Region 4
U.S. Environmental Protection Agency
Science and Ecosystem Support Division
Athens, Georgia

OPERATING PROCEDURE

Title: **Waste Sampling**

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Revision History

This table shows changes to this controlled document over time. The most recent version is presented in the top row of the table. Previous versions of the document are maintained by the SESD Document Control Coordinator.

History	Effective Date
SESDPROC-302-R3, *Waste Sampling*, replaces SESDPROC-302-R2. **General:** Corrected any typographical, grammatical, and/or editorial errors. **Title Page:** Changed the Field Quality Manager from Bobby Lewis to Hunter Johnson. Updated cover page to represent SESD reorganization. John Deatrick was not listed as the Chief of the Field Services Branch **References:** Outdate references were omitted and replaced with the appropriate citation or language.	December 16, 2016
SESDPROC-302-R2, *Waste Sampling*, replaces SESDPROC-302-R1.	January 29, 2013
SESDPROC-302-R1, *Waste Sampling*, replaces SESDPROC-302-R0.	November 1, 2007
SESDPROC-302-R0, Waste Sampling, Original Issue	February 05, 2007

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TABLES

1 General Information

1.1 Purpose

This document describes general and specific procedures, methods and considerations to be used and observed when collecting waste samples for field screening or laboratory analysis.

1.2 Scope/Application

The procedures contained in this document are to be used by field personnel when collecting and handling waste samples in the field. On the occasion that SESD field investigators determine that any of the procedures described in this section are inappropriate, inadequate or impractical and that another procedure must be used to obtain a waste sample, the variant procedure will be documented in the field logbook, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and have been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on SESD's local area network (LAN). The Document Control coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.4 References

ASTM. 2000. Manual 42, RCRA Waste Management: Planning, Implementation and Assessment of Sampling Activities, Cosgrove, Neill and Hastie, West Conshohocken, PA.

ASTM, Standard Guide for Sampling Strategies for Heterogeneous Wastes, D 5956, Most Recent Version.

ASTM, Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities, D 6232, Most Recent Version.

Federal Register, Volume 55, Issue 26, Friday, June 29, 1990: Page 26990.

International Air Transport Authority (IATA). Dangerous Goods Regulations, Most Recent Version.

SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005, Most Recent Version.

SESD Operating Procedure for Logbooks, SESDPROC-010, Most Recent Version.

SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011, Most Recent Version.

SESD Operating Procedure for Equipment Inventory and Management, SESDPROC-108, Most Recent Version.

SESD Operating Procedure for Management of Investigation Derived Waste, SESDPROC-202, Most Recent Version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, Most Recent Version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination at the FEC, SESDPROC-206, Most Recent Version.

SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209, Most Recent Version.

SESD Operating Procedure for Soil Sampling, SESDPROC-300, Most Recent Version.

Title 40 Code of Federal Regulations, Pts. 260 to 282, US EPA, Most Recent Version.

Title 49 Code of Federal Regulations, Pts. 171 to 179, Most Recent Version.

United States Environmental Protection Agency (US EPA). 1981. "Final Regulation Package for Compliance with DOT Regulations in the Shipment of Environmental Laboratory Samples," Memo from David Weitzman, Work Group Chairman, Office of Occupational Health and Safety (PM-273), April 13, 1981.

US EPA. Safety, Health and Environmental Management Program Procedures and Policy Manual. Region 4 SESD, Athens, GA, Most Recent Version.

1.5 General Precautions

1.5.1 Safety

Proper safety precautions must be observed when collecting waste samples. Refer to the SESD Safety, Health and Environmental Management Program (SHEMP) Procedures and Policy Manual and any pertinent site-specific Health and Safety Plans (HASP) for guidelines on safety precautions. These guidelines, however, should only be used to complement the judgment of an experienced professional. Sampling of waste units

should be assessed for potential hazards by both the project leader and the site safety officer (SSO). It is the SSO's responsibility to enforce the site safety plan, and to ensure that procedures used during waste sampling are in accordance with Branch safety procedures and protocols found in the SESD SHEMP Procedures and Policy Manual and the HASP.

When using this procedure, minimize exposure to potential health hazards through the use of protective clothing, eye wear and gloves. Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate. Specific levels of dress for waste sampling will be described in greater detail later in this operating procedure.

Sampling equipment contaminated during waste sampling investigations should be cleaned in accordance with the SESD Operating Procedure for Field Equipment Cleaning and Decontamination (SESDPROC-205). Contaminated sampling equipment that is to be discarded must be properly disposed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202). These procedures should be specified in the site-specific study plan or Quality Assurance Project Plan.

1.5.2 Procedural Precautions

The following precautions should be considered when collecting waste samples.

- Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample.
- Collected samples must remain in the custody of the sampler or sample custodian until the samples are relinquished to another party.
- If samples are transported by the sampler, they will remain under his/her custody or be secured until they are relinquished.

- Shipped samples will conform to all U.S. Department **o**f Transportation (DOT) rules of shipment found in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179), and/or International Air Transportation Association (IATA) hazardous materials shipping requirements found in the current edition of IATA's Dangerous Goods Regulations.
- Documentation of field sampling is done in a bound logbook.
- Chain-of-custody documents will be filled out and remain with the samples until custody is relinquished.

1.6 Quality Control Procedures

In some instances, special decontamination procedures will be necessary and should be developed on a case-by-case basis according to the specific material encountered. Any cleaning procedures and equipment repairs conducted in the field, which deviate from those specified in the SESD Operating Procedure for Field Equipment Cleaning and Decontamination (SESDPROC-205) or the study plan, will be thoroughly documented in the logbooks. Equipment blanks will be collected in accordance with the SESD Operating Procedure for Field Sampling Quality Control (SESDPROC-011) if equipment is field cleaned and re-used on-site or if necessary to document that low-level contaminants were not introduced by any sampling equipment. All air monitoring and field analytical/screening equipment should be checked and calibrated before being issued for field studies, as specified in the SESD Operating Procedure for Equipment Inventory and Management (SESDPROC-108).

1.7 Auxiliary Information and Data Collection

The collection of auxiliary information and data is particularly important when collecting waste samples. Any field analyses or field screening results should be recorded in a logbook as outlined in the SESD Operating Procedure for Logbooks (SESDPROC-010). Sketches of waste units, sampling locations, containers, tanks and ancillary equipment, markings/labels, etc., should be fully documented in logbooks. Photographs are extremely useful for recording this information and may be used during waste sampling operations. A field log of the photographs taken will be maintained as outlined in the SESD Operating Procedure for Logbooks (SESDPROC-010).

1.8 Records

Information generated or obtained by SESD personnel will be organized and accounted for in accordance with SESD records management procedures found in the SESD Operating Procedure for Control of Records (SESDPROC-002). Field notes, recorded in a bound field logbook, will be generated, as well as chain-of-custody documentation in accordance with the SESD Operating Procedure for Logbooks (SESDPROC-010) and the SESD Operating Procedure for Sample and Evidence Management (SESDPROC-005).

1.9 Investigation Derived Waste

Sampling and decontamination can generate investigation derived waste (IDW), the disposition of which must be considered. See the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) for guidance on management or disposal of this waste.

2 Waste Sampling - Background

2.1 General

Hazardous wastes are regulated by the USEPA under 40 CFR Parts 260-282. As a consequence, many of the methods that are used to manage, store, treat and dispose hazardous wastes and potential hazardous wastes are of concern to both the regulators and the regulated community.

Samples are often required of regulated or potentially regulated materials. While it is understood that each facility and wastestream may present its own unique sampling and analytical challenges, this operating procedure will list equipment and procedures that have been used to safely and successfully sample specific waste units.

2.2 Waste Unit Types

Waste management units can be generally categorized into two types: open and closed. In practice, open units are larger than closed units. Open units include waste piles and surface impoundments whereas closed units include containers and tanks as well as ancillary tank equipment. In addition to containers and tanks, sumps may also be considered closed units because they are designed to collect the spillage of liquid wastes and are sometimes configured as a confined space.

Although both may pose hazards, units that are open to the environment are generally less hazardous than closed units. Sampling of closed units is considered a higher hazard risk because of the potential of exposure to toxic gases and flammable/explosive atmospheres. Because closed units prevent the dilution of the wastes by environmental influences, they are more likely to contain materials that have concentrated levels of hazardous constituents. While opening closed units for sampling purposes when the unit's contents are unknown, investigators will use Level B personal protective equipment (PPE) and air monitoring instruments to ensure that the working environment does not contain hazardous levels of flammable/explosive gases or toxic vapors, and follow the appropriate safety requirements stipulated in the site specific safety plan.

Buried waste materials should be located and excavated with extreme caution. Once the buried waste is uncovered, the appropriate safety and sampling procedures utilized will depend on the type of waste unit.

2.2.1 Open Units

While open units may contain many types of wastes and come in a variety of shapes and sizes, they can be generally regarded as either waste piles or surface impoundments. Definitions of these two types of open units from 40 CFR Part 260.10 are:

- (Waste) pile - any non-containerized accumulation of solid, non-flowing hazardous waste that is used for treatment or storage and that is not a containment building.

- Surface impoundment - "...a facility or part of a facility which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold the accumulation of liquid wastes or wastes containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling and aeration pits, ponds, and lagoons."

One of the distinguishing features between waste piles and surface impoundments is the state of the waste. Waste piles typically contain solid or non-flowing materials whereas liquid wastes are usually contained in surface impoundments. The nature of the waste will also determine the mode of delivering the waste to the unit. Wastes are commonly pumped or gravity fed into impoundments while heavy equipment or trucks may be used to dump wastes in piles. Once the waste has been placed in an open unit, the state of the waste may be altered by environmental factors (e.g., temperature, precipitation, etc.).

Surface impoundments may contain several phases such as floating solids, liquid phase(s) and sludges. Waste piles are usually restricted to solids and semi-solids. All of the potential phases contained in a waste unit should be considered in developing the sample design to meet the study's objective.

During RCRA compliance investigations, it is common to collect waste samples from industrial process areas and from surface impoundments. Frequently these materials may be liquids or process waters conveying wastes from industrial processes or pollution control devices to open units. These industrial process water samples may be collected to determine the point of generation or compliance with the RCRA regulations.

2.2.2 Closed Units

There are a variety of designs, shapes, sizes and functions of closed units. In addition to the challenges of the various designs and the safety requirements for sampling them, closed units are difficult to sample because they may contain liquid, solid, semi-solid/sludge or any combination of phases. Based on the study's design, it may be necessary to obtain a cross-sectional profile of the closed unit in an attempt to characterize the unit. The following are definitions of types of closed waste units described in 40 CFR Part 260.10:

- Container - any portable device in which a material is stored, transported, treated, disposed, or otherwise handled. Examples of containers are drums, overpacks, pails, totes and roll-offs.
- Tank - a stationary device, designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials which provide structural support.

Portable tanks, tank trucks and tank cars vary in size and may range from simple to extremely complex designs. Depending on the unit's design, it may be convenient to consider some of these storage units as tanks for sampling purposes even though they meet the definition of a container.

- Ancillary equipment (tank) - any device including, but not limited to, such devices as piping, fittings, flanges, valves and pumps that is used to distribute, meter or control the flow of hazardous waste from its point of generation to a storage or treatment tank(s), between hazardous waste storage and treatment tanks to a point of disposal on-site, or to a point of shipment for disposal off-site.
- Sump - any pit or reservoir that meets the definition of a tank and those troughs/trenches connected to it that serve to collect hazardous wastes.

  Note: some outdoor sumps may be considered open units/surface impoundments.

Although any of the closed units may not be completely sealed and may be partially open to the environment, the unit should be treated as a closed unit for sampling purposes until a true determination can be made. Once a closed unit is opened, a review of the proposed sampling procedures and level of protection can be performed to determine if the personal protective equipment is suitable for the site conditions.

Samples collected from different waste units should not be composited into one sample container without additional analytical and/or field screening data to determine if the materials are compatible and will not cause an inadvertent chemical reaction.

3 Waste Sampling Equipment

3.1 General

Selecting appropriate equipment to sample wastes is a challenging task due to the uncertainty of the physical characteristics and nature of the wastes. It may be difficult to separate, homogenize and/or containerize a waste due to its physical characteristics (viscosity, particle size, etc.). In addition, the physical characteristics of a waste may change with temperature, humidity or pressure. Waste streams may vary depending on how and when a waste was generated, how and where it was stored/disposed and the conditions under which it was stored/disposed. Also, the physical location of the wastes or the unit configuration may prevent the use of conventional sampling equipment.

Given the uncertainties that a waste may present, it is desirable to select sampling equipment that will facilitate the collection of samples that will meet the study's objective, and that will not unintentionally bias the sample by excluding some of the sample population that is under consideration. However, due to the nature of some waste matrices or the physical constraints of some waste units, it may be necessary to collect samples knowing that a portion of the desired population was omitted due to limitations of the equipment. Any deviations from the study plan or difficulties encountered in the field concerning sample collection that may have an effect on the study's objective should be documented in a logbook, reviewed with the analytical data and presented in the report.

3.1.1 Waste Sampling Equipment

Waste sampling equipment should be made of non-reactive materials that will neither add to nor alter the chemical or physical properties of the material that is being sampled. Table 1 lists some conventional equipment for sampling waste units/ phases and some potential limitations of the equipment. Another reference for selecting sampling equipment is the ASTM, *Standard Guide for Selection of Sampling Equipment for Wastes and Contaminated Media Data Collection Activities*, D 6232, most recent version.

3.1.2 Ancillary Equipment for Waste Sampling

In addition to the equipment listed in Table 1 which provides the primary device used to collect various waste samples, ancillary equipment may be required during the sampling for safety and/or analytical reasons. Some examples of these types of equipment are glass mixing pans, particle size reducers, remote drum opening devices and spark resistant tools. Any influences that these types of ancillary equipment may have on the data should be evaluated and reported as necessary.

4 Waste Sampling Procedures

4.1 Waste Piles

Waste piles vary in size, shape, composition and compactness, and may vary in distribution of hazardous constituents and characteristics (strata). These variables will affect safety and access considerations. The number of samples, the type of sample(s), the sample location(s) and interval(s) should be based on the study's objectives. Commonly used equipment to collect samples from waste piles is listed in Table 1. Specific procedures will vary depending on the equipment and objectives of the investigation. All equipment should be compatible with the waste and should be cleaned to prevent cross contamination of the sample.

4.2 Surface Impoundments

Surface impoundments vary in size, shape and waste content, and may vary in distribution of hazardous constituents and characteristics (strata). The number of samples, the type of sample(s) and the sample location(s) and interval(s) should be based on the study's objectives. Commonly used equipment to collect samples from surface impoundments is listed in Table 1. Specific procedures will vary depending on the equipment and objectives of the investigation. All equipment should be compatible with the waste and should be cleaned to prevent cross contamination of the sample.

Because of the potential danger of sampling waste units suspected of containing elevated levels of hazardous constituents, personnel should never attempt to sample surface impoundments used to manage potentially hazardous wastes from a boat. All sampling should be conducted from the banks or piers of surface impoundments. Any exception must be approved by the appropriate site safety officer and/or the Occupational Health and Safety Designee (OHSD).

4.3 Drums

Drums are the most frequent type of containers sampled by field investigators for chemical analyses and/or physical testing. Caution should be exercised by the field investigators when sampling drums because of the potential presence of explosive/flammable gases and/or toxic vapors. Therefore, the following procedures should be used when collecting samples from drums of unknown material:

1. Visually inspect all drums that are being considered for sampling for the following:

    - pressurization (bulging/dimples);
    - crystals formed around the drum opening;
    - leaks, holes, stains;
    - labels, markings;

- composition and type (steel/poly and open/bung);
- condition, age, rust; and
- sampling accessibility.

Drums showing evidence of pressurization and crystals should be furthered assessed to determine if remote drum opening is needed. If drums cannot be accessed for sampling, heavy equipment is usually necessary to stage drums for the sampling activities. Adequate time should be allowed for the drum contents to stabilize after a drum is handled.

2. Identify each drum that will be opened (e.g., paint sticks, spray paint, cones, etc).

NOTE: LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING STEPS:

3. Before opening, ground each metal drum that is not in direct contact with the earth using grounding wires, alligator clips and a grounding rod or metal structure. If a metal drum is in an over-pack drum, the metal drum should be grounded.

4. Touch the drum opening equipment to the bung or lid and allow an electrical conductive path to form. Slowly remove the bung or drum ring and/or lid with spark resistant tools (brass/beryllium).

5. Screen drums for explosive gases and toxic vapor with air monitoring instruments as bung or drum lid is removed. Depending on site conditions, screen for one or more of the following:

   - radioactivity;
   - cyanide fumes;
   - halogen vapors;
   - pH; and/or
   - flash point (requires small volume of sample for testing).

   Note the state, quantity, phases and color of the drum contents. Record all relevant results, observations and information in a logbook, Drum Data Form or Drum Data Table. Table 2 is an example of a Drum Data Table. Review the screening results with any pre-existing data to determine which drums will be sampled.

6. Select the appropriate sampling equipment based on the state of the material and the type of container. Sampling equipment should be made of non-reactive material.

7. Place oil wipe (as necessary), sampling equipment and sample containers near drum(s) to be sampled.

NOTE: AIR MONITORING FOR TOXIC VAPORS AND EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONDUCTED DURING DRUM SAMPLING

Liquids – COLIWASAs (COmposite LIquid WAste SAmplers) or drum thieves are used to collect liquid samples from drums. The COLIWASA or drum thief is slowly lowered to the bottom of the container. Close the COLIWASA with the inner rod or create a vacuum with the sampler's gloved thumb on the end of the thief and slowly remove the sampling device from the drum. Release the full contents from the device into one sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids – Use a push tube, bucket auger or screw auger or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully use a clean stainless steel spoon to place the sample into container(s) for analyses.

Close the drums when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the drum screening procedure (Step #5). At a minimum, contaminated, non-disposable equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field. IDW should be managed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) and Region 4's *Contaminated Media Policy*.

4.4 Tanks

Sampling tanks is considered hazardous due to the potential for them to contain large volumes of hazardous materials and therefore, appropriate safety protocols must be followed. Unlike drums, tanks may be compartmentalized or have complex designs. Preliminary information about the tank's contents and configuration should be reviewed prior to the sampling operation to ensure the safety of sampling personnel and that the study's objectives can be achieved.

In addition to having discharge valves near the bottom of tanks and bulk storage units, most tanks have hatches at the top. It is desirable to collect samples from the top hatch because of the potential for the tank's contents to be stratified. Because wastes often stratify due to different densities of phases or settling of solids, it may be important to obtain a vertical cross section of the entire unit, or it may be desirable to collect grab samples from each strata. Additionally, when sampling from the discharge valve, there is a possibility of a stuck or broken valve which could cause an uncontrolled release. Investigators should not utilize valves on tanks or bulk storage devices unless they are operated by the owner or operator of the facility, or a containment plan is in place should the valve stick or break. If the investigator must sample from a tank discharge valve, the valving arrangement of the particular tank must be clearly understood to ensure that the compartment(s) of interest is sampled.

Because of the many different types of designs and materials that may be encountered, only general sampling procedures that outline sampling a tank from the top hatch are listed below:

1. All relevant information concerning the tank such as the type of tank, the tank capacity, markings, condition and suspected contents should be documented in a logbook.

2. The samplers should inspect the ladder, stairs and catwalk that will be used to access the top hatch to ensure that they will support the samplers and their equipment.

3. Before opening, ground each metal tank using grounding wires, alligator clips and a grounding rod or metal structure.

NOTE: LEVEL "B" PROTECTION IS REQUIRED FOR THE FOLLOWING STEPS:

4. Any vents or pressure release valves should be slowly opened to allow the unit to vent to atmospheric pressure. Air monitoring for explosive/flammable gases and toxic vapors should be conducted during the venting with the results recorded in a logbook. If dangerous concentrations of gases evolve from the vent or the pressure is too great, leave the area immediately.

5. Touch tank opening equipment to the bolts in the hatch lid and allow electrical conductive path to form. Slowly remove bolts and/or hatch with spark resistant tools (brass/beryllium). If a pressure build up is encountered or detected, cease opening activities and leave the area.

6. Screen tanks for explosive/flammable gases and toxic vapors with air monitoring instruments. Depending on the study objectives and site conditions, conduct characteristic screening (e.g., pH, halogen, etc.) as desired. Collect a small volume of sample for flash point testing, if warranted. Note the state, quantity, number of phases and color of the tank contents. Record all relevant results, observations, and information in a logbook. Compare the screening results with any pre-existing data to determine if the tank should be sampled.

7. Select the appropriate sampling equipment based on the state of the material and the type of tank. Sampling equipment should be constructed of non-reactive materials.

8. Place oil wipe (as necessary), sampling equipment and sample containers near tanks(s) to be sampled.

NOTE: AIR MONITORING FOR TOXIC VAPORS AND EXPLOSIVE GASES AND OXYGEN DEFICIENT ATMOSPHERES SHOULD BE CONDUCTED DURING DRUM SAMPLING

Liquids -- Slowly lower the bailer, bacon bomb, Dipstick™, COLIWASA, or Teflon® tubing to the desired sampling depth. *(NOTE: In work areas where explosive/flammable atmospheres could occur, peristaltic pumps powered by 12 V batteries should not be*

used.) Close the sampling device or create a vacuum and slowly remove the sampling device from the tank. Release the sample from the device into the sample container. Repeat the procedure until a sufficient sample volume is obtained.

Solids/Semi-Solids - Use a push tube, bucket auger, screw auger, Mucksucker™, or if conditions permit a pneumatic hammer/drill to obtain the sample. Carefully extrude the sample from the sampling device or use a clean stainless steel spoon to place the sample into containers for analyses.

9. Close the tank when sampling is complete. Segregate contaminated sampling equipment and investigative derived wastes (IDW) containing incompatible materials as determined by the screening procedure (Step #6). At a minimum, contaminated, non-disposable equipment should be cleaned with laboratory detergent and rinsed with tap water prior to returning it from the field. IDW should be managed according to the SESD Operating Procedure for Management of Investigation Derived Waste (SESDPROC-202) and Region 4's *Contaminated Media Policy*.

4.5 Miscellaneous Contaminated Materials

Sampling may be required of materials or equipment (e.g., documents, building materials, equipment, etc.) to determine whether or not various surfaces are contaminated by hazardous constituents, or to evaluate the effectiveness of decontamination procedures.

Wipe or swab samples may be taken on non-absorbent, smooth surfaces such as metal, glass, plastic, etc. The methodology for wipe sampling should be based on the site-specific Data Quality Objectives. All surfaces and areas selected for sampling should be based on the study's objectives.

For items with porous surfaces such as documents (usually business records), insulation, wood, etc., actual samples of the materials are required. It is therefore important that during the collection and/or analyses of the sample that evidentiary material is not destroyed. Use scissors or other particle reduction devices that have been cleaned as specified in the SESD Operating Procedures for Field Equipment Cleaning and Decontamination (SESDPROC-205) or the SESD Operating Procedures for Field Equipment Cleaning and Decontamination at the FEC (SESDPROC-206) to cut/shred the sample. Mix in a glass pan as specified in the SESD Operating Procedure for Soil Sampling (SESDPROC-300). The shredded, homogenized material is then placed in sample containers.

5 Waste Sample Handling Procedures

5.1 General

When collecting samples of concentrated wastes for laboratory analyses, field personnel are required to screen the waste materials to ensure safe handling and transportation of the samples. Safety procedures, sampling and screening methods used to collect the samples must comply with those procedures/methods described in this protocol. It should be noted that waste samples should not be preserved because of the potential for an inadvertent chemical reaction with the preservative. Additionally, with the exception of aliquots collected for volatile organic analysis, concentrated waste samples are not required to be cooled to 4°C.

After samples have been collected and containerized, the outside of the sample containers should be cleaned with water, paper towels and/or oil wipes to remove any spilled material from the exterior of the container. It should be noted that each sample container should be labeled in accordance with SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005 (Most Recent Version) and placed in a plastic bag. The bag should be securely closed. Samples collected from materials that did not demonstrate any hazardous properties during the screening process nor have strong chemical odors may be placed in coolers and handled as non-hazardous samples in accordance with the SESD Operating Procedure for Packaging, Marking, Labeling and Shipping of Environmental and Waste Samples, SESDPROC-209 (Most Recent Version).

Field investigators will use knowledge gained of site practices and processes, labels and marking on waste containers, field screening results and personal observations made during their investigation to determine the hazard potential of a sample. Samples considered to be hazardous by the field investigators or detected to have strong chemical odors will be placed in secondary containment for transport to the SESD laboratory and for subsequent handling upon arrival. The bagged samples will be placed in a plastic pail and sealed with a tight fitting lid. The project number for the sampling investigation and the specific sample station number will be marked on the secondary container in indelible ink. A standard SESD Hazard Communication Label will be affixed to the side of the secondary container. The appropriate hazard(s) for the sample (Health, Flammability, and/or Reactivity) will be indicated with an "X." Additionally, an "X" will be placed in the "Protective Equipment" section of the label if protective equipment was required for collection of the sample.

All secondary containing pails will be secured in the vehicles while transporting the samples from the field to the laboratory for analyses. In addition, each pail should indicate when protective equipment is recommended to handle the actual waste sample material.

6 Particle Size Reduction

6.1 General

Particle size reduction of waste samples is periodically required in order to complete an analytical scan or the Toxicity Characteristic Leaching Procedure (TCLP) test. Samples that may require particle size reduction include slag, bricks, glass/mirror cullet, wire, etc. EPA Method 1311 (TCLP) states "Particle size reduction is required, unless the solid has a surface area per gram of material equal to or greater than 3.1 cm^2, or is smaller than 1 cm in its narrowest dimension (i.e., capable of passing through a 9.5 mm (0.375 inch) standard sieve). If the surface area is smaller or the particle size larger than described above, prepare the solid portion of the waste for extraction by crushing, cutting or grinding the waste to a surface area or particle size as described above" (55 FR 26990). The method also states that the surface criteria are meant for filamentous (paper, cloth, etc.) waste materials, and that "Actual measurement of the surface area is not required, nor is it recommended." Also, the loss of volatile organic compounds could be significant during particle size reduction.

Waste samples that require particle size reduction are often too large for standard sample containers. If this is the case, the sample should be secured in a clean plastic bag and processed using normal chain-of-custody procedures (SESD Operating Procedure for Sample and Evidence Management, SESDPROC-005 (Most Recent Version)). Note that the sample labels or tags that will be required for the various containers should be prepared in the field and either inserted into or attached to the sample bag.

Because of the difficulty in conducting particle size reduction, it may be completed at SESD's Field Equipment Center (FEC). The following procedure may be used for crushing and/or grinding a solid sample:

1. Remove the entire sample, including any fines that are contained in the plastic bag and place them on the standard cleaned stainless steel pan or cover the sample material with clean plastic.

2. Using a clean hammer, carefully crush or grind the solid material (safety glasses are required), attempting to minimize the loss of any material from the pan. Some materials may require vigorous striking by the hammer, followed by crushing or grinding. The material may be subject to crushing/grinding rather than striking.

3. Continue crushing/grinding the solid material until the sample size approximates 0.375 inch. Attempt to minimize the creation of fines that are significantly smaller than 0.375 inch in diameter.

4. Pass the material through a clean 0.375-inch sieve into a glass pan.

5. Continue this process until sufficient sample is obtained. Thoroughly mix the sample as described in the SESD Operating Procedure for Soil Sampling (SESDPROC-300). Transfer the contents of the glass pan into the appropriate containers.

6. Attach the previously prepared labels/tags and submit for analyses.

Table 1

SAMPLING EQUIPMENT FOR VARIOUS WASTE UNITS

Equipment	Waste Units/Phases	Limitations
Scoop with bracket/conduit	Impoundments, piles, containers, tanks/liquids, solids, sludges	Can be difficult to collect deeper phases in multiphase wastes. Depth constraints.
Spoon	Impoundments, piles, containers/solids, sludges	Similar limitations as the scoop. Generally not effective in sampling liquids.
Push tube	Piles, containers/cohesive solids, sludges	Should not be used to sample solids with dimensions >½ the diameter of the tube. Depth constraints.
Auger	Impoundments, piles, containers/solids	Can be difficult to use in an impoundment or a container, or for solidified wastes.
Sediment sampler	impoundments, piles/solids, sludges	Should not be used to sample solids with dimensions >½ the diameter of the tube.
Ponar dredge	Impoundments/solids, sludges	Must have means to position equipment to desired sampling location. Difficult to decon.
COLIWASA or drum thief	Impoundments, containers, tanks/liquids	Not good with viscous wastes. Devices ≥ 7' require 2 samplers to use effectively.
Dipstick™ / Mucksucker™	Impoundments, containers, tanks/liquids, sludges	Not recommended for tanks >11 feet deep. Devices ≥ 7' require 2 samplers to use effectively.
Bacon bomb	Impoundments, tanks/liquids	Not good with viscous wastes.
Bailer	Impoundments, tanks/liquids	Only if waste is homogeneous. Not good with viscous wastes.
Peristaltic pump with vacuum jug assembly	Impoundments, tanks/liquids	Cannot be used in flammable atmospheres. Not good with viscous wastes.
Back-hoe bucket	Piles/solids, sludges	May be difficult to access desired sampling location. Difficult to decon. Can lose volatiles.
Split-spoon	Piles/solids	Requires drill rig or direct push equipment.
Roto-hammer	Piles, containers/solids	Physically breaks up sample. May release volatiles. Not for flammable atmospheres.

Table 2

DRUM DATA TABLE

DATES:___________________________________ **PAGE** _______**of** _______

SESD PROJECT ID NO.______________________ **SITE NAME:**____

CITY:___________________________________ **STATE:**_______________

SESD Drum No.	Markings	Drum Size	Drum Type	Drum Condition	Drum Opening Team	Volume	Drum Contents Description Phase Color	Air Monitoring FID-PID / CGI / pH	Fl. Point / Hal.	Sample Collected	Sampler / Time
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				
		55 /	S / P /___	G / F / P		F / ½ / E	L / S				