HANDLING POTENTIALLY HIGH HAZARD ENVIRONMENTAL SAMPLES

CONTENTS

SUPERCEDES: SOP #1502; Revision 0; 8/10/90; U.S. EPA Contract EP-W-09-031

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1.0 OBJECTIVE

The purpose of this standard operating procedure (SOP) is to describe laboratory safety practices applicable to the preparation and analysis of environmental samples which may contain unknown concentrations of hazardous/toxic materials.

2.0 APPLICABILITY

This procedure is a compliment to the routine laboratory safety procedures described in Environmental Response Team (ERT)/Scientific, Engineering, Response and Analytical Services (SERAS) SOP #3013, SERAS Laboratory Safety Program. This procedure will focus on special handling and waste management practices for a mobile High Hazard (HH) Laboratory.

3.0 DESCRIPTION

3.1 Protective Clothing and Restricted Access

3.1.1 Protective Clothing

Permanent and disposable protective clothing will be provided for all HH lab personnel. The types of protective clothing and requirements for use are summarized below.

Items	Materials	Requirements For Use
Safety Glasses		At all times
Coveralls with hood	Tyvek Polymer	At all times
Disposable shoe covers	Tyvek Polymer	At all times
Aprons	Polyethylene	Worn, if desired
Gloves	Disposable Latex	Worn at all times for routine operation and for spill cleanup as appropriate

3.1.2 Entry and Exit Procedures

All HH lab personnel must sign in and out on the laboratory activity log (Appendix A) posted at the entry area. The following procedures for entering and exiting the restricted access area are intended as a supplement to ERT/SERAS SOP #3013.

Don appropriate protective clothing (in the sequence outlined in ERT/SERAS SOP #3013) in the HH lab foyer, and turn on lights and hood or ventilation upon entering. Doff protective clothing in HH lab foyer prior to exiting. Dispose of clothing as per Section 3.7. Ensure that the facility is secured upon leaving and sign out on the access log. Personnel without appropriate training or authorization are not permitted in the HH laboratory.

3.2 Sample Receipt and Handling

Samples known or suspected to contain more than 100-ng/g acutely hazardous contaminants shall be received and processed in the HH laboratory.

Proper clothing will be worn when handling samples. At no time will sample containers be handled without gloves. All gloves and disposable equipment which come into contact with samples will be segregated and left on site.

Samples will be labeled and placed in a designated refrigerator for storage until subsequent analysis. The usual procedures outlined in ERT/SERAS SOP #2002, Sample Documentation, for sample identification and ERT/SERAS SOP #1008, Operation of Sample Refrigeration Units and Sample Receiving, Handling and Storage, for log-in and storage will apply to these samples.

3.3 Storage and Handling Chemicals

All pure chemicals (or concentrated stock solutions) must be stored in the designated area (e.g., flammable storage cabinet, refrigerator, etc.) prescribed by current lab safety procedures.

All manipulations of samples, such as weighing or diluting, must be carried out inside a certified NuAire biological safety cabinet (glove box) and fume hood assembly. Operations inside the box involving transfer of materials such as weighing, pipetting or pouring should be carried out using a spill tray so any accidental spillage is contained and can be cleaned up easily.

All needed equipment, materials (including chemicals), solvents and containers (including waste containers) should be placed in the glove box and fume hoods prior to beginning any operation. A logbook to record the activities which take place in the glove box should be maintained as per ERT/SERAS SOP #4001, Logbook Documentation.

All dilutions or new solutions which are prepared must be labeled with the name of the compound, date prepared, name or initials of preparer, and actual (or estimated) concentration. These data should also be recorded in a logbook.

All waste (paper, disposable equipment, etc.) should be placed in a site specific labeled waste container (Section 3.7).

3.4 Sample Handling

When samples are being received, processed, divided, aliquoted, or removed from the secondary or shipping container, the lab will be posted with a sign to the effect, and access will be restricted to those individuals identified in Section 3.8. The HH laboratory shall be locked at the end of each day.

Plastic-backed absorbent paper shall be used on all work surfaces where the sample materials are manipulated.

Only those individuals identified in Section 3.8 will be allowed to handle samples. At least two such people will be present in the HH laboratory when sample manipulations are taking place.

Sample weighing, percent solid determination, and extraction will be performed inside the glove box and fume hood assembly. All glassware and utensils used in this extraction procedure will be disposable.

3.5 Spill Containment and Cleanup Procedures

An extremely important part of the safety program for the HH lab is the response to spills which may occur during daily laboratory operations.

When a spill occurs, personnel in the immediate area of the spill need to quickly assess the nature of the spill to determine the immediate action to be taken. The immediate action will be determined by the location of the spill (e.g., in the hood or on the floor), whether personnel contamination is involved, and the type and amount of material spilled. If the spill involves unanalyzed samples or other materials or unknown hazards, the regulated area is to be evacuated, and cleanup operations are to commence only after a thorough evaluation has been made of the protective equipment required and an identification of the necessary steps required to contain the spill. The person or persons at the spill site are responsible for alerting all other personnel and evacuating the laboratory, if necessary.

Spills, such as pipet drippings, that are contained in a hood or glove box and involve only a small quantity of material, can be cleaned up using Kimwipes or paper towels. The area can then be wiped clean with an appropriate solvent, followed by washing with a detergent solution. All contaminated material including rubber gloves must be immediately disposed in the waste container located inside the lab.

In the event of a spill outside the hood or glove box area, any personnel who have been contaminated need to be swiftly assisted. If necessary, contaminated clothing will be immediately removed from affected personnel and contamination rinsed from their body. Appropriate respiratory protection also must be used during personnel decontamination if the circumstances warrant such equipment. If personal injury is apparent, emergency assistance should be requested immediately.

The necessary protective equipment and cleanup supplies are to be assembled prior to spill cleanup. For spills of hazardous waste samples outside the hood, notify the Health and Safety Officer for recommendations on personal protective clothing and respiratory protection. The following general procedures must be followed.

<u>Cleanup of Spilled Liquids</u>

1. Use all available means to confine or contain the spill to a small area.

2. Use a neutralizing agent or an absorbent mixture for spills involving small amounts of inorganic acids or bases. For spills involving small quantities of other materials, use a non-reactive material, such as vermiculite, dry sand, or towels, to absorb the spill.

3. Carefully pick up and clean any objects that have been splashed or immersed.

4. If the spilled material is volatile, such as an organic solvent, allow it to evaporate and be exhausted by the mechanical ventilation system.

Cleanup of Spilled Solids

1. Sweep any spilled solids of low toxicity into a dust pan and place in a solid-waste container for disposal.

2. Use caution in picking up more highly toxic spilled solids in order to avoid aerosol formation and spread of contamination.

After cleanup of the bulk of the material spilled, the affected areas must be carefully decontaminated. This is accomplished by cleaning the area towards the center of the spill using an appropriate detergent solution or other appropriate decontamination solution. All residues will be disposed of at the site of sample origin. Protective clothing must also be discarded in a similar manner. Self-contained breathing apparatus (SCBAs) and other non-disposable equipment must be decontaminated before being removed from the area.

3.6 Typical Analytical Protocol

Approximately 10 grams (g) of soil are weighed out and transferred to a 100 milliliter (mL) crimp top vial. 100 mL of a 50:50 acetone/methylene chloride mixture is added to the sample. Samples are then shaker extracted for 45 minutes.

Gas Chromatography:

The operation conditions for the gas chromatograph are listed below:

GC:	HP 5890 with integrator and auto sampler
Detector:	FID
Column:	Restek Rtx-5, 30 meter x 0.53 mm ID, 0.5 µm film thickness
Injector Temp:	250°C
Detector Temp:	275°C
Carrier Gas:	11.0 mL/min Helium
Oven Temp:	Initial temp. 70°C, 5 min
	8°C/min to 90°C, 1 min
	25°C/min to 285°C, 10 min
Injection Vol:	2µL

(Note: the GC instrument will be vented to the fume hood.)

Quantitation:

$$\text{Sample } (\mu\text{g/g}) = \frac{(\text{Instrument conc.}) \times (V_F) \times (DF)}{(W_T) \times (\%TS)}$$

where:

V_F = Final extract volume
D_F = Dilution factor of the final extract
W_T = Weight of the sample (g)
$\%TS$ = Percent solid

3.7 Waste Disposal

Waste material includes:

- Excess extracts and standard solutions (including those from wipe tests)
- Unanalyzed portions of samples and extracted/analyzed residue from solid samples and solid reagents and materials used in sample cleanup such as spent aluminum oxide, filter paper, glass wool, etc.)
- Standards no longer needed
- Disposable laboratory ware used for analysis
- Disposable clothing or other personal protective gear
- Absorbent paper employed during analysis
- Potentially contaminated cleanup media used during analysis, such as glass wool, spent alumina/silica gel, filter paper, etc.

Any extracts, standard solutions or other liquids that could conceivably be contaminated will be transferred to a 1-gallon epoxy-lined, Department of Transportation (DOT) 17E container.

Extracted sample solids will be placed in a 5-gallon DOT 6D container with a 2S polyethylene liner.

Neat analytical standards no longer needed will be packaged and labeled as a hazardous waste and will be left on site.

Disposable laboratory ware used in analysis shall be single-rinsed with acetone into a 5-gallon solvent waste can and then disposed. All spent solid reagent waste, column cleanup material, used filter papers, and glass wool will be disposed of in 5-gallon DOT 6D waste containers with a 2S polyethylene liner.

Tyvek suits and booties will be disposed of immediately only if an overt exposure has occurred (i.e., spill, splash of liquid, etc.). Otherwise, such clothing will be disposed of at the end of each project. Gloves will be disposed of after each removal. All such clothing and protective gear will be disposed of in double bag waste containers.

All absorbent, bench top paper used for analyses will be disposed of in double bag waste containers.

3.8 Personnel

SERAS laboratory personnel identified on a site-specific HH Laboratory Personnel Concurrence Sheet (Appendix B) are authorized to work in the HH laboratory. Each employee is required to participate in the SERAS health monitoring program and is required to read this SOP and be fully aware of the potentially hazardous nature of each site sample. All assignments will be made specifically by the Analytical Section Leader.

4.0 HEALTH AND SAFETY PROTOCOLS

4.1 Health and Safety Plans

Laboratory personnel will utilize the Health and Safety Plan prepared for the field activation to be appraised of the site background, anticipated contaminants and concentration levels and hazard information/protection. A separate signature sheet will demonstrate that laboratory personnel have read the site specific health and safety plan (Appendix B).

4.2 Right to Know and Specialized Training

Due to the potential that materials handled at the mobile HH laboratory may contain contaminants of an acute toxic nature, and that techniques for handling the samples and analysis may be more elaborate than standard laboratory practices, Right to Know and specialized training will be provided and documented.

4.3 Monitoring Procedures

4.3.1 Medical Surveillance

All individuals in the HH lab are required to participate in the SERAS routine medical monitoring program. Refer to ERT/SERAS SOP #3004, SERAS Medical Monitoring Program.

4.3.2 Facility Surveillance

Environmental monitoring will consist of wipe samples on potentially exposed surfaces. Wipe samples will be collected and analyzed at the conclusion of each project or whenever a spill, breakage or other contamination incident occurs (both before and after cleanup).

5.0 REFERENCES

1. EPA Draft Guidelines for Hazardous Waste Management System, Design/Utilization of Laboratories, and Laboratory Use of Chemical Substances, 1985-1986.

2. Occupational Health and Safety Manual, 1440 03/18/86. Chapter 8 - Laboratory Use of Toxic Substances.

3. Safety Plan - NEIC/Laboratory Services Division TCDD/TCDF, September, 1983

APPENDIX A
High Hazard Lab Activity Access Log
SOP #1502
October 1994

High Hazard Lab Activity Access Log

DATE	NAME	TIME IN	TIME OUT	PROJECT CODE	COMMENT

APPENDIX B
High Hazard Lab Personnel Concurrence Sheet
SOP #1502
October 1994

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High Hazard Laboratory Personnel Concurrence Sheet

SITE NAME: _____ W.O. #: _____

I have read, understood, and agree with the information set forth in the Site Specific Health and Safety Plan. I have also received Site Specific Right-To-Know training and understand the hazards and proper safety procedures to follow for the tasks being performed. I agree to adhere to the protocols specified within the Site Specific Health and Safety Plan, ERT/SERAS SOP #3013, SERAS Laboratory Safety Program and, ERT/SERAS SOP #1502, Handling Potentially High Hazard Environmental Samples.

Lab Manager	Signature	Date
Site Safety Coordinator	Signature	Date
Analyst	Signature	Date
Analyst	Signature	Date
Analyst	Signature	Date
Waste Disposal Coordinator	Signature	Date
Health and Safety Officer	Signature	Date