

## APPENDIX 7-D

### RECOMMENDED SAMPLE CONTROL PROCEDURES

#### GENERAL

This section outlines the acceptable procedures governing the control of samples. In order for samples to be properly controlled, they must first be identified properly. Appropriate sample identification procedures are discussed in this section. Samples must be adequately contained and transmitted from the primary site investigator through an unbroken chain of custody process to the analytical laboratory manager and the analytical chemist. Proper containment and preservation of samples are also discussed in this section. The shipment and chain-of-custody process are described, as well as procedures for documentation of sample control for data defensibility.

#### SAMPLE IDENTIFICATION

The sample identification process used depends on the level(s) of analytical support required. Analytical support levels are described in Appendix 7-A. The primary site investigator will specify the level of analytical support required for a particular sampling event in the site-specific sampling plan. (See Appendix 7-C). The procedures described here are for Data Quality Level 3 analytical support, which involves analyses of samples at an analytical laboratory. These procedures should be modified accordingly by the primary site investigator for other levels of analytical support.

##### Sample Identification Tags

Each sample collected in the field will be identified with a sample identification tag. An example sample identification tag is shown in Figure 7D.1. The sample identification tags will be completely filled out in waterproof or indelible ink and affixed to the sample containers prior to collection of the sample. The following information is included on each sample tag:

1. Serial Tag Number: The tag should have a unique stamped serial number. This number should be recorded in the field notebook.
2. Event code: The event code is a unique number assigned by the primary site investigator for each site and sampling event.
3. Date: State the date the sample was collected. All dates are expressed as YYMMDD, where YY refers to the two-digit year code (e.g., 1998 has the year code 98), MM refers to the two-digit month code (01 for January, 02 for February, etc.), and DD refers to the

|                      |                   |  |  |                         |  |   |       |
|----------------------|-------------------|--|--|-------------------------|--|---|-------|
| <b>SAMPLE ID TAG</b> |                   |  |  | <b>SERIAL TAG #</b>     |  |   |       |
| EVENT CODE:          | DATE<br>(YYMMDD): |  |  |                         |  |   | TIME: |
| STATION #:           | STATION LOCATION: |  |  |                         |  |   |       |
| PRESERVATIVE:        |                   |  |  |                         |  | <input type="checkbox"/> GRAB<br><input type="checkbox"/> COMPOSITE |       |
| ANALYSIS REQUESTED:  |                   |  |  |                         |  |   |       |
| SAMPLING PERSONNEL:  |                   |  |  |                         |  |   |       |
| FIELD SAMPLE ID #:   |                   |  |  | LABORATORY SAMPLE ID #: |  |   |       |
| REMARKS:             |                   |  |  |                         |  |   |       |

**Figure 7D.1 Sample Identification Tag**

two-digit day code for the month (01 for the first day, etc.). So that data may be chronologically sequenced in a database file without errors, it is imperative that the full two-digit day code be used.

4. Time: The time the sample was collected is entered on the sample identification tag. All times are expressed as four-digit numbers indicating the time of collection using 24-hour clock notation in Hawaiian Standard Time (HST).
5. Station number: The station number is the unique sampling point identification number assigned to each sampling location during preparation of the site-specific sampling plan.
6. Station location: The sampling station location identified in the sampling plan at which the sample was procured is described on the sample tag.
7. Preservative: If a chemical preservative was used, the type and quantity of preservative added to the sample is written on the sample tag.
8. Grab/Composite sample: Indicate on the sample tag if the sample is a grab sample or a composite sample.

9. Analysis Requested: Indicate the type of analysis requested for the sample.
10. Sampling Personnel: The printed name and signature of each person who collected the sample is included on the sample tag.
11. Field Sample ID Number: A unique number identifying the sample in sequence of collection at the station location.
12. Laboratory Sample ID Number: A space on the sample tag is reserved for laboratory use to record the laboratory sample number.
13. Remarks: Any pertinent information such as identification of split samples or special procedures is included on the sample tag.

## **SAMPLE CONTAINERS**

### Primary Containers

Primary sample containers are those that contain the material for analysis. The site-specific sampling plan identifies the sample containers to be used for samples collected for each of the analyses to be performed. The materials of construction, volume, source, and grade of the sample containers are also specified. The quantity of sample bottles provided for a sampling event should always exceed the required number of samples bottles by 50 percent, in case of accidents or so that additional samples can be taken if desired. Table 7D.1 lists appropriate sample containers for the different types of media and analyses commonly required for leaking UST site investigations.

Secondary and tertiary containers for Data Quality Level 3 analytical support are discussed below. These procedures should be modified accordingly in the site-specific sampling plan by the primary site investigator for other levels of analytical support.

### Secondary Containers

Primary sample containers (such as samples collected for volatile organic analyses) may require secondary containment for protection of the sample container and to eliminate the possibility of cross-contamination. Generally secondary containment is only required if the material is considered to contain "medium" (> 10ppm) or higher levels of chemicals. Secondary containers (plastic bags, metal cans, etc.) should have an appropriate packing material and be secured with a custody seal. If appropriate, the primary site investigator will consider the need for travel blanks).

**Table 7D.1 Sample Container, Maximum Holding Times, and Preservation**

| Parameter                                   | SW-846 Method        | Matrix | Container                  | Holding Time* | Preservation**                                |                                    |
|---|----------------------|--------|----------------------------|---------------|---|------------------------------------|
| Total Petroleum Hydrocarbons (Extractables) | 8015B                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       |   |                                    |
|   |                      |        |                            | 40 days       |   |                                    |
|   | 8015B                | Water  | 2x 1-L amber <sup>C</sup>  | 7 days        |   | HCL/H <sub>2</sub> SO <sub>4</sub> |
|   |                      |        |                            | 40 days       |   |                                    |
| Total Petroleum Hydrocarbons (Purgeables)   | 8015B                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       | HCL/H <sub>2</sub> SO <sub>4</sub>            |                                    |
|   | 8015B                | Water  | 3x40 mL vials <sup>B</sup> | 14 days       |   |                                    |
| Oil and Grease                              | 9071A                | Soil   | 8 ounce jar <sup>A</sup>   | 28 days       | HCL   |                                    |
|   | 9070                 | Water  | 2x 1-L amber <sup>C</sup>  | 28 days       |   |                                    |
| Total Recoverable Petroleum Hydrocarbons    | 8440                 | Soil   | 8 ounce jar <sup>A</sup>   | ASAP          | HCL   |                                    |
|   | 418.1 <sup>***</sup> | Water  | 2x1-L glass <sup>C</sup>   | 28 days       |   |                                    |
| Benzene, Toluene, Xylene Ethylbenzene       | 8021B                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       | HCL/H <sub>2</sub> SO <sub>4</sub>            |                                    |
|   | 8021B                | Water  | 3x40 mL vials <sup>B</sup> | 14 days       |   |                                    |
| MtBE  | 8260B                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       | HCL/H <sub>2</sub> SO <sub>4</sub>            |                                    |
|   | 8260B                | Water  | 3x40 mL vials <sup>B</sup> | 14 days       |   |                                    |
| Halogenated Volatiles                       | 8260B                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       | HCL/H <sub>2</sub> SO <sub>4</sub>            |                                    |
|   | 8260B                | Water  | 3x40 mL vials <sup>B</sup> | 14 days       |   |                                    |
| Polynuclear Aromatic Hydrocarbons           | 8270C                | Soil   | 8 ounce jar <sup>A</sup>   | 14 days       | Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> |                                    |
|   |                      |        |                            | 40 days       |   |                                    |
|   | 8270C                | Water  | 2x 1-L amber <sup>C</sup>  | 7 days        |   |                                    |
|   |                      |        |                            | 40 days       |   |                                    |

**Table 7D.1 Sample Container, Maximum Holding Times, and Preservation (Continued)**

|                           |       |       |                           |          |                  |
|---------------------------|-------|-------|---------------------------|----------|------------------|
| Polychlorinated Biphenyls | 8082  | Soil  | 8 ounce jar <sup>A</sup>  | 14 days  | NA               |
|                           |       |       |                           | 40 days  |                  |
|                           | 8082  | Water | 2x 1-L amber <sup>C</sup> | 7 days   |                  |
|                           |       |       |                           | 40 days  |                  |
| Lead                      | 6010B | Soil  | 8 ounce jar <sup>A</sup>  | 6 months | HNO <sub>3</sub> |
|                           | 6010B | Water | 1x 1-L polyethylene       | 6 months |                  |
| Cadmium                   | 6010B | Soil  | 8 ounce jar <sup>A</sup>  | 6 months | HNO <sub>3</sub> |
|                           | 6010B | Water | 1x 1-L polyethylene       | 6 months |                  |

Notes

Methods listed are not the only methods available (see Table 7.1). Specific information concerning detection limits and QC procedures can be found in SW-846.

- \* Unshaded box: Maximum holding time for sample (extract within this time or analyze if extraction is not required).  
Shaded box: Maximum holding time for extract (analyze within this time) .
- \*\* Preservatives listed are for aqueous samples only. All samples (soil and water) should be chilled to 4° C.
- \*\*\* EPA Method for Chemical Analysis of Water and Wastes 1983 (EPA-600/4-79/020 PB84-128677).
- A All glass jars shall have Teflon-lined lids, a maximum of two jars per sample shall be required. Glass jars with Teflon-lined lids of different sizes may be requested.
- B All vials shall have caps with Teflon-lined septa.
- C All amber bottles shall have Teflon-lined caps.

Tertiary Containers

Samples to be shipped to the analytical laboratory will be placed in tertiary containers (coolers, shipping containers, etc.). The tertiary containers are padlocked or sealed with custody seals. If custody seals are used, a minimum of two custody seals will be placed on each shipping container with at least one at the front and one at the back. These custody seals are located in a manner which would indicate container tampering. Wide, clear tape is placed over the seals to ensure that the seals are not broken during transit. As above, the primary site investigator will consider the need for travel blanks.

**SAMPLE PRESERVATION**

After samples have been contained, and depending on the level of analytical support and type of analyses required as specified in the site-specific sampling plan, appropriate preservation techniques will be used. Sample preservation ensures that no physical/chemical changes to the sample occur prior to workup, extraction and/or

analysis at the laboratory. Both temperature and light can be significant sources of error in the sampling and analysis process. Adequate controls for these sources of error, such as storing the samples in a dark, cold container, are also specified in the sampling plan. Table 7D.1 presents appropriate preservation techniques for typical samples taken at UST sites.

## **CHAIN OF CUSTODY**

Chain of custody is the process by which authorized control of a sample is successively transferred from one person to another person by the use of approved procedures and documents. If sample integrity is to be defensible, chain-of-custody procedures are necessary to document handling of samples from procurement through final analysis and disposition.

A sample is considered to be under a person's custody if:

1. The sample is in the person's physical possession;
2. The sample is in view of the person after that person has taken possession;
3. The sample is secured by that person so that no one can tamper with the sample; and
4. The sample is secured by that person in an area which is restricted to authorized personnel.

Field samplers are personally responsible for the care and custody of the samples collected by their teams until the samples are transferred or dispatched properly. A person is usually designated to receive the samples from the field samplers after decontamination. This person maintains custody until the samples are dispatched. As few people as possible should handle the samples.

Sample shipments to the analytical laboratory are accompanied by a chain of custody form. The chain of custody form is shown in Figure 7D.2 and contains the following information:

- Project name/location
- Sampler's name
- Sample number

| <b>Project Information:</b>                   |             |                  |                                 |          |             |                      |
|---|-------------|------------------|---------------------------------|----------|-------------|----------------------|
| Site Name: _____                              |             |                  |                                 |          |             |                      |
| Site Location: _____                          |             |                  |                                 |          |             |                      |
| Sampling Personnel: _____ Phone Number: _____ |             |                  |                                 |          |             |                      |
| Company: _____                                |             |                  |                                 |          |             |                      |
| Sample No.                                    | Station No. | Station Location | Date                            | Time     | Sample Type | Number of Containers |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
|   |             |                  |                                 |          |             |                      |
| Relinquished by: <i>(Signature)</i>           |             |                  | Received by: <i>(Signature)</i> |          | Date:       | Time:                |
| Relinquished by: <i>(Signature)</i>           |             |                  | Received by: <i>(Signature)</i> |          | Date:       | Time:                |
| Relinquished by: <i>(Signature)</i>           |             |                  | Received by: <i>(Signature)</i> |          | Date:       | Time:                |
| Relinquished by: <i>(Signature)</i>           |             |                  | Received by: <i>(Signature)</i> |          | Date:       | Time:                |
| Dispatched by: <i>(Signature)</i>             |             |                  |                                 |          | Date:       | Time:                |
| Received for Lab by: <i>(Signature)</i>       |             |                  |                                 |          | Date:       | Time:                |
| Laboratory Name:                              |             |                  |                                 | Address: |             |                      |
| Method of Shipment:                           |             |                  |                                 |          |             |                      |

**Figure 7D.2 Example Chain-of-Custody Form**

- Sampling date
- Sampling time
- Sample destination
- Special handling requirements

Forms will be filled out with waterproof ink. When transferring samples, the individuals involved will sign, date, and note the time on the form.

Samples are packaged properly for shipment and dispatched to the laboratory for analysis, with a separate chain-of-custody record accompanying each shipment. A sample analysis request form, which specifies the analyses requested for each sample and any preservatives used (see Figure 7D.3), will also accompany each shipment of samples to the laboratory. Copies of both forms are retained by the sampler.

Once received at the laboratory, laboratory custody procedures will apply. It is then the laboratory's responsibility to maintain custody records throughout sample preparation and analysis.

### **SAMPLE SHIPMENT AND DELIVERY**

After being properly contained, preserved and documented, samples will be shipped or delivered to the analytical laboratory, according to the sample packing and shipping procedures included in the site-specific sampling plan. Samples must be packaged and transported in accordance with Federal and State statutes and regulations, particularly 49 CFR 172.101. The samples will be delivered to the laboratory manager. The analytical laboratory should be contacted before the sampling event so that delivery of the samples can be arranged. If nonhazardous samples are sent by mail, the package is registered and a return receipt is requested.

Table 7D.1 lists sample holding times for different sample matrices and analyses. These holding times should be considered when developing sampling and shipping schedules.

**PART 1: FIELD SAMPLER SECTION**

SAMPLE COLLECTION INFORMATION:

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Number of Samples Included: \_\_\_\_\_

Site Name: \_\_\_\_\_

Site Location: \_\_\_\_\_

Sampling Personnel: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Organization: \_\_\_\_\_

| LAB SAMPLE NO. | FIELD SAMPLE NO. | SAMPLE LOCATION | TYPE OF SAMPLE | ANALYSIS REQUESTED | NOTES (Preservatives) |
|----------------|------------------|-----------------|----------------|--------------------|-----------------------|
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |
|                |                  |                 |                |                    |                       |

SPECIAL STORAGE AND/OR HANDLING INSTRUCTIONS:

**Part 2: LABORATORY SECTION**

Received By: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

Comments (sample integrity, cooler temp., etc.):

**Figure 7D.3 Example Sample Analysis Request Form**