SAMPLE STORAGE, PRESERVATION AND HANDLING

CONTENTS

*These sections affected by Revision 0.0.

SUPERCEDES: SOP #2003; Revision 2.0; 01/09/92; U.S. EPA Contract EP-W-09-0031.

SAMPLE STORAGE, PRESERVATION AND HANDLING

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general guidelines for the storage and preservation of water and soil/sediment samples. Requirements for sample volume, matrix spike/matrix spike duplicate (MS/MSD) sample volume, container type, and preservation techniques are presented for both individual parameters and groups of parameters. Specific requirements for sample storage, preservation and handling must be established in the Quality Assurance (QA) Work Plan prior to sample collection.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U. S. Environmental Protection Agency (U.S. EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

This SOP is applicable to all water or soil/sediment samples collected by ERT/SERAS personnel. For handling, storage and preservation requirements for waste and air samples refer to the specific SOPs for waste and air sampling techniques.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

3.1 Sample Storage and Preservation

Samples should be collected using equipment and procedures appropriate to the matrix, parameters and sampling objective. The volume of the sample collected must be sufficient to perform the analysis requested. Sample containers must not be pre-rinsed with the sample prior to sample collection.

Table 1 (Appendix A) contains a list of parameters which are typically of interest in ERT/SERAS activations. Table 1 also indicates sample volumes to be collected by matrix and parameter. Samples must be stored in the proper types of containers and preserved in a manner appropriate to the analysis to be performed. This information is also provided in Table 1. To prevent leakage during shipping, sample containers should be no more than 90% full. If air space would affect sample integrity (i.e., samples for VOA analysis), fill the sample container completely and place the container in a second container to meet the 90% requirement.

All samples must be cooled to 4^{o}C from the time of collection until analysis. When a preservative other than cooling is used, the preservative is generally added after the sample is collected, unless the sample container has been pre-preserved by the laboratory. If necessary, the pH must be adjusted to the appropriate level and checked with pH paper in a manner which will not contaminate the sample.

Depending on the arrangements for sample analysis and the amount of sample required for the analysis, it is possible that aliquots for several analyses may be taken from the same sample container. This should be verified with the laboratory performing the analyses prior to sample collection.

All sample containers must be labeled appropriately. The exterior of the sample containers must be wiped clean and dry prior to sample packaging. All samples must be packaged according to the requirements of U.S. Department of Transportation (U.S. DOT) or International Air Transportation Association (IATA).

3.2 Special Analytical Requests

If a parameter or group of parameters is not included in Table 1 (Appendix A), the laboratory performing the analysis should be contacted to determine the appropriate sample containers, volumes and preservatives. This information shall be documented in the QA Work Plan.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The following are interferences or potential problems associated with sample storage, preservation and handling:

1. Samples should be protected from sunlight which may initiate photodegradation of sample components.

2. Delaying sample preservation may cause chemical reactions to occur, altering original sample composition.

3. Improper sample preservation may adversely affect sample results.

4. Inadequate sample volume may prohibit the appropriate analyses from being performed.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

The following specific equipment/apparatus may be required for proper sample preservation:

-pipettes (various sizes)
-bulb
-pH paper
-safety equipment

6.0 REAGENTS

Reagents required for preservation of samples are specified in Table 1 (Appendix A). The preservatives required are specified by the analyses to be performed. Decontamination solutions are specified in ERT/SERAS SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURES

Once aqueous samples are collected, add the appropriate preservative to reach the desired pH. For non-aqueous samples, cool samples to 4°C immediately after collection. For handling, storage and preservation requirements for waste and air samples refer to the specific SOPs.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/Quality Control (QC) samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QC activities which are associated with sampling techniques. All data associated with sampling must be documented on Field Data Sheets or within site logbooks.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potential hazardous materials, follow U.S. EPA, OSHA and corporate health and safety procedures.

12.0 REFERENCES

This section is not applicable to this SOP.

APPENDIX A
Table
SOP #2003
August, 1994

TABLE 1. Sample Containers, Volumes to be Collected and Preservatives by Parameter and Matrix[1]

Parameter	Matrix[2]	Container[3]	Volume to be Collected	Preservative
Acidity/Alkalinity	W	P or G	1 liter	Cool (4°C)
Acidity/Alkalinity	S	P or G	8 oz	Cool (4°C)
BNA[4]	W	G (amber)	2 x 1 liter	Cool (4°C)
BNA	S	G	8 oz	Cool (4°C)
BOD	W	G	1 liter	Cool (4°C)
COD	W	P or G	1 liter	Cool (4°C) H_2SO_4,pH<2
Cr^{+6}	W	P	200 ml	Cool (4°C)
Creosotes[4]	W	G	2 x 1 liter	Cool (4°C)
Creosotes	S	G	8 oz	Cool (4°C)
Cyanide[4]	W	P	1 liter	Cool (4°C), NaOH, pH>12
Cyanide	S	G	8 oz	Cool (4°C))
Dioxin/Furans	W	G	2 x 1 liter	Cool (4°C)
Dioxin/Furans	S	G	16 oz	Cool (4°C))
Herbicides[4]	W	G	2 x 1 liter	Cool (4°C)
Herbicides	S	G	8 oz	Cool (4°C)
Metals	W	P or G	1 liter	Cool (4°C), HNO_3, pH<2
Metals	S	G	8 oz	Cool (4°C)
Oil & Grease[4]	W	G	2 x 1 liter	Cool (4°C), H_2SO_4 pH<2
Oil & Grease	S	G	8 oz	Cool (4°C)
Petroleum Hydrocarbons[4]	W	G	2 x 1 liter	Cool (4°C), H_2SO_4, pH<2
Petroleum Hydrocarbons	S	G	8 oz	Cool 4°C)
Pesticides/PCBs[4]	W	G (amber)	2 x 1 liter	Cool (4°C)
Pesticides/PCBs	S	G	8 oz	Cool (4°C)
Phenols	W	G	1 liter	Cool (4°C), H_2SO_4, pH<2
Phenols	S	G	8 oz	Cool (4°C)
Polynuclear Aromatic Hydrocarbons[4]	W	G	2 x 1 liter	Cool (4°C)
Polynuclear Aromatic Hydrocarbons	S	G	8 oz	Cool (4°C)
Reactivity (RCRA) (Cyanide)	W	P	1 liter	Cool (4°C), NaOH, pH>12
Reactivity (RCRA) (Sulfide)	W	P	1 liter	Cool (4°C), 4.0 ml zinc acetate solution
Reactivity (RCRA) (Cyanide/Sulfide)	S	G (amber)	8 oz	Cool (4°C)
Corrosivity (RCRA)	W	P	500 ml	Cool (4°C)

TABLE 1. (continued) Sample Containers, Volumes to be Collected and Preservatives by Parameter and Matrix[1]

Parameter	Matrix[2]	Container[3]	Volume to be Collected	Preservative
Ignitibility (RCRA)	W	G (amber)	500 ml	Cool (4°C)
Ignitibility (RCRA)	S	G (amber)	8 oz	Cool (4°C)
TCLP-VOAs[6]	W	G	3 x 40 ml vial	Cool (4°C)
TCLP-BNAs	W	G (amber)	2 x 1 liter	Cool (4°C)
TCLP-Pesticides/Herbicides	W	G (amber)	2 x 1 liter	Cool (4°C)
TCLP-Inorganics	W	P	1 liter	Cool (4°C),HNO_3, pH<2
TCLP-Non-Volatile Extraction[5]	S	G	16 oz	Cool (4°C)
TCLP-Volatile Extraction[5]	S	G	16 oz	Cool (4°C)
TOC	W	P or G	500 ml	Cool (4°C), H_2SO_4, pH<2
TOC	S	G	8 oz	Cool (4°C)
TOX	W	G	300 ml	Cool (4°C)
TOX	S	G	8 oz	Cool (4°C)
VOAs[6]	W	G	3 x 40 ml vial	Cool (4°C)[7]
VOAs	S	G	40 ml vial	Cool (4°C)

1. ERT/SERAS requirements. Subcontract laboratory requirements may vary. Verify prior to sample collection.
2. W - water, S - soil/sediment
3. P - polyethylene, G - glass
4. For 1 sample of every batch of 10 (or less) samples, collect 2 additional 1 liter volumes for MS/MSD analysis.
5. For 1 sample of every batch of 10 (or less) samples, collect 2 additional 16 oz volumes for MS/MSD analysis.
6. Avoid excessive turbulence when filling the sample container. The container must be sealed so that no air bubbles are entrapped. No headspace allowed.
7. For drinking water samples, if residual chlorine is present, the sample should be preserved with 0.008% sodium thiosulfate. EPA Methods 330.4 and 330.5 may be used for measurement of residual chlorine. Field test kits are commercially available for this purpose.