and regulations by their employees and their subcontractors and suppliers, regardless of tier.

1.12.2 EMR's Subcontractor Health and Safety Reinforcement

Upon knowledge by EMR of a safety hazard or unsafe act, verbal notification will be given to the subcontractor's responsible party. If the required correction does not occur immediately or within the time period specified by EMR, verbal notification will be given to the Subcontractor's Project Safety Representative. If the subcontractor's Project Safety Representative does not ensure correction and continuing safety compliance, EMR reserves the right to take whatever action is required to correct the hazard or unsafe act.

This action may include any of the following:

- A stop work order for the specific operation or area of construction until the hazard or unsafe act is corrected.
- Written notification to the subcontractor's EMR/Project Executive and company President.

- Replacement of the subcontractor's Project Safety Representative.

1.12.3 Suppliers

Procurement and delivery of supplies is a significant component of this work. Supplier personnel that require site access will be briefed on the contents of this plan and the personnel are to signify understanding of this plan by signature on the acknowledgement page. The EMR SSHO will implement the required measures for supplier personnel site access.

1.13 Hazard Analysis and Safety Precautions

Construction activities will be complaint with OSHA standards and regulations as set forth in 29 CFR 1910 and 1926 and Air Force and local standards and regulations. EMR's Safety Manual and SHSP, subcontractor's health and safety manuals and SHSPs will be continuously consulted to identify the most stringent requirements that will be applicable at this project site.

Selected specific safety hazards for this construction project are addressed in the following subsections and additional information is included as Appendix 4. Other related construction safety hazards are addressed in EMR's Safety Manual that will be available onsite.

1.13.1 Housekeeping

Poor housekeeping on construction projects create unsafe walking and working conditions due to tripping hazards. Fire hazards but are ever-present due to the inflammable and combustible nature of most construction debris.

The Site Superintendent will plan his/her housekeeping program at the start of the project and assign responsibilities for cleanup and removal of debris to all involved in the project. The following housekeeping rules will be enforced:

1. Make certain that subcontractors understand their contractual obligations for cleanup and removal of their debris. Enforce contractual requirements.

2. Plan ahead and set up schedules for prompt emptying of rubbish containers. Full containers will be removed promptly and replaced with empty containers.

3. Hoses, extension cords, welding leads, etc., will not be laid on the floor in occupied areas outside of construction areas. All such lines will be strung overhead.

4. Combustible or flammable debris will be cleaned up and removed on a timely basis, no less than daily. Accumulations of this type of debris are prohibited.

5. Construction debris will be cleaned up ***as the work progresses*** and will not be permitted to accumulate or remain scattered and strewn about.

6. In no case will construction debris be permitted to become strewn or accumulated in occupied areas outside of construction areas. Debris produced from construction activities in such areas will be cleaned up and removed as it is produced. The following areas will be kept clear of debris at all times:
   a. Walkways
   b. Aisles
   c. Stairways
   d. Ladder ways
   e. Ramps
   f. Loading docks
   g. Elevator lobbies and landings
   h. Entrances to the project

7. Containers for debris will be provided at the following locations:
   a. Employee lunch areas
   b. Shanties
   c. Storerooms
   d. Field offices
   e. Entrances to project
   f. Lower landing of elevators

8. Where containers for debris are not readily available, the debris will be put into isolated piles ready for removal and not left scattered and strewn about.

9. Nails may not be left protruding from lumber. Protruding nails will be backed out or removed.

10. Oil and grease spills or releases will be cleaned up. A cleanup plan and spill kit will be required near potential spill or release areas. The spill kit shall contain at a minimum, absorbent pads, booms and bags granular absorbents. In the event of a spill or release, the Site Manager will notify the Cannon AFB Fire Department and the AFCEE. Spill response will be conducted in accordance with federal, state, local, and Cannon AFB regulations. Emergency response procedures are specified in the SHSP.

11. Where sweeping of debris from floors may create dusty atmospheres, sweeping compound will be used or the floors sprinkled with water, whichever is required to reduce dust in the atmosphere to acceptable levels. Workers will wear the appropriate PPE such as dust masks, and, if necessary, eye protection when sweeping.

12. Where openings to rubbish chutes may permit materials to ricochet or fly out of the openings or where the openings present a falling hazard to employees, the opening will be equipped with a cover of 3/4 inch plywood or its equivalent or with a 2" x 4" bar across the opening. Covers or bars will be kept in place when the opening is not in use. Where the openings are large enough to admit a wheelbarrow, a substantial wheel stop will be installed on the floor in front of the openings.

13. Where employees are required to enter into confined space, OSHA requirements would have to be met for entry of personnel into one of these situations. Additionally, it is a requirement that a confined entry has a spotter in place and the personnel involved in the entry are trained in OSHA 29 CFR 1910.146. Confined space entry is not anticipated under this SOW or TO.

14. Where construction activities take place in occupied areas, outside of regular construction areas, and the work cannot be isolated, only such tools, equipment and materials as may

be immediately used will be permitted. One employee will serve as flagman to warn occupants of the hazards and direct them away from or around the work.

15. Construction materials and equipment will not be stored in occupied areas outside of construction areas.

16. Where construction materials, tools, supplies and equipment must be moved through occupied areas, one employee will serve as flagman to warn occupants of the hazards and direct them away from or around the move.

1.13.2 Electrical

Prior to starting any fieldwork onsite, locate any underground or overhead utilities that could be touched by tools, equipment, or workers during the performance of specified work tasks. This will be done by obtaining Cannon AFB dig permits, reviewing as-built drawings, and discussing utility locations with Cannon AFB personnel and having a licensed locator and/or licensed electrician onsite.

1. All electrical work installation and wire capacities, both temporary and permanent, will be in accordance with the National Electrical Code.
2. All electrical equipment whether portable or fixed will be grounded.

3. Portable tools that are double insulated need not be grounded.

4. All extension cords and cords on plug connected equipment are required to be three-pronged (hot, neutral and ground prong).

5. Temporary lights will be equipped with guards to prevent accidental contact with the bulb.

6. Aisles, stairs, and walkways will be kept clear of electric cords or cable so as not to present a tripping hazard. Unused cord and cables will be picked up and stored away.

7. Cords with worn, frayed or broken insulation or with loose plugs will not be used.

8. All switches, circuit breakers, breaker panels, distribution panels, receptacles, and fuse boxes that may be exposed to water will be protected so that water does not enter.

9. Energized transformers and other related energized equipment over 150 volts to ground will be protected against accidental contact by providing individual housing or by an enclosure. Access to such energized equipment will be secured by lock, and signs indicating danger and prohibiting unauthorized access will be displayed on the housing or enclosure. Transformers on poles 12 ft from the ground are exempt from this requirement.

10. Alteration of connections in welding leads are prohibited. All connections will be grounded along with portable welders.

11. The Site Superintendent will enforce the use of Ground Fault Circuit Interrupter (GFCI) devices on all electrical tools and extension cords.

1.13.3 Equipment Safety

Walking and working under suspended booms of excavators or backhoes are prohibited. Hard hats must be worn when working around the equipment. Lifting hooks will be equipped with operable safety latches. All accessible areas within the swing area of the rotating excavator will be blocked out. All equipment with an obstructed view to the rear will be equipped with an audible back-up alarm or will utilize a spotter when operated in the reverse mode.

Prior to lifting any load, the approximate weight of the load must be known. Backhoes or excavators used to hoist loads must have a manufacturer's approved lifting lug and load radius/capacity chart showing the equipment is capable of performing the lift. Visual inspections by excavator/backhoe operators must be performed prior to shift. Wire ropes must also be visually inspected.

1. Excavators and backhoes will not be operated beyond their rated capacities and limits. Rated load capacities, recommended operating speeds, and manufacturer's operating instructions will be posted conspicuously at the operator's station.

2. Hand signals will be used between an operator and spotter.

3. Only one person will be designated as a spotter. The spotter will be stationed in full view of the operator and use approved signals.

4. The operator will inspect the excavator or backhoe prior to and during each use to make sure it is in safe operating condition. All defects will be corrected before continued use.

5. Accessible areas within the swing radius of a rotating excavator or backhoe will be barricaded in such a manner as to prevent an employee from being struck or crushed.

6. An ABC multi-class dry chemical type fire extinguisher will be located at the operator's station or in the cab at all times.

7. No part of an excavator or backhoe is permitted to come within less than 10 ft of any energized electric lines.

8. Modifications or additions that affect the capacity or safe operation of the excavator or backhoe will not be made without the manufacturer's written approval.

9. All booms and jibs will have positive stops to prevent their movement beyond 5 degrees of vertical. Cable type belly slings are not acceptable as boom or job stops.

10. Cracked or broken window glass in cabs of the excavator or backhoe is prohibited.

11. Operators of excavators or backhoes will not pass suspended loads over the heads of employees below. Horn blow and all employees clear lift area until load is in place.

12. All loaders, dozers and scrapers manufactured after **July 1, 1979** will be equipped with rollover protective structures. Buckets and blades of loaders, dozers and scrapers will be set down on the ground when the operator is out of the operator's seat.

13. No helicopters will be used at the project site without the permission of the AFCEE. Helicopter cranes will comply with all applicable regulations of the Federal Aviation Administration.

14. Modifications or additions that affect the capacity or safe operations of the equipment will not be made without the manufacturer's written approval. All high lift industrial trucks will be equipped with overhead guards.

15. Wheels of rubber tire vehicles parked on ramps or inclined surfaces will be blocked or chocked and the parking brake will be set. Vehicles left unattended at night in or adjacent to a public street or road will have appropriate lights, reflectors or barricades equipped with appropriate lights or reflectors to identify the location of the equipment.

1.13.4 Excavating, Trenching and Shoring

1.13.4.1 Introduction

EMR implemented this Excavation Program to assure the safety of employees who work in or around excavations as part of their job duties. This program is also designed to protect employees and the general public who work or travel in the vicinity of excavations.

1.13.4.2 Scope

This program is designed to assist departments with establishing procedures to achieve workplace safety standards as established in the OSHA excavation standard at 29 CFR 1926 Subpart P. The program establishes guidelines and procedures for use on excavations created on EMR jobsites.

1.13.4.3 Application

This program applies to all work involving excavations on EMR job sites.

1.13.4.4 General Program Requirements

- Employees who work in or around excavations must be provided training according to their work.
- The excavation or trench must either be sloped or supported as required to comply with OSHA requirements

- Traffic around the site must be controlled and barricades, signs, and/or flag persons used, as needed, to control both vehicular and pedestrian traffic.
- Utilities on the site must be protected and suitable precautions taken if any utility will be disturbed by the work.
- Employees must use required PPE.

Excavation work may involve safety hazards not addressed by this program including:

- Work conducted on or around electrical utilization systems addressed using procedures from the Electrical Safety Program.
- Work that may impact existing utilities that may need to be locked and tagged out using procedures from the Lockout/Tagout Program.
- Work conducted in areas where hazardous atmospheres or gases could accumulate (e.g. landfills, manure pits, gas distribution lines, or hazardous materials storage locations) covered under the Confined Space Program.
- Work associated with electric power generation, transmission and distribution systems.
- Fall hazards covered under the Fall Protection Program.

Excavated materials (spoils) at your site are dangerous if they are set too close to the edge of a trench/excavation. The weight of the spoils can cause a cave-in, or spoils and equipment can roll back on top of workers, causing serious injuries, or death.

Provide protection by one or more of the following:

- Set spoils and equipment at least 2 ft back from the excavation.
- Use retaining devices, such as a trench box, which will extend above the top of the trench to prevent equipment and spoils from falling back into the excavation.
- Where the site does not permit a 2 ft setback, spoils may need to be temporarily hauled to another location.

1.13.5 Sloping and Benching Systems

For this soil excavation, sloping is anticipated to be at 1.5 horizontal (H) run to 1.0 vertical (V) rise. The ratio 1.5H:1:V refers to the slope or grade of the excavation walls. The horizontal run

will be 50% longer than the vertical rise. Example: If the vertical rise of a wall is 2 ft, the horizontal run will be 3 ft (3.0H:2V). An access ramp for equipment ingress and egress will be constructed at an appropriate location at a slope of 3.0H to 1.0V.

The slope and configuration of sloping and benching systems must be selected and constructed by a Competent Person in accordance with one of the following:

Option 1 - Allowable Configurations and Slopes

Excavations must be sloped at an angle not steeper than 1.5H to 1.0V (34 degrees measured from the horizontal), unless the Competent Person uses one of the other options listed below.

The slopes used must be excavated in accordance with the slopes shown in Appendix 8 Figure 3.0 – Excavations Made in Type C Soil.

Option 2 - Determination of Slopes and Configurations

Maximum allowable slopes, and allowable configurations for sloping and benching systems, must meet the requirements of the slope configurations in Appendix 8 and Section 5.13.7 - Soil Classification.

Option 3 - Designs Using Other Tabulated Data

The design of sloping or benching systems may be selected from and must be constructed in accordance with other tabulated data, such as tables and charts. The tabulated data used must be in written form and include all of the following:

- Identification of the factors that affect the selection of a sloping or benching system
- Identification of the limits of use of the data, including the maximum height and the angle of the slopes determined to be safe
- Other information needed by the user to make correct selection of a protective system

One copy of the tabulated data that identifies the licensed Professional Engineer (PE) who approved the data must be maintained at the jobsite during construction of the protective

system. After that time, the data may be stored off the jobsite but a copy of the data must be made available to AFCEE upon request.

Option 4 - Design by a PE

Sloping and benching systems not utilizing Option (1), Option (2) or Option (3) above must be approved by a licensed PE.

Designs must be in written form and must include at least the following:

- The maximum height and angle of the slopes that were determined to be safe for the particular project
- The identity of the licensed PE approving the design

At least one copy of the design must be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy must be made available upon request.

1.13.6 Sloping and Benching

1.13.6.1 Scope

This section contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. Employees' entering the excavation is not anticipated with this SOW and TO. The definitions and slope configurations are included as Appendix 8.

1.13.6.2 Application

The requirements of this section apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in Section 5.13.5 - Sloping and Benching Systems Option 2.

1.13.7 Soil Classification

1.13.7.1 Scope

This section describes a method of classifying soil and rock deposits based onsite and environmental conditions and on the structure and composition of the earth deposits and contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

1.13.7.2 Application

This section applies when a sloping or benching system is designed in accordance with the requirements set forth in 1926.652(b)(2) as a method of protection for employees from cave-ins. This section also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in 1926.652(c) and the use of the data is predicated on the use of the soil classification system set forth in this reference material. Appendix 9 includes the soil classification definitions and requirements

1.13.8 Aerial Lifts

No aerial lifts are planned to be used as part of this project.

Definitions

An **excavation** is any man made cavity or depression in the earth's surface formed by earth removal and producing unsupported earth conditions by reasons of the excavation.

A **trench** is a narrow excavation at least 4 ft deep and not over 15 ft wide.

The **angle of repose** is the greatest angle above the horizontal plane at which a material will lie naturally without sliding.

Notes

Table P-1 in Subpart P of the OSHA construction regulations shows the approximate angle of repose for various types of soil conditions.

Table P-2 in Subpart P of the OSHA construction regulations shows minimum construction requirements for shoring in trenches.

1.14 Welding, Cutting, and Brazing

Hot work such as welding, cutting, and brazing, will be conducted only after the proper training and documentation have been completed. Both EMR SOPs and Cannon AFB procedures will be followed. The most stringent of procedure will take precedence to ensure compliance. Welding, cutting, and brazing are not anticipated for this SOW and TO.

The AF Form 592, *USAF Welding, Cutting and Brazing Permit*, will be obtained from the Base Fire Department prior to use of any welding, cutting, or brazing equipment. This form will be kept with the contractor/subcontractor employees accomplishing the work at all times. Upon receipt, the Contractor will forward a copy of all permits to the Contracting Officer (KO). Storage of all portable gases will comply with the National Fire Protection Association 55 standard.

This procedure establishes the practices to be followed and the equipment to be used when performing cutting and welding operations if life and property are to be adequately protected. This procedure covers electric, all welding, oxy-acetylene fusion welding and cutting, brazing, welding, electric resistance, or induction welding.

1.14.1 Restricted Areas

Welding and cutting operations are prohibited in or near areas or equipment containing flammable vapors, dusts, or liquids on or in closed tanks or other containers that have held flammable liquids until all fire and explosive hazards have been eliminated as prescribed in the American Welding Society's recommended procedure for welding or cutting of containers that have held combustibles. Air monitoring is required prior to welding, cutting, and brazing. Under no circumstances are welding or cutting operations to be performed in or on containers, drums, tanks, or other vessels containing combustible or flammable liquids, or other substances of a similar dangerous nature.

1.14.2 Sprinkler Protection

If the work to be performed is within a building equipped with an operative sprinkler system, the sprinkler system must not be made inoperative during cutting and welding operations unless specific permission is granted by EMR. Welding within a building is not anticipated under this SOW and TO.

1.14.3 Floor and Material Protection

The basic precautions for fire protection in welding and cutting operations are:

1. When practical, remove the object to be welded or cut to a safe location designated for such work.
2. If the object to be welded or cut cannot be readily moved, all movable fire hazards in the vicinity will be taken to a safe place at least 30 ft from the cutting or welding protection.
3. If the object to be welded or cut cannot be moved and if all fire hazards cannot be removed, the following additional precautions should be observed: After the combustible floors have been swept clean, they should be protected by flame proofed tarpaulins or the equivalent or, if practical, the area may be wetted down. ***CAUTION! Ordinary waterproofed tarpaulins must not be used. This type of tarpaulin would add to rather than retard a fire.***
4. Wherever there are floor openings or cracks in the flooring that cannot be closed, an examination should be made to ascertain that there are no highly combustible materials on the floor below which would be exposed to sparks that might drop through the floor. The same protection should be observed with regard to breaks or holes in walls, open doorways, and open or broken windows.
5. In grassy areas, the vegetation will be cropped closed to the ground and well wetted before cutting and welding operations are completed.

1.14.4 Fire Watch

1. Suitable fire extinguishing equipment will be maintained in a state of readiness for instant use. Such equipment may consist of hose lines or portable extinguishers depending upon the nature and quantity of the combustible materials exposed.
2. Additional personnel will be stationed as fire watchers not only while the actual operations are being performed but also to patrol the area at intervals of one-half hour and one hour after the operations have been completed to check for smoldering fire, even to the extent of remaining at the site after normal working hours. An extra man to watch for sparks and fire will be provided for each single or for multiple operations if within 50 ft of the extra man.
3. When welding or cutting operations are conducted through floor, ceiling, or wall openings, a fire watch will be conducted not only at the scene of operations but also on the other side. The cutting and welding area, the floor below, and the floor above will be patrolled at intervals on one-half hour and one hour after the operations have been completed to check for smoldering fire, even though the normal working hours have been completed.

1.14.5 Work in Confined Spaces

1. Before entering confined spaces such as tanks or manholes, tests should be made to determine the toxicity and explosive range of the vapors present and to determine if there is sufficient oxygen to maintain life. All tests should be repeated during prolonged working periods. Workmen must not enter such areas until the atmosphere has been tested and found safe by those engaged in the cutting and welding operations (also see **Confined Space Entry Program documentation that EMR can provide**).
2. When welding or cutting is being performed in confined spaces, the gas cylinders and the welding machine will be left on the exterior. Prior to starting operations, any portable equipment mounted on wheels will be securely blocked to prevent accidental movement.
3. When it is necessary for a welder to enter a confined space through means of a manhole or other limited opening, a safety belt and lifeline should be used. A watch will be maintained at the opening and will constantly observe the condition of the operator so that assistance may be rendered in the event of an emergency.

4. In confined spaces where the amount of toxic substances is likely to exceed the maximum allowable concentration, supplied-air respirators are required. This not only applies to the welder but also to helpers and other personnel within the immediate vicinity.
5. When arc welding is to be suspended for any substantial period of time such as during lunch or overnight, all electrodes will be removed from the holders and the holders carefully located so that accidental contact cannot occur. The machine should also be disconnected from the power source. To eliminate the possibility of gas escaping through leakage or improperly closed valves, the torch valves will be closed and the gas supply to the torch positively shut-off at some point outside the confined area.
6. Exhaust ventilation will not be substituted for the required respiratory program.

1.15 Ladder Safety

Comply with OSHA 1926.1053 – Ladders, when using ladders for the work.

1. The use of ladders with broken or missing steps or rungs, broken or split side rails or other defects is prohibited.
2. Ladders used to travel from one level to another will meet the following requirements.
    a. Side rails of ladders will extend not less than 36 inches above the top landing level, and the space between the side rails at the top 36 inches will be free of rungs or other obstructions so as to permit employees to enter or leave the ladder between the side rails.
    b. The ladder will be tied, blocked, nailed, or otherwise secured to prevent being displaced when in use.
    c. The pitch of the ladder will be such that the horizontal distance from the top support to the foot of the ladder is about 1:4 of the length of the ladder between the top support and the base.
3. If one ladder is to provide the only means of access or exit from a working area for 25 or more employees or simultaneous two-way traffic is expected, a double ladder will be provided.
4. Ladders will not be used in the horizontal position as platforms, runways or scaffolds. Ladders will extend 3 ft past the lean.
5. The use of planks and ladders to make a scaffold is prohibited.

6. Metal ladders will not be used for electrical work or where they may contact electrical conductors such as wiring for temporary lighting and power.
7. Feet of extension ladders will be equipped with safety shoes.
8. Sections of extension ladders will not be separated for use.

1.16 Training and Safety Meetings

1.16.1 Employee Safety Indoctrination Subjects

The subjects to be covered under mandatory employee safety indoctrination training include, but may not be limited to:

- Description of work being performed and responsible parties
- Personnel responsibilities and lines of authority
- Any required mandatory training or certifications
- Accident reporting
- Medical support arrangements
- Required personal protective equipment
- Special programs and procedures required by the plan
- Review of site-specific hazard analyses

1.16.2 Mandatory Training and Certifications

All site visitors must receive a site orientation and a briefing of safety procedures. After satisfactory orientation, project personnel are to sign the HEALTH AND SAFETY PLAN ACCEPTANCE form (Appendix 1). Signed forms will become a part of the permanent project records.

1.16.3 Project Site Safety Meetings

Project site safety meetings will include: initial mobilization briefings, daily tool box/ tailgate-type meetings, and subsequent pre-work, preparatory-type meetings. All safety briefings are to be conducted by the EMR SSHO and will be documented in the project files.

1.16.3.1 Initial Mobilization Briefing

This safety briefing will be performed at the beginning of the project as site mobilization occurs. All EMR site and subcontract personnel will be required to attend. Supplemental Initial Mobilization Briefings will be performed when additional personnel are assigned to the project after activity is under way.

1.16.3.2 EMR Monthly General Safety Meeting

This meeting is held to coordinate overall job safety with supervisors and subcontractors. The following basic requirements will apply to this meeting:

- Study and review safety material furnished by the EMR CHSO, insurance carriers and other safety personnel.
- The SSHO will coordinate the meeting which will be held monthly. Scheduling will depend on the scope of the project, manpower present, and hazardous nature of the work.

The following persons will attend the meeting:

- The ranking supervisor of each subcontractor. Attendance is compulsory and alternates or substitutes are not acceptable.
- EMR's management team.
- Other interested parties such as Client, etc. may attend at their discretion.

EMR will control the meeting so that all discussion is limited to safety only.

1.16.3.3 Daily Tailgate Safety Meetings

Daily safety meetings will include relevant discussions of topics such as:

- Weather conditions that could influence site work and safety conditions, and health and safety considerations for the day's activities
- Near-miss incidents, accidents, and injuries that have occurred onsite since the time of the last safety meeting

- Health effects and hazards of the chemical, physical, biological, and energy agents identified or suspected to be onsite in the specific areas of the site during the applicable time frame
- Observations of unsafe work practices or conditions that have developed since the time of the previous safety meeting
- Changes in site personnel that have occurred since the time of the previous safety meeting
- Administrative and engineering controls that will be utilized during the applicable time frame
- Required PPE for the identified hazards during the applicable time frame
- Prohibitions in the specific areas of the site where work will occur during the applicable time frame
- Changes in emergency procedures, evacuation routes, or safe refuge areas that have developed since the time of the previous safety meeting.

1.16.3.4 Pre-Task, Preparatory-Type Meetings

These meetings will be held on an as-needed basis when work activity results in the performance of a task not previously conducted at the project site and the work scope was not previously covered in one of the meetings described above. The meeting will address specific hazards associated with the impending work feature. The basic agenda at such a meeting would be:

- To apprise the subcontractor of the real concern that employees in the particular area of operation the subcontractor will be engaged, and evaluate the contractor's planned protective measures for reducing these exposures to a minimum.
- The most effective means with which to enlist the contractor to the side of safety is to show that a definite potential for economic advantage exists for him.
- EMR's overall safety program should be outlined with emphasis upon the fact that this program is designed to assist the subcontractor in effecting a smooth and continuous job performance with minimum interruptions due to accidents. It should be stressed that this program will not function properly without the subcontractor's wholehearted support.
- To permit the subcontractor to present their company's accident prevention (or safety) program if any, and explain their maintenance and inspection program for hoists, cables,

motorized equipment, fuel handling methods, planned use of PPE program for their employees, housekeeping procedures, and the use and construction of temporary structures. At this time the EMR can enlist the subcontractors cooperation by offering suggestions to improve his/her program and to outline the programs established to cope with common hazards.

- To review the principal exposures to the public and employees in the particular area of operation the subcontractor will be engaged and evaluate the subcontractor's planned protective measures for reducing these exposures to a minimum.

1.16.3.5 Subcontractors Safety Meetings

Subcontractors are required to attend scheduled morning safety meetings in conjunction with EMR at Cannon AFB for the duration of the project.

- It is essential to the overall coordination of job safety that subcontractors conduct such meetings to disseminate to their personnel information and instructions reviewed in the general safety meeting.
- The EMR SSHO will issue firm instructions about this requirement to the subcontractor supervisors and follow up to see that meetings are held.
- Subcontractors will prepare written reports of their safety meetings showing date, attendance, and topics reviewed. Reports will be retained in the subcontractor's field safety file and will be available to EMR for the inspection.
- Subcontractor's Safety Officer will indoctrinate each new employee on the project in basic safety requirements, as follows:
    - Review employee safety duties.
    - Review the required uses and care of personal protective equipment such as hard hats, eye protection, respirators, safety belts, etc.
    - See that each employee has certification of instruction in the use of such items as powder actuated tools, lasers, motor vehicles, etc.
    - Review procedures for obtaining first aid treatment and medical care for job related injuries.
- Subcontractors will include in all work assignments to each employee, instruction in the recognition and avoidance of unsafe conditions related to the work. Particular care will be given to the following conditions:

- Handling or use of flammable liquids and gases, or toxic material.
- Work involving exposure to falls from heights over 6 ft.
- Work in trenches or excavations.
- Work in confined or enclosed workspaces with limited egress that may be subject to the accumulation of toxic or flammable atmospheres.
- Work involving eye hazards.

- Where EMR and/or the SSHO find subcontractor employees engaged in unsafe acts or working in unsafe conditions, they will instruct the employees on an individual basis on the nature of the hazard, safety regulations violated, and required protective action.

1.16.4 Safety Planning and Task-Specific Hazard Analysis

EMR's project management team and workers will include safety planning in all coordination meetings with all subcontractors at the project site. Such planning will include a review of the construction methods, tools, equipment, MSDS of the products to be used, protective equipment, and personnel assigned to the task.

The purpose of the review will be to determine any potential unsafe conditions or acts inherent in the work and which safety rules or regulations may be applicable to control the hazards. Subcontractors will comply with all safety instructions issued by EMR.

Subcontractors will conduct similar safety planning internally with their respective personnel. Supervisors and foremen will issue safety instructions relating to the work to all employees when making work assignments.

1.17 Health and Safety Inspections

1.17.1 Internal Inspections

Internal inspections will be conducted by various EMR personnel including the EMR PM, the SSHO, and CHSO. The inspections will consist of informal, cursory reviews at random intervals during companion, technically oriented site visits. Internal memoranda that are copied to the project file will document the reviews. Noted deficiencies are to be addressed by the PM and

the SSHO. Internal memoranda that are copied to the project file will document correction of deficiencies.

1.17.2 Inspections by Subcontractors

The subcontractor will, at a minimum, conduct weekly inspections. EMR may request that the subcontractor conduct an inspection jointly with EMR.

1.17.3 External Inspections

External safety inspections may be conducted by OHSA. These inspections could happen without notification to EMR, subcontractor, or POC at Cannon AFB. Every party involved in the project should be prepared at any moment to have complete safety related documentation available to an OSHA officer that could do an inspection. When required, formal responses or actions will be documented and submitted to the Contracting Officer's Representative (COR).

1.18 Health and Safety Objectives and Compliance

1.18.1 Objective and Goals

The personal health and safety of each employee is of primary importance. The prevention of occupationally induced injuries and illnesses is of such value that it will be given priority over operating productivity where necessary.

To the greatest degree possible, management will provide appropriate training, equipment, and facilities to ensure personal health and safety of the staff in keeping with the highest standards.

1.18.2 Disciplinary Action Policy

EMR's disciplinary action policy is as follows:

Compliance with the EMR CHSM and all applicable regulations and legislation is necessary to maintain a safe and healthy work environment. Disciplinary measures may be required as a means of preventing occupational accidents.

Acts of gross negligence that cause or have the potential to cause a serious injury, fatality or major property damage may result in the immediate termination of the employee or subcontractor. Each incident will be reviewed under its own merits. Prior to an employee being terminated for a safety infraction, EMR will conduct a review of the incident. With the assistance of the SSHO, an agreement will be reached as to the degree of discipline to be taken. The following guidelines will be used to deal with other less serious infractions:

- **First Offence:** A verbal warning with the correct conduct explained to the person involved.
- **Second Offence:** A written warning outlining the action that will result upon a third infraction.
- **Third Offence:** Implementation of the written warning.

1.19 Reporting and Investigations

1.19.1 Introduction

Accidents may result in personal injury, economic loss, or both. To effectively use the experience gained through a study of accident causes, each employee will report ALL accidents to his/her supervisor. Federal and state laws require that all injuries, regardless of the severity, be reported.

1.19.2 Hazard Reporting

Subcontractors and workers observing safety hazards or violations of safety rules and regulations, which are beyond their ability or authorization to correct or control, will report them promptly to the EMR for investigation and correction.

1.19.3 Safety Complaints

To ensure maximum participation of all employees in the safety effort at the project and to minimize the possibility of regulatory complaint inspections, each subcontractor will implement the safety complaint procedure. EMR will furnish copies of the procedure to each subcontractor at the project site.

1.19.4 Accident Reporting

All subcontractors at the project site will fill out an incident report if an incident occurs. All accidents, whether they are an employee injury or a general liability incident, will have an Investigation Report completed on them.

Each employer in the US will comply with recording and reporting of accidents and illnesses as required in the OSHA "*Record keeping Requirements Under the Occupational Safety and Health Act of 1970*". Copies of the manual and booklet will be available for review at the EMR project office.

1.20 Medical Support

1.20.1 Medical Emergencies

These procedures detail the steps required to coordinate and manage emergency action procedures in the event of a field emergency. Both the field crew and the Site Superintendent must work together to ensure personnel safety.

1.20.2 Medical Emergencies Classification

Injuries are classified into three categories:

- **MINOR** - Those that can be handled by basic first aid procedures and do not require immediate additional medical treatment or transportation.
- **SERIOUS/NON-LIFE-THREATENING** - Those that require immediate medical attention beyond the first aid that can be provided at a clinic or doctor's office. These injuries do not require ambulance transportation.
- **SERIOUS/LIFE-THREATENING** - These injuries require immediate transportation by ambulance to a medical facility. This includes, but is not limited to, all individuals with chest pains, breathing difficulties, severe bone breaks, back injuries, or severe cuts with uncontrollable bleeding; unconscious persons; severe head injuries; and any other injury or illness that may cause the individual to lose consciousness or experience cardiac

arrest while in transit to a medical facility. Individuals with serious/life-threatening injuries should not be transported in private vehicles because of the lack of communication equipment.

1.20.3 First Alert

First alert ensures that incidents are reported quickly to relevant personnel when an incident occurs that results in serious injury/death; requires reporting to a regulatory body (i.e., OSHA); is considered possible to lead to enforcement action; an enforcement notice is issued; or results in injury to a member of the public/visitor.

1.20.3.1 Minor Injuries

- Immediately report all injuries to the Site Superintendent and SSHO.
- Take appropriate first aid measures.
- The PM/Site Superintendent will complete and submit a Supervisor's Report of Injury or Illness form and a First Aid Incident Report form to the CHSO and HR before the end of the work shift in which the incident occurred.
- Complete the Accident/First Aid Incident Summary Log.

1.20.3.2 Serious/Non-Life-Threatening Injuries/Illness

- Take immediate and appropriate first aid measures. First aid responders must be careful and avoid direct contact with blood. Exam gloves and a cardiopulmonary resuscitation (CPR) disposable, one-way-valve, rescue breather device should be provided in the first aid kit and used as appropriate.
- Notify the Site Superintendent and SSHO as soon as possible.
- Ensure that the employee has transportation to the appropriate medical facility.
- The PM/SITE SUPERINTENDENT will contact the CHSO and HR to report the injury and for record-keeping purposes. The PM/SITE SUPERINTENDENT will complete and submit the Supervisor's Report of Injury or Illness form and the First Aid Incident Report, respectively, to the CHSO and HR before the end of the work shift in which the incident occurred.
- The SSHO will complete the Accident/First Aid Incident Summary Log.

1.20.3.3 Serious/Life-Threatening Injuries/Illness

- Ensure that someone notifies the fire department/paramedics (call 9-1-1) immediately.
- Provide immediate first aid and/or CPR measures as required. First aid responders must be careful and avoid direct contact with blood. Exam gloves and a CPR disposable, one-way-valve, rescue breather device should be provided in the first aid kit and used as appropriate.
- Notify the Site Superintendent and SSHO as soon as possible.
- Have another employee meet the incoming ambulance at the entrance to the site to direct them to the injured individual, if possible.
- DO NOT MOVE the injured individual unless his/her life is in danger at that location.
- Upon arrival of the ambulance, a staff member should be prepared to provide any needed information on the injured individual. However, employees will not interfere with medical treatment provided by the ambulance team.
- The PM/Site Superintendent will contact the CHSO and HR to report the injury and for record-keeping purposes. The PM or SITE SUPERINTENDENT will complete and submit the Supervisor's Report of Injury or Illness form and the First Aid Incident Report, to the CHSO and HR before the end of the work shift in which the incident occurred.
- In the event of a work-related injury or illness that results in hospitalization of three or more employees within 30 days of a work-related incident, the nearest area office of the federal OSHA (refer to the Emergency Contact List in this HSP) must be notified within 8 hours. OSHA reserves the right to investigate these cases. The CHSO must be notified as soon as possible if an injury of this magnitude arises.
- The SSHO will complete the Accident/First Aid Incident Summary Log.

1.20.3.4 Deaths

- In the event that an individual appears to have died because of injury or illness, those procedures outlined in Section 5.20.3.3 will be followed. The only exception to this would be when an individual is "obviously deceased." Examples of this would be decapitation, rigor mortis, etc. In these cases, first aid and/or CPR would be inappropriate. Bear in mind that deaths become a law enforcement jurisdiction and that covering, tampering with, or moving of deceased individuals by unauthorized persons could constitute a violation of the law.

- The PM/Site Superintendent will contact base security.
- If an individual is discovered who is "obviously dead," ALL persons will be cleared from the area but not allowed to leave until released by a law enforcement officer. The area surrounding the deceased individual will not be altered in any manner. The area should be "roped off" by the SSHO.
- The PM/Site Superintendent will interact directly with the police department, unless otherwise specified.
- In the event of a work-related death, the nearest area office of federal or state OSHA (see Emergency Contact List in this HSP) must be notified within 8 hours. Federal or state OSHA will investigate all work-related deaths.
- The caller should be prepared to give the following information:
  - Time and date of accident
  - Employer's name, address, and telephone number
  - Name and job title of the person reporting the accident
  - Address of accident site or event
  - Name of person to contact at the accident site (if applicable)
  - Name and address of injured employee(s)
  - Nature of the illness
  - Location where injured employee(s) was (were) moved to
  - Description of the accident
  - Identification of any law enforcement agencies present at the site of the accident
  - Contact the CHSO and HR to report the death and for record-keeping purposes.
  - Complete applicable forms, which may include the Supervisor's Report of Injury or Illness and First Aid Incident Report form.

1.20.4 Medical Support Contact

The telephone contact numbers for various medical support agencies are listed on the Emergency Contact List located in Section 1.2 of this Plan. Directions and a map showing the route to the nearest medical hospital are located in Appendix B of this Plan.

1.21 Personal Protective Equipment

1.21.1 PPE Procedure Development

The purpose of PPE is to protect the wearer from health and safety hazards.

1.21.2 PPE Designation

The general level of PPE for this project is level D except the use of safety glasses and safety-toe boots are required when performing tasks where the activity hazard assessment requires the use of this protective equipment. There may be other specific activities where the hazard assessments require an increased level of protection that that specified herein. The SSHO is responsible for implementing the PPE procedures identified in this plan for EMR employees. Each subcontractor is responsible for providing proper PPE to their employees. Additional PPE information is included as Appendix D.

APPENDIX A - HEALTH AND SAFETY PLAN ACCEPTANCE

HEALTH AND SAFETY PLAN ACCEPTANCE

I have had the opportunity to read and ask questions about this SHSP. My signature certifies that I understand the procedures, equipment, and restrictions of this plan and agree to abide by them.

SIGNATURE PAGE

No.	Name	Signature	Date	Company
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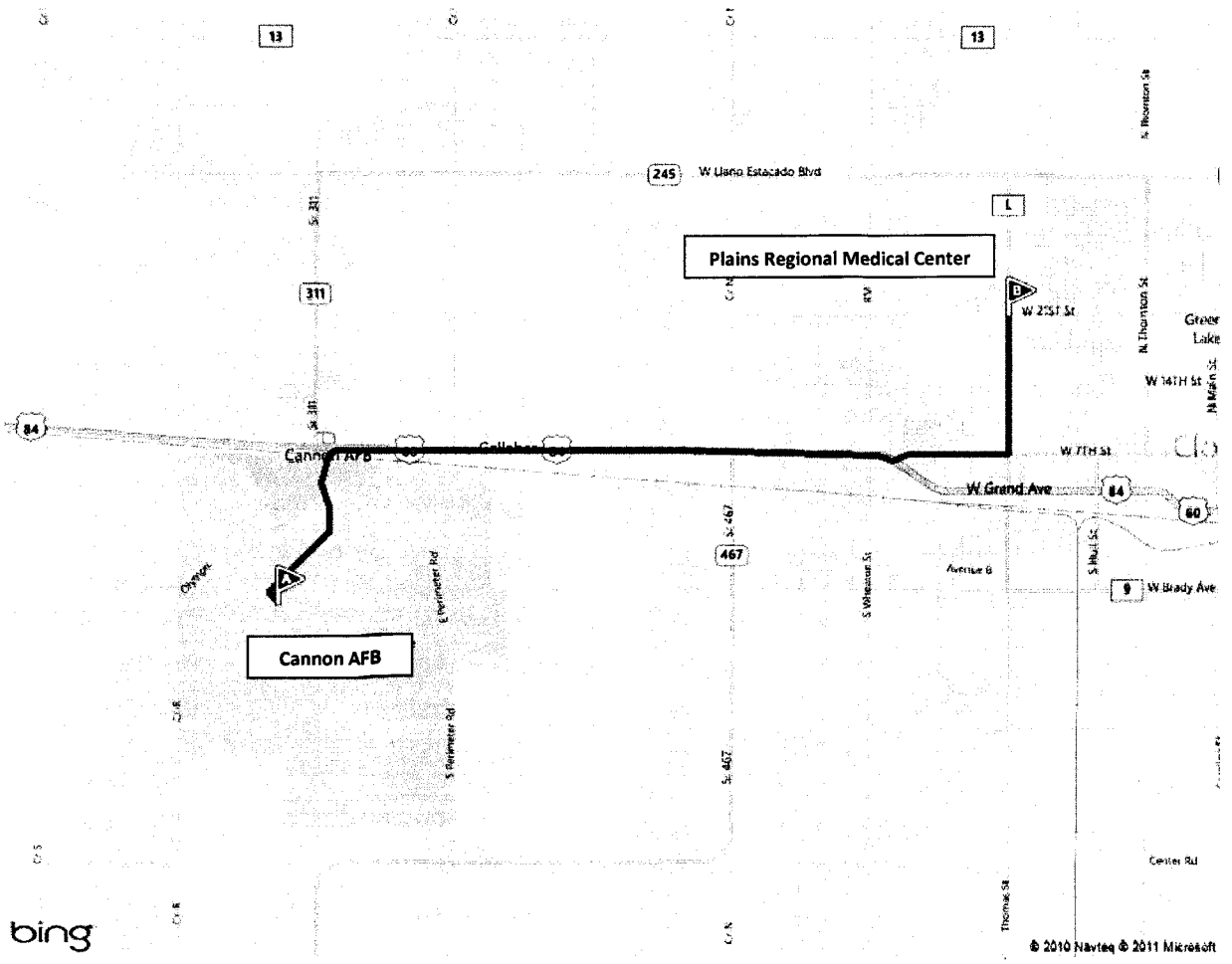
APPENDIX B - LOCATION OF MEDICAL FACILITIES

Hospital Route Map



Hospital Plains Regional Medical Center

Address: 2100 N Dr Martin Luther King Jr. Blvd, Clovis, New Mexico

Telephone: (575) 769-2141

Direction to Hospital

Route: **7.3 mi, 20 min**

A	**Cannon Air Force Base, NM**	**A–B: 7.3 mi** 20 min
1.	Depart **E Trident Ave** toward S Torch Blvd *Private Road*	488 ft
2.	Turn **right** onto **S Torch Blvd** *Private Road*	410 ft
3.	Road name changes to **N Torch Blvd** *Private Road*	1.1 mi
4.	Take ramp **right** and follow signs for **US-60 East / US-84 South**	4.1 mi
5.	Bear **left** onto **W 7TH St**	0.9 mi
6.	Turn **left** onto **N Martin Luther King Jr Blvd**	1.0 mi
B 7.	Arrive at **2100 N Dr Martin Luther King Jr Blvd, Clovis, NM** *The last intersection is W 21ST St* *If you reach Dillon St, you've gone too far*	

APPENDIX C - HEAT STRESS, SAFETY TRAINING/HAZWOPER, DRILL RIG AND EXCAVATION EQUIPMENT INSPECTIONS, SMOKING AND SUBSTANCE ABUSE

HEAT STRESS

Heat stress is one of the most common (and potentially serious) illnesses that can affect site workers. The most common cause of heat stress during site activities is the effect that PPE has on the body's natural cooling mechanism. Impermeable PPE interferes with perspiration evaporation and causes the body to retain metabolic and environmentally induced heat. Individuals will vary in their susceptibility and degree of response to the stress induced by increased body heat. Factors, which may affect a worker's predisposition to heat stress include lack of physical fitness, lack of acclimatization to hot environments, degree of hydration, level of obesity, current health status (e.g., having an infection, chronic disease, or diarrhea), alcohol or drug use, and the worker's age and sex. Sunburn can also increase an individual's susceptibility to heat stress. For the remainder of this section, references to liquids will mean water or an electrolyte replacement solution. Tea, coffee, or soft drinks are not adequate and may aggravate the condition.

HEAT STRESS DISORDERS

Sunburn

Sunburn is the first stage of heat stress. It is caused by overexposure to ultraviolet radiation from the sun. Excessive or multiple sunburns cause premature aging of the skin and lead to skin cancer. Skin cancer is the most common type of cancer in the United States, and exposure to the sun is the leading cause of skin cancer.

- Symptoms: Redness, swelling of the skin, pain, blisters, fever, chills, weakness; dry, itching, and peeling skin days after the burn. Severe sunburns may cause a person to go into shock, which is characterized by fainting, low blood pressure, and severe weakness.

- Treatment: Sunburns usually heal themselves in a couple of weeks. However, depending on the severity and location of the sunburn, the following may be recommended: To alleviate pain and heat (skin is warm to the touch) caused by the sunburn, take a cool (not cold) bath, or gently apply cool, wet compresses to the skin.

Take a pain reliever such as aspirin, acetaminophen, or ibuprofen. To rehydrate the skin and help reduce swelling, apply topical moisturizing cream, aloe, or 1 percent hydrocortisone cream. Stay in the shade until the sunburn is healed. Additional sun exposure will only increase the severity and pain of the sunburn. Seek medical attention right away if shock occurs or if the sunburn is severe and blisters occur.

Heat Rash

Heat rash is caused by continuous exposure to heat and humid air that is aggravated by wet, chafing clothes. This condition can decrease a worker's ability to tolerate hot environments.

- Symptoms: Mild red rash, especially in areas of the body that sweat heavily.

- Treatment: Decrease amount of time in protective gear and provide powder such as cornstarch or baby powder to help absorb moisture and decrease chafing. Maintain good personal hygiene standards and change into dry clothes if needed.

Heat Cramps

Heat cramps are caused by a perspiration rate that is not balanced by adequate fluid and electrolyte intake. The occurrence of heat-related cramps, are often an indication that excessive water and electrolyte loss has occurred, which can further develop into heat exhaustion or heatstroke.

- Symptoms: Acute, painful spasms of voluntary muscles such as the back, abdomen, and extremities.

- Treatment: Remove victim to a cool area and loosen restrictive clothing. Stretch and massage affected muscles to increase blood flow to the area. Have patient drink one to two cups of liquids immediately and every 20-minutes thereafter. Consult a physician, if condition does not improve. If available, an electrolyte replacement solution should be taken along with water. Consumption of soft drinks will not be adequate and may aggravate the condition.

Heat Exhaustion

Heat exhaustion is a state of definite weakness or exhaustion caused by excessive fluid loss from the body. This condition leads to inadequate blood supply and cardiac insufficiency. Heat exhaustion is less dangerous than heat stroke, but nonetheless must be treated. If allowed to go untreated, heat exhaustion can quickly develop into heat stroke.

- Symptoms: Pale or flushed, clammy, moist skin, profuse perspiration, and extreme weakness. Body temperature is basically normal or slightly elevated, the pulse is weak and rapid, and breathing is shallow. The individual may have a headache, be dizzy, or feel nauseated.

- Treatment: Remove the individual to a cool, air-conditioned place, loosen clothing, elevate feet, and allow individual to rest. Consult physician, especially in severe cases. Have the individual drink 1 to 2 cups of liquids immediately and every 20 minutes thereafter. Total liquid consumption should be about 1 to 2-gallons per day. If the signs and Symptoms of heat exhaustion do not subside, or become more severe, immediate medical attention is required.

Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the heat-regulating mechanisms of the body. The failure of the individual's temperature control mechanism causes the perspiration system to stop working correctly. When this occurs, the body core temperature rises rapidly to a point (>105°F) where brain damage and death will result if the person is not cooled quickly.

- Symptoms: The victim's skin is hot and may or may not be red and dry because the individual may still be wet from perspiration while wearing protective clothing earlier. The individual may experience nausea, dizziness, confusion, extremely high body

temperatures, rapid respiratory and pulse rate, delirium, convulsions, unconsciousness, or coma.

- Treatment: Immediately cool the individual. If the body temperature is not brought down quickly, permanent brain damage or death may result. Cool the individual by either sponging or immersing the victim in cool water to reduce the core temperature to a safe level (<102°F). If the individual is conscious, provide cool liquids to drink. Observe the individual and obtain immediate medical help. Do not give caffeine or alcoholic beverages.

PREVENTIVE HEAT STROKE MEASURES

Minimal Preventive Measures

To avoid heat-related illnesses, proper preventive measures will be implemented whenever environmental conditions dictate the need. The preventive measures listed below represent the minimal steps to be taken and will include the following procedures:

- The SHSO will examine each site worker before starting daily operations to determine the individual's susceptibility to heat stress. The SHSO will closely monitor workers exhibiting factors that make them susceptible to heat stress.
- Site workers will be trained to recognize signs and Symptoms of and treat heat-related illnesses, as outlined in this section.
- Workers will be encouraged to drink a minimum of 16 ounces of liquids prior to start of work in the morning, after lunch, and before leaving the site at the end of the work day. Disposable 4- to 12-ounce cups and liquids will be provided on site. Acceptable liquids will include water and an electrolyte replacement solution, with the intake of each being equally divided. Liquids containing caffeine are to be avoided.
- When ambient conditions and site workload requirements dictate, as determined by the SHSO, workers will be required to drink a minimum of 16 to 32 ounces of liquids during each rest cycle.
- Avoid exposure to the sun between 10:00 a.m. and 2:00 p.m.

- Wear protective clothing that provides the most coverage, consistent with the job to be performed.
- Protect eyes during sun exposure with ultraviolet radiation absorbing sunglasses or tinted safety glasses.
- Use a commercial sunscreen, preferably with a skin protection factor of 15 or greater. Sunscreen should be applied 15 to 30 minutes before exposure to the sun and reapplied every 60 to 90 minutes. It is best to use a sunscreen that claims to protect against both UV-B and UV-A rays.
- A shelter or shaded area will be provided where workers may be protected from direct sunlight during rest periods.
- Monitoring of ambient or physiological heat stress indices will be conducted to allow prevention and/or early detection of heat-induced stress.
- Site workers will be given time to acclimate to working in hot environments. Acclimatization usually takes 2 to 6 days and allows the worker's body to become adjusted to working in hot environments. This process involves a gradual increase of the workload over the 2- to 6-day period. The recommended acclimatization schedule suggests starting workers at 50 percent of the anticipated workload and increasing each day by 10 percent. For fit or trained individuals, the acclimatization period may be shortened to 2 or 3 days.

Additional Preventive Measures

When possible and/or feasible, the following measures will also be implemented to prevent or reduce the effects of heat-induced stress:

1. Designated rest areas should be air conditioned and the temperature maintained between 72 and 76°F;
2. Cooling devices will be provided to aid in body heat exchange. Cooling devices may include cooling jackets, vests, or suits and field showers or hose-down areas. Depending on the severity of the heat exposure, some form of artificial cooling may be required to ensure protection of the workers; and;
3. Workers will be encouraged to achieve and maintain an optimum level of physical fitness. Increased physical fitness will allow workers to better tolerate and respond to hot environments and heavy workloads. In comparison to an unfit person, a fit person

will have less physiological strain, a lower heart rate and body temperature, and a more efficient sweating mechanism.

Physiological Heat Stress Monitoring

When site personnel are engaged in site activities involving the use of semi-permeable or impermeable clothing in ambient temperatures greater than 70°F, physiological monitoring will be conducted. The goal of all heat stress monitoring is to ensure that the worker's body temperature does not exceed 100.4°F. The following subsections describe the physiological monitoring methods to be implemented based on the severity of the heat and workload. As a minimum, the SHSO will monitor the worker's heart rate as an indication of potential heat stress; however, if monitoring with the heart rate method indicates the need for closer, more direct monitoring, the Oral Temperature (OT) method will be implemented. The SHSO will determine the need for monitoring body water loss, based on observation of the sweat loss experienced by site personnel during their work cycle.

Heart Rate Monitoring

The worker's baseline heart rate should be recorded before starting site activities by measuring the radial (wrist) pulse rate for 30-seconds. After each work cycle, the heart rate should be measured by taking the pulse rate as early as possible into the resting period. Taking the radial pulse rate is the preferred method; however, the carotid (neck) pulse rate may be taken if a worker has difficulty finding the radial pulse. The pulse rate at the beginning of the rest period should not exceed 110 beats per minute (bpm). If the pulse rate is higher than 110 bpm, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate exceeds 110 bpm at the beginning of the next rest period, the work cycle should be further shortened by 33 percent. This procedure is continued until the pulse rate at the beginning of the rest cycle is maintained below 110 bpm.

Oral Temperature Monitoring

If deemed necessary by the SHSO and the conditions warrant, OT monitoring will be conducted. The worker's OT will be taken and recorded before starting site activities using a clinical

thermometer placed under the tongue. The OT must be taken before consuming cool liquids and will be done at the end of each work period. Whenever the OT exceeds normal resting OT by more than 1°F, the work cycle must be shortened by one-third, without changing the length of the rest period. If a worker's OT exceeds the norm by more than 1°F, then the OT should be tested again at the end of the rest cycle, and the worker should not be allowed to return to work until the OT drops below normal +1°F. If a worker's OT exceeds 100.4°F, the worker will not be allowed to work in impermeable or semi-permeable PPE for the remainder of that workday.

Body Weight Loss

If expected site conditions and work requirements have the potential for causing excessive fluid loss, the SHSO will monitor the worker's fluid loss by weighing each worker prior to and again at the conclusion of each day's site activities. This will be needed to ensure that proper hydration is being maintained and that the total amount of water weight loss throughout the day does not exceed 1.5% of the employee's body weight. Body weights will be taken with the workers wearing undergarments only. If, as determined by the SHSO, site conditions and work requirements cause an extreme amount of fluid loss, body weights will also be taken prior to the lunch break. Calculating the water weight loss and assessing the effectiveness of hydration must be conducted as follows:

1. Subtract the ending weight (W_{ending}) from the daily starting weight (W_{start}) to obtain the weight lost (W_{lost}) during a given work period [i.e.: (W_{start}) - (W_{ending}) = (W_{lost})];
2. Multiply the starting weight by 1.5% to obtain permissible weight loss (W_{perm}) [i.e.: (W_{start}) x 0.015 = (W_{perm})]; and,
3. Compare (W_{lost}) to the (W_{perm}). If (W_{lost}) is less than or equal to (W_{perm}), then hydration has been adequate, but if (W_{lost}) is greater than (W_{perm}), then hydration should be increased during the next work period.

Heat Stress Documentation

The SHSO will be responsible for recording all heat-stress related information. This will include training sessions and physiological monitoring data. Suggested frequency of physiological monitoring is included in the table below.

Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers

Adjusted Temperature[1]	Normal Work Ensemble[2]	Impermeable Ensemble
≥90°F	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5°F	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5°F	After each 150 minutes of work	After each 120 minutes of work

Notes:

1 = Calculate the adjusted air temperature (T_{aj}) by using the equation: T_{aj} (°F) = T (°F) + (13 x % sunshine). Measure air temperature (T) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows)

2 = A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants

Source: NIOSH/OSHA/USCG/EPA, 1985

Frostbite

Occurs when skin tissue actually freezes and cell damage results. Fingers, toes, cheeks, nose, and ears are primarily affected. The symptoms of frostbite include uncomfortable sensations of coldness; there may be a tingling, stinging, or aching feeling followed by numbness. Initially the frostbitten area appears white and is cold to the touch. This is followed by heat, redness, and swelling. Occasionally a victim may not be aware of the frostbite.

Tissue damage can be mild and reversible or severe, resulting in scarring and tissue death. Amputation or loss of function can be an unfortunate result. First aid includes treating affected areas with warm water at 102° to 110°F. Be careful to avoid rubbing frostbitten areas because this can lead to greater tissue injury. If there is a chance for refreezing, do not re-warm the affected areas.

General Hypothermia

Hypothermia is the progressive loss of body heat with prolonged exposure to cold. Body heat loss is accelerated more rapidly when a person is wet because of sweat or working in a damp

environment. Most cases of hypothermia develop in air temperatures between 30° & 50°F, but significant hypothermia can occur with air temperatures as high as 65°F (particularly when clothing is wet), or in the water at 72°F.

The first symptoms of hypothermia are uncontrollable shivering and feeling of cold. As the body's temperature continues to drop, an individual can become confused, careless, and disoriented. At this point a person may make little or no effort to avoid further exposure to the cold. For those working around machinery or animals, accidental injury is an additional risk. When the core body temperature falls below 86°F, the body's adaptive mechanisms for reducing heat loss become ineffective and death can occur.

ANNUAL HEALTH AND SAFETY TRAINING/HAZWOPER

All employees working at hazardous waste sites or with hazardous materials will attend an annual 8-hours health and safety training/hazardous waste operations and emergency response (HAZWOPER) class.

Employees may acquire annual 8-hour health and safety/Hazwoper training through non-EMR classes or training. All non-EMR training courses will be approved by CHSO **PRIOR** to attendance. Written records of employee training will be kept on file by EMR for each employee. The CHSO will review employee training status quarterly, and the applicable employees/project managers will be informed of their training status.

DRILLING/EXCAVATION EQUIPMENT INSPECTION

The competent person will conduct daily inspections of excavation equipment, adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection will be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after each hazard-changing event (e.g. rainstorm/sandstorm). These inspections are required when the excavation and/or drilling operations will be or is occupied by employees.

Where the competent person finds evidence of a situation that could result in a possible cave-in, failure of protective systems, hazardous atmosphere, or other hazardous conditions, exposed employees shall be removed from the hazardous area until precautions have been taken to assure their safety.

The competent person shall maintain a written log of all inspections conducted. This log shall include the date, work site location, results of the inspection, and a summary of any action taken to correct existing hazards.

- An initial inspection to evaluate site hazards must be conducted by a competent person.

- All hazards must be eliminated, controlled, or employees must be provided appropriate personal protective equipment.
- Protection must be provided against potential cave-ins using either sloping or benching systems or support systems.
- Inspections must be conducted daily or as conditions occur that may affect or create hazards.

DRUG AND ALCOHOL TESTING POLICY

EMR prohibits the possession, consumption, use, sale, dispensing, distribution, transfer, manufacture, or "being under the influence" of illegal drugs/controlled substances or unauthorized possession or use of alcohol during working hours. The objectives of this policy are:

- To create a safe and healthy environment for all employees to work in.
- To provide professional, efficient service to clients with employees utilizing their full potential.
- To reduce the costs directly and indirectly associated with substance abuse in our workplace.
- To assure fairness and equality in the administration of this policy.
- To set forth the procedures for the administration and implementation of this program and policy.

Random testing without prior notice may be given to those employees who are in safety sensitive positions including any supervisory or management position in which an impairment caused by drug or alcohol use would threaten the health or safety of any person. All employee positions at EMR shall be designated "safety sensitive" positions.

Testing without prior notice may be given employees who have been referred by the employer for chemical dependency treatment or evaluation or who are participating in a chemical dependency treatment program under an employee benefit plan or have participated in a chemical dependency treatment program in the prior two years.

APPENDIX D – ACTIVITY HAZARD ANALYSIS AND PERSONAL PROTECTIVE EQUIPMENT

ACTIVITY HAZARD ANALYSIS

Removal of Contaminated Soil at FT-08 (SWMU 107)
Cannon Air Force Base, New Mexico

SITE MOBILIZATION

Principal Steps	Potential Hazards	Recommended Controls
Setup Work Areas	Potential Exposure to Chemical Hazards	• Delineate exclusion zones and use PPE specified in SSHP. • Visual observation shall be used to verify selection of PPE. • Identify all chemical hazards and receive training (MSDS) regarding safe handling of chemicals. The SHSO will file copies of all MSDSs at the site.
	Noise exposure	• Hearing protection (as needed if noise inhibits verbal communication at normal speaking levels) will be worn by operators and site personnel with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or earplugs).
	Biological hazards such as snakes, insects, or spiders could cause injury or bites	• Wear PPE. • Look carefully for snakes, insects and spiders before stepping into any area or before placing hands near the ground. • Use insect repellant as necessary.
	Slip, trip, and fall hazards	• Work areas shall be visually inspected and slip, trip, and fall hazards shall *be marked, barricaded, or eliminated, if feasible. Use care in work area;* look for depressions and obstructions. • Employees shall only be allowed to work on walking/working surfaces that have the strength and integrity to support employees safely. Walking/working surfaces for this requirement include the edges of trenches.

Setup Work Areas (continued)	Slip, trip and fall hazards (continued)	• Employees performing work on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems. • Openings of 18 inches or more in diameter must be covered and marked. All openings less than 18 inches in diameter and all holes must be marked or barricaded.
	Sharp objects/punctures	• Wear cut-resistant work gloves when sharp edges or other objects may cause the possibility of lacerations or other injury. When possible, sharp edges will be blunted. • Workers should not stand or walk on equipment or supplies.
	Strains from manually moving materials and equipment	• Personnel will be trained to use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use of hand truck shall be encouraged. • Employees will not lift more than 50 pounds. • Pre-employment back evaluations are recommended for craft workers who may be at greater risk of developing low back pain or low back injury. • Surveys shall be performed by qualified persons to identify and evaluate tasks that might result in injuries due to ergonomic hazards. The focus of the surveys will be operations that involve the manual lifting and moving of objects of excessive weight or asymmetric size. • Hand tools shall be selected to minimize the following stressors: chronic muscle contraction or steady force, extreme or awkward finger/hand/arm positions, repetitive forceful motions, excessive gripping, pinching, and pressing with hand and fingers.
	Exposure to extreme temperatures	• Monitor for heat stress. Provide fluids and rest breaks during warm weather and while wearing impermeable protective clothing.
	Eye hazards	• Safety glasses are the minimum required eye protection for all work areas.

Setup Work Areas (continued)	Lack of communication in widely dispersed areas	• Ensure each work team has a telephone or a two-way radio or access to a telephone for communication. • If more than one team at a time is working, ensure there is communication between the work teams and project management. Workers must work in team of two or more. Each team must use the "buddy" system.
	Struck by or against vehicles	• Wear high-visibility reflective vests at all times in work area. • Make eye contact with operators of vehicles. • Understand and review posted hand signals. Traffic barricades, signs, flags, and backup spotters will be used during field activities, as necessary.
	Power and hand tools	• Inspect all tools before each use. Discard or tag out any tool that is not safe, has broken handles, patched handles, missing guards, and so forth. • Personnel will be trained in the proper use of hand and power tools. • If power tools are connected to power sources other than batteries, the tools will be grounded or double insulated and connected to a GFCI outlet.
	Material handling	• Identify and avoid pinch points. • **Maintain communication with others involved in material handling.** • Use appropriate PPE.

Principal Steps	Potential Hazards	Recommended Controls
Vehicles, equipment, hand tools	Daily and before use	• Only DOT-licensed personnel will operate vehicles. • Specific training for power tools and hand tools will be provided.

dBA decibels, A-weighted scale
DOT Department of Transportation
GFCI ground fault circuit interrupter
MSDS Material Safety Data Sheet
PPE personal protective equipment
SSHP *Site Safety and Health Plan*

ACTIVITY HAZARD ANALYSIS

Removal of Contaminated Soil at FT-08 (SWMU 107)
Cannon Air Force Base, New Mexico

EXCAVATION, BACKFILL, AND HAULING

Principal Steps	Potential Hazards	Recommended Controls
Excavation	Contact with underground utilities	• Physically verify the location and depth of existing utilities prior to starting excavation through geophysical and utility survey. • Complete Kirtland AFB Dig Permit, prior to any disturbance of ground. • Protect all existing utilities during excavation. • Perform excavation within 4 ft of existing utilities by hand and/or non-aggressive methods per EHS 3-15, *Underground Utilities.* • Protect all underground utilities as soil is removed around or under the utility line.
	Struck by or against heavy equipment	• Wear reflective warning vests when exposed to vehicular traffic. • Avoid equipment swing areas. • Make eye contact with operators before approaching equipment. • Understand and review posted hand signals. • Workers must always be in visual sight of the operators. • Use trained spotters.
	Exposure to chemical contaminants or potential gases, such as natural gas from a leaking gas line	• Conduct air monitoring for contaminants as excavation activities proceed according to the SSHP. • If odors are detected, immediately check for the presence of potentially explosive gas concentrations. • Wear PPE as required.

Excavation (continued)	Excavation hazards	• Follow EHS Procedure 6-3, *Excavation and Trenching.* • Ensure proper shoring or sloping. • Spoil banks and equipment must be at least 3 ft away from the excavation (EHS 6-3). • Use diversion ditches, dikes, or other means to prevent surface water from entering an excavation and to provide good drainage of the area adjacent to the excavation • Daily inspections of excavation, the adjacent areas and protective systems shall be made by the project assigned competent person. The excavation/trenching permit must also be completed by the competent person each day. • Maintain eye contact with operators. Personnel must wear visible vests. • Avoid climbing on berms and stockpiles. Cover all stockpiles. • *Workers will not work under any equipment or loads.* • Barricade all open excavations as required by the work plan. • Handle soil carefully to avoid dust generation.
	Failure to protect excavations could cause injury to workers and local population	• At a minimum, all excavations left open overnight will be fenced unless they are located in a secured fenced area where no persons other than workers have access. • Cover all open excavations with trench plate, if possible. Place barricades and signs as appropriate. • If excavations are located on roads that will be partially closed or off to the side of open roads, or are located in any area where vehicles may drive, the excavation will be barricaded as required by EM 385-1-1, Section 25 and reflectors and/or flashing lights will be placed so that excavation activity is marked during hours of darkness. Verify that flashing lights are working at night.

Excavation (continued)	Falling into trench	• If walkover ramps are used they must meet the requirements for fall protection: Standard guard rails, designed for the weight of personnel and equipment, fixed (staked) to ground at both ends, inspected daily. • For excavations that are over 4 ft in depth, ladders will be placed in the excavation to provide access and egress within 25 ft lateral (for example, one ladder placed in center of 50 ft lateral provides egress within 25 ft on either side). • Ladder must extend 3 ft above edge of excavation and must be placed at an angle that is ¼ of the height.
	Strains from use of tools, such as shovels	• Maintain steady pace when using tools and take adequate rest periods. • If possible, rotate tasks among the workers. • *Use appropriate tools for the task and maintain tools in good condition.*
	Heavy equipment hazards	• Equip all heavy equipment on this project with rollover protection systems and backup alarms. • Stay clear of moving equipment unless necessary. (If working near equipment workers must be in visual contact with the operator.) • Inspect all equipment daily before use to ensure proper maintenance is being performed. • Make eye contact with operator, heavy equipment has right-of-way.
Shoring, if used to protect employees, if employees must enter the excavation	Improper construction or installation leading to collapse of excavation wall	• Insure support system is installed according to specifications and is capable of supporting sidewall of excavation. • All support systems are to be inspected by a qualified engineer.
Backfilling	*Struck by or against heavy* equipment or trucks	• *Wear reflective warning vests.* • Avoid equipment swing areas. • Make eye contact with operators before approaching equipment or trucks. • Always use spotters when backing up. • Understand and review posted hand signals.

Backfilling (continued)	Damage to utilities	• Ensure that utilities are protected from the fill material as it is being placed. • Be sure fill materials had no rocks or objects that could damage the utilities. • Follow work plan for proper placement and compaction of backfill.
Hauling, material must be hauled from the excavation and backfill must be hauled to the excavation	Struck by or against heavy equipment or trucks	• Establish and follow a traffic control plan. • Wear reflective warning vests. • Avoid equipment swing areas, and designated traffic routes. • Make eye contact with operators before approaching equipment or trucks. • Understand and review posted hand signals. • Use spotters and flaggers as necessary to direct trucks as well as any nearby traffic.
	Loading trucks	• Prohibit truck drivers from standing near trucks as they are being loaded. • Prohibit truck drivers from sitting in the cab of trucks as they are being loaded, unless the truck is equipped with a cab protector (FOPS).
	Dirt and dust can accumulate on roads used for transport of material	• Brush off trucks before they enter a paved road. • Tarp truck or load truck in such a manner to prevent dirt and dust from getting on to paved roads.

Principal Steps	Potential Hazards	Recommended Controls
Heavy equipment, dump trucks	Daily and before use	• Only trained equipment operators may operate heavy equipment; only DOT-licensed personnel will operate trucks.

DOT Department of Transportation
EM Engineer Manual
EHS Environmental Health and Safety
FOPS Falling Object Protection System
Ft feet
PPE personal protective equipment
SSHP Site Safety and Health Plan

ACTIVITY HAZARD ANALYSIS

Removal of Contaminated Soil at FT-08 (SWMU 107)
Cannon Air Force Base, New Mexico

DEMOBILIZATION

Principal Steps	Potential Hazards	Recommended Controls
Decontaminate equipment	Atmospheric and contact hazards	• Wear required PPE. • Use ambient air monitoring and visual monitoring to verify PPE selection.
	Slip, trip, and fall hazards	• Visually inspect work areas and slip, trip, and fall hazards will be marked, barricaded, or eliminated as feasible. • Maintain proper illumination in all work areas.
	Exposure to high temperatures	• Monitor for heat stress in accordance with EHS Procedure 4-6, *Temperature Extremes.* • Maintain fluid intake and take breaks, as needed.
	Strains from manually moving materials and equipment	• Use proper lifting techniques such as keeping back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. • Use of lifting devices whenever possible. • Pre-employment back evaluations are recommended for craft workers who may be at greater risk of developing low back pain or low back injury. This evaluation may be requested by contacting our CMC and may be performed by the local medical provider under the approval and direction of our CMC. • Surveys shall be performed by qualified persons to identify and evaluate tasks that might result in injuries due to ergonomic hazards. The focus of the surveys will be operations that involve the manual lifting and moving of objects of excessive weight or asymmetric size.

Decontaminate equipment (continued)	Strains from manually moving materials and equipment (continued)	• Hand tools shall be selected to minimize the following stressors: chronic muscle contraction or steady force, extreme or awkward finger/hand/arm positions, repetitive forceful motions, excessive gripping, pinching, and pressing with hand and fingers. • Do not lift more than 50 pounds without help.
Demobilization and site *restoration*	Struck by or against heavy *equipment*	• Wear high visibility reflective vests when exposed to vehicle traffic. • Make eye contact with operators before approaching equipment. • Understand and review posted hand signals. • Use traffic barricades, signs, flags, and backup spotters during demobilization.
	Electrocution	• Allow only qualified electricians to disconnect electrical circuits. Follow lockout, tag-out protocols. • Inspect all extension cords daily for structural integrity, ground continuity, and damaged areas. • Document extension cord inspection. • Use GFCIs on all outdoor 115- to 120-volt, 20 ampere or less, circuits. • Cover or elevate electric wire or flexible cord passing through work area to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching. • Keep plugs and receptacles out of water unless they are approved-submersible types. • Ground all electrical circuits in accordance with the National Electrical Code or other applicable regulations or standards. • Temporary wiring is not allowed to pass through wails, doors, or windows (extension cords are one type of temporary wiring).

Demobilization and site restoration (continued)	Electrocution (continued)	• If a generator is used, be sure it is a type that does not require grounding. If it requires grounding, follow manufacturer's directions. Table 11-2 or NEC 250-6 lists the exceptions for grounding portable and vehicle mounted generators. • *If electricity is used from nearby buildings- verify that it is acceptable to the* base to use those sources. In all cases ensure that all connections meet NEC requirements. Ensure that voltage, amperage and circuit breakers are rated for the equipment to be used.
	Struck by or against heavy equipment	• Wear high visibility reflective vests when exposed to vehicle traffic. • Make eye contact with operators before approaching equipment. • Understand and review posted hand signals. • Use traffic barricades, signs, flags, and backup spotters during demobilization.
	Material handling	• Identify and avoid pinch points. • Maintain communication with others involved in material handling. • *Use appropriate PPE.*
	Strains from manually moving materials and equipment	• Use proper lifting techniques such as keeping back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. • Use lifting devices whenever possible. • Pre-employment back evaluations are recommended for craft workers who may be at greater risk of developing low back pain or low back injury. This evaluation may be requested by contacting our CMC and may be performed by the local medical provider under the approval and direction of our CMC. • Surveys shall be performed by qualified persons to identify and evaluate tasks that might result in injuries due to ergonomic hazards. The focus of the surveys will be operations that involve the manual lifting and moving of objects of excessive weight or asymmetric size

	Strains from manually moving materials and equipment (continued)	• Hand tools shall be selected to minimize the following stressors: chronic muscle contraction or steady force, extreme or awkward finger/hand/arm positions, repetitive forceful motions, excessive gripping, pinching, and pressing with hand and fingers. • Do not lift more than 50 pounds without assistance.

Principal Steps	Potential Hazards	Recommended Controls
Heavy equipment, hand tools, power tools	Daily and before use	• Only trained equipment operators may operate heavy equipment; only DOT tools licensed personnel will operate trucks. • Specific training for power tools, hand tools, and electrical safety.

CMC Corporate Medical Consultant
DOT Department of Transportation
EHS Environmental Health and Safety
GFCI ground fault circuit interrupter
NEC National Electrical Code
PPE personal protective equipment

The minimum PPE for site personnel includes:

- Hardhat (when overhead hazards exist)
- Safety glasses with side shields (or impact resistant goggles)
- Steel-toed boots
- Ear protection in vicinity of noisy equipment
- Work gloves and/or chemical-resistant gloves
- Reflective Vest

The level of PPE is categorized as Level A, B, C, Modified Level D, or Level D, based upon the degree of protection required. The following is a brief summary of the levels that may be used at Cannon AFB, in order from most to least protective.

Level C (Not Anticipated):

- Level C protection is used when the concentration(s) and type(s) of airborne substance(s) are known and the criteria for using air-purifying respirators are met. The following constitute Level C equipment:
- National Institute for Occupational Safety and Health (NIOSH) approved, full-face air
- purifying respirator with organic vapor cartridges and P 100 particulate filters
- Chemical-resistant clothing
- Coveralls (optional)
- Gloves, outer, chemical-resistant (neoprene)
- Gloves, inner, chemical-resistant (nitrile or latex)
- Boots, outer, chemical-resistant, with steel toe and shank or equivalent
- Optional chemical resistant boot covers (neoprene or butyl rubber)
- Hard hat (Class B)
- Face shield and safety glasses when not wearing a full face respirator
- Tape wrists and ankle joints
- Hearing protection when working in areas with noise hazards

LEVEL D:

Level D protection is used when a work uniform affording minimal protection is used for nuisance contamination only. The following constitute Level D equipment:

Short- or long-sleeve shirt
Gloves (neoprene or leather, depending on activity)
Boots, leather, steel toe and shank
Optional chemical resistant boot covers (neoprene or butyl rubber)
Safety glasses or chemical splash goggle
Hard hat (Class B)
Personal flotation device with rope when sampling in water greater than 24 inches deep
Escape mask (optional)
Hearing protection when working in areas with noise hazards

ANTICIPATED PPE LEVELS:

TASK	Soil Sampling Activities / Drilling	Mobilization / Excavation / Transportation and Disposal / Demobilization
PPE:	Modified Level D	Level D
Minimal Requirements:	• Gloves (leather) - as needed • Gloves, inner, chemical-resistant (nitrile or latex) • Boots, leather, steel toe and shank or equivalent • Safety glasses or chemical splash goggles • Hearing protection when working in areas with noise hazard (Drilling/heavy equipment operation)	• Gloves (leather) - as needed • Boots, leather, steel toe and shank or equivalent • Safety glasses or chemical splash goggles - as needed • Hearing protection when working in areas with noise hazards

RESPIRATORY PROTECTION:

Based on site conditions and the types of fieldwork planned, respiratory protection most likely will not be required. The drilling subcontractor will provide a copy of their Written Respiratory Protection Program.

Respirator Selection

Engineering controls and safe work practices (e.g., elimination of the source of contamination, ventilation equipment, working upwind, limiting exposure time, etc.) must always be the primary control for air contaminants. Respirators will be used if engineering or work practice controls are not feasible for controlling airborne exposures below acceptable concentrations and as an interim control measure while engineering or work practice controls are implemented.

Once the need for respirators has been established, the respirators will be selected on the basis of the hazards to which the worker is exposed. Only NIOSH-approved respirators will be used.

Selection criteria established in 29 CFR 1910.134 will be followed in determining respirator requirements for this specific project. The forms of the airborne contaminants will be evaluated based upon the suspected chemicals of concern for each specific project. Evaluation of the concentration of the airborne chemical hazard will be performed using direct reading instruments to determine what type respirator will be used. Air purifying respirators equipped with appropriate cartridges will be used if the second action level defined is exceeded.

Fit Testing

A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, mad skullcaps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed for full-face respirators. Persons with facial conditions that prevent a proper seal are not allowed to wear a respirator until the condition is corrected. Facial conditions that may cause a seal problem include missing dentures, scars, severe acne, etc. Contact lenses may be worn with respiratory protection.

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been fit tested within the last year. Fit testing will be performed in accordance OSHA 29 CFR 1910.134.

Records of fit testing will be maintained on site or by the personnel's office and/or corporate medical surveillance program.

Respirator wearers will perform a user seal check each time the respirator is put on. For air purifying respirators, the positive user seal check is performed by first removing the exhalation valve cover, placing the palm over the respirator exhalation valve, and exhaling gently. The respirator mask should puff out without noticeable leakage. The negative user seal check is performed by placing the palms over both of the respirator cartridges, inhaling gently, and holding one's breath for 10 seconds. The respirator mask should remain collapsed on the face without noticeable leakage.

Respirator Use Instructions

Only those personnel who have been properly trained and qualified on the specific type of respirator to be worn may use that specific type of respirator. No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained.

All personnel whose job assignments require the use of respirators will have had training in accordance with 29 CFR 1910.134 during initial 40-hour and annual refresher training for hazardous waste operations prior to beginning work at Cannon AFB.

Hands-on training on inspecting and donning a respirator, including user seal checks, must also be provided at the time of fit testing. Retraining must be performed annually on each type of respirator worn by an individual. In addition, site-specific respirator training will be provided using Tailgate Safety Briefings conducted by the SSHO.

Particulate respirator cartridges should be changed out when the wearer has difficulty breathing through the cartridges. Chemical gas or vapor respirator cartridges will be changed out at least daily. The fit of a chemical gas or vapor respirator should be rechecked and the cartridges changed if the wearer detects chemical odor or feels chemical irritation on the skin, both indicators of leakage or cartridge breakthrough.

Respirator Inspection

The user will inspect the respirator before and after each day's use. The inspection procedures for air purifying respirators, including full-face piece and half-face piece cartridge respirators, will include the following:

Examine the face piece for:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage
- Inflexibility
- Cracked or badly scratched lenses (full-face only)
- Incorrectly mounted eyeglass lenses or broken or missing mounting clips (full-face only)
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets

Examine the head straps or head harness for:

- Breaks or cracks
- Broken or malfunctioning buckles
- Excessively worn serration on the head straps, which may permit slippage

Examine the inhalation valves (2) and exhalation valve for:

- Foreign material (e.g., hairs, particles, etc.)
- Improper insertion of the valve body in the face piece
- Cracks, tears, or chips in the valve body, particularly in the sealing surface
- Missing or defective exhalation valve covers

Cleaning of Respirators

Respirators assigned and worn by one individual must be dismantled and thoroughly cleaned and disinfected after each day's use. Visitors or multi-assigned respirators must be cleaned and disinfected after each use. A disinfectant spray or wipe is approved as a disinfectant between uses during the day but not for cleaning and sanitizing after each day's use. Care must be taken to prevent

damage from rough handling during the cleaning procedure. After cleaning, respirators must be reassembled.

Respirator Cleaning Procedure:

1. **Washing:** Disassemble and wash with a mild liquid detergent in warm water (not to exceed 110°F). A stiff bristle (not wire) brush may be used.

2. **Rinsing:** Rinse in clean water to remove all traces of detergent. This is very important to prevent dermatitis.

3. **Disinfecting:** Thoroughly rinse or immerse in a sanitizer provided by the manufacturer. Alternatively, a weak chlorine bleach solution (1-milliliter liquid bleach/liter of water) may be used.

4. **Final Rinsing:** Rinse thoroughly in clean water (110°F maximum) to remove all traces of disinfectant. This is very important to prevent dermatitis.

5. **Drying:** Drain and dry hanging by the straps from racks (take care to prevent damage); or towel dry with clean soft cloths or paper towels.

Maintenance of Respirators

Routine respirator maintenance, such as replacing missing valves, gaskets, nose cups etc., must only be performed by trained respirator users or a respirator manufacturer's representative. Only approved replacement parts must be used. Substitution of parts from a different brand or type of respirator is generally not possible, invalidates the technical approval of the respirator, and is not permitted. Any respirator suspected of being defective must be removed from service and replaced.

Storage of Respirators

When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage. Respirators must be stored in sealable (e.g., Ziploc or twist-tie), reusable plastic bags between shifts.

The respirator storage environment must be clean, dry, and away from direct sunlight. On site cabinets or cases are suggested. Storing bagged respirators in vehicles is discouraged due to the potential for damage from other material or equipment.

APPENDIX 2 – SAMPLING ANALYSIS PLAN

1.0 SAMPLING ANALYSIS PLAN

The Sampling and Analysis Plan (SAP) has been developed according to USACE and EPA Region 6 requirements and provides an overview of the sampling program, methodologies, objectives, equipment, and procedures.

This SAP specifically outlines the constituent sampling and analytical procedures/methodologies that will be used to verify that hazardous constituents have been removed and to characterize the excavated soil for disposal. The SAP was prepared for SWMU 107.

The SAP is divided two sections. Section 1.1 describes the Quality Assurance Project Plan (QAPP) and section 1.2 describes the Field Sampling Plan (FSP).

1.1 Quality Assurance Project Plan

1.1.1 Project Organization and Responsibilities

The proposed personnel organizational structure for the RA at FT-08 (SWMU 107) project is included in Figure 4. Ms. Cathy Larson (AECOM) will be the Project Chemist/Quality Control (QC) Validator. In this capacity, she will be the POC on all chemistry-related issues and will be responsible for ensuring that all Data Quality Objectives (DQOs) are met. Her responsibilities include the project planning, data evaluation, report preparation, QC, and client/agency liaison. PEL – Spectrum Analytical will provide analytical services. Mr. Mark Gudnason is the laboratory PM and will be responsible for the overall performance of the laboratory and the implementation of the analytical requirements for the project. Mr. Gudnason is also responsible for reporting any problems associated with sample cooler receipt and/or problems with analysis of the samples. Any corrective action implemented in the laboratory that may potentially affect the quality of the analytical data must be approved by Ms. Larson prior to implementation. Mr. Dwight Clark (AECOM) will be assisting with providing Environmental Restoration Program Information Management System (ERPIMS) data deliverables. Mr. Clark is a Senior Environmental Chemist who specializes in the development and implementation of systems for the collection and analysis of environmental data related to remediation of hazardous waste sites. The Project Environmental Scientist will be responsible for ensuring that sampling is conducted in accordance with prescribed procedures.

1.1.2 Project Description

This QAPP has been prepared to address the specific chemical Quality Assurance (QA) requirements for sampling and analysis conducted during the excavation activities at SWMU 107.

The activities covered by this QAPP include onsite soil screening for Toxicity Characteristic Leaching Procedure (TCLP) Benzene, TCLP Heavy Metals, BTEX, and TPH-DRO within SWMU 107 excavation. There will be additional sampling of decontamination water for Benzene resulting in excavation activities at SWMU 107.

An arsenic contaminated soil stockpile of approximately 30 cubic yards currently located at Cannon AFB will require soil sampling for TCLP Arsenic and water sampling of Total Arsenic.

The SAP contains detailed information on the number and types of samples to be collected and the sampling procedures to be used.

1.1.3 Estimated Project Schedule

EMR has prepared a proposed draft schedule for completing this TO, which can be found on Table 6-1. This schedule will be refined and updated as this TO is executed at Cannon AFB.

EMR will attend all meetings, provide supporting documentation, and will record and distribute meeting minutes. Anticipated major meetings include a post award coordination meeting and a pre-construction meeting. Other meetings include the preparatory, initial, and follow-up quality control meetings; a pre-final and final inspection meeting; daily toolbox safety meetings; and any other meetings requested by the COR.

TABLE 1-1
Estimated Project Schedule
QAPP for RA – Construction at Site FT-08 (SWMU 107)
Cannon AFB, NM

Activity (and EMR Personnel)	Coordinating Official	Timing
Pre-Construction Meeting (EMR PM, Site Supt, SSHO, QC, Subcontractors)	AFCEE Contracting, AFCEE COR, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1 business day
Dig Permit EMR Site Supt, SSHO	Civil Engineering, One-Call	1 week
Kickoff Meeting (EMR Site Supt, SSHO, QC, Subcontractors)	AFCEE COR, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1 business day
Mobilization notification (EMR Site Supt)	AFCEE Contracting, AFCEE COR, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1-3 business days
Personnel Badges and Vehicle Passes	Security	1 business day
Perform field work including laboratory analysis	AFCEE Contracting, AFCEE COR, (POC) at Cannon AFB, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security, (PEL) Lab, AECOM Project Chemist	3 to 10 weeks
Waste Disposal Manifests	COR or his/her designee	1-3 business days
Coordination and transportation of derived waste	AFCEE Contracting, AFCEE COR, (POC) at Cannon AFB, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1 week
Site Restoration	AFCEE Contracting, AFCEE COR, (POC) at Cannon AFB, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1 to 2 weeks
Final Site Inspection	AFCEE Contracting, AFCEE COR, (POC) at Cannon AFB, Civil Engineering, Safety, Fire Protection, Air Traffic Control, Environmental, Security	1 business day
Deliverable Documents (Final Letter Report)	Contracting, COR, (POC) at Cannon AFB	4 to 6 weeks

1.1.4 Quality Objectives

1.1.4.1 Data Quality Objectives

DQOs are statements of expectations of the performance capabilities of the entire program that aid in the environmental decision-making processes. DQOs are the expression of the degree of uncertainty that the decision-maker can tolerate in the environmental data being employed to make the decision. DQOs specify the data type, quality, quantity, and uses needed to make the decisions and are the basis for designing data collection activities.

To ensure that quality data continue to be produced, systematic checks must show that test results and field procedures remain reproducible and that the analytical methodology is actually measuring quantity in each sample.

SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* Update III (June 1997) contains the analytical testing methods that EPA has evaluated and considers to be among those acceptable for analysis of samples under Subtitle C of RCRA. These methods are intended to promote precision, accuracy, low bias, sensitivity, specificity, and comparability of analyses and test results. SW-846 includes many separate test methods addressing hundreds of analytes. For any given analyte, multiple methods with varying detection limits are potentially available from this resource. SW-846 is a dynamic document that is subject to change as new information and data are developed. However, it should be noted that recent SW-846 updates have deleted several methods where technology was considered outdated (e.g., packed chromatographic columns), and have incorporated several new field screening methods. Therefore, it is advisable to maintain current knowledge of these method advances and design projects taking advantage of the most recent promulgated methods.

As a measure to minimize variability associated with the analytical data, EPA, SW-846 test methods are the only acceptable analytical methodologies employed in support of all environmental restoration activities conducted at SWMU 107 where appropriate. Any deviation from this requirement will need prior approval from the EMR Project Chemist, in conjunction with the Base Program Manager. The general project DQOs are provided in Table 1-2.

The DQO planning process follows these steps:

1. State the problem to be resolved
2. Identify the decision
3. State the inputs
4. Define the boundaries of the study
5. Develop a decision rule
6. Specify the limits of uncertainty
7. Optimize design for data collection

The DQOs are then used to develop a scientific and resource-effective sampling design. Previous data and site history must be also used in the DQO process for determining site contaminants of concern and critical sampling locations.

The terms QC and QA have been used within the environmental industry as synonymous when in fact they are not. They are defined as follows:

- ***Quality Assurance*** – An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process or service meets the requirements of the customer.

- ***Quality Control*** - The routine technical activities that quantitatively measure the success of a process or service against standards of performance established to meet the needs of the customer.

QC indicates nothing about the systems, while QA tells you nothing specific about the validity of the results on your particular sample.

1.1.4.2 Specific Data Quality Objectives

General DQOs are summarized in Table 1-3. The Method Quantitation Limits (MQLs) for contaminants of concern and their target levels are listed by method and media below. Soil Target levels for site SWMU 107 are based on the NMED values for direct exposure for residential screening guidelines (June 2006).

Contaminant of Concern	Media	Analytical Method	MQL	Soil Screening Level
TPH	Soil	EPA 8015B	500 mg/kg	940 mg/kg
Benzene	Soil	EPA 8260B	0.005 mg/kg	25.8 mg/kg
Toluene	Soil	EPA 8260B	0.005 mg/kg	252 mg/kg
Ethylbenzene	Soil	EPA 8260B	0.005 mg/kg	128 mg/kg
m,p Xylene	Soil	EPA 8260B	0.005 mg/kg	82.0 mg/kg
o, Xylene	Soil	EPA 8260B	0.005 mg/kg	99.3 mg/kg

Table 1-2

PROJECT DATA QUALITY OBJECTIVES
Cannon AFB – SWMU 107

Project Objectives

- Determine if contamination exists at site.
- If contamination does exist, determine the nature and extent of contamination.
- Collect soil screening samples to determine where contamination may exist and where soil samples should be collected for chemical analyses.
- Screen soil samples for Volatile Organic Compounds (VOCs) and TPH using an PID.
- Collect soil samples from across the site for chemical analysis.
- Collect and generate defensible data per EPA Data Quality Objective Guidance documents.
- Meet the requirements set forth in the NMED soil guidelines.

Sample Location Determination

- Initial screening sample locations will be distributed across the site to include suspected areas of contamination. Subsequent sample locations will be selected based on screening results.

Field Screening

Soil

- VOCs by PID, Field description by ASTM Visual-Manual Method.

Sample Collection Equipment

Soil

- Stainless-Steel Hand Auger
- Split-Spoon Sampler
- Encore Sampler
- Stainless-Steel Scoop
- Stainless-Steel Bowl and Spoon

Sample Collection Technique

Refer to SOP 3 in Appendix 3 for soil sampling procedures.

Sample Volume and Preservation

Refer to Table 1-5

Table 1-2 (Continued)

PROJECT DATA QUALITY OBJECTIVES
Cannon AFB – SWMU 107

Completeness Goals for Sample Locations

- Greater than or equal to 90% for soil samples.

Analytical Program

- Soil samples will be analyzed according to the Site Specific Work Plan. All analyses will be according to EPA Methodologies. EPA methods referenced are for the most recent version. Methods included in this sampling program are:

Media	Parameter	Method
Soil	VOCs (BTEX)	8260B
	TPH	8015B
	Arsenic	6010

Reporting Limits

- Analytical results between the respective reporting limit and detection limit will be reported as estimated concentrations.
- The purpose of this reporting procedure is to be able to meet target clean-up levels.

Precision

Sampling Program

- Collection and analysis of field duplicates for each media and method.
- Collection and analysis of matrix spike duplicates for each media and method.

Analytical Program

- Will include laboratory duplicates, duplicate control samples as specified in the analytical methods.

Accuracy

Sampling Program

- Collection and analysis of matrix spike samples.

Analytical Program

- Will include blanks, surrogates, lab control samples, calibration checks as specified in the analytical methods.

Table 1-3

GENERAL DATA QUALITY LEVELS FOR SPECIFIC PROJECT OBJECTIVES
Cannon AFB – SWMU 107

Project Objectives	Objective Approach	Data Collection	Data Quality Level
Health & Safety	Onsite Monitoring	Organic Vapor Conc.	Screening
Nature & Extent of Contamination	Soil Sampling & Analysis	Chemical Composition	Definitive

1.1.4.3 Analytical Support Levels

The analytical support levels for the corrective action at SWMU 107 will include screening and definitive data levels based on the SOW. Screening level data will be generated during on-site monitoring by using a fully calibrated PID to aid in the field screening of soils and help refine the vertical and horizontal limits to excavation. Field screening protocols are detailed in the SAP.

Segregation of excavated soils will occur by placing soils into two stockpiles (clean and contaminated) based upon field screening. These soils will be segregated based on analytical data from the soil assessment and field screening.

1.1.4.4 Level of Field Quality Control Effort

Field Samples QC

The frequency of sample/analysis will be one duplicate sample per twenty samples per matrix, or one duplicate per sample matrix if fewer than twenty samples. The duplicate sample will be collected by the same methods at the same time as the original sample; these are used to verify sample and analytical reproducibility. Table 1-4 summarizes the Field and Lab QA/QC Sample Requirements.

Lab Samples QC

One Matrix Spike/Matrix Spike Duplicate (MS/MSD) will be sampled per twenty or fewer samples per matrix. The laboratory spiked sample is to evaluate matrix and measurement methodology. Method blanks will be sampled at a rate of one method blank per batch of samples prepared, or per lab SOP. The laboratory blank sample is to assess potential for contamination from laboratory instruments or procedures. Finally, laboratory control samples and duplicates samples, used to evaluate laboratory reproducibility, will be analyzed as per method requirements and laboratory SOPs.

TABLE 1-4

Field and Lab QA/QC Sample Requirements
QAPP for RA – Construction at Site FT-08 (SWMU 107)
Cannon AFB, NM

	QC Sample Type	Frequency of Sample/Analysis	Details
Field Samples	Duplicate Samples	1 duplicate per 20 samples per matrix, or 1 duplicate per sample matrix if fewer than 20 samples	Duplicate sample to be collected by the same methods at the same time as the original sample. Used to verify sample and analytical reproducibility.
Lab Samples	Matrix Spike/ Matrix Spike Duplicates	1 MS/MSD per 20 or fewer samples per matrix	Laboratory spiked sample to evaluate matrix and measurement methodology.
	Method Blanks	1 method blank per batch of samples prepared, or per lab SOP	Laboratory blank sample to assess potential for contamination from laboratory instruments or procedures.
	Laboratory Control Samples and Duplicates	Analyzed as per method requirements and laboratory SOPs	Evaluates laboratory reproducibility.

1.1.5 Documentation and Records

Documentation, records generated during this project, and the associated submittal schedule will be maintained in the EMR project files.

Analytical data packages will be submitted to the Project Chemist initially for ensuring that all DQOs and chemistry-related issues are met. Once the validation is completed and finalized, these results will be submitted to AFCEE POC in a Final Letter Report.

EMR will use select documents for recording information during project activities. Records to be used for project documentation include field forms, field books, laboratory data sheets, Chain-of-Custody (COC) forms, and technical papers.

At a minimum, the draft and Final Letter Report submittal packages will include the following:

- Text describing field-sampling methodologies, analytical results, conclusions, and recommendations.
- Figures showing property location, property boundaries, sampling locations, and summaries of contaminated areas.
- Tables comparing all laboratory data to the applicable standards.
- Tables summarizing QA/QC analytical results.
- Complete laboratory data reports, including copies of all COC records.
- Copies of soil boring, groundwater, sediment, and surface water sampling logs.
- Other relevant material needed to support property redevelopment.
- Data Assessment Report that discusses and compares overall field duplicate precision data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level.

1.1.6 Sampling Process Design

Sample locations, analytical parameters, and frequency of sampling are discussed in the Field Sampling Plan (FSP). Laboratory test parameters for the sampling program will include analysis for one or more of the following parameters:

- TCLP-8260 for Benzene (Method SW1311/8260 soil)
- TCLP-RCRA 8 Metals (Method SW1311/6010/7470 for soil)
- BTEX-8260 (SW8260 soil)
- TPH DRO-8015 (SW8015 soil)
- TCLP Arsenic (SW1311/6010 soil)
- 8260-Benzene (SW8260)

- 6010-Arsenic (SW6010)

The field SOPs are contained in Appendix 3 and laboratory SOPs for these analytical parameters are presented in Appendix 4.

1.1.7 Sampling Handling and Custody Requirements

Sample handling and custody requirements are contained in the SOP. The SOP provides detailed information on the processes used for sample labeling, sample preservation, sample handling and shipping, sample documentation and tracking, and sample COC (Appendix 6). Examples of the sample label, COC, and the custody seal forms are presented as Figures 5, 6, and 7, respectively. Sample containers, preservation requirements, and holding times are presented in Table 6-5.

Soil samples received at PEL – Spectrum Analytical will be documented and logged into their Laboratory Information Management System (LIMS) for tracking purposes. Each sample will be assigned a unique work order sample number and a label exhibiting the unique work order number will be attached to each sample container. Date and time of sample receipt, as well as identifying marks, are recorded on the sample receipt forms. Samples are tracked under COC from the point of entry into the laboratory system until time of disposal and are checked into and out of secure storage areas by authorized personnel.

Table 1-5

SAMPLE CONTAINERS, PRESEVATIVES, & HOLDING TIMES
Cannon AFB – SWMU 107

Soil:	Bottle size/Type	Preservation	Holding Time	Analysis method
TCLP - 8260 for benzene	8 oz / glass	4C	14 days	SW1311/8260
TCLP - RCRA 8 metals	8 oz / glass	Ambient Temp	180 days -6010 / 28 days - 7470	SW1311/6010/7470
BTEX - 8260	3-40 mL VOC	4C	48 hrs to freeze / 14 days to analyze	SW8260
TPH DRO - 8015	4 oz / glass	4C	14 days	SW8015
TCLP - Arsenic	4 oz / glass	Ambient Temp	180 days -6010	SW1311/6010
Water:				
8260 - Benzene	3-40 mL VOC/glass	4C	14 days	SW8260
6010 - Arsenic	1-250 mL / Poly	4C	180 days	SW6010

1.1.8 Analytical Methods Requirements

The methods and procedures that will be used to prepare and analyze samples are discussed in this section and explained in PEL – Spectrum Analytical (SOP), which are located in Appendix 5. Chemical analyses will be performed according to EPA SW-846, Test Methods for Evaluating Solid Waste (EPA, 1986)

The laboratory will perform instrument specific demonstration of capability and method detection limit (MDL) studies to verify that project-specific reporting limits can be met. Analyses will only be performed on instruments with valid and current MDL studies. The MDL documentation and TCLP Regulatory Levels Table are provided in Appendix 7.

1.1.9 Sampling at SWMU 107

The soil analyses will include: TCLP Benzene, TCLP Heavy Metals, BTEX, and TPH-DRO for soil extracted from the excavation. The decontamination water will be analyzed for Benzene. Table 1-6 in the SAP outlines quantity of samples to be taken.

1.1.10 Arsenic Contaminated Soil Stockpile (30 Cubic yds)

The soil analysis and the decontamination water will be analyzed for TCLP Arsenic using EPA method SW6010.

1.1.11 Quality Control Requirements

Confirmation soil duplicate samples will be collected and analyzed for the same parameters as the associated field samples: TCLP Benzene / Heavy Metals, BTEX, TPH-DRO and TCLP Arsenic.

No field duplicate sample will be collected from the arsenic contaminated soil stockpile samples.

The onsite Project Geologist and/or Project Scientist will be responsible for identifying nonconforming conditions during sampling and shipping. The EMR Laboratory PM will be responsible for identifying nonconforming conditions in the laboratory. All nonconforming conditions and recommended corrective action will immediately be reported to the Project Chemist / QC.

The Project Chemist / QC will ensure proper use of measurement systems; evaluate accuracy of analytical procedures, and to ensure the laboratory is adhering to internal policies and procedures as set forth in their QA Plan and SOPs.

1.1.12 Instruments/Equipment Testing and Maintenance Requirements

All field and laboratory instruments will be tested to ensure proper functioning prior to sampling and analysis. The laboratory performs maintenance on all instruments as per an established schedule or based on the manufacturer's recommendation.

1.1.13 Instruments Calibration

Instrument calibration for health and safety monitoring is discussed in the SHSP.

1.1.14 Inspection/Acceptance Requirements for Supplies

Level I certified sample containers will be used for collection of field samples. The offsite laboratory (PEL – Spectrum Analytical) will maintain all current certifications.

Standard solutions used by (PEL – Spectrum Analytical) for analytical testing are obtained from reliable sources and prepared with calibrated glassware. Where possible, standards that are traceable to the National Institute of Standards and Technology through the stock standard supplier and PEL – Spectrum Analytical internal system of standards tracking are used.

1.1.15 Data Acquisition Requirements

Based on a previous RFI Report for SWMU 107 additional action is recommended due to the presence of a TPH-DRO plume. This recommendation has help determine the field sampling and analysis requirements purposed by EMR.

1.1.16 Data Management

Definitive data deliverables are required for this project for the offsite laboratory analysis. Electronic Data Deliverables (EDD) and hard copies of the data deliverables will be provided to EMR within 21 days of receipt of samples at the laboratory. An electronic data submittal to AFCEE is required for this project. Based on the TO, laboratory data shall be entered into a computerized submission format in accordance with the ERPIMS Data Loading Handbook. All data submitted will correspond exactly with the data recorded in the original laboratory reports and other documents associated with sampling and laboratory tasks.

The following information is to be included in the hardcopy data deliverables and EDD:

- Case narrative
- Sample results summary forms
- COC documentation sample receipt forms

- Holding time information
- Initial and continuing calibration information
- Method blank summary
- Laboratory control sample summary
- Matrix spike/matrix spike duplicate summary
- Laboratory duplicate sample summary
- Surrogate percent recovery data
- Raw instrument data

1.1.17 Assessment/Oversight

The Laboratory PM will conduct laboratory oversight throughout the duration of the project. Any deficiencies noted during inspection activity requiring corrective action will be documented in a nonconformance report generated by the laboratory and provided to the AECOM Project Chemist/QC Validator. If deficiencies are present the Project Chemist will notify the EMR PM and the issue will be agreed upon by the all three parties.

1.1.18 Data Validation and Usability

The AECOM Project Chemist/QC Validator will validate analytical data generated by (PEL – Spectrum Analytical). This validation will be in accordance with the EPA guidance (1994b, 1994c) and will include a review of the COCs, holding times, instrument calibration, method blanks, verification of quantitation limits, laboratory corrective actions, analyte quantitation and identification, surrogate system monitoring compounds, MS/MSD recovery data, laboratory control sample data, duplicate sample analysis data, and data completeness. A brief summary of data usability will be included with the Final Letter Report.

1.2 Field Sampling Plan

The FSP has been developed according to USACE and EPA Region 6 requirements and provides an overview of the sampling program, methodologies, objectives, equipment, and procedures.
The FSP is divided into five sections. Sections 1.2.1 and 1.2.2 describe field sampling objectives and summarize the sampling and analysis program, respectively. Section 1.2.3 discusses data Collection information. Sections 1.2.4 outline project sampling procedures and field measurements.

1.2.1 Sampling Objectives

Field sampling will be performed to:

- Identify existing concentrations of both organic and inorganic analytes present within SWMU 107.
- Characterize soil generated during excavation activities to determine efficient identification and segregation of clean soils and contaminated soils.

The FSP is designed to meet project objectives associated with the identification and removal of contaminated soil to obtain site restoration at SWMU 107.

Specifically, the FSP will be used to generate analytical data for soil samples collected during remedial activities to ensure the following:

- Analytical quantitation limits are sufficient to enable detection of potential contaminants of concern at concentrations sensitive to human health and ecological concerns
- Site restoration can be achieved and performed in a safe manner
- Soil collection, containment, storage, transport, and discharge activities are in compliance with all federal, state, and local regulatory agency requirements

1.2.2 Summary of Sampling Analysis Program

The analytical parameters established for the soil assessment and site excavation activities were based on the final recommendations of the RFI Report, which recommended additional action due to the presence of a TPH-DRO plume. A RA is required to remediate contaminants within the soil at SWMU 107.

Soil screening will be broken down into the following sampling protocols:

- Waste characterization
- Soil screening for TCLP Benzene, TCLP Heavy Metals, BTEX, and TPH-DRO within SWMU 107 excavation area.

An arsenic contaminated soil stockpile of approximately 30 cubic yards currently located at Cannon AFB will require soil sampling for TCLP Arsenic and decontamination water sampling for Total Arsenic.

Table 1-6 summarizes the estimated number of samples to be collected for the SWMU 107 soil assessment, confirmation samples and approximately (30 cubic yards) of arsenic-contaminated stockpiled soil onsite.

Table 1-6. Soil Analysis and Quantity of Samples - Cannon AFB RA

Soil:	Total Maximum Number of Samples	Waste Characterization Samples	Confirmation Floor Samples	Confirmation Side Wall Samples
TCLP - 8260 for benzene	20	Head Screen every 10 ft / Max 2 samples per boring		
TCLP - RCRA 8 metals	20	Head Screen every 10 ft / Max 2 samples per boring		
8260 - BTEX	20		4-8 samples / 8 Max	8-12 samples / 12 Max
8015 - TPH DRO	20		4-8 samples / 8 Max	8-12 samples / 12 Max
TCLP - Arsenic		Multiple samples		

Bolded indicates – Samples taken from SWMU 107
Italicized indicates – Samples taken from Arsenic Stockpile

Table 1-6. Water Analysis and Quantity of Samples - Cannon AFB RA

Water:	Total Maximum Number of Samples	Waste Characterization Samples	Confirmation Floor Samples	Confirmation Side Wall Samples
8260 - Benzene	1	1		
6010 - Arsenic	1	1		

Bolded indicates – Samples taken from SWMU 107
Italicized indicates – Samples taken from Arsenic Stockpile

1.2.3 Design of Data Collection Operations

This section addresses project-specific requirements related to the location and frequency of sampling. Sample nomenclature to designate the various samples that will be acquired in the field is also detailed.

Sample Locations and Frequency

An initial Soil Assessment will include the installation of 10 soil borings to a depth of approximately 60 ft bgs, with one soil sample collected every 10 ft. A maximum of two samples per boring will be submitted for laboratory analysis. An EMR Geologist will log, field screen (PID), and sample soils from each borehole to determine the extent of petroleum contamination on site. Soil samples will be submitted for laboratory analysis to determine the volume and specific locations of contaminated soil for removal and disposal.

A fully calibrated PID will be utilized to aid in the field screening of soils and help refine the vertical and horizontal limits to excavation. Soil excavation will be performed by gridding the excavation area into an anticipated 4 to 8 sections with an assigned excavation depth based upon the soil assessment. Each section is expected to be 200 to 400 sq ft with the excavation depth expected at 10 to 40 ft.

When visual and PID results indicate that contaminated soils are no longer being encountered, confirmation samples will be collected from the floor of each section and every 20 ft of excavation wall. From 8 to 12 wall samples and 4 to 8 floor samples are anticipated.

Sample Identification

Collected samples will be thoroughly homogenized (unless noted by the laboratory) and transferred to the appropriate sampling containers without chemical preservation. Immediately upon collection, all samples will be placed in coolers containing ice for preservation. Table 6.5 summarizes the appropriate sample containers, preservation and holding times for the planned samples to be analyzed by the designated laboratory.

The sample designation for analytical and QA/QC samples is a three letter and seven-digit/letter unique identification for each sample (C##-YYYY-ZZZ). "C##" is the facility and site identifier, with "C" for Cannon AFB and "##"representing the letter identifying a specific SWMU. For example, the sample designation for SWMU 107 would start as "C107-."

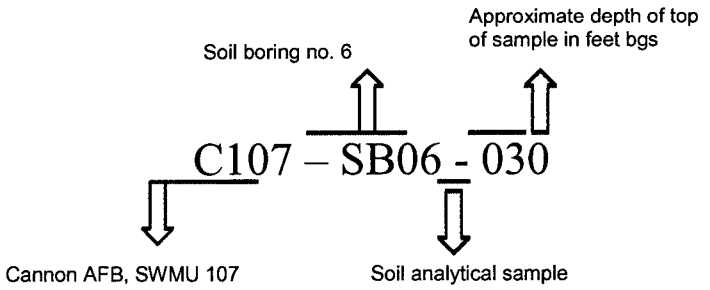
The next four digits (YYYY) identify the sampling method and specific sampled location. The first two characters will represent the method of sampling. "SB" for soil boring will be used as the first two characters. The last two characters will identify the sample location. Samples from the second soil boring at SWMU 107 would be identified as "C107-SB02-."

The last set of characters (ZZZ) is the sample identifier. The first number corresponds to the type of sample:

- 0 for soil (analytical) sample
- 1 for soil a matrix spike/matrix spike duplicate (MS/MSD)
- 2 for field duplicate

The MS/MSD should also be labeled the same as the original sample, but should also have "MS/MSD" written on the label.

The last two numbers correspond to the beginning depth of the sample in feet below ground surface (bgs) for all soil samples. The following is an example of an identification number:



Multiple soil samples may be collected from the same boring. The last two digits differentiate among these multiple samples and represent the approximate upper depth at which the sample was collected. Specific procedures for sample handling, packaging, and shipping are discussed in SOP 5 of Appendix 3. The field logbook will note the sample designated for duplicate analysis.

1.2.4 Disposal Characterization Sampling and Analysis

The following sections discuss characterization sampling and analysis needs for the potential waste streams resulting from excavation activities. Excavated soil will be sampled as previously indicated and samples will be analyzed for the parameters specified in Table 1-6. The soil will be classified as either a hazardous or nonhazardous waste. Sampling and analysis will be performed in accordance with the latest revision of EPA SW-846, as amended by Final Updates I, II, IIA, IIB, III, IIIA, IIIB, and IV (EPA, 2007).

1.2.4.1 Characterization of Contaminated Soils

Excavated soils will not be directly loaded onto trucks but will be segregated into two stockpiles (contaminated and clean) based on previous analytical data and field screening. A fully calibrated PID will be utilized to aid in the field screening of soils and help refine the vertical and horizontal limits to excavate. Laboratory analytical data of soil samples collected during the assessment phase will be used to properly characterize soil for waste disposal.

1.2.4.2 Characterization of Decontamination Water

Appropriate samples will be collected to characterize collected liquids for disposal along with decontamination water. As outlined in Table 1.6, SWMU 107 decontamination water will be sampled for Benzene and the Arsenic Stockpile for Total Arsenic.

1.2.4.3 Air Monitoring and Field Headspace Analysis

A PID equipped with a 10.2 eV lamp or greater will be used for soil headspace analysis and for health and safety air monitoring. Headspace analysis will be used as a field screening tool along with other field screening criteria (e.g., soil staining and obvious fuel odors) to determine which soil samples will be submitted to the laboratory for analysis. An immediate spike in the PID likely indicates the presence of organic vapor in the soil sample. A gradual increase in the PID reading indicates that organic vapor is not present in the soil sample and the PID reading may be a result of moisture in the soil or ambient air conditions (e.g., internal combustion exhaust). A PID calibrated to "benzene equivalent" will be used during field activities.

1.2.5 Sampling Equipment and Procedures

The following SOPs contained in Appendix 3 will be followed to collect samples:

SOP 1 - Wet Decontamination Methods

SOP 2 - Photoionization Detectors

SOP 3 - Soil Sampling

SOP 4 - Soil Stockpile Sampling

SOP 5 - Sample Handling and Documentation

APPENDIX 3 – FIELD STANDARD OPERATING PROCEDURES

SOP 1 - DECONTAMINATION METHODS

Decontamination methods will consist of an Alconox solution wash followed by a potable water rinse between sample locations.

A decontamination pad will be constructed at a site location approved by Cannon AFB and AFCEE personnel. The decontamination pad will be bermed and lined with plastic sheeting.

All equipment and tools associated with the soil sampling will be decontaminated after each sample location. All decontaminated equipment will be stored in a clean condition.

Investigative derived waste (IDW) from decontamination activities will be managed in accordance with this Work Plan.

SOP 2 - PHOTOIONIZATION DETECTORS

A PID is used to detect the concentration of organic gases in air.

During field investigations, this instrument will be used to screen for potentially contaminated materials.

The instrument cannot specify particular parameters and in addition, the reading on the meter represents the total concentration of VOCs rather than the concentration of any one parameter.

If odor is detected by site workers, the PID will be used to monitor worker breathing zones for the presence of contaminants above action levels.

SOP 3 - SOIL SAMPLING

The following procedure will be used for excavation and sampling:

1. PPE as required in the SHSP (Appendix D).

2. Grab soil samples will be collected from specified locations and placed in a sample container. **Personnel will not enter the excavation.**

3. Soil samples will be taken immediately from the split spoon and properly packaged. Any rocks, grass, leaves, or other debris will be removed from the sample and placed into a sample container.

4. After placing the grab samples into containers, the soil samples will be packaged into a cooler with ice and kept at 4 °C. The samples will be shipped within 24 hours by overnight courier.

5. Fill out field logbook, sample labels, COC forms and custody seals. Examples of these forms are included in the QAPP, Appendix 2 of this Work Plan.

6. The soil lithology will be included in the field logbook.

SOP 4 - SOIL STOCKPILE SAMPLING

Soil composite sampling from stockpiled soil will be performed using the following procedures:

1. Wear appropriate personal protection equipment as specified in Appendix D of the SHSP. In addition, new nitrile gloves will be used at each location.

2. Collect one random sample from each determined section of the soil stockpile using the excavator or loader bucket.

3. Record appropriate air monitoring results.

4. Collect one sample from a random location within each excavator or loader bucket to create a composite sample from each stockpile section.

5. Any rocks, grass, leaves, or other debris will be removed from the sample and placed into a sample container.

6. After placing the grab samples into containers, the soil samples will be packaged into a cooler with ice and kept at 4 °C. The samples will be shipped within 24 hours by overnight courier.

7. Fill out field logbook, sample labels, COC forms and custody seals. Examples of these forms are included in the QAPP, Appendix 2 of this Work Plan.

SOP 5 - SAMPLE HANDLING AND DOCUMENTATION

Sample handling and documentation procedures will be used to ensure the integrity of the sample from sample collection to receipt at the laboratory. Documentation of sample handling will be implemented to ensure the traceability and integrity of the sample.

Labeling

All sample containers will be labeled. Preprinted sample labels containing sample identification, sample type, and analyses requested, will be used. Sample labels should be completed and placed on the sample container prior to sample collection for soil samples.

At a minimum, each numbered label will contain the following information:

- Client/project/facility
- Sample identification
- Sample type (e.g., grab, composite)
- Date and time of sample collection
- Analyses required
- Preservation used
- Sampler's initials

Sampling Containers

Certified, clean sample containers will be obtained from the laboratory.

Sample Preservation

All samples will be stored on ice in an insulated cooler immediately following sample collection.

Sample Handling and Shipping

Sample containers will be placed in resealable plastic storage bags and wrapped in protective packing material. Ice will be placed on top of the samples in a cooler for shipment to the laboratory. Samples will be packed in bubble packing to ensure that no breakage occurs during shipment. Samples will be shipped by overnight courier for delivery to the analytical laboratory.

A completed COC form for each cooler will be placed in a resealable plastic storage bag inside the cooler. Coolers will be wrapped with tape to secure lids. Signed custody seals will be placed on the outside of each cooler.

Holding Times

The holding time is the maximum allowable time between sample collection and analysis. The times are based on the parameter to be analyzed, stability factors, and preservation methods. Allowable holding times are listed in Table 1-3 of the QAPP. Samples will be shipped daily by overnight courier to the laboratory.

Parameters that will be analyzed have been identified in the Field Sampling Plan, Appendix 2.

Sample Documentation and Tracking

This section describes documentation required in the field logbook and sample COC requirements.

Field Logbook - Documentation of observations collected during field activities will provide information on the collection of samples and also provide a permanent record. The observations and data will be recorded with waterproof ink in a permanently bound weatherproof field book.

The information in the field logbook will include the following:

- Project name
- Location of sample
- Sample identification number
- Date and time of sample collection
- Description of samples matrix
- Composite or grab sample
- Analysis to be performed
- Sample methods
- Field observations
- Personnel present

If corrections need to be made in the field logbook, the information to be corrected should be lined out with a single line mark, initialed, and dated by person making change. Sufficient information will be recorded to allow the sampling event to be reconstructed without relying on the collector's memory.

At the end of each page of the field logbook, the person making the entry will sign and line out the open space of the page. Anyone making entries in another person's field book will sign and date those entries.

Sample COC - During field sampling activities, information of the sample must be maintained from the time the samples are collected until laboratory data are issued. Information on the custody, transfer, handling, and shipping of samples will be recorded on a COC form. COCs will include site identification, field sample number, sample type, and analysis requested.

The sampler is responsible for completing the COC. The COC will be signed by the sampler when the sampler relinquishes the samples to anyone else. When shipping the samples, the airbill will be retained by the sample handler for tracking purposes. A COC form will be completed for each set of samples and will contain the following information:

- Project number
- Sample identification number
- Date and time of collection
- Sample type/matrix, i.e. water, soil, etc.
- Grab or composite sample
- Number of containers
- Preservative used
- Analyses requested
- Samplers signature and affiliation
- Signature of persons relinquishing custody, dates, and times
- Signature of persons accepting custody, dates, and times (laboratory)
- Method of shipment

The person responsible for delivery of the samples to the delivery courier will sign the COC form, retain a copy of the COC form, document the method of shipment, and send the original and the second copy of the COC form with the sample. Upon receipt at the laboratory, the person receiving the samples will sign the COC form. A copy of the signed COC by the sampler and laboratory personnel will be kept with the analytical results.

SOP 6 – Field Headspace Screening of Soil

When field screening is specified, soil samples will be screened for VOCs in the field at the time of sample collection. Field screening will utilize a PID and will be performed in accordance with the following procedures. Along with the screening by PID, soil staining and odor will also be used.

- Immediately upon opening the split spoon, a portion of the sample will be collected and placed in a new resealbable plastic bag.
- The resealable plastic bag with be allowed to rest for the sample to adequately volatilize.
- Slightly open the resealable plastic bag and insert the PID probe and record the maximum meter reading.
- Record the screening data in a field logbook and boring log.
- The screening instrument will be calibrated according to the appropriate standard span gas and at a minimum of twice daily.

APPENDIX 4 – LABORATORY STANDARD OPERATING PROCEDURES

SPECTRUM ANALYTICAL, INC.
Massachusetts Master List Standard Operating Procedure

Department	Standard Operating Procedure	Methods Performed	Accrediting Authority and Number	File Name	Revision No.	Review Date/Initials of reviewer
Semi-Volatile Organic Dept. & Volatile Organic	SOP for Manual Integrations	SA Policy		F:\data\QAQC\NELAC SOPs 2004\manual integration1.doc	Rev. 1 - 12-17-04	12/17/04 - JOC
Semi-Volatile Organic Dept. & Volatile Organic	SOP for NJ DEP Extractable Petroleum Hydrocarbons (EPH)	NJ DEP Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), October, 2009 Revision 2	NJ MA011	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\SVOC\SOP NJ EPH 8-5-10Rev 1.doc	Rev. 1 - 8/5/10	8/5/10 - SM
Semi-Volatile Organic Dept.	Procedure for Handling Methylene Chloride	SA Procedure		F:\Data\QAQC\NELAC\SOP for Methylene Chloride		
Volatile Organic Department	SOP for VPH	MADEP WSC-CAM-IV A	NY 11840, FL E87936	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\VOC\SOP for VPH Rev.4 10-11-10.doc	Rev 4 - 10/11/10	10/12/10 - WB
Volatile Organic Department	Analysis of 1,4-Dioxane	EPA 8260B Mod.	CT PH-0777	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2009\VOC\SOP for VOC analysis of 1,4-Dioxane by modified 8260B Rev.3. 8/12/09.doc	Rev 3 - 8/21/09	8/13/09 - EK
Volatile Organic Department	Analysis of Maine Gasoline Range Organics (ME GRO) by Maine Health and Environmental Testing Laboratory	ME GRO	ME MA0138	F:\QAQC\NELAC SOPs 2004\ME GRO SOP 2004 8-02-04.doc	Rev 0 - 8/02/04	02/08/05 - KW
Volatile Organic Department	Analysis of Volatile Organic Compounds by EPA 624 and the Massachusetts Water Resource Act	EPA 624	NY 11840, M-MA1110, FL E87936	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\VOC\SOP 624 Rev 4 9-28-10	Rev 4 - 9/28/10	9/28/10 EK
Volatile Organic Department	Analysis of Volatile Organic Compounds by EPA 524.2 & MADEP WSC-CAM-II A	EPA Methods 524.2	NY 11840, M-MA1110, FL E87936	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\VOC\SOP for 524.2 09-07-10 rev 5.doc	Rev 5 - 9/08/10	9/08/10 - WB
Volatile Organic Department	VOC by EPA 8260B & MADEP SC-CAM-II-A	SW 846 8260B MADEP WSC-CAM-II A	NY 11840, FL E87936	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\VOC\SOP for SW846 8260C Rev.5 3-30-10.doc	Rev 5 - 04/29/10	04/29/10 - EK
Volatile Organic Department	Z-Nose Screening of Aqueous Samples	SA Procedure		F:\data\QAQC\NELAC SOPs\NELAC SOPs 2008\VOC\SOP for Z-Nose Screening	Rev 0 - 3/26/08	
Wet Chemistry	% Nitric Acid % Hydrofluoric Acid	MCA - 223 SA SOP		Method discontinued as of 05/15/08 per JOC - SOP Removed from Dept.	Rev 3 - 7/21/06	7/21/06 - JO
Wet Chemistry	Acidity	SM2310B		F:\data\QAQC\NELAC SOPs\NELAC SOPs 2007\Wet Chemistry\SOP Acidity 4-16-07 Rev 4.doc	Rev 4 - 4/16/07	4/19/07 - JO
Wet Chemistry	Alkalinity	SM2320B	NY 11393, M-MA138, FL	F:\Data\QAQC\NELAC SOPs 2009\Wet Chemistry\ALKALINITY SM2320B	Rev 6 - 8/6/09	8/9/09 -DR
Wet Chemistry	Ammonia by Flow injection	EPA 350.1	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2008\Wet Chemistry\ Ammonia by Flow Injection	Rev 1 - 7/21/08	7/22/08 -DR

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Department	Standard Operating Procedure	Methods Performed	Accreditating Authority and Number	File Name	Revision No.	Review Date/Initials of reviewer
Inorganic - Metals	Digestion of Non-Aqueous Samples via Microwave, SW846 3051A	SW846 3051A	NY 11393, M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Metals\Digestion of Non-Aqueous samples via Microwave, SW846 3051A Rev 1 8-30-10	Rev 1 - 8/30/10	9/7/10 - JC
Inorganic - Metals	Mercury	EPA 245.1/SW 846 7470 and 7471 SW846 7421	NY 11393, M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Metals\SOP for Mercury EPA 245.1 3-9-10 Rev 13.doc	Rev 13 - 3/5/10	3/9/10-JOC
Inorganic - Metals	Metals by Inductively Coupled Plasma-Atomic Emission Spectrometry	EPA 200.7	NY 11393, M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Metals\SOP for Metals 200.7 12-10-10 Rev 6.doc	Rev 6 - 12/10/10	12/10/10 - JC
Inorganic - Metals	Metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)	EPA 200.8	NY 11393 M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs 2009\Metals\SOP ICP-MS 200.8 Rev 7; 1-13-09.doc	Rev 7 - 1-13-09	1-15-09- CW
Inorganic - Metals	Metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)	SW846-6020A	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs 2010\SOP ICP-MS 6020A 9-07-10 Rev. 3	Rev 3 - 9-07-10	9-07-10- CW
Inorganic - Metals	SOP for Metals by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) SW846 3005A/3050B/6010C	SW846 3005A/3050B/6010C	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs\ NELAC SOPs 2010\ Metals\ SOP for Metals by ICP SW846 3005A, 3010A, 3050B, 6010C 07-09-10 Rev.3	Rev 3 - 7/15/10	7/15/10 - JC
Inorganic - Metals	SOP for the Operation of the Hydra Prep Automated Mercury Preparation System	N/A		F:\data\QAQC\NELAC SOPs\NELAC SOPs 2008\Metals	Rev 0 - 08/28/08	9/8/08 - JC
IT	Laboratory Computers	SA Policy		F:\Data\QAQC\NELAC\SOP Laboratory Computers	Rev 1 - 02/10/05	2/11/05 - JN
IT	Laboratory Data Backup Procedure	SA Policy		F:\Data\QAQC\NELAC\SOP Data Backup	rev 3 - 11/05/03	
Microbiology	Anaerobic Bacteria for UTC Power Space Shuttle Water	SA Procedure	NY 11393, M-MA138	F:\PDF Documents\NELAC SOPs in PDF - Uncontrolled Copies\Microbiology\Old SOPs\SOP Anaerobic Bacteria	Rev 0 - 5/07/07	discontinued 10/6/10
Microbiology	Confirmation for Total Coliform using Lauryl Tryptose Broth & Brilliant Green Lactose Bile Broth and E. Coli Using Nutrient Agar with MUG	SM9222B SM9222G, MI Agar	NY 11393, M-MA138	F:\data\QAQC\NELAC SOPs 2009\Microbiology\SOP for Total Coliform Confirmation.doc	Rev 5 - 1/14/09	1/22/09 -CB
Microbiology	Fecal Coliform Membrane Filtration	SM9222D	NY 11393, M-MA138	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Microbiology\SOP Fecal Coliform Filtration SM9222D 12-10-10 Rev.10.doc	Rev 10 - 12/10/10	12/10/10 - JOC
Microbiology	General Microbiology Requirements	N/A	NY 11393, M-MA138	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Microbiology\SOP General Microbiology Requirements 12-16-10 Rev.12	Rev 12 - 12-16-10	12/22/10 - RT
Microbiology	Heterotrophic Plate Count	SM9215B	NY 11393, M-MA138	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\Microbiology\SOP SM9215 Heterotrophic Plate Count 12-09-10 Rev. 7.doc	Rev 7 - 12-09-10	12/09/10 - JOC

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Department	Standard Operating Procedure	Methods Performed	Accrediting Authority and Number	File Name	Revision No.	Review Date/Initials of reviewer
Semi-Volatile Organic Dept.	Organic Lead by GAS Chromatography Mass Spectrometry: Capillary Column Technique	SW846 8270C Mod.		F:\Data\QAQC\NELAC SOPS 2005\SOP for Organic Lead By Modified 8270C 3-1-05.doc	Rev 0-3/14/05	3/14/05-CW
Semi-Volatile Organic Dept.	Polychlorinated Biphenyls (PCBs) by Gas Chromatography (GC/ECD)	EPA Methods 608, SW846 8082A	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\SVOC\SOP 8082A-608 6-30-10 Rev. 18.doc	Rev 18 - 4-20-10	6/30/10 - JG
Semi-Volatile Organic Dept.	1,2-Dibromethane (EDB), 1,2-Dibro-3-Chloropropane (DBCP) in Water by Microextraction and Gas Chromatography (GC/ECD)	EPA Method 504.1	NY 11393, M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs 2009\SVOC\SOP 504.1 1-8-09 Rev 7	Rev 7 - 1/8/09	1/12/09 - SM
Semi-Volatile Organic Dept.	Chlorinated Herbicides Acids and Esters by Gas Chromatography/ECD SW846 8151A	SW846 8151A	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\SVOC\SOP 8151A Herb 6-30-10 Rev 7.doc	Rev 7 - 6/30/10	7/2/10 - DS
Semi-Volatile Organic Dept.	Determination of Glycol/Alcohol in Soil and Water	SW846 8015B Mod.		F:\data\QAQC\NELAC SOPs\NELAC SOPs 2009\SVOC\SOP Glycols - Alcohol by 8015B 12-16-09 Rev.3.doc	Rev 3 - 12/16/09	12-29-09 - JG
Semi-Volatile Organic Dept.	Determination of Petroleum Range Hydrocarbons (FL-PRO)	FL-PRO	FL E87600	F:\data\QAQC\NELAC SOPs 2006\FLOPRO SOP 2006 rev-06-15-06.doc	Rev 3 - 6-15-06	6/19/06 - JD
Semi-Volatile Organic Dept.	DRO Modified 8015B	8015B Modified		F:\data\QAQC\NELAC SOPs\NELAC SOPs 2008\SVOC\SOPS FOR DRO 8015B modified	REV 0 - 2/21/08	2/21/08 JG
Semi-Volatile Organic Dept.	Extractable Petroleum Hydrocarbons (EPH)	Massachusetts DEP Method for EPH		F:\data\QAQC\NELAC SOPs 2010\SVOC\SOP MACAM EPH 11-1-10 Rev 13	Rev 13 - 11/1/10	11/1/10 - SM
Semi-Volatile Organic Dept.	Extractable Total Petroleum Hydrocarbons (CT ETPH)	CT-ETPH	CT PH-0777	F:\data\QAQC\NELAC SOPs 2008\ETPH SOP 2008 rev.3 3-20-08.doc	Rev 3 - 3/20/08	3/20/08 JG
Semi-Volatile Organic Dept.	Gel Permeation Chromatography (GPC)	Method 3640		F:\data\QAQC\NELAC SOPs 2006\SVOC\SOP GPC Cleanup 8-25-06 Rev No. 0.doc	Rev. 0 - 8/25/06	9/22/06 - JD
Semi-Volatile Organic Dept.	Haloacetic Acids in Drinking Water by Liquid-Liquid Extraction and Derivatization by GC/ECD - EPA 552.2	EPA Method 552.2		F:\data\QAQC\NELAC SOPs 2008\SVOC\SOP HAA 552.2 10-17-08 Rev. 1.doc	Rev. 1 - 10-17-08	10-20-08-TG
Semi-Volatile Organic Dept.	Maine DRO	ME DRO	ME MA0138	F:\Data\QAQC\NELAC\SOP for MEDRO	Rev 1 3/31/03	
Semi-Volatile Organic Dept.	Oil & Grease/Total Petroleum Hydrocarbons (TPH)	EPA Method 1664 Gravimetric Procedure	NY 11393, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2007\SVOC\SOP for EPA 1664 Rev.6. 8-08-07.doc	Rev 6 - 8/08/07	8/08/07 - JG
Semi-Volatile Organic Dept.	Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column GC/MS	EPA Method 525.2	NY 11393, M-MA138, FL E87600	F:\data\QAQC\NELAC SOPs\NELAC SOPs 2010\SVOC\EPA Method 525.2 Rev. 6 8-13-10	Rev 6 - 8/13/10	8/26/10 - JG

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APPENDIX 5 – SLOPING AND BENCHING DEFINITIONS AND SLOPE CONFIGURATIONS

Definitions

Actual Slope

Means the slope to which an excavation face is excavated.

Distress

Means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and raveling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum Allowable Slope

Means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term Exposure

Means a period of time less than or equal to 24 hours that an excavation is open.

Requirements

Soil Classification

Soil and rock deposits must be classified in accordance with the Section 1.17 - Soil Classification Procedures of the SHSP.

Maximum Allowable Slope

The maximum allowable slope for a soil or rock deposit must be determined from Table 1-2 of the SHSP.

Table 1. Maximum Allowable Slopes for Excavations Less Than 20 Feet

Soil or Rock Type	Maximum Slope (H:V)	Maximum Slope (Degrees)
Stable Rock	Vertical	90
Type A	75:1	53
Type B	1:1	45
Type C	1.5:1	34

Footnote (1)

- Numbers shown in Max Slope (degrees) are angles expressed in degrees from the horizontal - Angles have been rounded off

Footnote (2)

- A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 ft (3.67 m) or less in depth
- Short-term maximum allowable slopes for excavations greater than 12 ft (3.67 m) in depth shall be 3/4H:1V (53 degrees)

Footnote (3)

- Sloping or benching for excavations greater than 20 ft deep shall be designed by a registered professional engineer

Actual Slope

The actual slope must not be steeper than the maximum allowable slope.

The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least 1/2H:1V less steep than the maximum allowable slope.

When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must:

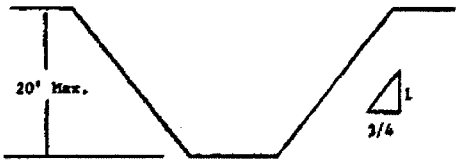
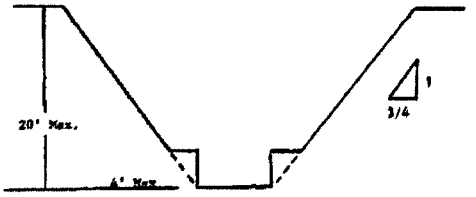
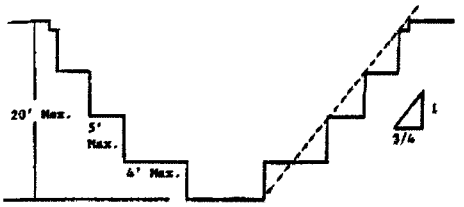
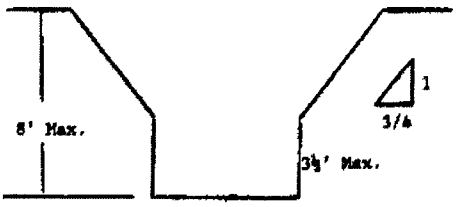
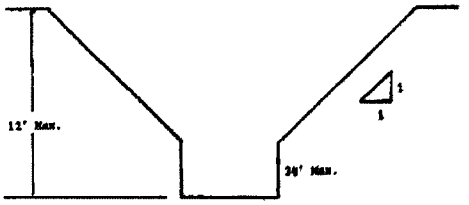
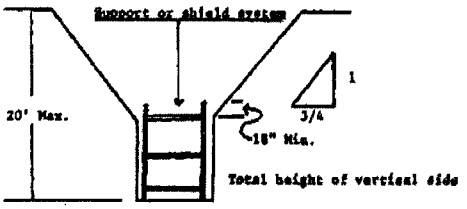
- Determine the degree to which the actual slope must be reduced below the maximum allowable slope
- Assure that such reduction is achieved

Surcharge loads from adjacent structures must be evaluated in accordance with this program.

Slope Configurations

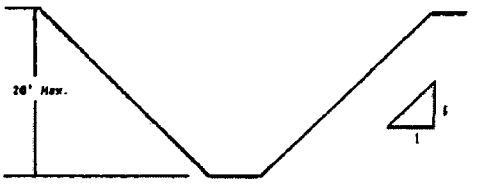
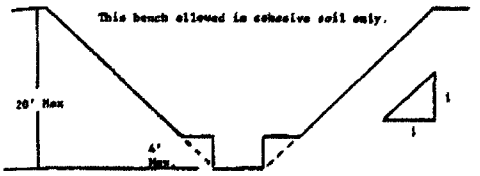
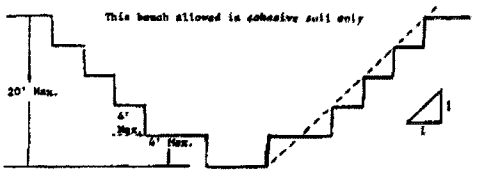
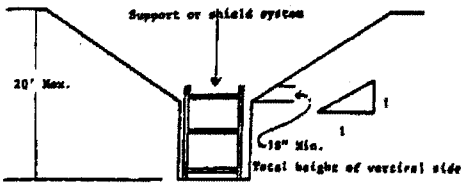
Configurations of sloping and benching systems must be in accordance with the table and figures below. All slopes stated below are in the horizontal to vertical ratio.

Figure 1.0. Excavations Made in Type A Soil

All simple slope excavations 20 ft or less in depth will have a maximum allowable slope of 0.75H:1V.	
All benched excavations 20 ft or less in depth will have a maximum allowable slope of 0.75H:1V and maximum bench dimensions as indicated.	 
All excavations 8 ft or less in depth which have unsupported vertically sided lower portions will have a maximum vertical side of 3 ½ ft.	
All excavations more than 8 ft but not more than 12 ft in depth with unsupported vertically sided lower portions will have a maximum allowable slope of 1H:1V and a maximum vertical side of 3 ½ ft.	
All excavations 20 ft or less in depth which have vertically sided lower portions that are supported or shielded will have a maximum allowable slope of 0.75H:1V. The support or shield system must extend at least 18 inches above the top of the vertical side.	

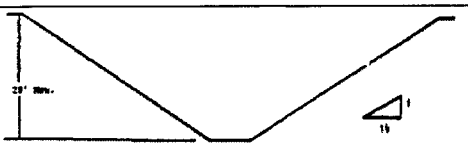
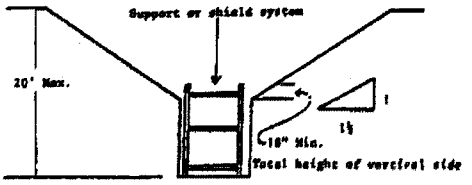
All other simple slope, compound slope, and vertically sided lower portion excavations will be in accordance with the other options described in Section 1.15 – Sloping and Benching Systems of the SHSP.

Figure 2.0. Excavations Made in Type B Soil

All simple slope excavations 20 ft or less in depth will have a maximum allowable slope of 1H:1V.	
All benched excavations 20 ft or less in depth will have a maximum allowable slope of 1H:1V and maximum bench dimensions as indicated.	 
All excavations 20 ft or less in depth which have vertically sided lower portions will be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations will have a maximum allowable slope of 1H:1V.	

All other sloped excavations must be in accordance with the other options permitted in Section 1.15 – Sloping and Benching Systems of the SHSP.

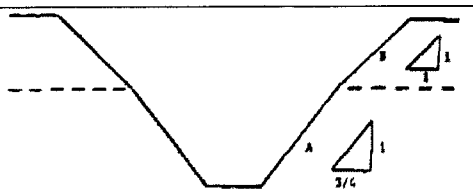
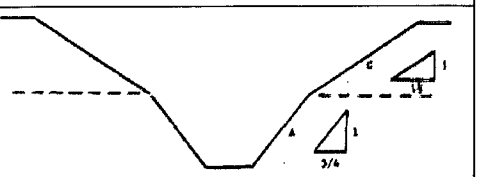
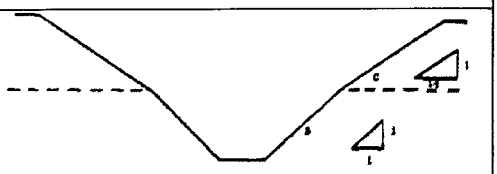
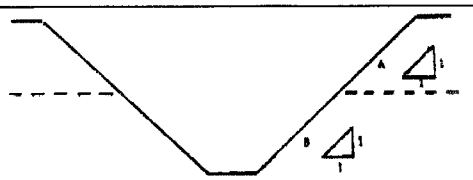
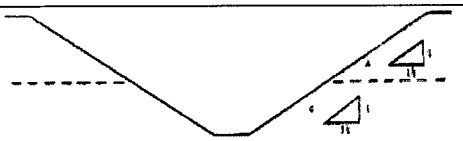
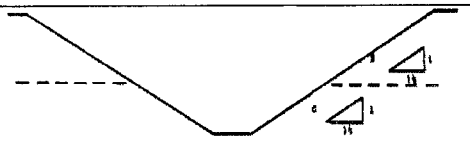
Figure 3.0. Excavations Made in Type C Soil

All simple slope excavations 20 ft or less in depth will have a maximum allowable slope of 1.5H:1V.	
All excavations 20 ft or less in depth which have vertically sided lower portions will be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations will have a maximum allowable slope of 1.5H:1V.	

All other sloped excavations must be in accordance with the other options described in Section 1.15 – Sloping and Benching Systems of the SHSP.

All excavations 20 ft or less in depth made in layered soils will have a maximum allowable slope for each layer as set forth below.

Figure 4.0. Excavations Made in Layered Soils

Type B over Type A	
Type C over Type A	
Type C over Type B	
Type A over Type B	
Type A over Type C	
Type B over Type C	

All other sloped excavations must be in accordance with the other options described in Section 1.15 – Sloping and Benching Systems of the SHSP.

APPENDIX 6 – SOIL CLASSIFICATION DEFINITIONS AND REQUIREMENTS

Definitions

The definitions and examples given below are based on, in whole or in part, the following: American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System; The U.S. Department of Agriculture Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

Cemented Soil

Means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive Soil

- Clay (fine grained soil), or soil with a high clay content, which has cohesive strength
- Cohesive soil does not crumble, can be excavated with vertical side slopes, and is plastic when moist
- Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged
- Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay

Dry Soil

- Means soil that does not exhibit visible signs of moisture content

Fissured

- A soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular Soil

- Gravel, sand, or silt (coarse grained soil) with little or no clay content
- Granular soil has no cohesive strength
- Some moist granular soils exhibit apparent cohesion
- Granular soil cannot be molded when moist and crumbles easily when dry

Layered system

- Two or more distinctly different soil or rock types arranged in layers
- Micaceous seams or weakened planes in rock or shale are considered layered

Moist soil

- A condition in which a soil looks and feels damp
- Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling
- Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic

- A property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change

Saturated soil

- A soil in which the voids are filled with water
- Saturation does not require flow
- Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or sheer vane

Soil classification system

- For the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability
- The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure

Stable Rock

- Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed

Submerged Soil

- Oil which is underwater or is free seeping

Type A

- Cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater - Examples of cohesive soils are:
    - Clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam

- Cemented soils such as caliches and hardpan are also considered Type A. However, no soil is Type A if:
    - The soil is fissured
    - The soil is subject to vibration from heavy traffic, pile driving, or similar effects
    - The soil has been previously disturbed
    - The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of 4H:1V or greater
    - The material is subject to other factors that would require it to be classified as a less stable material

Type B

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam
- Previously disturbed soils except those which would otherwise be classed as Type C soil
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration
- Dry rock that is not stable
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than 4H:1V, but only if the material would otherwise be classified as Type B.

Type C

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less
- Granular soils including gravel, sand, and loamy sand
- Submerged soil or soil from which water is freely seeping
- Submerged rock that is not stable
- Material in a sloped, layered system where the layers dip into the excavation or a slope of 4H:1V or steeper

Unconfined Compressive Strength

- The load per unit area at which a soil will fail in compression - It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods

Wet Soil

- Soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated
- Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet

Requirements

Classification of Soil and Rock Deposits

Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in this section.

Basis of Classification

The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

Visual and Manual Analyses

The visual and manual analyses, such as those noted as being acceptable in this section, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

Layered Systems

In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

Reclassification

If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

Acceptable Visual and Manual Tests

Visual Tests

Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular. Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material.

If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

Manual Tests

Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

Plasticity

Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

Dry Strength

If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which

can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

Thumb Penetration

The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils (based on the thumb penetration test described in ASTM Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure)"). Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

Other Strength Tests

Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shear vane.

Drying Test

The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

If the sample develops cracks as it dries, significant fissures are indicated.

Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.

If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by

hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.