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Los Alamos National Laboratory
I NVIRONMENTAL RESTORATION (ER)
SITE-SI ECIFIC HEALTH & SAFETY PLAN (SSHASP)

Project Name: Non-Traditic al In Situ Vitrification (NTISV) Demonstration at TA-21 MDA-V Site

The LANL ER Health a d Safety Plan (HASP) supplements this SSHASP and shall be complied with as applicable. Copies of the HASP and this SSHASP are to be readily accessible for review onsite by individuals who may be exposed to hazards resulting from work conducted under the scope of this SSHASP. Personnel performing work under the scope of this SSHASP re required to sign the LANL ER Work Authorization and Health & Safety Briefing Acknowledgement page signifying that they are aware of the hazard information documented herein and will abide by requirements of these plans to eliminate or lessen the risk of injury or illness from exposure to the identified hazards.

APPROVALS / CONCURRENCE

Signature	Name/Title	LANL Group	Date
Deba Dayman	Deba Dayman	EES-13	2/18/99

Focus Area Project Leader (FAPL) Approval

Signature	Name/Title	Company	Date
Gordon Hiddleston	Gordon Huddleston/MSE Project Manager	MSE-TA	2-17-99

MSE H&S Responsible Line Manager Approval

Signature	Name/Title	Company	Date
Brett E. Campbell	Brett E. Campbell/Mgr of Eng & Ops	Geosafe	2-17-99

Geosafe H&S Responsible Line Manager Approval

Signature	Name/Title	Company	Date
see attached			

AGEC H&S Responsible Line Manager Approval

Signature	Name/Title	Company	Date
see attached			

Mtn. States Equipment H&S Responsible Line Manager Approval

Signature	Name/Title	Company	Date
	Clark Judy, Manager	MK	2-22-99

MK H&S Responsible Line Manager Approval

Signature	Name/Title	Company	Date
	AL FUNK Principal	PMC	2/22/99

PMC H&S Responsible Line Manager Approval

Signature	Name/Title	Date
	Dave Gardiner / President SGW	2/22/99

S.G.Western H&S Responsible Line Manager Approval

(continu


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APPROVALS / CONCURRENCE

(Continued)

Signature	Name/Title	ESH-5	Date
See attached			

MSE-Geosafe Electrical Safety Supervisor Approval (Tasks 3, 4)

Signature	Name/Title	ESH-5	Date
	Jim Rundle ER/HS Rep.	ESH-5	2/23/99

ER/ESH-5 Representative Concurrence

Signature	Name/Title	ESH-1	Date
	JOHN W. ELLIOTT ESH-1 ER/D&D Team Leader		2/22/99

ER/ESH-1 Representative Concurrence

Signature	Name/Title	FMU-50	Date
Bruce R. Erdal			2/18/99

EM-50 Project Manager Concurrence

Signature	Name/Title	EM-50	Date
for	DAVID PADILLA		2-23-99

Facility Manager Concurrence

Comments of the above reviewers have been incorporated as stipulated or resolved with written record and copy to the respective reviewer.

Preparer's Name	Signature	Company/LANL Group	Date	Mailstop	Phone
(Rick Obstar)		MSE-TA Tech.	2/12/99		606-794-7572
Raymond Wright		PMC	2/22/99	M327	662-1325

Los Alamos National Laboratory
ENVIRONMENTAL RESTORATION (ER)
SITE-SPECIFIC HEALTH & SAFETY PLAN (SSHASP)

Project Name: Non-Traditional In Situ Vitrification (NTISV) Demonstration at TA-21 MDA-V Site

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APPROVALS / CONCURRENCE

Signature	Name/Title	LANL Group	Date
Focus Area Project Leader (FAPL) Approval			
[signature]	Gordon Huddleston/MSE Project Manager	MSE-TA	2-17-99
MSE H&S Responsible Line Manager Approval			
[signature]	Brett E. Campbell/Mgr of Engr Ops	Geosafe	2-17-99
Geosafe H&S Responsible Line Manager Approval			
STEVEN J PHILLIPS	STEVEN J PHILLIPS	AGEC	2-17-99
AGEC H&S Responsible Line Manager Approval			
Mtn. States Equipment H&S Responsible Line Manager Approval			
MK H&S Responsible Line Manager Approval			
PMC H&S Responsible Line Manager Approval			
S.G.Western H&S Responsible Line Manager Approval			

(continued)

Los Alamos National Laboratory
ENVIRONMENTAL RESTORATION (ER)
SITE-SPECIFIC HEALTH & SAFETY PLAN (SSHASP)

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APPROVALS / CONCURRENCE

Signature	Name/Title	LANL Group	Date
Focus Area Project Leader (FAPL) Approval			
[signature]	Gordon Hoddleston/MSE Project Manager	MSE-TA	2-17-99
MSE H&S Responsible Line Manager Approval			
[signature]	Brett E. Campbell/Mgr of Eng & Ops	Geosafe	2-17-99
Geosafe H&S Responsible Line Manager Approval			

Signature	Name/Title	Company	Date
AGEC H&S Responsible Line Manager Approval			
Pete Williams	Pete Williams President	MT. States Equipment	2-17-99
Mtn. States Equipment H&S Responsible Line Manager Approval			
MK H&S Responsible Line Manager Approval			
PMC H&S Responsible Line Manager Approval			
S.G.Western H&S Responsible Line Manager Approval			

(continued)

APPROVALS / CONCURRENCE

(Continued)

Craig Zimmerman	Craig Zimmerman / Staff Engr.		2/17/99
Signature	Name/Title	ESH-5	Date

MSE-Geosafe Electrical Safety Supervisor Approval (Tasks 3, 4)

Signature	Name/Title	ESH-5	Date

ER/ESH-5 Representative Concurrence

Signature	Name/Title	ESH-1	Date

ER/ESH-1 Representative Concurrence

Signature	Name/Title	FMU-80	Date

EM-50 Project Manager Concurrence

Signature	Name/Title	EM-50	Date

Facility Manager Concurrence

Comments of the above reviewers have been incorporated as stipulated or resolved with written record and copy to the respective reviewer.

			2/17/99		
Preparer's Name	Signature	Company/LANL Group	Date	Mailstop	Phone
Preparer's Name	Signature	Company/LANL Group	Date	Mailstop	Phone

Table of Contents

List of Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ACS	Asbestos Contractor Supervisor
ALARA	As Low As Reasonably Achievable
AL	Action Level
ANSI	American National Standard Institute
AAP	Asbestos Abatement Plan
APR	Air-Purifying Respirator
AR	Administrative Requirements
ATM	Atmosphere
°C	Degrees Centigrade
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
CP	Competent Person
CPR	Cardiopulmonary Resuscitation
CRZ	Contamination Reduction Zone
DAC	Derived Air Concentration
dBA	Decibels (A-Weighted Scale)
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPL	Decommissioning Project Leader
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ESH	Environmental, Safety and Health
ESH-1	Health Physics Operations Group
ESH-2	Occupational Medicine Group
ESH-5	Industrial Hygiene and Safety Group
ESH-12	Policy and Program Analysis Group
eV	Electron Volts
EZ	Exclusion Zone
°F	Degrees Fahrenheit
Fibers/cc	Fibers Per Cubic Centimeter
FID	Flame Ionization Detector
GET	General Employee Training
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations
HEPA	High Efficiency Particulate Air
HPT	Health Protection Technician
HS	Health and Safety
IARC	International Agency for Research on Cancer
IDLH	Immediately Dangerous to Life or Health
IP	Ionization Potential

List of Acronyms and Abbreviations (continued)

JS	Job Superintendent
LAMC	Los Alamos Medical Center
LANL	Los Alamos National Laboratory
LAP	Lead Abatement Plan
LCP	Lead Competent Person
LEL	Lower Explosive Limit
LIG	Laboratory Implementation Guidance
LIR	Laboratory Implementation Requirement
LP	Laboratory Procedure
mg/M^3	Milligrams Per Cubic Meter
mm	Millimeters
MAWP	Maximum Allowable Working Pressure
MSDS	Material Safety Data Sheet
MUC	Maximum Use Concentration
NIOSH	National Institute for Occupational Safety and Health
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PAPR	Powered Air Purifying Respirator
PEL	Permissible Exposure Limit
PF	Protection Factor
PGM	Program Manager
PID	Photoionization Detector
PJM	Project Manager
PPE	Personal Protective Equipment
PRS	Potential Release Site
RCT	Radiological Control Technician
RFP	Request For Proposal
RMMA	Radioactive Materials Management Area
RSP	Radiological Screening Personnel
RWP	Radiological Work Permit
SC	Spill Containment
SLM	Sound Level Meter
SOP	Standard Operating Procedures
SSHASP	Site-Specific Health and Safety Plan
SSO	Site Safety Officer
SUP	Supervisor
SWMU	Solid Waste Management Unit
SWP	Special Work Permit
SZ	Support Zone
TA	Technical Area
THA	Task Hazard Analysis
TLD	Thermoluminescent Dosimeter

List of Acronyms and Abbreviations (continued)

TLV.....Threshold Limit Value
TWA..... 8-Hour Time-Weighted Average
μ/M^3.....Micrograms Per Cubic Meter

1.0 PROJECT INFORMATION

1.1 PROJECT SCOPE

The overall purpose of the proj ct is to demonstrate and verify the potential of NTISV to extend the capabilities of ISV beyond hose of conventional systems, thereby broadening the DOE's options for cost effective remediation of buried wastes. This is to be accomplished by the performance of two demonstrations , a cold der onstration and a hot demonstration, at the LANL MDA V site (Site Map included as Section 1.7.1). The demonstrations have the purpose of determining whether NTISV technology can cost eff ctively contain and permanently immobilize contaminants in place while reducing risk and meeting regulatory requirements. In addition, a most important evaluation factor is the technical merits and overall potential of the proposed system to meet DOE and LANL near and long range requiremer s.

The scope of this project includ s the design, fabrication and operation of an NTISV system, preparation of a simulated abso ption bed (for the cold demo), evaluation of the two demonstrations, and subsequent reporting. Tradi ional ISV is simply described as Atop-down in situ melting. It should be noted that Geosafe is propos g to use its existing ISV equipment system for this NTISV demonstration and, therefore, th design and fabrication requirements of a new NTISV system will be minimized. This factor will gre tly reduce cost and speed the deployment of the NTISV technology.

The hot demonstration will be performed in one end of MDA V Absorption Bed #1. The cold demonstration will be employed nearby that location to ensure that the subsurface geology is similar to that in Bed #1, and to minimize costs associated with movement of equipment between demonstrations. The cold demonstration will involve the treatment of a mock disposal trench similar to MDA V located in an uncontaminated area up gradient of the hot demonstration site.

The project will consist of the following eight primary tasks, for which a Task Hazard Analysis (THA) is included in this SSHASP:

1 Cold Cell Construction,
2 Cold Cell Preparation (includes monitoring well and electrode casing installation, starter path injection, and the dynamic disruption of the area surrounding the cold demonstration bed),
3 Mobilization and Demobilization of the NTISV System for the Cold Demonstration,
4 Cold Demonstration Operations,
5 Hot Demonstration Preparation (includes sampling, electrode casing installation, starter path injection, and the dynamic disruption of the area surrounding the hot demonstration bed),
6 Mobilization and Demobilization of the NTISV System for the Hot Demonstration,
7 Hot Demonstration Operations, and
8 Post Hot Demonstration Evaluation

1.1.1 ISV Description

In-situ vitrification has been de veloped as a remedial action methodology for soils containing hazardous chemical and/or radic logical substances. A parallel array of two sets electrodes are set approximately into the soil and connected with a starter pla e of conductive material to initially establish the Planar ISV melt. An electrical potential is appli d to the electrodes to establish an electrical current in the starter path. For the Cold Demonst ation, the maximum potential applied will be 4000 V. The flow of current heats the starter path and surrounding soil to well above the initial soil-melting temper tures of 1100 to 1400 degrees Ce sius. The graphite starter path is eventually consumed by o: dat on and the current is transfer ed to the molten soil which is processed at temperatures between 1450 a d 2000 degrees C. The elec rodes are fed (electrode feeding) deeper into the ISV volume as the planar molten zone advances inw rd and downward.

The high temperature of the process destroys organic components by pyrolysis. The byproducts of pyrolysis either dissolve in the molten mass or migrate to the surface of the vitrified zone where they combust in the presence of air. Nonvolatile contaminants such as heavy metals and radionuclides are incorporated into the molten zone and encapsulated in the vitrified (glass) block.

The vitrification zone is covered by an off-gas collection hood with a diagonal cross-section of approximately 45 feet. The hood is maintained at a negative pressure of 0.25 to 1.0 inches of water throughout the melt and the off-gases which consist of in excess of 99% clean make-up air, carbon dioxide, and water vapor, are treated by prefiltering, quenching/scrubbing, HEPA filtration, and activated carbon absorption or thermal oxidation (as required).

Upon completion of the last ISV setting, the off-gas t eatment system and the ISV hood itself, must be decontaminated. If dry decontamination is insuffici nt, spray washing will be used as an alternative decontamination method in a designated ai a, and is expected to generate substantial volumes of decontamination wash-water. Depending n the results of "swipe" sampling and analysis of the hood and off-gas system prior to decontaminati n, wash water will either be discharged to the sanitary sewer system, or will itself be collected and a alyzed, and either discharged to the sanitary sewer, or treated as a hazardous or radioactive waste, as appropriate.

1.2 KEY PERSONNEL HAVING PROJECT H&S RESPONSIBILITIES

Project Management

FAPL: Deba Dayman, EES-13 Phone No. 667-9021 / 104-3969

FTM: Jayne Jones, CST-7 Phone No. 665-5342 / 104-4968

Field Team

Sup. (MSE/Geosafe): Brett Campbell Phone No. Field TBD

Alt. Sup. (MSE/Geosafe): Steve Minnick Phone No. Field TBD

SSO (MSE/Geosafe): Rick Obstar Phone No. Field TBD

Alt. SSO (MSE/Geosafe): Brett Campbell Phone No. Field TBD

Sup. Drilling (AGEC): Steve Phillips Phone No. Field TBD

Crane Sup./Op. (Mtn.StatesEquip.): _____ Phone No. Field TBD

Sup. (MK-PMC): John DeJoya Phone No. 662-1359

HPT (MK-PMC): Ray Wright Phone No. 662-1325

Alt. RSP (MK-PMC): Ken McFadden Phone No. 662-1302

Support Personnel

ESH-5: Ann Rundle Phone/Pager No. 665-5128/996-3404

ESH-1: John Elliott Phone No. 665-7461 / 104-7264 / 699-4055

Facility Contacts

Facility Manager: David Padilla, F-8 Phone No. 667-2408 / 104-8726

Facility Coordinator: Charles Trujillo, F-8 Phone No. 667-0491 / 996-1084

1.3 RELEVANT SITE INFORMATION

1.3.1 Site Description/History

Material Disposal Area V (MDA V) located at the LANL Site has been selected as the NTISV demonstration site. The MDA V site is located in Technical Area 21 along its northern boundary, immediately east-southeast of the Los Alamos townsite. The MDA V site encompasses an area of 0.88 acre. It contains three liquid absorption beds constructed to receive waste effluent from the Delta Prime laundry facility, which previously cleaned radioactively-contaminated clothing.

The absorption beds were constructed by excavating pits and then backfilling them with a 1.5-m depth of large cobble and then filling the remaining depth with layers of small gravel, soil, and tuff. The beds measure 7.6-m wide by 6[illegible]-m long by 2.4-m deep. The MDA V beds received waste effluents from the laundry for a 16 year period beginning in 1945 and ending in 1961. The beds are also reported to have received waste from industrial treatment research operations that took place in building TA-21-45. Extensive soil characterization has shown the beds to exceed Screening Action Levels (SALs) for the following heavy metals: cadmium, chromium, copper, lead, mercury, silver and uranium. Radionuclides exceeding the SALs are americium, cesium, plutonium, strontium, tritium, and uranium. No organic compounds were detected above SALs. Contamination in and below the beds is expected to range from between 1.2-m to 6.7-m in depth.

1.3.2 Existing Conditions

Extensive sampling and analysis has been performed on the LANL Site. Substances, detected in soil on the site and the range of concentrations detected are listed in Table 1. Contaminates detected within the adjacent MDA-B boundary are provided in Attachment A. Contaminant levels at the Cold Demo site and nearby MDA-B do not pose an occupational or radiological health hazard. Confirmatory sampling results of soil collected at approximately 8 feet below ground surface at the cold test pit location indicated no levels of occupational health concern (Attachment A). As such, the scope of work and associated task activities do not fall under the OSHA HAZWOPER Standard (29 CFR 1926.65).

Radionuclides

Radionuclides (primarily plutonium) were detected in the soils in and around the MDA V site. These levels are all part of the subsurface contamination at the site. This material is not expected to be disturbed and brought to the surface during the course of this project.

Inorganics

Antimony, cadmium. chromium, copper, lead, and mercury were detected in soils during sampling of the MDA V absorption beds. Although those metals may pose an environmental toxicity concern, they are not present in sufficient quantities to pose an occupational hazard.

Organics

Organic compounds were detected at or near the analytical detection limits in soil samples, placing them below the SALs for the site, and well below any occupational exposure levels.

TABLE 1

SOIL ANALYTE CONCENTRATIONS AT LANL MDA V

CHEMICAL	MAXIMUM CONCENTRATION	MINIMUM CONCENTRATION	NUMBER OF OCCURRENCES	AVERAGE CONCENTRATION
Radionuclides (pCi/g)				
Americium-241	14.1	0.002	21	1.455
Cesium-137	0.16	0	21	0.047
Plutonium-238	2800	0	21	133.6
Plutonium-239	525	0.002	21	61.98
Strontium-90	8.1	-0.07	21	0.609
Tritium	15.2	0.116	21	1.079
Uranium-234	6.3	0.85	21	3.238
Uranium-235	0.64	0.08	21	0.356
Uranium-238	5.18	1.35	21	2.618
Inorganics (mg/kg – ppm)				
Antimony	5.2	0.74	21	4.168
Cadmium	0.52	0.16	21	0.428
Calcium	2800	1050	21	1734
Chromium	8.9	2.1	21	4.436
Copper	2820	4.5	21	462.5
Lead	323	9.1	21	86.61
Mercury	0.85	0.014	21	0.255
Silver	0.52	0.27	21	0.456
Uranium	15.54	3.21	21	4.861
Organics (No organics were detected above SALs.)				

1.4 PROJECT EMERGENCY ACTION/RESPONSE PLAN

Incident/emergency action requirements, equipment, and supplies are specified below for each task or group of tasks having different requirements. Response to an incident or emergency shall occur according to Section 9 of the HASP and this section and 29CFR1926.30 and/or 1926.65(l) or (p). Any exceptions or deviations from requirements of the HASP are noted below. In the event of an incident or emergency, the Geosafe Supervisor will function as the site emergency/incident coordinator, as necessary, and will arrange for immediate notification of LANL emergency response personnel to take control of the scene and/or arrange for immediate notification of appropriate authorities.

- **Emergency Coordinator:** Geosafe Supervisor

- **Site Access:** Emergency access to the site is via air or road. DP road, which borders the site to the north, is the closest ground access.

- **First Aid/CPR:** Ray Wright is the MK-PMC provider of CPR/First Aid. All Geosafe personnel that will be on-site are trained and certified CPR/First Aid providers. At least one field member who is properly trained in first-aid and CPR will be present during site activities at all times. Route to Hospital and ESH-2 Medical Services provided as Section 1.7.2.

- **Communications:** A cellular phone will be kept on-site for emergency communications. An air horn will serve as the site emergency notification device.

- **Emergency Signal to Evacuate:** An air horn will be used to notify site personnel of an emergency requiring evacuation. Two blasts will mean meet at the muster area. Three blasts will mean to evacuate this site by the shortest possible route. The evacuation procedure will be tested during the initial stages of the project and then periodically throughout.

- **Muster Area:** The muster area will be located at the vehicle parking area whenever possible. If the location changes due to wind or site conditions, the crew will be properly notified. The emergency escape routes will be discussed with the workers during the daily tailgate safety meeting. Access to the site will be controlled and a daily access roster our workers will be used to determine if all personnel are present during an emergency. Only the heavy equipment and power to the electrodes will be shutdown prior to evacuation.

- **Fire Extinguisher Equipment:** As stated in the THAs, several type ABC fire extinguishers will be located on-site for emergency response. If spark-producing activities such as cutting or welding are performed, fire extinguishers will be moved to the location of the activity for the duration required to complete the task.

- **Emergency Response Equipment:** A minimum of two first aid kits will be on-site at all times. One will be kept in the ISV process control room and the second will be in the office trailer. The first-aid supplies shall be kept in a weatherproof container and the contents shall be checked weekly and re-supplied by SSO or designee. Contents shall meet the American National Standard Minimum Requirements for Industrial Unit-Type First Aid Kits (ANSI Z308.1-1978).

  It is anticipated that the emergency eyewash will be located in the ISV process trailer and also in the equipment storage container. The emergency eyewash shall be located within 10 seconds travel time and not more than 100 feet of travel distance of any source of chemical splash that may be corrosive or moderately to severely irritating to body tissue. They must have a capacity

to be able to provide continuous flushing for the duration of time necessary to sufficiently flush the most hazardous substance for which the device is being specified. They also shall be inspected weekly by the SSO or designee, and flushed according to the manufacturers instructions. Refer to ANSI Z358.1-1990 for further information. If corrosives will be used during the project, an emergency shower will be mobilized to the site.

1.5 PROJECT SPILL CONTAINMENT

Spill containment equipment will be available onsite, which will include at a minimum the following items, empty drums, shovels, absorption materials (pads and boom). The use of plastic/tarps underneath likely sources (i.e.: heavy equipment & drill rigs) will also be used to contain any potential leaks. If special spill containment is required during specific tasks it will be addressed in the specific THAs attached. When HAZWOPER compliance is required (i.e.: during the A hot demonstration), a separate spill control program will be implemented that adheres to the requirements specified in 29 CFR 1926.65(b)(4)(ii)(J).

1.6 EMERGENCY CONTACTS AND PHONE NUMBERS

MEDICAL EMERGENCY/FIRE:

Los Alamos Fire Dept.	Phone No.: **667-7080**

HAZARDOUS RELEASE/SPILL:

LANL HAZMAT Team (EM&R)	Phone No.: **667-6211**

SUPPORT CONTACTS:

LANL Occupational Medicine Clinic (ESH-2)	Phone No.: **667-7848**
Los Alamos Medical Center Hospital	Phone No.: **662-2455**
Security OS/Pro Force	Phone No.: **667-6534**
Los Alamos Police	Phone No.: **662-8222**
Health Physics Operations ESH-1	Phone No.: **667-7171**

PROJECT MANAGEMENT/SUPPORT CONTACTS:

FTM: Jayne Jones, CST-7	Phone No.: **665-5342 / 104-4968**
FAPL: Deba Daymon, EES-13	Phone No.: **667-9021 / 104-3969**
Project ESH-5 Rep.: Ann Rundle	Phone No.: **665-5128/996-3404**
Project ESH-1 Rep.: John Elliott	Phone No.: **665-7461 / 104-7264 / 699-4055**

FACILITY CONTACT:

David Padilla, FMU-80 Facility Manager	Phone No.: **667-2408 / 104-8726**
Charles Trujillo FMU-80 Facility Coordinator	Phone No.: **667-0491 / 996-1084**

MANAGEMENT CONTACTS:

AGEC:	(main office)	Phone No.: **1-509-943-2432**
Geosafe:	Jack McElroy	Phone No.: **1-509-375-0710**
MK:	Clark Judy	Phone No.: **662-1320 / 662-7300**
MSE:	Tom Burkhart	Phone No.: **1-406-494-7100**
Mtn. States Eq.:	(main office)	Phone No.: **1-505-856-6041**
PMC:	Al Funk	Phone No.: **662-1323 / 662-7300**
S.G.Western:	Sam Gardner	Phone No.: **662-3852**

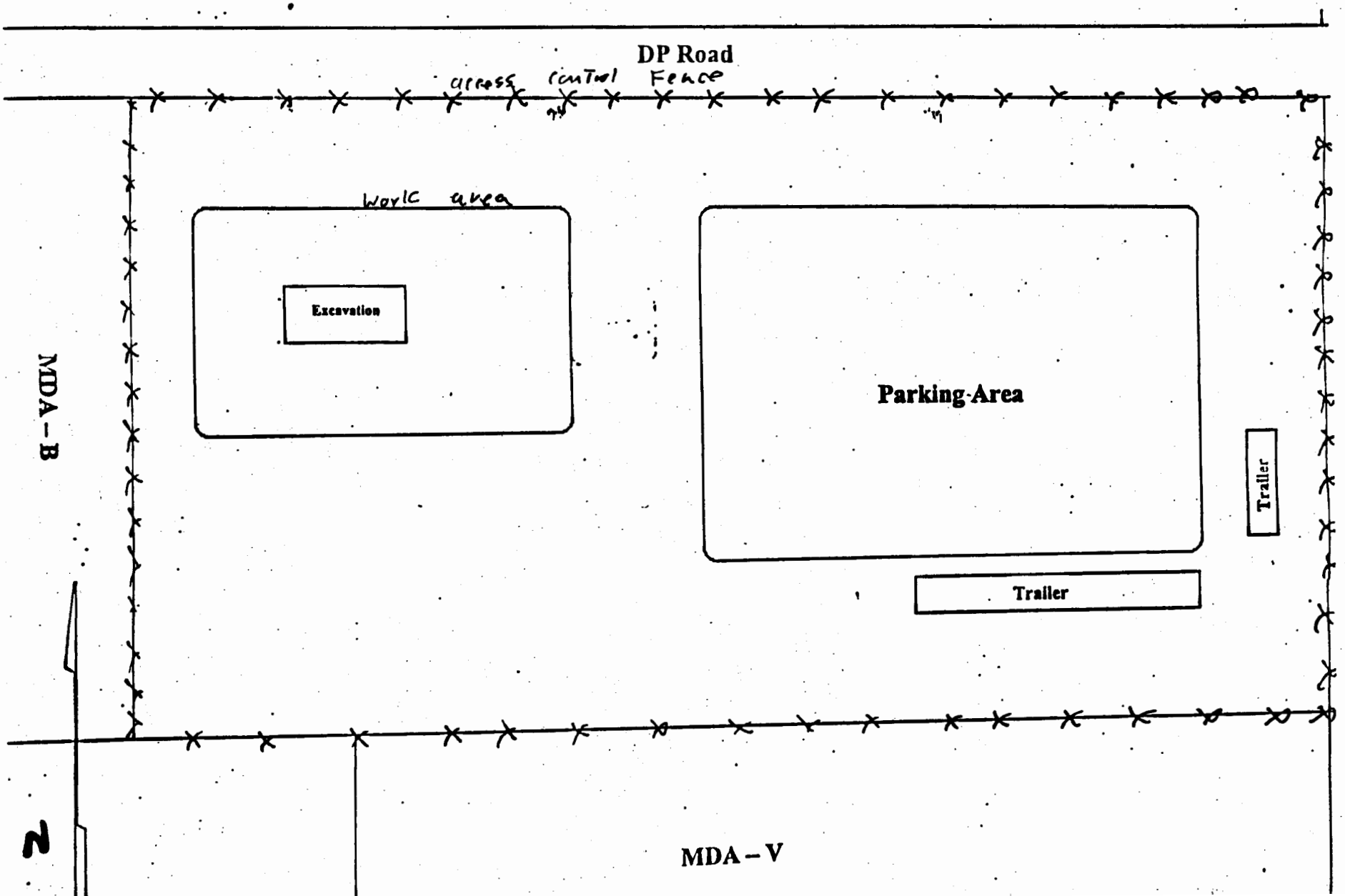
LANL Pager Access (for 104- pagers): Phone No.: **665-9800**

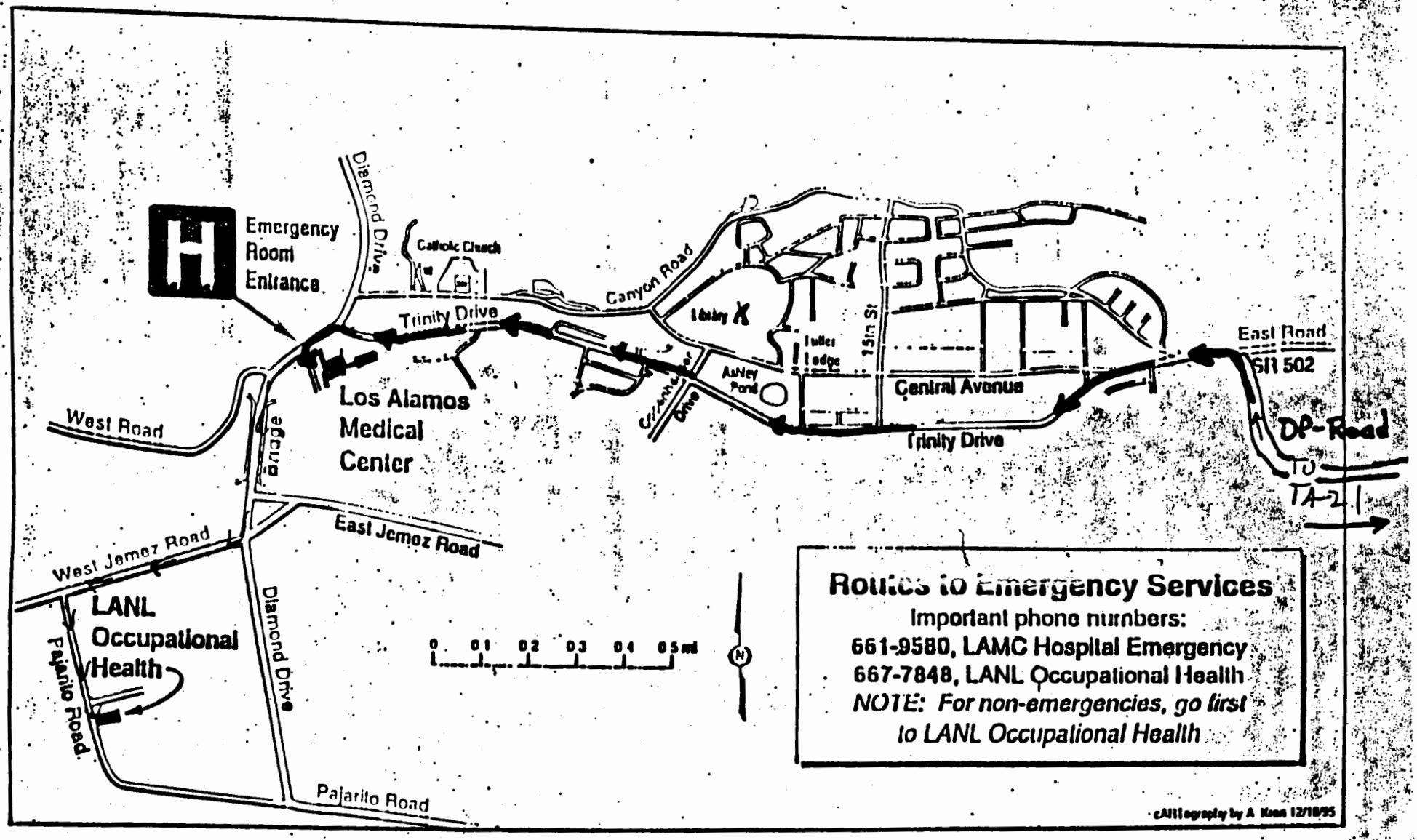
EMERGENCY REPORTING INFORMATION:

When calling for emergency services, have the following information available to report:

- Site name/location/phone #
- Number of personnel involved
- Caller ID
- Name and condition of affected personnel
- Nature of emergency
- Actions taken and assistance required

Schematic of Site Layout




Emergency Room Entrance
Diamond Drive
Catholic Church
Canyon Road
Trinity Drive
Los Alamos Medical Center
West Road
Bridge
East Jemez Road
West Jemez Road
LANL Occupational Health
Pajarito Road
Diamond Drive
Pajarito Road
Ashley Pond
Fuller Lodge
15th St
Central Avenue
Trinity Drive
East Road
SR 502
DP-Road
TO TA-21
0 01 02 03 04 05 mi
N
Routes to Emergency Services
Important phone numbers:
661-9580, LAMC Hospital Emergency
667-7848, LANL Occupational Health
NOTE: For non-emergencies, go first to LANL Occupational Health
cAllegraphy by A Kean 12/18/95

PRE-JOB START HEALTH AND SAFETY BRIEFING & HASP/SSHASP ACKNOWLEDGMENT FORM

Project Title: Non-Traditional In Situ Vitrification Demonstration at the TA-21 MDA-V Site

SSHASP No.: 230 Date: _____

Briefing conducted by:

Printed Name	Title	Employer or LANL Group	Z Number

Signature Date

I acknowledge that I understand the HASP requirements applicable to this project, and have read or been briefed on the contents this SSHASP in accordance with requirements of Section 1.2 and 10.1.3 of the HASP.

NAME	EMPLOYER/GROUP	Z NUMBER	SIGNATURE/DATE

LANL ER WORK AUTHORIZATION & TASK HEALTH & SAFETY BRIEFING ACKNOWLEDGEMENT

The individuals who sign this acknowledgement are authorized by their respective health and safety responsible line manager (who has signed approval of this SSHASP) to perform the tasks identified within the scope of this SSHASP.

Project Title: Non-Traditional In Situ Vitrification Demonstration at the TA-21 MDA-V Site SSHASP No.: 230

Task:_____ Date: _____

Briefing conducted by:

Printed Name | Title | Employer or LANL Group | Z Number

Signature | Date

I acknowledge that I understand this SSHASP, including the hazards related to performing this work and the ways I can eliminate the hazards or protect myself from injury or illness on the job.

NAME	EMPLOYER/GROUP	Z NUMBER	SIGNATURE/DATE

ATTACHMENT A

PREVIOUS SITE DATA

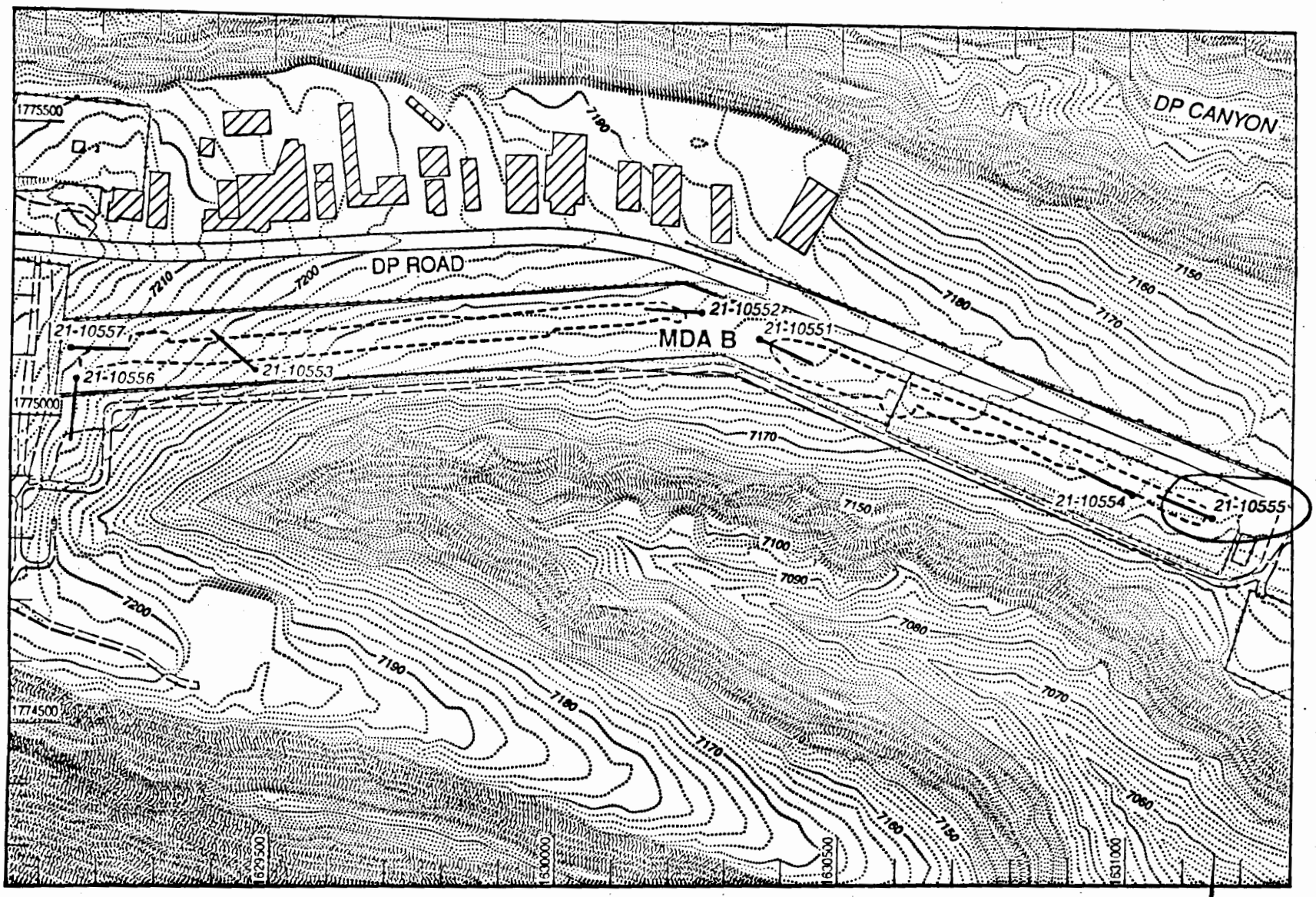


Figure 2.1 Location of angled boreholes and disposal beds at MDA B.

Att-A

Attachment A

Rec'd 2/3/99 2/10/99

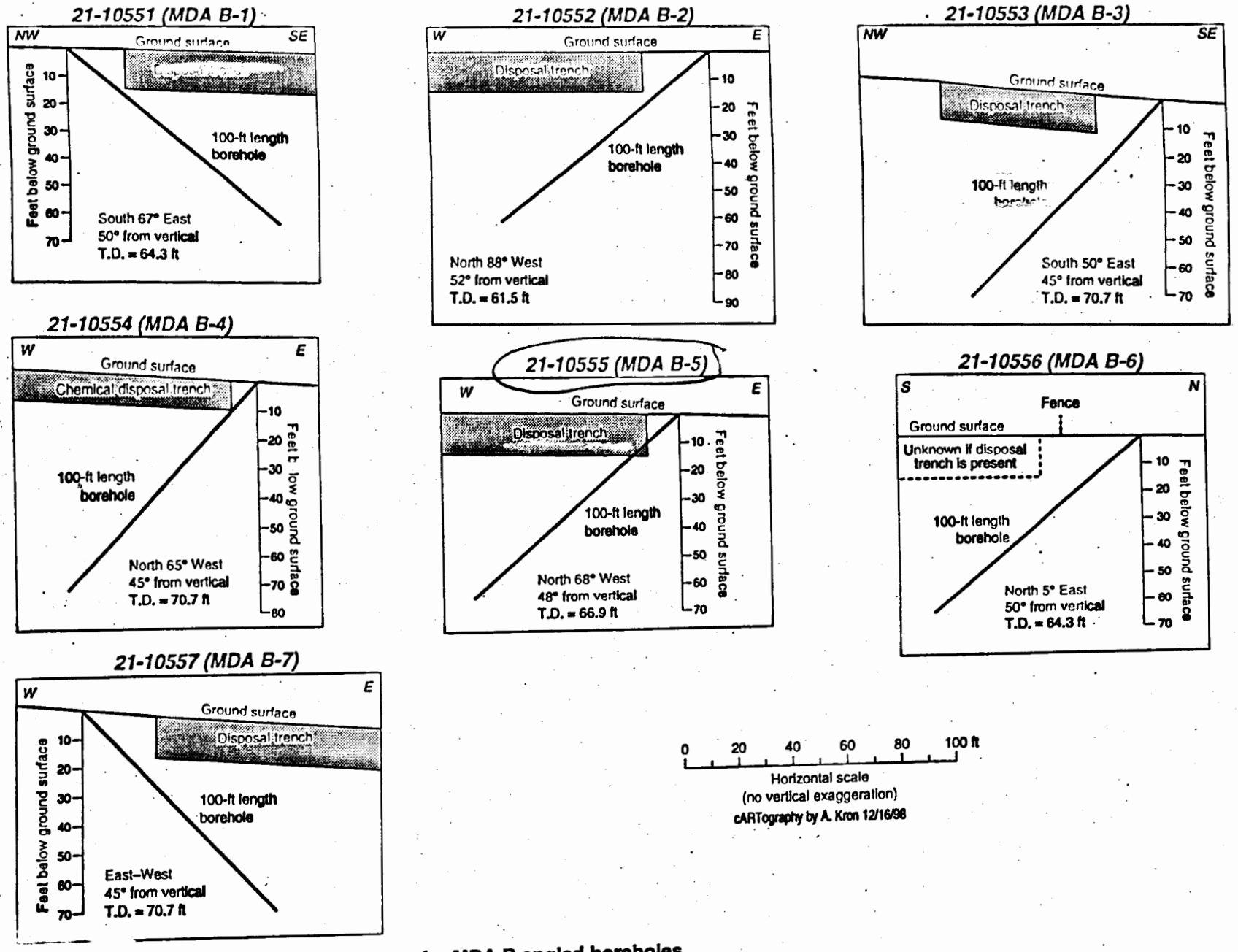


Figure 3.2 Schematic cross section diagrams for MDA B angled boreholes.

TA-21 MDA B
SOIL GAS VOLATILE ORGANICS
DETECTION HIGHLIGHTS
ppb

REPORTING LIMIT	3.0	3.1	0.47	3.2	1.6	0.55
BOREHOLE	1	1	1	2	2	2
DEPTH (ft)	35	75	100	35	75	100
SAMPLE ID	MD21-98-0104	MD21-98-0109	MD21-98-0114	MD21-98-0126	MD21-98-0132	MD21-98-0138
CHLOROFORM	29	56				
1,1,1-TRICHLOROETHANE	28	13	2.9	190	200	30
CARBON TETRACHLORIDE	6.4	14				
TRICHLOROETHENE	56	120	0.70	11	1.8	
TOLUENE	9.6	16	2.1	15	4.1	7.8
TETRACHLOROETHENE	4.4	10				
m-XYLENE & p-XYLENE	4.9	5.4		3.2		2.7
o-XYLENE						0.83
BENZENE		3.3	0.53	3.7		6.6
DICHLORODIFLUOROMETHANE			0.59			0.65
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE				9.0	9.1	1.4
METHYLENE CHLORIDE				15	2.1	
ETHYLBENZENE						0.66
1,2,4-TRIMETHYLBENZENE						0.72
1,3,5-TRIMETHYLBENZENE						
STYRENE						
TRICHLOROFLUOROMETHANE						

8/20

TA-21 MDA B
SOIL GAS VOLATILE ORGANICS
DETECTION HIGHLIGHTS
ppb

REPORTING LIMIT	0.74	0.54	0.61	1.8	1.5	2.0
BOREHOLE	3	3	3	4	4	4
DEPTH	35	75	100	35	75	100
SAMPLE ID	MD21-98-0148	MD21-98-0154	MD21-98-0160	MD21-98-0170	MD21-98-0176	MD21-98-0182
CHLOROFORM						
1,1,1-TRICHLOROETHANE	16	25	27	100	45	29
CARBON TETRACHLORIDE						
TRICHLOROETHENE						
TOLUENE	1.1	4.0	1.8	9.9	11	6.1
TETRACHLOROETHENE						
m-XYLENE & p-XYLENE		1.1		3.3	3.1	2.3
o-XYLENE						
BENZENE		3.4		7.2	8.4	4.4
DICHLORODIFLUOROMETHANE		0.59				
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	0.78	1.2	1.4	4.4	2.1	
METHYLENE CHLORIDE						
ETHYLBENZENE						
1,2,4-TRIMETHYLBENZENE						
1,3,5-TRIMETHYLBENZENE						
STYRENE						
TRICHLOROFLUOROMETHANE						

TA-21 MDA B
SOIL GAS VOLATILE ORGANICS
DETECTION HIGHLIGHTS
ppb

REPORTING LIMIT	1.3	0.90	0.97	2.4	0.57	0.52
BOREHOLE	5	5	5	6	7	7
DEPTH	35	75	100	35	35	75
SAMPLE ID	MD21-98-0192	MD21-98-0204	MD21-98-0198	MD21-98-0214	MD21-98-0239	MD21-98-0245
CHLOROFORM						0.69
1,1,1-TRICHLOROETHANE	38	39	33	46	6.7	10
CARBON TETRACHLORIDE					2.2	4.8
TRICHLOROETHENE					24	53
TOLUENE	8.8	1.3	13	4.9	36	23
TETRACHLOROETHENE					0.90	1.2
m-XYLENE & p-XYLENE	3.7		6.5	5.7	6.7	6.0
o-XYLENE			2.2	2.7	3.1	2.7
BENZENE	6.6		7.9		14	16
DICHLORODIFLUOROMETHANE					0.68	
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	2.5	2.4	2.1	2.9		
METHYLENE CHLORIDE						
ETHYLBENZENE			1.8		2.9	2.3
1,2,4-TRIMETHYLBENZENE			1.6	5.4	4.0	3.8
1,3,5-TRIMETHYLBENZENE					0.94	1.0
STYRENE					1.1	0.87
TRICHLOROFLUOROMETHANE						0.77

TA-21 MDA B
SOIL GAS VOLATILE ORGANICS
DETECTION HIGHLIGHTS
ppb

REPORTING LIMIT	0.69
BOREHOLE	7
DEPTH	100
SAMPLE ID	MD21-98-0256
CHLOROFORM	1.3
1,1,1-TRICHLOROETHANE	14
CARBON TETRACHLORIDE	7.6
TRICHLOROETHENE	92
TOLUENE	26
TETRACHLOROETHENE	1.5
m-XYLENE & p-XYLENE	3.3
o-XYLENE	1.7
BENZENE	4.8
DICHLORODIFLUOROMETHANE	0.87
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	
METHYLENE CHLORIDE	
ETHYLBENZENE	1.3
1,2,4-TRIMETHYLBENZENE	2.4
1,3,5-TRIMETHYLBENZENE	
STYRENE	
TRICHLOROFLUOROMETHANE	0.84

MEMORANDUM
PROGRAM MANAGEMENT COMPANY

TO: John Hopkins

FROM: Bill Hardesty

DATE: February 9, 1999

SUBJ: Laboratory Results Request 5148

Dear John:

The results for the four samples MD21-99-0001, 0002, 0003, 0004 at TA-21 are generally at or just above the LANL all soils background levels for inorganic analytes. The only organic compounds detected were acetone, methylene chloride, chloroform, toluene, and xylene (total).

The results for acetone, methylene chloride, chloroform, and xylene in Request 5148R should be regarded as nondetected (U) because the sample results were less than 5 times the concentration of the analyte in the blank, which indicates the detected results are indistinguishable from blank contamination. This rule is taken both from the EPA National Fundamental Guidelines for Organic Data review, as well as the LANL baseline validation procedures. The following table summarizes the qualified results.

Request 5148 Volatile Organic Compounds Qualified Results

Sample	Acetone	Methylene Chloride	Chloroform	Toluene	Xylene
Soil Blank	4.4 ug/kg	1.5 ug/kg	0.2 ug/kg	ND	0.3ug/kg
5X Blank value	22 ug/kg	7.5 ug/kg	1 ug/kg		1.5 ug/kg
MD21-99-0001 Result	4.5 ug/kg (U)	2.3 ug/kg (U)	0.24 ug/kg (U)	0.29 ug/kg	ND
MD21-99-0002 Result	3.9 ug/kg (U)	3.5 ug/kg (U)	0.61 ug/kg (U)	0.33 ug/kg	ND
MD21-99-0003 Result	6.8 ug/kg (U)	2.8 ug/kg (U)	0.46 ug/kg (U)	0.33 ug/kg	0.23 ug/kg (U)
MD21-99-0004 Result	6.2 ug/kg (U)	2.5 ug/kg (U)	0.38 ug/kg (U)	0.26 ug/kg	ND

The results for toluene can not be qualified as non-detected due to blank contamination. The toluene results are qualified as estimated (J) because the toluene results are less than the practical quantitation limit (PQL) but above method detection limit (MDL). The toluene results are just in the detectable range.

Sincerely,

Rec'd 2/10/99 Ac

Bill Hardesty

2.0 TASK HAZARD ANALYSIS (THA) / WORK PACKAGE

PROJECT NAME: Non-Traditional In Situ Vitrification Process at TA-21, MDA-V

TASK 1 Cold Test Demo. Site Construction

ESTIMATED DATE(S) & DURATION OF WORK: Feb. 1999 ~8 days

2.1 TASK 1 DESCRIPTION

This task involves excavation and installation of a simulated absorption bed at TA-21, adjacent and outside the boundary of MDA-V. A sketch of the intended excavation is provided as Addendum A to this THA.

A backhoe or excavator will be used to excavate a pit approximately15-feet long by 10-feet wide by 6-feet deep. All excavated soils will be placed out of the way along the MDA-B perimeter fence and covered. After excavation of this pit, a trench (described below) will be cut into the side of the pit for installation of thermocouples. Each thermocouple is 2 feet long and has 100 feet of cable connected to the probe. This cable will be run to the surface during backfilling of the trench

The trench will measure 4-feet wide by 11-feet deep by 10-feet long and will be located along the side of the pit (see attached construction plans). Nine sets of four-thermocouples will then be placed in the second trench at various depths as the trench is backfilled up to the bottom of the pit (6-ft. bgs). The trench will be back-filled to ground level (see attached construction plans), thereby replacing the side wall of the pit.

During the excavation, it will be necessary to cut (spark/flame producing hot work) a buried metal pipe to remove it. Hot work-related activities will be conducted according to the LANL AR 8-4, which identifies the permitting requirements for hot work activities. In addition, the permit will identify specific requirements regarding site controls (i.e., fire watch, fire hazard separation, etc.) and personal protective equipment to be worn by personnel performing hot work.

After installation of the thermocouples in the trench, the pit will be filled with material to simulate the absorption beds in MDA-V. A 24-inch layer of 12 to 24 inch diameter cobbles will be placed in the bottom of the pit. 6.5 Kg of cesium carbonate and 29.5 kg of cerium oxide (powdered form) will also be placed as the cobbles are being laid. Both of these surrogates are non-hazardous and non-radioactive and are being added to the bed to evaluate the success of the vitrification process in retaining radioactive isotopes. Next a 12-inch layer of gravel will be placed over the cobbles, followed by a 12-inch layer of tuff and a 2-foot layer of soil. After the pit has been backfilled, a 60-foot diameter area from the centerline of the pit will be graded to produce a level surface. Upon completion of the cold test, the pit will be covered and compacted with the stockpiled soil and returned to its original state. For further information see the Geosafe Corporation NTISV Demonstration Plan.

Because the placement of the thermocouples is critical, it may be necessary to have one person enter the pit. If this is required, all activities will be in compliance with 29CFR1926 Subpart P requirements. At this time it is planned to slope the sides of the excavation as required, determined by the excavation competent person. If shoring or installation of a trench box becomes necessary, a Modification to this THA will be completed first to detail plans. A LANL Excavation permit has already been approved for this task (permit

98X-0588) and JCI and Los Alamos County utility locators will mark all underground utilities ten days prior to the start of field activities. If it is necessary to leave the excavation open overnight, site personnel will install barrier tape and cones around the perimeter of the excavation, the area will be taped and posted with appropriate warning signs, and access to the entire work site is limited by a locked chain link fence.

2.1.1 KEY PERSONNEL HAVING TASK-SPECIFIC H&S RESPONSIBILITY*

FAPL:	Deba Dayman, EES-13	Phone No.	667-9021 / 104-3969
FTM:	Jayne Jones, CST-7	Phone No.	665-5342 / 104-4968
Sup. (MK-PMC):	John DeJoya	Phone No.	662-1359
SSO/HPT (MK-PMC):	Ray Wright	Phone No.	662-1325
Alt. SSO/RSP (MK-PMC):	Ken McFadden	Phone No.	662-1302
Supervisor (SG Western):	Sam Gardner	Phone/Pager	662-3852
Excavation competent Person:	John DeJoya	Phone/Pager	662-1359

2.1.2 HAZARD ASSESSMENT

Radiological: Exposure to alpha/beta/gamma radiation while excavating pit and stockpiling soil possibly could occur, **HAR of negligible to minor.**

Safety / Physical:

Excavation (general) -	Life-threatening injury possibly could occur from exposure to safety hazards associated with excavation work, **HAR of minor to serious.**
Cave-in/Personnel - Entrapment	Life-threatening injury possibly could occur due to cave in during excavation operations, **HAR of minor to serious.**
Underground Utilities -	Life-threatening injury from exposure to underground utilities associated with digging excavation possibly could occur, **HAR of minor to serious.**
Overhead Electrical Lines - (if excavator used)	Life-threatening injury from exposure to overhead electrical line associated with digging excavation possibly could occur, **HAR of minor to serious.**
Heavy Equipment - Operation / Maintenance	Being hit, run-over, or pinch points resulting in irreversible or fatal injury possibly could occur, **HAR of moderate to serious.**
Heavy Equipment Refueling -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR of minor to serious.**
Fire/Hot Work -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR of minor to serious.**

Slips /Trips / Falls -	Uneven terrain resulting in reversible injury probably will occur, **HAR of negligible to moderate.**
Ergonomics (lifting) -	Injury resulting in irreversible harm possibly could occur, **HAR of minor to moderate.**
Sanitation -	Unsanitary working conditions resulting in serious illness or death possibly could, **HAR of minor to serious.**
Lightning –	Exposure to lightning resulting in irreversible or fatal injury, **HAR of moderate to serious.**
Hand and Power Tools- (Pipe Cutting)	Skin/puncture wounds and/or electrocution from mishandling of power tools/equipment resulting in reversible injury; **HAR = negligible to minor.**
Excessive Noise -	Exposure to noise associated with heavy equipment is unlikely to occur contributing to irreversible injury, **HAR of negligible.**
Cold Stress -	Exposure to extreme cold weather conditions resulting in irreversible injury unlikely to occur due to close proximity to heated buildings, trailers and vehicles, **HAR of minor.**
Airborne Dust -	Inhalation exposure to airborne nuisance dust while operating heavy equipment resulting in reversible injury/illness is unlikely to occur, **HAR of negligible.**
Gas Cylinders - (for calibration)	Irreversible injury or death possibly could occur, **HAR of minor to serious.**

Chemical:

Occupational Exposure to - VOC's / SVOC's	Skin / inhalation exposure to VOCs/SVOCs while excavating soil resulting in injury/illness is unlikely to occur, **HAR of negligible.**
Occupational Exposure to - Metals	Skin / inhalation exposure to metals while excavating soil resulting in injury/illness is unlikely to occur, **HAR of negligible.**
On-site Materials -	Exposure to diesel, oil and hydraulic fluids contained in heavy equipment resulting in reversible injury possibly could occur occur, **HAR of negligible to minor.**

Biological:

General -	Refer to HASP Appendix G for information concerning general hazards associated with occupational exposure to hazardous biological agents.
Occupational Exposure to - Bloodborne Pathogens	Refer to Appendix A2 and Sections 9.3.1.3 and 10.1.3 of the HASP.

2.1.3 HAZARD COMMUNICATION

Individuals who may be exposed to hazardous substances must be informed of the physical, chemical and toxicological properties of the substances and the means and methods for preventing, detecting, mitigating, and/or protecting themselves from exposure before they are allowed to access an area or perform a task where exposure may occur. It is LANL's policy that whenever feasible a less toxic product should be substituted for a more toxic one, especially for products having a carcinogen..

MSDSs for each hazardous chemical product brought to the project site are to be kept readily available to anyone who may be exposed to the product, and shall be shared with other employer's employees onsite who may be affected by the hazardous product. As deemed necessary by the SSO to administer requirements of this SSHASP and for compliance with applicable requirements (e.g., HAZCOM, HAZWOPER, and/or employee H&S briefing), some or all of the following resources are to be kept readily available for reference by project personnel:

- ACGIH Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices (published annually)
- Chemical Substance Hazard Assessment and Protection Guide (compiled and edited by Urie Environmental Health Inc.; most recent publication - 1994/5)
- DOT Emergency Response Guidebook (most recent publication - 1. 93)
- Guide to Occupational Exposure Values (compiled by ACGIH, published annually)
- NIOSH Pocket Guide to Chemical Hazards (most recent publication - June 1997)

2.1.4 SITE CONTROL

Workers must work in groups of at least two people (buddy system), and have means of direct communication or maintain visual contact at all times. A lockable chain link fence has been erected around the perimeter of the work area to restrict access by unauthorized personnel. Barrier tape and postings may be used to demarcate areas where special controls may apply. All postings will be in compliance with 29 CFR 1926 Subpart G, and LIR 402-712-01-1 (Radiological postings, if necessary). A hand wash station will be located at the exit of work area for personal decon. Toilet facilities will be located in Building 14, immediately east of the work area. If it is necessary to leave the excavation open overnight, the area will be taped and posted with appropriate warning signs (in compliance with requirements listed above).

2.1.5 ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS

ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS	
Hazard	**A&E Control**
Excavation/Trenching (General)	**LANL excavation permit required.** Permit required for excavating/trenching > 1 foot; A&E controls shall be implemented in accordance with **LANL Excavation permit # 98X-0588** and as specified herein. • Inspections of excavations by a competent person shall be made prior to start of work and daily as needed throughout shift and after every rainstorm or other hazard increasing occurrence per 29 CFR 1926.651. • Appropriate engineering controls shall be implemented in accordance with 29 CFR 1926.651 whenever the stability of a structure adjoining an excavation may be endangered. • Excavated materials shall be kept at least 2 ft. away from edge of excavation. • Employees exposed to public vehicular traffic shall be provided with, and shall wear warning vests or other suitable garments marked with or made of reflectorized or high visibility material. • No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. • When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical siginals, or stop logs. • All excavations/trenches will be monitored for hazardous atmospheres prior to entry.
Cave-in/Personnel entrapment	• Inspections of excavations by a competent person shall be made prior to start of work and daily as needed throughout shift and after every rainstorm or other hazard increasing occurrence per 29 CFR 1926.651. • Trench/excavation ≥ 4 ft. deep shall have a stairway, ladder, ramp, or other means of egress located so as to require no more than 25 ft. of lateral travel by personnel in trench/excavation per 29 CFR 1926.651. • Employees entering excavations 5 ft. or greater shall be protected from cave-ins by sloping the sides of the excavation to the extent determined by competent person.
Underground Utilities	• Location of utilities will be covered under approved **LANL excavation permit # 98X-0588.** • Compliance with Electrical Safety LIR 402-600-01.0 • Determine estimated locations of utilities. Notify utility owners of intended work and request they demarcate on ground surface location(s) of underground utilities.; have field team member accompany utility owner rep. To identify intended excavation location(s) and to find out specifics of utility location(s) • If utility owner cannot establish exact location of utility installation(s), excavating/trenching may proceed with caution, provided detection equipment or other acceptable means to locate utility installation(s) are used.

Will task affect other LANL operations, employees, or tasks? **Yes** ____ **No** X____

If yes for other than emergency response matters, explain precautions taken and contacts notified:

2.1.6 MEDICAL/RADIOLOGICAL SURVEILLANCE

Hazard	Action Level	Requirement
Bloodborne Pathogens (Or other Potentially Infectious Materials)	Any occupational exposure	29 CFR 1910.1030(f) For First-aid/CPR responders only
Radiation	Potential to exceed 100 mrem/year dose limit	10 CFR 835 and HASP (Section 6.3)

2.1.7 EXPOSURE MONITORING

Hazardous Condition/ Substance	Instrument	Procedure	Location and Frequency of Monitoring	Action Level(s)/Rationales	Response Action(s)
Hazardous Atmo-sphere	CGI equipped with Oxygen sensor	IAW manufacturer instructions	Prior to any personnel access to excavation	Explosivity ≥ 10% LEL 19.5%> O_2 >22%	No personnel allowed in excavation; allow natural ventilation.
Organic Vapors	Thermo Environmental 580b w/11.8 eV bulb, or equivalent	ER-HSM-1C "Direct-Reading Monitoring Methods Using GCs, PIDs, and FIDs"	Intermittently during excavation and prior to entry into open excavation.	≥ background for 2 minutes sustained **Rationale:** Screening is a precautionary measure. Site is not located in any known PRS or SWMU, but is adjacent to MDA-V and MDA-B	Allow area of concern to vent naturally. If elevated levels persist, limit access of excavation to monitoring personnel and notify ESH-5 rep. that SSHASP modification necessary to characterize vapors.
Cold Stress	local weather station and thermometer	ER-HSM-1F "Meteorological Station Method	Monitor temperature and wind conditions on-site prior to work start, during work breaks, and whenever conditions change noticeably.	<30.2°F <19.4°F **Rationale:** Potential for frostbite, hypothermia, trench foot due to extended exposure outdoors during winter months. Threshold Limit Values, ACGIH	Refer to ACGIH table concerning wind chill factors. Workers should don cold protective clothing (including head protection) and insulating gloves. Refer to ACGIH table concerning wind chill factors. Provide and require use of heated shelter where workers can take breaks to warm up.

HEALTH PHYSICS						
Radiation Gross α and gross-β/γ contamination (specific radio-isotopes listed in Table 1, page 4 of this SSHASP)	β /γ Eberline ESP-1 with HP260 probe or equiv. α -Ludlum 139 with air proportional probe or equiv.	Per LANL Radiation Protection Program and ESH-1 Procedures	Surface Sampling/Excavations : Excavated soil, ground surface prior to disturbance, and excavated soil/material. Drilling: As sample barrel comes out of borehole; after sample barrel is opened and prior to sampling soil. Equipment: Prior to decon and for release Personnel: Prior to exiting controlled work zone Intermittent RCT coverage	Background Personnel: If any contamination above background detected on personnel, notify ESH-1 RCT immediately	Field team member trained in ESH-1 procedures performs surveys (soil, equipment, personnel, etc.) Intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level I: > Background α < 500 cpm/probe area β/γ < 5,000 cpm/probe area	Notify ESH-1 of elevated readings Dedicated field team member trained in ESH-1 procedures performs surveys Increased intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level II: α > 500 cpm/ probe area β/γ > 5,000 cpm/probe area	Work may only proceed according to approved RWP and with continuous coverage by an onsite ESH-1 technician (or equiv.) in accordance with Sections 3.2.4 and 3.3.4 of the HASP.	Standard levels set by ESH-1
	Ludlum Model 19 μR meter /ion chamber	Per LANL Radiation Protection Program procedures and training	Initially to determine pre-job conditions, prior to sampling, and intermittently during rad survey walkover	> 5 mR/hr	Notify ESH-1 of elevated readings. Dedicated field team member trained in ESH-1 procedures to perform surveys	Standard levels set by ESH-1

2.1.8 PERSONAL PROTECTIVE EQUIPMENT (PPE) *

Head: Use of hard hat around heavy equipment and where any overhead hazards exist; compliance with 29 CFR 1910.135, ANSI Z89.1-1986.

Face & Eye: Safety glasses with sideshields required for all fieldwork; compliance with 29 CFR 1910.133, ANSI Z87.1-1989. Goggles or face shield shall be worn during equipment refueling and pipe cutting operations.

Feet: Steel-toed leather shoes or boots; compliance with 29 CFR 1910.136, ANSI Z41-1991.

Hands: Work gloves for operating heavy equipment (optional); compliance with 29 CFR 1910.137 and 138.

Hot Work: As indicated on the permit, e.g., welding leathers, leather welding gloves, welding hood (arc welding), or welding goggles (gas cutting).

* PPE listed above may be modified per ESH-1 Rep. if RWP is initiated

2.1.9 DECONTAMINATION

Personnel Decon:

Hand wash station to be located on-site. Hands must be washed prior to leaving work area and before smoking, eating, drinking, or chewing.

Equipment Decon:

It is not anticipated that heavy equipment will have to be decontaminated. If required, equipment will be decontaminated using brushes to remove loose soil from contaminated areas.

2.1.10 SPILL CONTAINMENT PLANS (task-specific)

A spill kit (e.g., for hydraulic oil, etc.) will be kept on-site at all times during site activities. The kit will consist of absorbent (e.g., vermiculite, kitty liter) absorbent pillows, and shovels. Emergency contact list will be posted at site and will be addressed in daily safety tailgate meetings.

2.1.11 EMERGENCY PLANS (task-specific)

Refer to Section 1.4 for project emergency response plan.

2.1.12 ADDITIONAL INSTRU TIONS/PROCEDURES (task-specific)

Applicable ARs/LIRs:

- AR 8-4 Welding, Cutting, and Other Spark-/Flame-Producing Operations
- 402-600-01 – Electrical Safety
- 402-708-01.2 – Contamination Control
- 402-708-01.1 – Radiation Instrumentation
- 402-712-01.1 – Radiological Personnel Protective Equipment
- 402-712-01.1 – Radiological Posting
- AR1-12 – Excavation
- 402-715 (LPR) - Records
- 402-717 (LPR) - Storage and Labeling

INSPECTION REQUIREMENTS	
Inspections	**Inspector**
Job Site, Material and Equipment (in accordance with 29 CFR 1926.20(b)(2))	SSO
General Sanitation (i.e., potable and non-potable water, toilets, washing facilities, eating and drinking areas, vermin control, and/or change rooms; in accordance with 29 CFR 1926.51)	SSO
Materials handling, storage, use and disposal (in accordance with 29 CFR 1926.250 and 252)	SSO
Signs, Signals and Barricades (in accordance with 29 CFR 1926.200)	SSO
Motor vehicles and mechanized equip. (in accordance with 29 CFR 1926, Subpart O)	Operator
Material handling equipment (e.g., rubber-tired scraper, loader, and dozers) equipped with rollover protective structures and overhead protection (in accordance with 29 CFR 1926, subpart W)	Operator
Excavations/trenches (in accordance with 29 CFR 1926, Subpart P)	CP or PE as required
Power Tools (per 29CFR1926 Subpart I)	SSO
PPE (Section 7 and 29 CFR 1926.95)	User
Incident/emergency response equipment (prior to each use and at least monthly)	SSO
Fire extinguisher equipment (per 29 CFR 1926.150(a) and (c))	SSO

RECORDKEEPING REQUIREMENTS		
Record/Form	**Requirement Reference**	**Keep Onsite**
ER Project HASP	HASP Section 1	X
This SSHASP	HASP Section 1	X
Completed SSHASP Modification Forms	HASP Section 1	X
SSOs Daily Logbook	HASP Section 13.1	X
Documentation of Training Requirements	HASP Section 10	X
Documentation of Medical Surveillance	HASP Section 11	X
Exposure Monitoring Records	Section 6 of the HASP and Applicable Methods in Appendix F of the HASP	X
HS Inspection Records	HASP Section 12.1	X

2.1.13 TRAINING REQUIREMENTS

Types of training: **R** = Read training; **C** = Classroom training; **F** = Field training; **AN** = As necessary per the DHASP or applicable (regulatory or employer) requirement

Training Requirement	Type	Personnel to be Trained
HASP	R	All
SSHASP (HASP Section 10.1.1)	R	All
Pre-Job Start HS Briefing (HASP Section 10.1.1)	F or C	All
Task HS Briefing	F or C	All
HS Tailgate Mtgs (as necessary, at least weekly) (HASP Section 10.1.2)	F	All
General Employee Training (GET) - LANL provided (DHASP Section 10.2.1)	C	All
Rad. Worker II (HASP Section 10.2.3)	C	Per RWP, if one becomes necessary
Radiological Surveillance Authorization Agreement (RSAA)	C	RSP/HPT/RCT
SSO (HASP Section 10.1.4)	C & F	SSO
1st Aid/CPR (Amer. Red Cross or equiv.; compliance with DHASP Sctn 10.1.3)	C	SSO
Bloodborne Pathogens (Employer's program & *29 CFR 1910.1030)*	C	First-aid/CPR providers
PPE (Employer's program & HASP Section 7)	F or C	All
Employer's Hazard Communication Program (Employer's program & 29 CFR 1910.1200)	C	All
Sanitation (29 CFR 1926.51 or 65(n))	R	SSO
Postings (29 CFR 1926.200 & ANSI Z535.2 and .3)	R	SSO
Material Handling, Storage, Use, Disposal (29 CFR 1926.250 and 252)	R	SSO
Motor Vehicles, Mechanized and/or Material Handling Equipment (29 CFR 1926, Subparts N and O)	R	SSO, Operator
AR 8-4 Welding, Cutting, and Other Spark-/Flame-Producing Operations	R	SSO, affected personnel
Excavation/Trenching (29 CFR 1926.651(k)(1) and 32(f))	C	Competent Person/P.E.

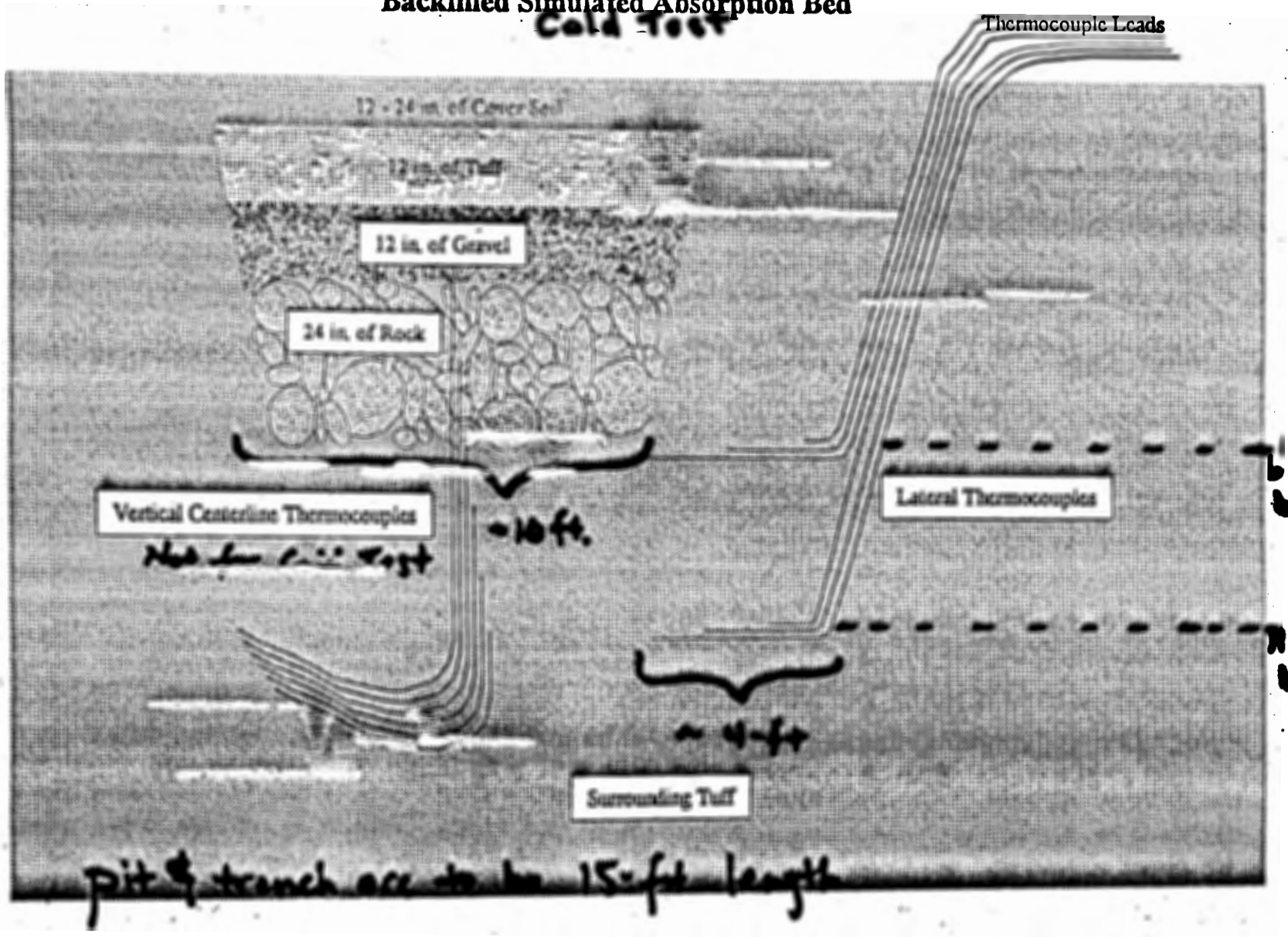
ADDENDUM A

To

THA 1

SKETCH OF INTENDED EXCAVATION

Backfilled Simulated Absorption Bed



2.0 TASK HAZARD ANALYSIS (THA)

PROJECT NAME: Non-Traditional *In Situ* Vitrification (NTISV) Site Demonstration Project for the MDA V Site; Los Alamos National Laboratory

TASK 2: Site Pre-Conditioning - Geophysical Borehole Installation, Electrode Placement, Starter Plane Injection (Cold Site Demonstration Only)

ESTIMATED DATE(S) AND DURATION OF WORK: March 1999, ~7 days

2.2 TASK 2 DESCRIPTION

Task 2 is a phased work task, which involves the following activities:

- The Tuff material around the edges and below the center portion of the simulated absorption bed will be broken up to a depth of 10-feet using a crane suspended hydraulic vibratory beam. Site preconditioning to this extent will promote subsidence of the absorption bed walls into the melt during the cold demonstration.

- The installation of four (4) geophysical boreholes to accommodate geophysical surveying using a diesel hydraulic track drill. The boreholes will be 6-inch in diameter, installed to a depth of 50-feet below ground surface (bgs) and provide a means for acquiring the necessary tomographic data for the cold demonstration. Alternatively, drilling may be used for certain portions of the preconditioning.

- The crane assisted placement of four (4) steel electrode casings (16-inch diameter) into the ground to accommodate the positioning of the graphite electrodes. The electrode casings will be vibrated through the simulated absorption bed to an approximate depth of 4-feet below the bottom of the rock layer. Electrodes will then be positioned vertically within the casings. The casings will then be removed by being pulled out vertically over the top of the electrodes. Alternatively, drilling may be used for certain portions of the preconditioning.

- The subsurface injection of conductive starter planes using a high pressure injection system, consisting of: (1) a diesel hydraulic track drill with angle drilling capacity, (2) a high pressure liquid and slurry pump, (3) an intermediate pressure liquid and slurry pump, (4) a high pressure and flow air injection compressor, (5) coaxial drilling pipe, (6) a down the hole air or liquid driven drill and drill bit module, (7) jet grout drilling subs, (8) grout continuity instrument probes, (9) bulk handling lift vehicles, and (10) vibratory hammer/extractor. The purpose of the starter plane is to establish conductive paths connecting the electrodes.

  A simulation of the injection process will be conducted in a clean nearby location. A few vertical injections will be made and the area will be exhumed to determine process effectiveness and whether adjustments to the injection parameters (i.e., pressure, rate, etc.) are necessary. Minimally, the excavation will penetrate to 6-feet bgs (top of the injection point) and may continue down the side of the sample plane that has been formed. It is not expected that personnel will enter the excavation, nor that the excavation will be very large.

- During the subject task activities, spark/flame producing hot work such as cutting or welding, may be necessary for repair and/or maintenance of onsite equipment. Should this occur, all hot work activities will be approved and conducted under the guidance of the LANL AR 8-4, which identifies the permitting requirements for all hot work activities. In addition, the permit will identify specific requirements regarding site controls (i.e., fire watch, fire hazard separation, etc.) and personal protective equipment to be worn by personnel performing hot work.

2.2.1 KEY PERSONNEL HAVING TASK-SPECIFIC H&S RESPONSIBILITY

FAPL:	Deba Dayman, EES-13	Phone No.	667-9021 / 104-3969
FTM:	Jayne Jones, CST-7	Phone No.	665-5342 / 104-4968
Sup. (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Alt. Sup. (MSE/Geosafe):	Steve Minnick	Phone No.	Field TBD
SSO (MSE/Geosafe):	Rick Obstar	Phone No.	Field TBD
Alt. SSO (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Sup. Drilling (AGEC):	Steve Phillips	Phone No.	Field TBD
Crane Sup./Op.(Mtn.StatesEquip.):		Phone No.	Field TBD
Sup. (MK-PMC):	John DeJoya	Phone No.	662-1359
HPT (MK-PMC):	Ray Wright	Phone No.	662-1325
Alt. RSP (MK-PMC):	Ken McFadden	Phone No.	662-1302

2.2.2 HAZARD ASSESSMENT

Radiological:

If radiological contamination is encountered during this task phase, an HPT/RSP will be available to conduct the appropriate screening/monitoring of onsite personnel and/or equipment. Radiological screening will have been conducted prior to and during Task 1 to verify non-detection of subsurface radiological contamination. As a precaution, however, it may be necessary to screen designated equipment (i.e., drilling) during this task phase to verify non-detection or safe working levels (if encountered). Exposure to excessive levels of radiological contamination could possibly result in reversible illness; **HAR = negligible to minor.**

Physical/Safety:

- Underground utilities could present life-threatening injury/illness from the possibility of single encounter occurring; **HAR = minor to serious.**
- Operation of crane and drilling equipment and associated use presents hazard potential of being hit, run over, pinch-points, overhead hazards, rotating parts resulting in irreversible or fatal injury; **HAR = serious to imminent.**
- Overhead electrical lines presenting life-threatening injury associated with crane/drilling operations could possibly occur; **HAR = minor to serious.**
- High pressure lines (air/liquid) rupturing and/or uncoupling resulting in irreversible injury/illness; **HAR = moderate to serious.**

- Refueling of vehicles/heavy equipment could present fire and/or explosion potential resulting in irreversible injury or death; **HAR = minor to serious.**
- Exposure to vehicular traffic during routine site operations could possibly result in life-threatening injury; **HAR = minor to serious.**
- Lifting and carrying equipment and materials (ergonomical considerations) resulting in the possibility of reversible injury; **HAR = negligible to minor.**
- Walking on terrain in/around work site where slips, trips, falls could result in possible reversible injury; **HAR = minor.**
- Exposure to warm/hot weather conditions (heat stress) resulting in reversible injury are unlikely to occur due to seasonal (winter) weather; **HAR = negligible.** (No A&E control referenced.)
- Exposure to cool/cold temperate weather conditions coupled with high elevation considerations (i.e., acclimatization) could result in the possibility of irreversible injury; **HAR = minor to moderate.**
- Skin puncture/wounds, and/or electrocution from mishandling of power tools/equipment resulting in possible reversible injury; **HAR = negligible to minor.**
- Fire hazard(s) associated with routine site prep/operations could result in possible injury; **HAR = minor to serious.**
- Exposure to excessive noise associated with the use of heavy equipment (i.e., drilling, crane, compressors, etc.) is unlikely to occur contributing to irreversible injury; **HAR = negligible to minor.**
- Exposure to airborne nuisance dust likely to occur resulting in reversible illness; **HAR = negligible.**
- Working with/around electrically energized equipment (i.e., electrical utilities, generators) could possibly result in irreversible injury or death; **HAR = minor to serious.**
- Unsanitary working conditions (i.e., site sanitation/housekeeping) could possibly result in serious injury/illness or death; **HAR = minor to serious**
- Inadequate site illumination during low-light/night conditions could result in possible reversible injury; **HAR = negligible to minor.**
- Falls from elevated work levels (> 6-feet above working surface, i.e., drill mast) could possibly result in death; **HAR = minor to serious.**

Biological:

- Presence of rodent droppings, nests in or around site, and associated potential for Hanta virus illness unlikely; **HAR = negligible.**
- Occupational exposure to Bloodborne Pathogens rendering first aid or CPR could result in life-threatening illness; **HAR = negligible to minor.**

Chemical:

Potential for exposure to the following chemical compounds/substances (refer to Section 2.2.3); **HAR = negligible to minor.**

- Diesel Fuel
- Unleaded Gasoline
- Hydraulic Fluids/Pump Oils
- Graphite (powder)
- Sodium Silicate (solution)

High Explosives (HE):

Not Applicable

2.2.3 HAZARD COMMUNICATION

The OSHA Hazard Communication Standard (29 CFR 1910.1200) applies to chemical substances utilized during specific phases of the subject work task(s). Personnel performing these tasks will be informed of the physical, chemical, and toxicological properties of the chemical substances identified in Section 2.2.2; along with the means and methods for preventing, detecting, mitigating, and/or protecting themselves from exposure before they are allowed to access an area or perform a task where exposure might occur. Information will be provided during the project H&S briefing before the start of field operations. The information will also be reinforced during H&S tailgate sessions before the task is started and as necessary throughout the duration of the task.

Some or all of the following resources will be kept readily available for reference by project personnel:

- NIOSH Pocket Guide to Chemical Hazards (most recent)
- ACGIH/TLVs for Chemical Substances, Physical Agents, and Biological Exposure Indices (Annual Publication)
- DOT Emergency Response Guidebook
- Applicable Material Safety Data Sheets (MSDSs)

2.2.4 SITE CONTROL

Workers must work in groups of at least two people (buddy system) and have a means of direct communication or maintain visual contact at all times. An exclusion zone, support zone, and postings will be established around the perimeter of those operation areas to restrict access by unauthorized personnel; barrier tape and/or other types of access limiting devices will be used. In addition, a chain-link fence will be used to control access to the overall site.

2.2.5 ADMINISTRATIVE AND ENGINEERING (A&E) CONTROLS

Applicable LANL LIRs/LPRs/ARs:

- 402-600-01.0 Electrical Safety
- 402-407-01 Contamination Control
- 402-710-01 Radiological PPE
- 402-712-01 Radiological Posting
- 402-719-01 Workplace Monitoring
- 402-720-01 Work Planning
- 402-715 (LPR) Records
- 402-717 (LPR) Storage and Labeling
- AR 1-12 Excavation or Fill Permit Review
- AR 8-4 Hot Work Permit

- Use of appropriate PPE as specified in Section 2.2.8 of this THA. An HPT/RSP will be available to monitor equipment/operations as necessary. If radiological action levels (see Section 2.2.7) are exceeded, stop work. ESH-1 is to be notified and RWP issued before work may proceed.

- Determine the estimated location(s) of utilities. Notify utility owners of intended work and request surface demarcation(s) of underground utilities; field team member should accompany utility owner representative to identify intended drilling borehole/casing locations and any other specifics of utility location(s). If utility owner cannot establish exact locations, drilling and associated operations may proceed with caution, provided that detection equipment or other acceptable means to locate utility installation(s) are used. As drilling operations approach estimated utility location(s), exact location(s) of utility shall be determined by safe and acceptable means (i.e., Using hand held probe/drilling device). Work shall be conducted under the guidance of the LANL Excavation Permit and LANL "Electrical Safety" LIR 402-600-01.0.

- Crane and drilling equipment shall be maintained and inspected on a daily basis to ensure operational provisions for engineering controls are adequate per compliance with 29 CFR 1926, Subparts N, O, S, V, and applicable sections. Workers will be alerted to stand clear of moving equipment and rotating/pinch points. Workers will also be alerted as to audible warning devices (i.e., backup alarms, swing indicators, etc.) installed on heavy equipment. Additionally, heavy equipment operation and maintenance shall comply with the applicable sections of 29 CFR 1926.201 and Subparts N and O, including vehicle inspections and use of seatbelts and ROPs provisions. All equipment operation shall be required to show adequate training/certification for equipment operation.

- High pressure lines and their associated couplings/fittings shall have been rated/tested to ensure that their MAWPs are adequate for intended service and bare manufacturer verification for same. In addition, high pressure lines will be provided with hobble/whip-check safety devices. Personnel working with/around high pressure lines will be provided with adequate PPE to include (as a minimum): hard hat with goggles and leather gloves.

- During stationary operation, minimum clearance between live lines and any part of equipment or load: 10 ft. for lines rated 50KV; 10 ft. and 0.4 in. for each 1KV over 50KV; or twice the length of line insulator, whichever is greater. Voltages $\leq$50KV at 4 ft min. Voltages 50KV $< x \leq$ 345KV at 10 ft. min. Voltages 345KV $< x \leq$ 750KV at 16 ft. min.

- Compliance with 29 CFR 1926.152, specifically paragraphs (d), (e), and (f). Refueling of vehicles/heavy equipment in no case be allowed in the presence of spark and/or flame sources. Portable containers for refueling purposes shall be provided with flame arresters and adequate bonding systems.

- Field team personnel exposed to vehicular traffic shall be provided with and required to wear (as deemed necessary) warning vests or other suitable garments of reflective or high visibility material. Vests/garments and signaling directions/devices shall be in accordance with 29 CFR 1926.201.

- Do not manually lift any loads in excess of 50 pounds; use two (or more) people to lift and carry heavier loads or use mechanical lift assist equipment (i.e., dolly, forklift, etc.). Make sure that path of travel is clear. Position any load to be lifted directly in front of body. Bend knees and grasp load underneath with both hands and raise load primarily using legs (not back). To extent possible, carry the load in a manner that does not obstruct vision or intended access to where you step while transporting load.

- Use caution and be observant when walking in areas of potential concern. Minimize the threat of slick/obstructed surfaces and use appropriate PPE.

- Observe ambient air temperatures on daily basis and alert project personnel as to wearing adequate cold weather clothing. Advise project personnel on sings/symptoms of over exposure to cold temperatures (i.e., frost bite, hypothermia). If necessary, provide temperature/wind instrumentation at work site to monitor extreme weather conditions. Temperature and wind chill factors along with associated responsive actions will be monitored in accordance with the ACGIH guidelines for Cold Stress.

- Compliance with 29 CFR 1926.300, 301, and 302 (Subpart I).

- Compliance with 29 CFR 1926 Subpart F and 1926.150 and 151, as applicable. Fire extinguishers shall be maintained and readily accessible on site and ready for use at all times. Typical size/type will be 20 lb. ABC dry-chemical.

- Compliance with 29 CFR 1910.95. As appropriate, implement engineering/administrative controls or use appropriate PPE to reduce excessive noise levels. Whenever voice communications must be raised between personnel located within approximately 3 feet of each other (or less), the noise level(s) is likely exceeding the PEL. Conduct noise monitoring as deemed necessary in the absence of any previous representative data.

- If necessary, implement engineering controls (i.e., wet methods, dust suppression agent, ventilation) in compliance with 29 CFR 1926.55(b), 1926.57 and/or 1910.1000, as applicable, to prevent/minimize dispersion of dust in air. Also use of proper PPE/RPE.

- Compliance with 29 CFR 1926, Subpart K, and NEC recommendations, as applicable. GFCI is required for all electrical equipment where ground fault potential exists. Primary electrical equipment (i.e., transformers, generators) will be provided with continuous ground path protection.

- Compliance with OSHA housekeeping standards (29 CFR 1926.25 and 250 (c)). As necessary, subcontractor to provide and maintain sanitary potable water supply and portable toilet facilities at clean site location (29 CFR 1926.51). Project personnel will also be advised of practicing good personal hygiene.
- Compliance with 29 CFR 1926.26 and 1926.56 for required illumination levels.
- Be observant and avoid walking in areas where rodent droppings or nests are observed. Avoid touching any droppings or materials.
- If required, fall protection will be provided to site personnel to include (as a minimum); full body harness with attaching lanyard. Fall protection will be in accordance with 29 CFR 1926, Subpart M.
- Refer to Bloodborne Pathogens Program.
- Use appropriate PPE (chemical protective clothing; rubber gloves, and/or eye/face protection) as deemed necessary for the corresponding task(s). Portable emergency eyewash shall be located on site within 10 seconds and ≤ 100 feet travel distance of any source of hazardous chemical splash. Unit will provide 15 minutes continuous flushing. Unit will be inspected weekly and flushed according to manufacturer_s instructions. Reference to ANSI Z358.1-1990.

Will task affect other operations, employees, or tasks? No. X

2.2.6 MEDICAL/RADIOLOGICAL SURVEILLANCE

- Radiological: Potential to exceed 100 mrem/year dose limit; 10 CFR 835 and LANL requirements
- Noise > 80 dBA; 29 CFR 1910.95
- Bloodborne Pathogens: Any occupational exposure; 29 CFR 1910.1030(f) for first aid/CPR responders only

2.2.7 EXPOSURE MONITORING

Hazardous Condition/ Substance	Instrument	Procedure	Location and Frequency of Monitoring	n Level(s)/ tionales	Response Action
Noise	Quest Sound Level Meter	Per 29 CFR 1910.95	Unless representative exposure data has already been assessed, noise measurements will be required when voice must be raised to communicate between two persons located ≤3 feet of each other.	> 80dBA (Hearing Conservation Program) > 84 dbA (hearing protection required) **Rationale:** OSHA 29 CFR 1910.95	If unable to lower noise levels below AL, demarcate/post zones of excessive noise and limit access only to employees having sufficient hearing protection training, medical surveillance, and hearing protection per this SSHASP. Appropriate NRR of PPE must be determined based upon monitoring results and the resulting necessary noise reduction to achieve compliance.
Cold Stress	Local weather station and thermometer	ACGIH TLVs for Physical Agents in the Work Environment	Monitor temperature and wind conditions on-site prior to work start, during work breaks, and whenever conditions change noticeably.	<30.2°F <19.4°F **Rationale:** Potential for frostbite, hypothermia, trench foot due to extended exposure outdoors during winter months. Threshold Limit Values, ACGIH	Workers should use gloves. Refer to ACGIH table concerning wind chill factors. Workers should don cold protective clothing (including head protection) and insulating gloves. Refer to ACGIH table concerning wind chill factors. Provide and require use of heated shelter where workers can take breaks to warm up.

Radiation: Refer to the following tal le.

Hazardous Substance	Instrument	Procedure	Location/Frequency	Action Levels	Response Action	Action Level Rationale
Radiation Gross α and gross- β/γ contamination (specific radio-isotopes listed in Table 1, page 4 of this SSHASP)	β/γ Eberline ESP-1 with HP260 probe or equiv. α -Ludlum 139 with air proportional probe or equiv.	Per LANL Radiation Protection Program and ESH-1 Procedures	Surface Sampling/Excavations: Excavated soil, ground surface prior to disturbance, and excavated soil/material. Drilling: As sample barrel comes out of borehole; after sample barrel is opened and prior to sampling soil. Equipment: Prior to decon and for release Personnel: Prior to exiting controlled work zone Intermittent RCT coverage	Background Personnel: If any contamination above background detected on personnel, notify ESH-1 RCT immediately	Field team member trained in ESH-1 procedures performs surveys (soil, equipment, personnel, etc.) Intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level I: > Background α < 500 cpm/probe area β/γ < 5,000 cpm/probe area	Notify ESH-1 of elevated readings Dedicated field team member trained in ESH-1 procedures performs surveys Increased intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level II: α > 500 cpm/ probe area β/γ > 5,000 cpm/probe area	Work may only proceed according to approved RWP and with continuous coverage by an onsite ESH-1 technician (or equiv.) in accordance with Sections 3.2.4 and 3.3.4 of the HASP.	Standard levels set by ESH-1
	Ludlum Model 19 μR meter /ion chamber	Per LANL Radiation Protection Program procedures and training	Initially to determine pre-job conditions, prior to sampling, and intermittently during rad survey walkover	> 5 mR/hr	Notify ESH-1 of elevated readings. Dedicated field team member trained in ESH-1 procedures to perform surveys	Standard levels set by ESH-1

2.2.8 PERSONAL PROTECTIVE EQUIPMENT (PPE)

Body/Torso: As necessary, reflective or high visibility warning vest/garment. Laundered cotton coveralls or disposable coveralls (i.e., Tyvek™) required for workers handling potentially radiological contaminated equipment/materials.

Ears: If necessary, plugs/muffs with sufficient NRR

Eyes: All times during subject tasks -- safety glasses with side shields (compliant with ANSI Z87.1-1989). Goggles for personnel working with/around high pressure lines.

Feet: Steel-toe safety boots (compliant with ANSI Z41-1991)

Hands: Leather gloves. Nitrile gloves (4-mil) required if handling potentially radiological contaminated equipment/materials.

Head: Non-conductive hardhat (compliant with ANSI Z89.1-1986). Hardhat with face shield (work directly with/around high pressure lines).

Hot Work: Welding leathers, leather welding gloves, welding hood (arc welding), or welding goggles (gas cutting).

*PPE listed above may be modified per direction of HPT/RSP if RWP is initiated.

2.2.9 DECONTAMINATION

Equipment Decon: Equipment decontamination will be accomplished using dry decontamination as a primary/initial means. If dry decontamination is insufficient, spray washing will be used as an alternative decontamination method.

Personnel Decon: Hands must be washed prior to smoking, eating, drinking, or chewing.

2.2.10 SPILL CONTAINMENT PLANS (Task-Specific)

Per Section 1.5 of this SSHASP.

2.2.11 EMERGENCY PLANS (Task-Specific)

Per Section 1.4 of this SSHASP.

2.2.12 ADDITIONAL INSTRUCTIONS/PROCEDURES (Task-Specific)

INSPECTION REQUIREMENTS	
Inspections	**Inspector**
Job Site, Material and Equipment (in accordance with 29 CFR 1926.20(b)(2)	SSO
General Sanitation (i.e., potable and non-potable water, toilets, washing facilities, eating and drinking areas, vermin control, and/or change rooms; in accordance with 29 CFR 1926.51)	SSO
Materials handling, storage, use and disposal (in accordance with 29 CFR 1926.250 and 252)	SSO
Signs, Signals and Barricades (in accordance with 29 CFR 1926.200)	SSO
Motor vehicles and heavy equipment (i.e., crane, drill-rig) prior to site mobilization (in accordance with 29 CFR 1926, Subparts N, O, S, and V and applicable sections	Operator
Material handling equipment (e.g., drilling, crane, forklift) equipped with rollover protective structures and overhead protection (in accordance with 29 CFR 1926, Subpart W)	Operator
PPE (per employer's PPE Program)	User
Incident/emergency response equipment (prior to each use and at least monthly)	SSO
Fire extinguisher equipment (per 29 CFR 1926.150(a) and (c))	SSO
Emergency eyewash (per ANSI Z358.1-1990)	SSO
Power tools (per 29 CFR 1926 Subpart I)	SSO

RECORDKEEPING REQUIREMENTS		
Record/Form	**Requirement Reference**	**Keep Onsite**
ER Project HASP	HASP	X
This SSHASP	HASP	X
Completed SSHASP Modification Forms	HASP	X
SSOs Daily Logbook	HASP	X
Documentation of Training Requirements	HASP	X
Documentation of Medical Surveillance	HASP	X (as applicable: hearing)
Exposure Monitoring Records		X
HS Inspection Records	HASP	X

2.2.13 TRAINING REQUIREMENTS – TASK 2

TRAINING REQUIREMENTS		
Types of training: R = Read training; C = Classroom training; F = Field training; AN = As necessary per the DHASP or applicable (regulatory or employer) requirement.		
Training Requirement	**Type**	**Personnel to be Trained**
HASP (Employer's Program)	R	All
SSHASP	R	All
Pre-Job Start HS Briefing	F or C	All
Task HS Briefing	F or C	All
HS Tailgate Mtgs (as necessary, at least weekly)	F	All
General Employee Training (GET) – LANL provided (HASP Section 10.2.1)	C	All
1st Aid/CPR (Amer. Red Cross or equivalent)	C	Field Personnel (at least 2)
Bloodborne Pathogens (Employer's Program & 29 CFR 1910.1030)	C	First-aid/CPR providers
PPE (Employer's Program)	F or C	User
Hearing Protection (Employer's Program & 29 CFR 1910.95)	C	Affected Personnel
Employer's Hazard Communication Program (Employer's Program & 29 CFR 1910.1200)	C	All
Sanitation (29 CFR 1926.51 or 65(n))	R	SSO
Postings (29 CFR 1926.200 & ANSI Z535.2 and .3)	R	SSO
Fire Extinguisher Use (29 CFR 1926.150(c)(1)(xi))	R	All
Material Handling, Storage, Use, Disposal (29 CFR 1926.250 and 252)	R	SSO
Motor Vehicles, Mechanized and/or Material Handling Equipment (29 CFR 1926, Subparts N and O)	R	SSO, Operator
LIR 402-600-01.0; Electrical Safety	R or C	SSO
Radiological Surveillance Authorization Agreement (RSAA) (per HASP Section 3.2.4)	R or C	HPT/RSP
Rad Work II	C	Per RWP (See Section 2.2.5)

2.0 TASK HAZARD ANALYSIS (THA) / WORK PACKAGE

PROJECT NAME: Non-Traditional *In Situ* Vitrification Process at TA-21, MDA V

TASK 3: Mobilization and Demobilization of the NTISV System for the Col l Demonstration
(Cold Site Demonstration only)

ESTIMATED DATE(S) & DURATION OF WORK: March - April 1999
~25 days Mob. / ~5 days Demob.

2.3 TASK 3 DESCRIPTION

This task involves the subtasks of mobilization and demobilization of the NTISV system and its ancillary components (e.g., off-gas hood). A summary of this task is provided below; details of the electrical design and layout are included as Addendum A to this THA.

The mobilization includes the transport, assembly, and interconnection of the NTISV system. The mobile ISV process equipment is contained on or in three transportable trailers: 1) process trailer, 2) support trailer, and 3) electrical trailer. The process trailer contains the off-gas treatment system and the process control station. The support trailer is mounted with the 480 V, 500 kVA support transformer, the glycol cooling system, and the process control and instrument air compressor and system. The electrical trailer support the 3750 kVA Scott-Tee transformer, which supplies power to the ISV melt.

Each of the above three trailers are positioned and interconnected by various electrical, piping, monitoring instrumentation, and control circuitry connections that allows the system to operate as an integrated unit. In addition to these primary trailer system components, the other major component of the ISV system is the off-gas h od. The hood is positioned over the vitrification zone and interconnected to the off-gas treatment system via piping to direct gases from the vitrification area to the treatment system. The hood also supports the el ctrodes and electrode feeder units, which are electrically connected to the Scott-Tee transformer via multi le high voltage, high amperage electrical cables.

The h od is assem led or erected near the vitrification area. It consists of an eight-legged superstructure that suppo ts a work pl tform, electrode feeders, electrodes, electrical cables, off-gas piping connections, and a substructure of hoc d of gas containment panels. The substructure panels form the containment plenum region where any gases eleased for the ISV melt are captured, collected, and routed to the off-gas treatment system. All these str ctural, containment, piping and electrical components must be assembled and interconnected for the ISV system to function properly.

Electrical power i stal ation and connection will be provided by JCNNM as a separate activity under their hazard analy is a d work authorization process. Activities within the scope of this task with potential hazardous elec trical exposure involve setup and connection of de-energized R&D system components, and possi ly lockout-tagout during system startup and check.

Therefore, the mobi ization of the NTISV system, as described above, consists mainly of the equipment setup, assembly, and interconnection of integrated components. The majority of this work activity will be accommodated with the use of a crane and associated rigging equipment. Once this is completed, the system can be functionally nd operationally checked to ensure correct operability and re diness for designated vitrification operations.

The demobilization phase of this task consists primarily of placing the NTISV system in a safe standby condition. The system will sit idle while preparations are made for the radioactive demonstration of a portion of the MDA V adsorption bed. This includes electrode removal, electrode feeder removal, and off-gas piping disconnection of the hood unit. Once the hood is disconnected from the trailer system, it will be removed from the vitrification area so the required vitrified block cooling and subsequent product and test examinations and evaluations can be performed. The trailers and the assembled hood and components will remain in a fenced and secured area designated at the TA-21, MDA V Site during this standby time.

During the subject task activities, spark/flame producing hot work such as cutting or welding, may be necessary for repair and/or maintenance of onsite equipment. Should this occur, all hot work activities will be approved and conducted under the guidance of the LANL AR 8-4, which identifies the permitting requirements for all hot work activities. In addition, the permit will identify specific requirements regarding site controls (i.e., fire watch, fire hazard separation, etc.) and personal protective equipment to be worn by personnel performing hot work.

2.3.1 KEY PERSONNEL HAVING TASK-SPECIFIC H&S RESPONSIBILITY*

FAPL:	Deba Dayman, EES-13	Phone No.	667-9021 / 104-3969
FTM:	Jayne Jones, CST-7	Phone No.	665-5342 / 104-4968
Sup. (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Alt. Sup. (MSE/Geosafe):	Steve Minnick	Phone No.	Field TBD
SSO (MSE/Geosafe):	Rick Obstar	Phone No.	Field TBD
Alt. SSO (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Crane Sup./Op.(Mtn.StatesEquip.):		Phone No.	Field TBD
Sup. (MK-PMC):	John DeJoya	Phone No.	662-1359
HPT (MK-PMC):	Ray Wright	Phone No.	662-1325
Alt. RSP (MK-PMC):	Ken McFadden	Phone No.	662-1302
Lockout/Tagout Authorized Person:			
(_____):		Phone No.	Field TBD

2.3.2 HAZARD ASSESSMENT

Radiological:

If radiological contamination is encountered during this task phase, an HPT/RSP will be available to conduct the appropriate screening/monitoring of onsite personnel and/or equipment. Radiological screening will have been conducted prior to and during Task 1 to verify non-detection of subsurface radiological contamination. As a precaution, however, it may be necessary to screen designated equipment (i.e., drilling) during this task phase to verify non-detection or safe working levels (if encountered). Exposure to excessive levels of radiological contamination could possibly result in reversible illness; **HAR = negligible to minor.**

Physical/Safety:

Crane Operation - Operation of crane and associated equipment presents hazard potential of being hit, run over, pinch-points, overhead hazards, rotating parts resulting in irreversible or fatal injury; **HAR = serious to imminent.**

Overhead Electrical Lines -	Life-threatening injury from exposure to overhead electrical line associated with crane operations possibly could occur, **HAR = minor to serious.**
Heavy Equipment Refueling -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR = minor to serious.**
Lockout-Tagout	Possible electrocution, though unlikely, see Section 2.3.5; **HAR = negligible to serious.**
Fire -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR = minor to serious.**
Slips /Trips / Falls -	Uneven terrain resulting in reversible injury probably will occur, **HAR = negligible to moderate.**
Ergonomics (lifting) -	Reversible injury possibly could occur, **HAR = minor to moderate.**
Sanitation -	Unsanitary working conditions resulting in serious illness or death possibly could, **HAR = minor to serious.**
Hand and Power Tools -	Skin/puncture wounds and/or electrocution from mishandling of power tools/equipment resulting in reversible injury; **HAR = negligible to minor.**
Excessive Noise -	Exposure to excessive noise associated with the use of heavy equipment (i.e., drilling, crane, compressors, etc.) is unlikely to occur contributing to irreversible injury; **HAR = negligible to minor.**
Cold Stress -	Exposure to cool/cold weather conditions coupled with high elevation considerations (i.e., acclimatization) could result in the possibility of irreversible injury; **HAR = minor to moderate.**
Airborne Dust -	Exposure to airborne nuisance dust likely to occur resulting in reversible illness; **HAR = negligible.**
Illumination -	Inadequate site illumination during low-light/night conditions could result in possible reversible injury; **HAR = negligible to minor.**
Biological:	
General -	Presence of rodent droppings, nests in or around site, and associated potential for Hanta virus illness unlikely; **HAR = negligible to minor.**
Occupational Exposure to - Bloodborne Pathogens	Occupational exposure to Bloodborne Pathogens rendering first aid or CPR could result in life-threatening illness; **HAR = negligible to minor.**
Chemical:	
General -	Potential for exposure to the following chemical compounds/substances: diesel fuel, unleaded gasoline, hydraulic fluids/pump oils, and possibly glycol coolant in off-gas scrubber system. Refer to Section 2.3.3; **HAR = negligible to minor.**
High Explosives (HE):	Not Applicable.

2.3.3 HAZARD COMMUNICATION

The OSHA Hazard Communication Standard (29 CFR 1910.1200) applies to chemical substances utilized during specific phases of the subject work task(s). Personnel performing these tasks will be informed of the physical, chemical, and toxicological properties of the chemical substances identified in Section 2.3.2; along with the means and methods for preventing, detecting, mitigating, and/or protecting themselves from exposure before they are allowed to access an area or perform a task where exposure might occur. Information will be provided during the project H&S briefing before the start of the field operations. The information will also be reinforced during H&S tailgate sessions before the task is started and as necessary throughout the duration of the task.

Some or all of the following resources will be kept readily available for reference by project personnel.

- NIOSH Pocket Guide to Chemical Hazards (most recent)
- ACGIH/TLVs for Chemical Substances, Physical Agents, and Biological Exposure Indices (Annual Publication)
- DOT Emergency Response Guidebook
- Applicable Material Safety Data Sheets (MSDSs)

2.3.4 SITE CONTROL

Workers must work in groups of at least two people (buddy system) and have a means of direct communication or maintain visual contact at all times. An exclusion zone, support zone, and postings will be established around the perimeter of those operation areas to restrict access by unauthorized personnel; barrier tape and/or other types of access limiting devices will be used. In addition, a chain-link fence will be used to control access to the overall site.

2.3.5 ADMINISTRATIVE AND ENGINEERING (A&E) CONTROLS

Applicable LIRs/ARs/LPRs:

- 402-600-01.0 Electrical Safety
- AR 1-12 Excavation or Fill Permit Review
- AR 8-4 Hot Work Permit
- 402-407-01 Contamination Control
- 402-710-01 Radiological PPE
- 402-712-01 Radiological Posting
- 402-719-01 Workplace Monitoring
- 402-720-01 Work Planning
- 402-715 (LPR) Records
- 402-717 (LPR) Storage and Labeling

ADMINISTRATIVE AND ENGINEERING (A&E) CONTROLS	
Hazard	**A&E Control**
Radiological Exposure (alpha beta/gamma radiation)	• Use appropriate PPE as specified in Section 2.3.8 of this THA. • HPT/RSP to monitor equipment/operations as necessary. • If radiological action levels (see Section 2.3.7) are exceeded, stop work. ESH-1 is to be notified, and RWP issued before work may proceed.
Electrocution working with energized equipment (e.g., generators)	• Compliance with 29 CFR 1926, Subpart K, and NEC recommendations, as applicable. GFCI is required for all electrical equipment where ground fault potential exists. Primary electrical equipment (i.e., transformers, generators) will be provided with continuous ground path protection.
Lockout-Tagout	• Per LANL "Electrical Safety" LIR 402-600-01.0 Table D-2.3,and task-/site-specific written Geosafe Lockout-Tagout Procedure (to be written before LOTO occurs).
Crane Operation	• Crane equipment shall be maintained and inspected on a daily basis to ensure operational provisions for engineering controls are adequate per compliance with 29 CFR 1926, Subparts N, O, S, and applicable sections. Workers will be alerted to stand clear of moving equipment and rotating/pinch points. Workers will also be alerted as to audible warning devices (i.e., backup alarms, swing indicators, etc.) installed on heavy equipment. Additionally, heavy equipment operation and maintenance shall comply with the applicable sections of 29 CFR 1926.201 and subparts N and O, including vehicle inspections and use of seatbelts and ROPs provisions. All equipment operation shall be required to show adequate training/certification for equipment operation.
Overhead Electrical Lines	• During stationary operation, minimum clearance between live lines and any part of equipment or load: 10 ft for lines rated 50 kV; 10 ft + 0.4 in. for each 1 kV over 50 kV; or twice the length of line insulator, whichever is greater. • Voltages < 50 kV: 4 ft min • Voltages 50 kV < x ≤345 kV: 10 ft min • Voltages 345 kV < x ≤750 kV: 16 ft min
Heavy Equipment Refueling	• Compliance with 29 CFR 1926.152, especially paragraphs (d), (e), and (f). • Refueling shall occur at the start of day prior to commencing other operations and before the engines are hot. • Proper bonding shall be enforced while transferring flammable liquids.
Fire	• Compliance with 29 CFR 1926 Subpart F and 1926.150 and 151, as applicable. Fire extinguishers shall be maintained and readily accessible on site and ready for use at all times. Typical size/type will be 20 lb. ABC dry-chemical.
Slips/Trips/Falls	• Be observant and walk cautiously in areas of potential concern. Minimize threat of slick surfaces.
Ergonomics (lifting)	• Do not manually lift any loads in excess of 50 pounds; use two (or more) people to lift and carry heavier loads or use mechanical lift assist equipment (i.e., dolly, forklift, etc.). Make sure that path of travel is clear. Position any load to be lifted directly in front of body. Bend knees and grasp load underneath with both hands and raise load primarily using legs (not back). To extent possible, carry the load in a manner that does not obstruct vision or intended access to where you step while transporting load.
Vehicular Traffic	• Field team personnel exposed to vehicular traffic shall be provided with and required to wear (as deemed necessary) warning vests or other suitable garments of reflective or high visibility material. Vests/garments and signaling directions/devices shall be in accordance with 29 CFR 1926.201.
Sanitation	• Compliance with OSHA housekeeping standards (29 CFR 1926.25 and 250[c]). • Subcontractor to provide and maintain sanitary potable water supply at clean location onsite; compliance with 29 CFR 1926.51. • Personnel to wash hands and face (as necessary) prior to eating, drinking, smoking, or chewing and after using toilet facilities.

ADMINISTRATIVE AND ENGINEERING (A&E) CONTROLS (continued)	
Hazard	**A&E Control**
Hand and Power Tools	• Compliance with 29 CFR 1926 Subpart I, particularly sections 300, 301, and 302 as applicable. Inspect tools for frayed cords.
Excessive Noise	• Compliance with 29 CFR 1910.95. As appropriate, implement engineering/administrative controls or use appropriate PPE to reduce excessive noise levels. Whenever voice communications must be raised between personnel located within approximately 3 feet of each other (or less), the noise level(s) is likely exceeding the PEL. Conduct noise monitoring as deemed necessary in the absence of any previous representative data.
Cold Stress	• Inform personnel of signs and symptoms of cold stress. (Appendix G of HASP) • Monitor personnel for indications of stress. • Strive to prevent exposure by implementing appropriate work regimen, including work breaks so personnel can warm up. • Install barriers or facilities to provide personnel protection from weather extremes.
Airborne Dust	• As first line of defense implement engineering controls (e.g., wet methods, dust suppression agent, and/or local ventilation) in compliance with 29 CFR 1926.55(b), 1926.57, and/or 1910.1000, as applicable, to prevent/minimize dispersion of dust in air.
Illumination	• Compliance with 29 CFR 1926.26 and 1926.56 for required illumination levels.
Hanta Virus	• Be observant and avoid walking in areas where rodent droppings or nests are observed. Avoid touching any droppings on materials. Refer to HASP Appendix G.
Occupational Exposure to Bloodborne Pathogens	• Refer to Bloodborne Pathogens Program.
On-site Materials	• Use appropriate PPE (chemical protective clothing and/or eye/face protection) as specified in Section 2.3.8 of this THA work package. • Portable emergency eyewash shall be available. Refer to SSHASP Section 1.4.

Will task affect other LANL operations, employees, or tasks? **Yes** _____ **No** X

If yes for other than emergency response matters, explain precautions taken and contacts notified:

2.3.6 MEDICAL/RADIOLOGICAL SURVEILLANCE

Hazard	Action Level	Requirement
Bloodborne Pathogens (Or other Potentially Infectious Materials)	Any occupational exposure	29 CFR 1910.1030(f) For First-aid/ CPR responders only
Hearing Conservation	Noise > 80 dBA	29 CFR 1910.95(g)
Radiation	Potential to exceed 100 mrem/year dose limit	10 CFR 835 and HASP (Section 6.3)

2.3.7 EXPOSURE MONITORING

Hazardous Condition/ Substance	Instrument	Procedure	Location and Frequency of Monitoring	Action Level(s)/ Rationales	Response Action(s)
Noise	Quest Sound Level Meter	Per 29 CFR 1910.95	Unless representative exposure data has already been assessed, noise measurements will be required when voice must be raised to communicate between two persons located ≤3 feet of each other.	80dBA (Hearing Conservation Program) 84 dbA (hearing protection required) **Rationale:** OSHA 29 CFR 1910.95	If unable to lower noise levels below AL, demarcate/post zones of excessive noise and limit access only to employees having sufficient hearing protection training, medical surveillance, and hearing protection per this SSHASP. Appropriate NRR of PPE must be determined based upon monitoring results and the resulting necessary noise reduction to achieve compliance.
Cold Stress	Local weather station and thermometer	ACGIH TLVs for Physical Agents in the Work Environment	Monitor temperature and wind conditions, on-site prior to work start, during work breaks, and whenever conditions change noticeably.	<30.2°F <19.4°F **Rationale:** Potential for frostbite, hypothermia, trench foot due to extended exposure outdoors during winter months. Threshold Limit Values, ACGIH	Workers should use gloves. Refer to ACGIH table concerning wind chill factors. Workers should don cold protective clothing (including head protection) and insulating gloves. Refer to ACGIH table concerning wind chill factors. Provide and require use of heated shelter where workers can take breaks to warm up.

Radiation: Refer to the following table.

Hazardous Substance	Instrument	Procedure	Location/Frequency	Action Levels	Response Actions	Action Level Rationale
Radiation Gross α and gross- β/γ contamination (specific radio-isotopes listed in Table 1, page 4 of this SSHASP)	β/γ Eberline ESP-1 with HP260 probe or equiv. α -Ludlum 139 with air proportional probe or equiv.	Per LANL Radiation Protection Program and ESH-1 Procedures	Surface Sampling/Excavations: Excavated soil, ground surface prior to disturbance, and excavated soil/material. Drilling: As sample barrel comes out of borehole; after sample barrel is opened and prior to sampling soil. Equipment: Prior to decon and for release Personnel: Prior to exiting controlled work zone Intermittent RCT coverage	Background Personnel: If any contamination above background detected on personnel, notify ESH-1 RCT immediately	Field team member trained in ESH-1 procedures performs surveys (soil, equipment, personnel, etc.) Intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level I: > Background α < 500 cpm/probe area β/γ < 5,000 cpm/probe area	Notify ESH-1 of elevated readings Dedicated field team member trained in ESH-1 procedures performs surveys Increased intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level II: α > 500 cpm/ probe area β/γ > 5,000 cpm/probe area	Work may only proceed according to approved RWP and with continuous coverage by an onsite ESH-1 technician (or equiv.) in accordance with Sections 3.2.4 and 3.3.4 of the HASP.	Standard levels set by ESH-1
	Ludlum Model 19 μR meter /ion chamber	Per LANL Radiation Protection Program procedures and training	Initially to determine pre-job conditions, prior to sampling, and intermittently during rad survey walkover	> 5 mR/hr	Notify ESH-1 of elevated readings. Dedicated field team member trained in ESH-1 procedures to perform surveys	Standard levels set by ESH-1

2.3.8 PERSONAL PROTECTIVE EQUIPMENT (PPE)*

Head:	Use of hard hat around heavy equipment and where any overhead hazards exist; compliance with 29 CFR 1910.135; ANSI Z89.1-1986.
Face & Eye:	Safety glasses with sideshields required for all fieldwork; compliance with 29 CFR 1910.133, ANSI Z87.1-1989.
Hearing:	Hearing protection required when working near heavy equipment (prior to noise monitoring and after if indicated by results); compliance with 29 CFR 1910.95, ANSI Z87.1-1989.
Feet:	Steel-toed leather shoes or boots; compliance with 29 CFR 1910.136, ANSI Z41-1991.
Hands:	Work gloves for operating heavy equipment (optional); compliance with 29 CFR 1910.137 and 138. Nitrile gloves (4-mil) required if handling potentially radiological contaminated material. Purging/refilling glycol coolant of off-gas scrubber system: latex inner gloves and Nitrile outer (elbow length).
Body:	Laundered cotton coveralls or disposable coveralls (Tyvek™) required for workers handling potentially radiological contaminated material. Work/street clothes only for heavy equipment operator.
Hot Work:	Welding leathers, leather welding gloves, welding hood (arc welding), or welding goggles (gas cutting).
Lockout-Tagout:	Per Electrical Safety LIR 402-600-01 Table D-2.3 and task-/site-specific Geosafe Lockout Tagout Procedure (to be written before LOTO occurs)

* PPE listed above may be modified per ESH-1 Rep. if RWP is initiated

2.3.9 DECONTAMINATION

Personnel Decon: Hands must be washed prior to smoking, eating, drinking, or chewing.

Equipment Decon: Equipment decontamination will be accomplished using dry decontamination as a primary/initial means. If dry decontamination is insufficient, spray washing will be used as an alternative decontamination method.

2.3.10 SPILL CONTAINMENT PLANS (task-specific)

Per Section 1.4 of this SSHASP.

2.3.11 EMERGENCY PLANS (task-specific)

Per Section 1.4 of this SSHASP.

2.3.12 ADDITIONAL INSTRUCTIONS/PROCEDURES (task-specific)

INSPECTION REQUIREMENTS	
Inspections	Inspector
Job Site, Material and Equipment (in accordance with 29 CFR 1926.20(b)(2)	SSO
General Sanitation (i.e., potable and non-potable water, toilets, washing facilities, eating and drinking areas, vermin control, and/or change rooms; in accordance with 29 CFR 1926.51)	SSO
Materials handling, storage, use and disposal (in accordance with 29 CFR 1926.250 and 252)	SSO
Signs, Signals and Barricades (in accordance with 29 CFR 1926.200)	SSO
Motor vehicles and heavy equipment (i.e., crane, drill-rig) prior to site mobilization (in accordance with 29 CFR 1926, Subparts N, O, S, and V and applicable sections	Operator
Material handling equipment (e.g., drilling, crane, forklift) equipped with rollover protective structures and overhead protection (in accordance with 29 CFR 1926, Subpart W)	Operator
PPE (per employer's PPE Program)	User
Incident/emergency response equipment (prior to each use and at least monthly)	SSO
Fire extinguisher equipment (per 29 CFR 1926.150(a) and (c))	SSO
Emergency eyewash (per ANSI Z358.1-1990)	SSO
Power tools (per 29 CFR 1926 Subpart I)	SSO
Electrical Safety (LIR 402-600-01 and Geosafe Lockout Tagout Procedure)	Qualified Person(s)

RECORDKEEPING REQUIREMENTS		
Record/Form	Requirement Reference	Keep Onsite
ER Project HASP	HASP	X
This SSHASP	HASP	X
Completed SSHASP Modification Forms	HASP	X
SSOs Daily Logbook	HASP	X
Documentation of Training Requirements	HASP	X
Documentation of Medical Surveillance	HASP	X (as applicable: hearing)
Exposure Monitoring Records		X
HS Inspection Records	HASP	X

2.3.13 TRAINING REQUIREMENTS

Types of training: R = Read training; C = Classroom training; F = Field training; AN = As necessary per the DHASP or applicable (regulatory or employer) requirement+

Training Requirement	Type	Personnel to be Trained
HASP (Employer's Program)	R	All
SSHASP	R	All
Pre-Job Start HS Briefing	F or C	All
Task HS Briefing	F or C	All
HS Tailgate Meetings (as necessary, at least weekly)	F	All
General Employee Training (GET) – LANL provided (HASP Section 10.2.1)	C	All
Radiological Surveillance Authorization Agreement (RSAA) (per HASP Section 3.2.4)	R or C	HPT/RSP
Rad Work II	C	Per RWP (See Section 2.2.5)
First Aid/CPR (Amer. Red Cross or equivalent)	C	Field Personnel (at least 2)
Bloodborne Pathogens (Employer's Program & 29 CFR 1910.1030)	C	First-aid/CPR providers
PPE (Employer's Program)	F or C	User
Hearing Protection (Employer's Program & 29 CFR 1910.95)	C	Affected Personnel
Employer's Hazard Communication Program (Employer's Program & 29 CFR 1910.1200)	C	All
Sanitation (29 CFR 1926.51 or 65(n))	R	SSO
Postings (29 CFR 1926.200 & ANSI Z535.2 and .3)	R	SSO
Fire Extinguisher Use (29 CFR 1926.150(c)(l)(xi))	R	All
Material Handling, Storage, Use, Disposal (29 CFR 1926.250 and 252)	R	SSO
Motor Vehicles, Mechanized and/or Material Handling Equipment (29 CFR 1926, Subparts N and O)	R	SSO, Operator
LIR 402-600-01.0; Electrical Safety	R or C	SSO & Qualified Person(s)
Lockout-Tagout (Geosafe Procedure)	R or C	SSO & Qualified Person(s), as necessary

ADDENDUM A

To

THA 3

DETAILS OF ELECTRICAL DESIGN AND LAYOUT

1/12/99

SENT BY FAX AND MAIL

Ms. Ann Rundle
University of California
LANL
Los Alamos, NM 87544

RESPONSE TO ELECTRICAL QUESTIONS

Dear Ann:

Please find the following response to the questions asked verbally and then documented in your e-mail. If you or Sam have any further questions, please feel free to contact me in advance of the conference call.

The Geosafe electrical system consists of a 3.75 MW Scott-tee transformer that connects to a grid of four electrodes for the purpose of melting earthen materials and debris. The Scott-tee transformer was fabricated by Spang Power Control in Sandy Lake Pennsylvania. The Scott-tee transformer is self contained and mounted on a flat bed trailer. Three fans that pull air through the core area provide cooling for the transformer. Temperatures within the transformer are monitored and recorded on the process control system. Alarm points have been established to warn operators of high transformer core temperatures, although this has never occurred.

The Scott-tee transformer accepts normal utility fed or generator supplied power in the range of 12.5 to 13.8 kV on the primary side input and converts it to two individually controlled single-phase outputs. In addition, the Scott-tee transformer is a variable tap transformer that has a secondary output range of 4000 V to 400 V and 400 A to 4000 A.

Typically, the connection to the utility is made via a fused disconnect that is either located on the pole or on the ground. For the application at the LANL site, it is believed that the disconnects will be pole mounted (in the form of line fuses) and only operated by LANL utilities personnel or their designated subcontractor. The connection to the fused disconnect up on the pole (approximately 25 ft above grade) is made via a four wire 15 kV mining cable that is laid on the surface of the ground and ran up and fixed to the pole. The ends of the cable are fitted with compression lugs that have long "needles" that are inserted into crimp connectors that are typical to the fuse holders. Geosafe has requested that the fuse holders be equipped with 200 amp fuses

for this application.

The 15 kV cable is manufactured by Rome Cable Corporation and is type Rome 4 XLP Portable Power Cable Lead Cured – Type SHD-GC. The 15 kV cable is intended "for heavy duty high voltage power applications on mobile equipment where delivery of heavy power load is required such as shovels, drill rigs, underground mine power distribution, etc. For use in circuits rated 15,000 volts with maximum conductor temperature of 90°C". This cable has three insulated conductors consisting of flexible stranded annealed-coated copper (3/0 AWG), with conductor shield, Rome-EPR ethylene-propylene rubber insulation, semi-conducting tape, and tinned copper shielding braid. The cable includes two uninsulated grounding conductors (2 AWG) of flexible stranded annealed tinned copper and one #8 AWG flexible stranded annealed copper insulated ground check conductor. The three insulated and shielded conductors are cabled together with the ground check conductor placed in the valley between the Black and White conductors and one grounding conductor in each of the other two valleys. Rubber fillers are used to make cable round, a tape over assembly and the overall two-layer reinforced Hypalon™ jacket, which is vulcanized in a metal mold. The cable is designed to carry 334 amps at 20°C ambient and 283 amps at 40°C ambient and weighs 5.92 lbs/ft.

On the other end of the 15 kV cable, the feed connects into a junction box on the front end of the Geosafe Scott-tee transformer trailer via normal lug connections. The power feed supplies both the 3.75 MW Scott-tee transformer and a 500 kVA three phase transformer converting 13.8 kV to 480 V. The 13.8 kV to 480 V transformer is used to power auxiliary equipment such as blowers, fans, pumps, and a 120 V transformer (for lighting and other small circuitry).

Power from the secondary of the Scott-tee transformer is supplied to the electrodes via 16 1000-MCM cables. Each cable is a 5 kV cable rated at 1000 amps at 40°C. These cables connect directly from the transformer secondary bus to contacts on the electrode feeders (≈ 150 ft), which are located on top of the off-gas collection hood. These electrode feeders act similar to brushes on a motor and pass the power being carried by the cables through copper contactors and into graphite electrodes. Four 12-in. graphite electrodes are used to carry the power down into the melt region. These electrodes are fed into the melt as the melt progresses downward and thus, the need for the electrode feeder assemblies.

The system is grounded by connection to the utility grid ground, as well as by placing six 8-ft ground rods into the area immediately surrounding the Scott-tee transformer. All components of the NTISV system are then connected to this ground circuit via appropriately sized ground cables. The system employs a common ground system such that all components are at the same electrical potential.

All of the electrical hardware is completely enclosed and adheres to all National Electrical Code requirements. There are two exceptions to these situations where enclosures are not feasible (i.e.: the electrode feeders located on top of the off-gas hood and the secondary bus connection on the Scott-tee transformer). In these two cases, protection is provided by restricting access onto the hood region and in the area of the bus connection once the lock and tag is removed, the contactor closed, and the system energized. The protection is provided by delineation of exclusion zones,

fencing/enclosure of these areas, controlled access, proper training of personnel, and appropriate other administrative controls.

The Geosafe system is designed inherently safe in regards to the electrical system. The system includes the ability to have three open disconnects (line fuses, main disconnect, and a vacuum breaker) during periods of maintenance.

In addition, the normal power level used during melt operations averages 2.7 MW for a system designed to operate at 3.75 MW which contributes to the reliability of the system and to Geosafe=s excellent safety record.

Work or maintenance on electrical equipment is always performed with a deenergized system. This is performed by ensuring that breakers, contactors, and disconnects are in the open position and by using a lock-out and tag-out procedure. The system includes three potential disconnects to deenergize the system from the 13.8 kV feed. In addition, breakers on all of the 480, 240 and 120 V systems are in place. Lights in the control room and indicators on the process control system indicate if the system is energized or in an open condition.

Geosafe will perform connections of the primary cable to the junction box on the Geosafe trailers and both ends of the secondary cable prior to connection to the grid power. Once Geosafe is satisfied with the connection and all appropriate electrical inspections are completed, LANL (or its subcontractor) will be requested to complete the interconnection on the pole to normal grid power. Once connection is made, the rotation of equipment will be checked. If the phase connection is not correct (based upon starting one of the rotational pieces of equipment), then the LANL (or its subcontractor) will be asked to swap two of the three phases at the point where they are connected at the pole.

Areas surrounding the primary and secondary cables, as well as the secondary bus connection area, are enclosed within a snow fence barricaded area that is posted with high voltage signs. The proposed layout including the barricaded areas can be seen on the attached PowerPoint file.

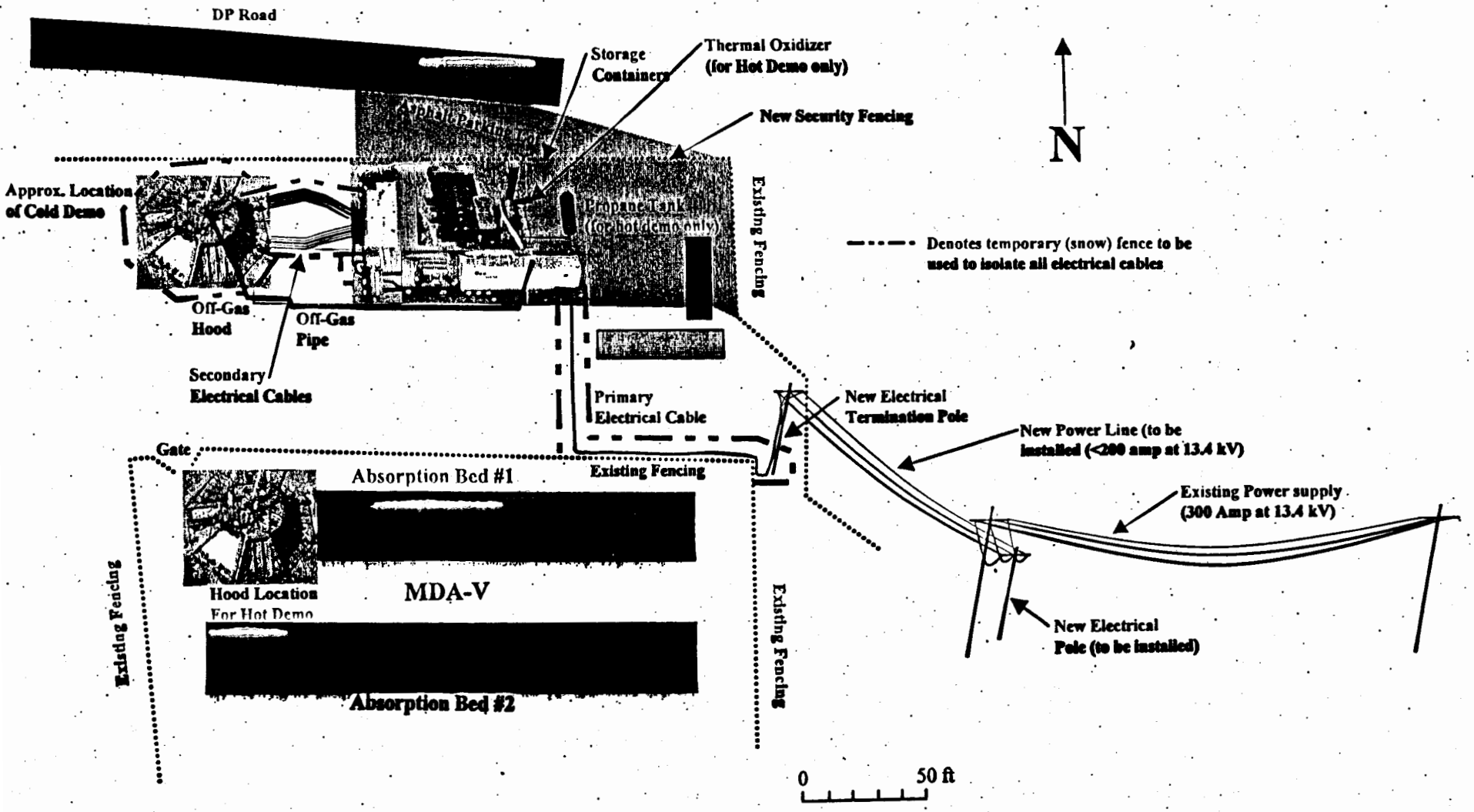
Let me know if you need additional information. Talk to you soon.

Sincerely,

GEOSAFE CORPORATION

Brett E. Campbell
Manager of Engineering and Operations

Proposed Site Layout for the NTISV Demonstrations



Ann, This is your copy - minus the drawing
Brett

Geosafe
Corporation
Advanced Vitrification
Solutions International

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February 3, 1999

SENT BY FEDEX

Mr. Sam Garcia
Los Alamos National Lab
P.O. Box 1663
Los Alamos, NM 87545

Electrical Questions Concerning the NTISV Cold Demonstration at the LANL Site

Dear Sam:

Thank you for taking time out of your schedule to participate in the conference call on Tuesday February 2. During the meeting we discussed many electrical issues, which led to some action items on our behalf. In summary, Geosafe was to provide you with:

- a copy of our one-line diagrams, (not attached - included in project file)
- information on the secondary cables,
- a description and information pertaining to the cables that are run outdoors for the purpose of interconnecting the trailers and other equipment,
- a schematic of the equipment grounding pattern, and
- a letter to file documenting the capability of Geosafe personnel to perform the electrical interconnections.

You will find the electrical one-line drawing attached and numbered as G-1-2841. This drawing provides the answer to your question regarding fuse protection on the primary of the 500 kVA transformer. As you can see, there are fuses on the primary side of transformer T2. The existence of these fuses was also confirmed with personnel that are familiar with the internals of this transformer.

The 16 secondary cables that connect from the secondary bus connection of the Scott-tee to the electrode feeders are labeled as Tiger Brand lead cured MV90 (UL) Sun resistant for CT use L/C 1000 MCM Cu 0.155" EPR 5 KV Non-shielded 100% insulation level 1994.

Drawing G-1-2843 provides a description of all the power circuits associated with the ISV equipment. I have highlighted all of the outdoor cables on the ISV system in yellow. All of the cables that interconnect the ISV trailers are run either in conduit or in cable trays. Other cables such as the primary 15 kV cable, the 1000 MCM secondary cables, cables that interconnect the back-up off-gas treatment system, and the cables that interconnect the back-up generator are run

directly on the ground. Drawing G-1-2843 provides the cable type, size, number of conductors, a description, interconnection points of the cable, and the run location of all the cables. Please refer to drawing G-1-2840 (System Block Diagram) for a general layout of the ISV trailers and the location of cable trays, junction boxes, and equipment that are referred to in drawing G-1-2843.

The grounding plan can also be seen on drawing G-1-2840. We will install four grounding rods (one on each corner of the electrical trailer) that will then be interconnected with 3/0 grounding cable. All other pieces of equipment (i.e.: ISV trailers, off-gas hood, back-up blower and generator, etc.) will be connected to this same grounding grid.

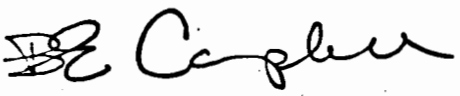
Included for your reference is a list of codes and standards that were used in the design and construction of ISV equipment.

I have also included a letter to file documenting the Geosafe personnel that have been trained adequately pertaining to the electrical interconnection of the ISV equipment. In addition, I have included the electrical training outline that we typically use to train selected staff.

If you need clarification on any of the information provided, feel free to give me a call at (509) 375-0710.

Sincerely,

GEOSAFE CORPORATION



Brett E. Campbell
Manager of Engineering and Operations

cc: Bob Balhiser
Rick Obstar

Memo to File

To: NTISV Project Files

From: Brett Campbell

Subject: Electrical Training for Personnel

Date: February 4, 1999

The following personnel have participated in Geosafe's Electrical Training Program consisting of classroom training and hands-on field experience. These personnel possess thorough knowledge of the ISV equipment, its operation, and associated hazards.

Geosafe personnel authorized to work on electrical components of the NTISV equipment at the LANL site are:

- Mike Berrigan,
- Brett Campbell,
- Steve Minnick,
- Dr. Pat Lowery,
- Craig Timmerman, and
- Steve Woosley.

An outline of Geosafe's Electrical Training Program is attached.

Outline of the Geosafe Corporation Electrical Training Program

1. Review of Geosafe's electrical equipment and layout.
2. Review of the generic hazards associated with electrical equipment.
3. Review of specific electrical hazards associated with the Geosafe ISV equipment.
4. Review of safety precautions for working with electrical services.
5. Review of Geosafe's standard electrical maintenance procedure.
6. Electrical Training provided by the City of Richland.
   a. City of Richland Electrical System Characteristics
      - General Overview
      - Site Specific Hazards
      - Service Provided to Geosafe
   b. City of Richland and Geosafe Coordination
      - Dispatcher
      - Power-up
      - Operation Schedules
      - Loading Capacity of City Power Lines
   c. Electrical Theory
      - Voltage
      - Current
   d. Safety Precautions and Case Histories
      - Main disconnects
      - Back Feed Precautions
      - Grounding
      - Health Hazards
      - Contacts
      - Case Histories
7. Review of the Department of Labor and Industries Electrical Workers Safety Rules (Chapter 296-45 of the Washington Administrative Codes).
8. Hands on experience working in the field following experienced personnel.
9. Review of Geosafe's Lockout/Tagout Program.

Example Training Record for Electrical Program

Geosafe Corporation

PERSONNEL TRAINING RECORD

Training Session Date: 11/7/90 Trainer: J.G. Carter / Wayne Callop

Reference Requirements, Procedures, Plans or Instructions:
Geosafe SEMP-1, Geosafe Lock & TAG Procedure
City of Richland training outline

Attendees:

Name (print)	Signature	Name (print)	Signature
Stephen Minnick	Steven Minnick	Brett E. Campbell	BE Campbell
Craig Timmerman	Craig Timmerman	Steven Anderson	Steven Anderson
Rick Winkelman	Rick Winkelman	Steven L. Woosley	Steven L Woosley
Darrell (Sam) Fackrell	Darrell Fackrell	Stephen C. Liikala	Stephen C. Liikala
Tom Spicer	Tom Spicer	John Gary Carter	John Gary Carter
Doris Pasco Richland	Doris Pasco		

Summary: Glen Everson and John Horrocks of the Department of Labor and Industries was at the instruction session for reviews and comments. Glen and John highlighted the State Safety Rules.

Reviewed by: J.G. Carter Date: 11/7/90

cc: Personnel Qualification Records

5.0 APPLICABLE CODES AND STANDARDS

The hazardous chemical waste in situ vitrification system will conform to the applicable chapters of the latest editions of the following codes and standards as amended at the date of this design criteria:

CODES

Uniform Building Code (UBC)

National Fire Code (NFC)

National Electric Code (NEC)

Uniform Mechanical Code (UMC)

Uniform Plumbing Code (UPC)

Occupational Safety and Health Administration (OSHA) Standards specifically: OSHA 29 CFR 1910, General Industry

STANDARDS

American National Standard: ANSI A58.1 Loads for Buildings and Other Structures

American Institute of Steel Construction (AISC)

Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

Air Moving and Conditioning Association (AMCA)

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

Federal Specifications

American Society for Testing and Materials (ASTM)

American Association of State Highway and Transportation Officials (AASHTO)

American Concrete Institute (ACI)

American Welding Society (AWS)

Consumer Product Safety Commission (CPSC)

American Iron and Steel Institute (AISI)

American Society of Mechanical Engineers (ASME) Publications

National Electrical Manufacturers Association (NEMA)

ANSI/ASME B31.1 Power Piping Standards

2.0 TASK HAZARD ANALYSIS (THA) / WORK PACKAGE

PROJECT NAME: Non-Traditional *In Situ* Vitrification Process at TA-21, MDA V

TASK 4 Non-Traditional *In Situ* Vitrification Process Operations (Cold Demo. Only)

ESTIMATED DATE(S) & DURATION OF WORK: April 1999 ~13 days

2.4 TASK 4 DESCRIPTION

This task involves the NTISV melt operations of the simulated absorption bed at TA-21, adjacent and outside the boundary of MDA V. This task will commence when power is applied to the electrodes and melting begins. It is anticipated that the melting operations will continue for 8 days. Operations will take place continuously, 24 hours per day for the duration of the melt. During operations, Geosafe staffing will consist of six ISV operators working in pairs on eight-hour shifts. MSE personnel will also be onsite during melting operations to monitor sub surface melt activities through the use of tomographic instrumentation and subsequent data collection. The melting operations will continue until the desired melt volume and depth has been attained. At that time power to the melt will be terminated and this task will have been completed.

Activities within the scope of this task with potential hazardous electrical exposure involve potential for lockout/tagout of de energized R&D system components.

This task will consist of the operations of two major subsystems - the power supply system and the off-gas treatment system. The power supply system is composed of two parts, the electrical power supply system and the electrode system. A primary source will supply the Geosafe Scott Tee transformer with a standard nominal input voltage in the range of 12.47 kV to 13.8 kV via a primary cable. The transformer then converts the three-phase line voltage to two single-phase supplies on the secondary side of the transformer. The voltage and current generated on the transformer secondary side is supplied to the electrodes through a set of 1000 MCM electrical cables. Four cables will be connected to each electrode and a total of sixteen cables will be used. The melt configuration changes continuously during the ISV process. The increasing size of the melt directly affects the resultant electrical resistance experienced during processing. The net resistance decreases with both increasing melt volume and temperature. This creates a constantly changing load on the transformer. To accommodate this variation in load, the transformer is equipped with sixteen taps that allow adjustment of the voltage and current supplied to the melt.

The electrode system consists of four graphite electrodes and their associated feeder assemblies. The output from the Scott-Tee transformer is delivered to the soil/waste matrix through these electrodes. Each phase of the transformer secondary-side output is connected to a pair of electrodes. Therefore, four electrodes are used to supply power to the two planar melts.

Each individual electrode will be composed of at least 5 or more electrode segments. Each segment has a diameter of 12-in and a length of approximately 6-ft. The segments have threaded couplings on each end. These allow a number of electrode segments to be joined to form the desired over all length. Electrode segments can be added at any time during the melt operations to allow for melting to the desired depth. The electrodes are held in position by electrode feeders. These feeders both maintain the vertical orientation of the electrode during processing and provides the electrical connection between the fore mentioned power

supply cables and the electrode. A set of pneumatic grippers is provided on each electrode feeder assembly. These grippers are used to control the insertion depth of the electrode to the desired depth. When the grippers are in the open position the electrode is able to gravity feed into the developing melt. In this situation, the bottom of the electrode rides on the bottom surface of the melt. Actuating the gripper will arrest the downward progression of the electrodes. Raising the electrodes is accomplished with the aid of a crane and lifting bail affixed to the top segment of the electrode column.

The off-gas treatment system is composed of two modular subsystems - the off-gas hood and the off-gas processing system. The off-gas hood performs the initial collection stage of processing. During melt operation the plenum space beneath the off-gas hood is maintained at a slight vacuum to prevent the release of any gases generated during processing. The off-gas hood collects the gases for subsequent treatment by the off-gas processing system. The vacuum is established by means of a blower located in the process trailer. Gases collected by the off-gas hood are transported to the off-gas processing system through a 12-in diameter stainless steel line.

The off-gas processing system is designed to collect and or destroy any potentially hazardous materials present in the off gas stream. This system consists of several stages- the quencher, hydro sonic scrubber, mist eliminator, heater, and HEPA filter subsystems. As an option, a thermal oxidizer is available for supplementary processing if desired.

Flow from the off-gas hood through each of the components of this system is established by means of a high volume blower located near the end of the off-gas treatment system. This blower also develops the slight vacuum needed to insure in-leakage into the off-gas hood. The system is designed to pull flow from the off-gas hood out the stack at 50 standard m^3/min. A backup blower in the system provides vacuum to the off-gas hood in the event of a failure of the main off-gas blower. The backup blower is designed to provide approximately the same volumetric off-gas flow rate as the main blower. The off-gas passing through this back-up system is processed by a set of HEPA filters and (if needed) a thermal oxidizer unit before being exhausted to atmosphere.

The first component of the scrub system that the off-gas enters is a quencher. Water spray nozzles inside the quencher cool the incoming off-gas flow. The spray pattern promotes good mixing, condensation, and heat transfer between the spray and off-gas flow streams. In addition to removing particulates in the off-gas flow, the wet scrubbing nature of the quencher also serves to remove soluble components from the flow stream components (e.g. – fluoride and chloride). Any trace concentrations of semivolatile materials still present in the off-gas stream are condensed into liquids or particles by the wet scrubbing action and are consequently also collected at this stage. Condensate from the quencher is further cooled with a water-to-glycol heat exchanger during its transfer to the scrub tanks.

A tandem nozzle hydrosonic scrubber is located just downstream of the quencher. The cooled gases leaving the quencher enter the first stage of the hydrosonic scrubber system. The mix of gas and fine mist produced by the scrubber captures and envelops any entrained dust particles at greater than 97% efficiency for particulates in the range of 0.5 micron and larger. A second hydrosonic scrubber is located just downstream of this first stage to further process the off-gas flow. As with the off-gas cooler and quencher system components, the wet scrubbing nature of these venturi scrubbers also serves to remove soluble components from the flow stream (e.g. – fluoride and chloride). Again, any trace concentrations of semivolatile materials still present in the off-gas stream are condensed into liquids or particles by the wet scrubbing action and are consequently also collected at this stage.

Liquids that have been entrained and/or injected into the flow stream to this point must be removed to protect the integrity of the HEPA filter portion of the treatment system. Therefore, a vane-type mist eliminator is located downstream of the venturi scrubbers to perform this de-watering function. The resulting condensate is transferred to the scrub tanks for further processing. At the system design off-gas flow rate of 50 standard m^3/min, the mist eliminator is designed to remove 99.9% of all water droplets from the flow stream.

Two scrub tanks are employed to collect the condensate from the quencher, scrubbers, and mist eliminator. The pH of the condensate in the scrub tanks is maintained between 6.0 and 8.0 to minimize solids formation during operation. The condensate in these tanks is recycled to provide the water for the quencher and venturi spray systems. Therefore, by maintaining the condensate in the slightly caustic range, acid gases can be more effectively removed from the off-gas flow. The scrub tanks are equipped with a transfer pump and line to allow transfer of the scrub solution between tanks during operation.

Following treatment by the mist eliminator, the off-gas is then passed through a heater to raise the dew point of the flow stream. The power supplied by the heater is controlled to achieve a desired temperature rise in the off-gas flow.

The final treatment stage in the standard off-gas treatment system involves filtering through a series of high efficiency particulate air (HEPA) filters. The minimum particulate removal efficiency of each filter is 99.97% for particles 0.3 micron and larger.

Following passage through the HEPA filters, the flow is then drawn through the off-gas blower and exhausted to atmosphere. A thermal oxidizer can be included in the off-gas line downstream of the blower to destroy any residual organic vapors and/or gases that have survived to this point. This is effectively a polishing step as the concentrations at this point in the process are extremely low and typically readily meet air emission criteria.

In the event that the primary power would be lost, the process system is connected to a back up diesel generator so that containment and continued processing of the off-gases are not interrupted. In the event the there is potential for exposure to residual waste gases or liquids in-line (e.g., during shutdown, and/or maintenance or repair), a Modification to the THA will be prepared prior to continuing with work with such potential exposure.

During the subject task activities, spark/flame producing hot work such as cutting or welding, may be necessary for repair and/or maintenance of onsite equipment. Should this occur, all hot work activities will be approved and conducted under the guidance of the LANL AR 8-4, which identifies the permitting requirements for all hot work activities. In addition, the permit will identify specific requirements regarding site controls (i.e., fire watch, fire hazard separation, etc.) and personal protective equipment to be worn by personnel performing hot work.

2.4.1 KEY PERSONNEL HAVING TASK-SPECIFIC H&S RESPONSIBILITY

FAPL:	Deba Dayman, EES-13	Phone No.	667-9021 / 104-3969
FTM:	Jayne Jones, CST-7	Phone No.	665-5342 / 104-4968
Sup. (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Alt. Sup. (MSE/Geosafe):	Steve Minnick	Phone No.	Field TBD
SSO (MSE/Geosafe):	Rick Obstar	Phone No.	Field TBD
Alt. SSO (MSE/Geosafe):	Brett Campbell	Phone No.	Field TBD
Crane Sup./Op.(Mtn.StatesEquip.):		Phone No.	Field TBD
Sup. (MK-PMC):	John DeJoya	Phone No.	662-1359
HPT (MK-PMC):	Ray Wright	Phone No.	662-1325
Alt. RSP (MK-PMC):	Ken McFadden	Phone No.	662-1302
Lockout/Tagout Authorized Person:			
(_____):		Phone No.	Field TBD

2.4.2 HAZARD ASSESSMENT

Radiological:

If radiological contamination is encountered during this task phase, an HPT/RSP will be available to conduct the appropriate screening/monitoring of onsite personnel and/or equipment. Radiological screening will have been conducted prior to and during Task 1 to verify non-detection of subsurface radiological contamination. As a precaution, however, it may be necessary to screen designated equipment (i.e., drilling) during this task phase to verify non-detection or safe working levels (if encountered). Exposure to excessive levels of radiological contamination could possibly result in reversible illness; **HAR = negligible to minor.**

Physical/Safety:

Lockout-Tagout	Possible electrocution, though unlikely, see Section 2.3.5; **HAR = negligible to serious.**
Hand / Power Tool Operation -	Skin puncture or wounds and /or electrocution from mishandling power tool(s), irreversible injury possible could Occur, **HAR of moderate to serious.**
Crane Operation -	Operation of crane and associated equipment presents hazard potential of being hit, run over, pinch-points, overhead hazards, rotating parts resulting in irreversible or fatal injury; **HAR = serious to imminent.**
Overhead Electrical Lines -	Life-threatening injury from exposure to overhead electrical line associated with crane / forklift work possibly could occur, **HAR of minor to serious.**
Electrical Hazards -	Life-threatening injury when working with associated electrical energy and electrical equipment, possibly could occur, **HAR of minor to serious.**
Heavy Equipment Refueling -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR of minor to serious.**
Fire / Hot Off-Gas Piping -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR of minor to serious.**
Molten Glass -	Life-threatening injury possibly could occur from direct contact to molten glass, **HAR of minor to serious.**
Pinch points/rotating parts -	Hazard severity resulting in irreversible injury or death possibly could occur, **HAR of minor to serious.**
Slips /Trips / Falls -	Uneven terrain resulting in reversible injury probably will occur, **HAR of negligible to moderate.**
Ergonomics (lifting) -	Injury resulting in reversible harm possibly could occur, **HAR of minor to moderate.**
Sanitation -	Unsanitary working conditions resulting in serious illness or death possibly could, **HAR of minor to serious.**

Excessive Noise -	Exposure to excessive noise associated with the use of heavy equipment (i.e., drilling, crane, compressors, etc.) is unlikely to occur contributing to irreversible injury; **HAR = negligible to minor.**
Cold Stress -	Exposure to cold weather conditions resulting in irreversible injury unlikely to occur due to close proximity to heated buildings, trailers and vehicles, **HAR of minor.**
Airborne Dust -	Exposure to airborne nuisance dust resulting in reversible illness possibly could occur, **HAR of negligible to minor.**
Illumination -	Inadequate site illumination during low-light/night conditions could result in possible reversible injury; **HAR = negligible to minor.**
Gas Cylinders (for calibration)-	Irreversible injury of death possibly could occur, **HAR of minor to serious.**
Biological:	
General -	Presence of rodent droppings, nests in or around site, and associated potential for Hanta virus illness unlikely; **HAR = negligible to minor.**
Occupational Exposure to - Bloodborne Pathogens	Occupational exposure to Bloodborne Pathogens rendering first aid or CPR could result in life-threatening illness; **HAR = negligible to minor.**
Chemical:	
On-Site Materials -	Potential for exposure to the following chemical compounds/substances: diesel fuel, unleaded gasoline, hydraulic fluids/pump oils; sodium hydroxide; glycol coolant of off-gas scrubber system. Refer to Section 2.4.3; **HAR = negligible to minor.**
High Explosives (HE):	Not Applicable.

2.4.3 HAZARD COMMUNICATION

The OSHA Hazard Communication Standard (29 CFR 1910.1200) applies to chemical substances utilized during specific phases of the subject work task(s). Personnel performing these tasks will be informed of the physical, chemical, and toxicological properties of the chemical substances identified in Section 2.1.2; along with the means and methods for preventing, detecting, mitigating, and/or protecting themselves from exposure before they are allowed to access an area or perform a task where exposure might occur. Information will be provided during the project H&S briefing before the start of field operations. The information will also be reinforced during H&S tailgate sessions before the task is started and as necessary throughout the duration of the task.

Some or all of the following resources will be kept readily available for reference by project personnel:

- NIOSH Pocket Guide to Chemical Hazards (most recent)
- ACGIH/TLVs for Chemical Substances, Physical Agents, and Biological Exposure Indices (Annual Publication)
- DOT Emergency Response Guidebook
- Applicable Material Safety Data Sheets (MSDSs)

2.4.4 SITE CONTROL

Workers must work in groups of at least two people (buddy system) and have a means of direct communication or maintain visual contact at all times. An exclusion zone, support zone, and postings will be established around the perimeter of those operation areas to restrict access by unauthorized personnel; barrier tape and/or other types of access limiting devices will be used. In addition, a chain-link fence will be used to control access to the overall site.

2.4.5 ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS

Applicable LANL LIRs/ARs:

- 402-600-01.0 Electrical Safety
- AR 1-12 Excavation or Fill Permit Review
- AR 8-4 Hot Work Permit
- 402-407-01 Contamination Control
- 402-710-01 Radiological PPE
- 402-712-01 Radiological Posting
- 402-719-01 Workplace Monitoring
- 402-720-01 Work Planning
- 402-715 (LPR) Records
- 402-717 (LPR) Storage and Labeling

ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS	
Hazard	A&E Control
Radiological Exposure (alpha/beta/gamma radiation)	• Use appropriate PPE as specified in Section 2.4.8 of this THA. • RCT/HPT to monitor equipment/operations as necessary. • If radiological action levels (see Section 2.4.7) are exceeded, stop work. ESH-1 is to be notified, and RWP issued before work may proceed.
Hand/Power Tool Operation	• Compliance with 29 CFR 1926 Subpart I, particularly sections 300, 301, and 302 as applicable. Refer also to "Electrical section as applicable.
Crane Operation	• Crane equipment shall be maintained and inspected on a daily basis to ensure operational provisions for engineering controls are adequate per compliance with 29 CFR 1926, Subparts N, O, S, and applicable sections. Workers will be alerted to stand clear of moving equipment and rotating/pinch points. Workers will also be alerted as to audible warning devices (i.e., backup alarms, swing indicators, etc.) installed on heavy equipment. Additionally, heavy equipment operation and maintenance shall comply with the applicable sections of 29 CFR 1926.201 and subpart N and O, including vehicle inspections and use of seatbelts and ROPs provisions. All equipment operation shall be required to show adequate training/certification for equipment operation.
Overhead Electrical Lines	• During stationary operation, minimum clearance between live lines and any part of equipment or load: 10 ft for lines rated 50 kV; 10 ft + 0.4 in. for each 1 kV over 50 kV; or twice the length of line insulator, whichever is greater. • Voltages < 50 kV: 4 ft min • Voltages 50 kV < x ≤345 kV: 10 ft min • Voltages 345 kV < x ≤750 kV: 16 ft min

ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS continued	
Hazard	**A&E Control**
Electrocution working with energized equipment (e.g., generator)	• Compliance with 29 CFR 1926, Subpart K, and NEC recommendations, as applicable. GFCI is required for all electrical equipment where ground fault potential exists. Primary electrical equipment (i.e., transformers, generators) will be provided with continuous ground path protection.
Lockout-Tagout	• Per LANL "Electrical Safety" LIR 402-600-01.0 Table D-2.3,and task-/site-specific written Geosafe Lockout-Tagout Procedure (to be written before LOTO occurs).
Heavy Equipment Refueling	• Compliance with 29 CFR 1926.152, especially paragraphs (d), (e), and (f). • Refueling shall occur at the start of day prior to commencing other operations and before the engines are hot. • Proper bonding shall be enforced while transferring flammable liquids.
Fire/Hot off-gas piping	• Compliance with 29 CFR 1926 Subpart F and 1926.150 and 151, as applicable. Fire extinguishers shall be maintained and readily accessible on site and ready for use at all times. Typical size/type will be 20 lb. ABC dry-chemical. • Cameras will be used to view the melt progression, thus reducing the need for personnel to be at or near the off-gas hood. • Work on or close the off-gas hood is to be performed only if necessary.
Process Exposure	• NO ENTRY into the hooded area until hazard assessment and controls are addressed by Modification to this THA. • Minimize work on and around the hood. • If work is necessary on or around the hood, the individuals near the hood will have radio communication with an ISV operator who is monitoring the melt data from the process trailer.
Pinch points in rotating parts	• Heavy equipment shall be inspected for engineering controls and operated in compliance with applicable sections of Subparts I and O of 29 CFR 1926 and 29 CFR 1926.251 • Workers will stand clear of rotating parts.
Vehicular Traffic	• Field team personnel exposed to vehicular traffic shall be provided with and required to wear (as deemed necessary) warning vests or other suitable garments of reflective or high visibility material. Vests/garments and signaling directions/devices shall be in accordance with 29 CFR 1926.201.
Slips/Trips/Falls	• Be observant and walk cautiously in areas of potential concern. Minimize threat of slick surfaces.
Ergonomics (lifting)	• Do not manually lift any loads in excess of 50 pounds; use two (or more) people to lift and carry heavier loads or use mechanical lift assist equipment (i.e., dolly, forklift, etc.). Make sure that path of travel is clear. Position any load to be lifted directly in front of body. Bend knees and grasp load underneath with both hands and raise load primarily using legs (not back). To extent possible, carry the load in a manner that does not obstruct vision or intended access to where you step while transporting load.
Sanitation	• Compliance with OSHA housekeeping standards (29 CFR 1926.25 and 250[c]). • Subcontractor to provide and maintain sanitary potable water supply at clean location onsite; compliance with 29 CFR 1926.51. • Personnel to wash hands and face (as necessary) prior to eating, drinking, smoking, or chewing and after using toilet facilities.

ADMINISTRATIVE and ENGINEERING (A&E) CONTROLS continued	
Hazard	**A&E Control**
Excessive Noise	• Compliance with 29 CFR 1910.95. As appropriate, implement engineering/administrative controls or use appropriate PPE to reduce excessive noise levels. Whenever voice communications must be raised between personnel located within approximately 3-feet of each other (or less), the noise level(s) is likely exceeding the PEL. Conduct noise monitoring as deemed necessary in the absence of any previous representative data.
Cold Stress	• Inform personnel of signs and symptoms of cold stress. (Appendix G of HASP) • Monitor personnel for indications of stress. • Strive to prevent exposure by implementing appropriate work regimen, including work breaks so personnel can warm up. • Install barriers or facilities to provide personnel protection from weather extremes.
Airborne Dust	• As first line of defense implement engineering controls (e.g., wet methods, dust suppression agent, and/or local ventilation) in compliance with 29 CFR 1926.55(b), 1926.57, and/or 1910.1000, as applicable, to prevent/minimize dispersion of dust in air.
Illumination	• Compliance with 29 CFR 1926.26 and 1926.56 for required illumination levels.
Gas Cylinders (for calibration)	• Handle cylinders with care (Refer to Safe Handling of Compressed Gases in Containers [CGA P-1-1982]). • Use of compressed gases will be done away from spark sources.
Hanta Virus	• Be observant and avoid walking in areas where rodent droppings or nests are observed. Avoid touching any droppings on materials.
Occupational Exposure to Bloodborne Pathogens	• Refer to Bloodborne Pathogens Program.
On-site Materials	• Use appropriate PPE (chemical protective clothing and/or eye/face protection) as specified in Section 2.4.3 of this THA work package. • Portable emergency eyewash shall be available. Refer to SSHASP Section 1.4.

Will task affect other LANL operations, employees, or tasks? **Yes**_____ **No X**____

If yes for other than emergency response matters, explain precautions taken and contacts notified:

2.4.6 MEDICAL/RADIOLOGICAL SURVEILLANCE

Hazard	Action Level	Requirement
Bloodborne Pathogens (Or other Potentially Infectious Materials)	Any occupational exposure	29 CFR 1910.1030(f) For First-aid/CPR responders only
Hearing Conservation	80 dBA or greater	29 CFR 1910.95(g)
Radiation	Potential to exceed 100 mrem/year dose limit	10 CFR 835 and HASP (Section 6.3)

2.4.7 EXPOSURE MONITORING

Hazardous Condition/ Substance	Instrument	Procedure	Location and Frequency of Monitoring	Action Level(s)/Rationales	Response Action(s)
Noise	Quest Sound Level Meter	Per 29 CFR 1910.95	Unless representative exposure data has already been assessed, noise measurements will be required when voice must be raised to communicate between two persons located ≤3 feet of each other.	80dBA (Hearing Conservation Program) 84 dbA (hearing protection required) **Rationale:** OSHA 29 CFR 1910.95	If unable to lower noise levels below AL, demarcate/post zones of excessive noise and limit access only to employees having sufficient hearing protection training, medical surveillance, and hearing protection per this SSHASP. Appropriate NRR of PPE must be determined based upon monitoring results and the resulting necessary noise reduction to achieve compliance.
Cold Stress	Local weather station and thermometer	ACGIH TLV's for Physical Agents in the Work Environment	Monitor temperature and wind conditions on-site prior to work start, during work breaks, and whenever conditions change noticeably.	<30.2°F <19.4°F **Rationale:** Potential for frostbite, hypothermia, trench foot due to extended exposure outdoors during winter months. Threshold Limit Values, ACGIH	Workers should use gloves. Refer to ACGIH table concerning wind chill factors. Workers should don cold protective clothing (including head protection) and insulating gloves. Refer to ACGIG table concerning wind chill factors. Provide and require use of heated shelter where workers can take breaks to warm up.

Radiation: Refer to the following table.

Hazardous Substance	Instrument	Procedures	Location/Frequency	Action Levels	Response Action	Action Level Rationale
Radiation Gross α and gross- β/γ contamination (specific radio-isotopes listed in Table 1, page 4 of this SSHASP)	β/γ Eberline ESP-1 with HP260 probe or equiv. α -Ludlum 139 with air proportional probe or equiv.	Per LANL Radiation Protection Program and ESH-1 Procedures	Surface Sampling/Excavations: Excavated soil, ground surface prior to disturbance, and excavated soil/material. Drilling: As sample barrel comes out of borehole; after sample barrel is opened and prior to sampling soil. Equipment: Prior to decon and for release Personnel: Prior to exiting controlled work zone Intermittent RCT coverage	Background Personnel: If any contamination above background detected on personnel, notify ESH-1 RCT immediately	Field team member trained in ESH-1 procedures performs surveys (soil, equipment, personnel, etc.) Intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level I: > Background α < 500 cpm/probe area β/γ < 5,000 cpm/probe area	Notify ESH-1 of elevated readings Dedicated field team member trained in ESH-1 procedures performs surveys Increased intermittent ESH-1 coverage α, β/γ swipes counted using Ludlum 2929 tray counter or equiv.	Standard levels set by ESH-1
				Action Level II: α > 500 cpm/ probe area β/γ > 5,000 cpm/probe area	Work may only proceed according to approved RWP and with continuous coverage by an onsite ESH-1 technician (or equiv.) in accordance with Sections 3.2.4 and 3.3.4 of the HASP.	Standard levels set by ESH-1
	Ludlum Model 19 μR meter /ion chamber	Per LANL Radiation Protection Program procedures and training	Initially to determine pre-job conditions, prior to sampling, and intermittently during rad survey walkover	> 5 mR/hr	Notify ESH-1 of elevated readings. Dedicated field team member trained in ESH-1 procedures to perform surveys	Standard levels set by ESH-1

2.4.8 PERSONAL PROTECTIVE EQUIPMENT (PPE) *

Head:	Use of hard hat around heavy equipment and where any overhead hazards exist; compliance with 29 CFR 1910.135, ANSI Z89.1-1986.
Face & Eye:	Safety glasses with side shields required for all fieldwork; compliance with 29 CFR 1910.133, ANSI Z87.1-1989.
Hearing:	Hearing protection required when working near heavy equipment (prior to noise monitoring and after if indicated by results); compliance with 29 CFR 1910.95, ANSI Z87.1-1989.
Feet:	Steel-toed leather shoes or boots; compliance with 29 CFR 1910.136, ANSI Z41-1991.
Hands:	Work gloves for operating heavy equipment (optional); compliance with 29 CFR 1910.137 and 138. Nitrile gloves (4-mil) required if handling potentially radiological contaminated material. Purging/refilling glycol coolant of off-gas scrubber system: latex inner gloves and Nitrile outer (elbow length).
Body:	Laundered cotton coveralls or disposable coveralls (Tyvek™) required for workers handling potentially radiological contaminated material. Work/street clothes only for heavy equipment operator.
Hot Work:	Welding leathers, leather welding gloves, welding hood (arc welding), or welding goggles (gas cutting).
Lockout-Tagout:	Per Electrical Safety LIR 402-600-01 Table D-2.3 and task-/site-specific Geosafe Lockout Tagout Procedure (to be written before LOTO occurs)

* PPE listed above may be modified per ESH-1 Rep. if RWP is initiated

2.4.9 DECONTAMINATION

Equipment Decon: Equipment decontamination will be accomplished using dry decontamination as a primary/initial means. If dry decontamination is insufficient, spray washing will be used as an alternative decontamination method.

Personnel Decon: Hands must be washed prior to smoking, eating, drinking, or chewing.

2.4.10 SPILL CONTAINMENT PLANS (task-specific)

Per Section 1.5 of this SSHASP.

2.4.11 EMERGENCY PLANS (Task-Specific)

Per Section 1.4 of this SSHASP.

2.4.12 ADDITIONAL INSTRUCTIONS/PROCEDURES (Task-Specific)

INSPECTION REQUIREMENTS	
Inspections	**Inspector**
Job Site, Material and Equipment (in accordance with 29 CFR 1926.20(b)(2)	SSO
General Sanitation (i.e., potable and non-potable water, toilets, washing facilities, eating and drinking areas, vermin control, and/or change rooms; in accordance with 29 CFR 1926.51)	SSO
Materials handling, storage, use and disposal (in accordance with 29 CFR 1926.250 and 252)	SSO
Signs, Signals and Barricades (in accordance with 29 CFR 1926.200)	SSO
Motor vehicles and heavy equipment (i.e., crane, drill-rig) prior to site mobilization (in accordance with 29 CFR 1926, Subparts N, O, S, and V and applicable sections	Operator
Material handling equipment (e.g., drilling, crane, forklift) equipped with rollover protective structures and overhead protection (in accordance with 29 CFR 1926, Subpart W)	Operator
PPE (per employer's PPE Program)	User
Incident/emergency response equipment (prior to each use and at least monthly)	SSO
Fire extinguisher equipment (per 29 CFR 1926.150(a) and (c))	SSO
Emergency eyewash (per ANSI Z358.1-1990)	SSO
Power tools (per 29 CFR 1926 Subpart I)	SSO
Electrical Safety (LIR 402-600-01 and Geosafe Lockout Tagout Procedure)	Qualified Person(s)

RECORDKEEPING REQUIREMENTS		
Record/Form	**Requirement Reference**	**Keep Onsite**
ER Project HASP	HASP	X
This SSHASP	HASP	X
Completed SSHASP Modification Forms	HASP	X
SSOs Daily Logbook	HASP	X
Documentation of Training Requirements	HASP	X
Documentation of Medical Surveillance	HASP	X (as applicable: hearing)
Exposure Monitoring Records		X
HS Inspection Records	HASP	X

2.4.13 TRAINING REQUIREMENTS

Types of training: R = Read training; **C** = Classroom training; **F** = Field training; **AN** = As necessary per the DHASP or applicable (regulatory or employer) requirement

Training Requirement	Type	Personnel to be Trained
HASP (Employer_s Program)	R	All
SSHASP	R	All
Pre-Job Start HS Briefing	F or C	All
Task HS Briefing	F or C	All
HS Tailgate Mtgs (as necessary, at least weekly)	F	All
General Employee Training (GET) – LANL provided (HASP Section 10.2.1)	C	All
Radiological Surveillance Authorization Agreement (RSAA) (per HASP Section 3.2.4)	R or C	HPT/RSP
Rad Work II	C	Per RWP (See Section 2.2.5)
1st Aid/CPR (Amer. Red Cross or equivalent)	C	Field Personnel (at least 2)
Bloodborne Pathogens (Employer_s Program & 29 CFR 1910.1030)	C	First-aid/CPR providers
PPE (Employer_s Program)	F or C	User
Hearing Protection (Employer_s Program & 29 CFR 1910.95)	C	Affected Personnel
Employer_s Hazard Communication Program (Employer_s Program & 29 CFR 1910.1200)	C	All
Sanitation (29 CFR 1926.51 or 65(n))	R	SSO
Postings (29 CFR 1926.200 & ANSI Z535.2 and .3)	R	SSO
Fire Extinguisher Use (29 CFR 1926.150(c)(l)(xi))	R	All
Material Handling, Storage, Use, Disposal (29 CFR 1926.250 and 252)	R	SSO
Motor Vehicles, Mechanized and/or Material Handling Equipment (29 CFR 1926, Subparts N and O)	R	SSO, Operator
LIR 402-600-01.0; Electrical Safety	R or C	SSO & Qualified Person(s)
Lockout-Tagout (Geosafe Procedure)	R or C	SSO & Qualified Person(s), as necessary