

Guidance Manual  
For  
Collection of Samples  
During RCRA Inspections

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## 0.0 IMPORTANT CONTACTS TO KNOW

In preparing your sampling plan, selecting analytical methods, obtaining equipment, and other related tasks, the following EPA contact numbers will be helpful to know:

- Chief, Quality Assurance Management Section (QAMS)  
  
For technical assistance in preparing sampling plan, selecting methods, obtaining laboratory space.  
  
(415) 744-1492
- Chief, EPA Laboratory, Richmond, CA  
  
For obtaining laboratory space.  
  
(510) 412-2311
- Regional Sample Control Coordinator (RSCC), QAMS  
  
RSCC must be notified as far in advance as possible with the anticipated number of samples to be collected and analyzed. In addition, RSCC must be called immediately following shipment of any samples to the laboratory.  
  
(415) 744-1498
- EPA Logistics Management Specialist  
  
For obtaining sample containers, metal paint cans, PPE.  
  
(415) 744-2322
- Equipment Management Facility (EMFac), Manager, EPA Laboratory, Richmond, CA  
  
For obtaining sampling equipment.  
  
(510) 412-2335
- EPA Health and Safety Manager  
  
For assistance in completing health & safety plan.  
  
(415) 744-1491

## 1.0 PURPOSE AND OBJECTIVES OF GUIDANCE MANUAL

Environmental samples may be useful in evaluating whether a waste stream is hazardous or nonhazardous, in determining the existence of contamination, and in assessing whether or not a release of a hazardous waste or hazardous waste constituent has occurred. The primary objective of sampling during a Resource Conservation and Recovery Act (RCRA) site inspection is to obtain legally defensible data which will assist personnel in identifying releases of hazardous waste or hazardous waste constituents or in determining if a material can be classified as a characteristic hazardous waste. The data from samples acquired during a RCRA site inspection may become the basis of a RCRA enforcement action. Collected data may further be used in the development of appropriate corrective actions.

Prior to actually collecting environmental samples, upfront planning is critical to ensure that the samples obtained meet the objectives of the investigation. This guidance manual is designed to provide the RCRA inspector with guidance for collecting a limited number of samples of opportunity during routine RCRA inspections. Samples of opportunity are initial grab samples collected during inspections in order to gather data to determine whether a detailed statistical assessment may be necessary at a site.

The procedures outlined in this guidance manual pertain to the collection of less than twenty samples of opportunity (including QC samples, such as blanks and background samples) after the sampling objectives have been clearly defined and the health and safety risks determined to be minimal. For example, a sampling event may include collection of ten soil samples, one equipment blank, one duplicate, and one background sample.

Samples should only be collected following careful consideration of the intended use of the analytical data and the health and safety aspects of collecting and transporting the samples. More extensive sampling efforts, or those posing significant health and safety risks, require the development of more detailed sampling and health and safety plans than those presented in this guidance manual.

The specific procedures outlined in this guidance manual correspond to EPA Region IX Environmental Services Branch (ESB) guidelines. This guidance is intended for use by experienced inspectors who are already familiar with basic inspection procedures, such as basic health & safety procedures and how to properly document evidence. It is assumed that the ESB laboratory will be used for most analytical services. However, the procedures outlined are also applicable when coordinating sample analyses with a private laboratory.

### **1.1 PURPOSE OF PERFORMING RCRA COMPLIANCE SAMPLING**

Under RCRA, periodic inspections of hazardous waste facilities are required in order to evaluate each facility's continued compliance with applicable RCRA regulations and/or RCRA permit conditions. In addition to inspections, periodic compliance sampling may be helpful in order to fully evaluate the compliance of a facility and to make determinations such as one or more of the following:

- To determine whether site operations have resulted in a release that poses an actual or potential threat to human health and the environment;
- To determine if an unknown waste can be classified as a characteristic or listed hazardous waste; and
- To determine whether a permit or RCRA regulatory violation has occurred.

### **1.2 SAMPLING STRATEGIES FOR RCRA FACILITIES**

In general, EPA uses a biased approach in collecting samples to provide evidence of a hazardous waste or hazardous waste constituent release or permit violation. In the biased approach, samples are collected in areas where a release of hazardous waste or hazardous waste constituents has most likely occurred or where evidence exists indicating that a release may have occurred (i.e., stained soil). Background information collected during previous inspections can provide a basis for selecting waste streams or site locations to sample for hazardous waste characterization. Environmental media in locations such as lagoons, waste ponds, tailings, or disposal trenches may be sampled directly to determine waste characteristics and/or to identify releases of hazardous constituents. Further description of sampling strategies and protocols are provided in this document.

## 2.0 SAMPLING PLAN DEVELOPMENT

The purpose of a sampling plan is to document all field and laboratory activities associated with a sampling effort. An abridged sampling plan to be completed prior to a RCRA inspection is included as Appendix A.

The abridged sampling plan should be brief and concise but must always contain the following basic elements:

- General site information (site name, description, and EPA ID Number if available);
- Name and phone number of person requesting the analyses;
- Analytical sampling dates;
- Analyses requested;
- Number of samples, including QC samples;
- Matrix of each sample;
- Type of preservation for each sample;
- Analytical holding times;
- Expected concentration of the samples;
- Type and size of sample containers;
- Objectives/Purpose of sampling;
- Analytical parameters;
- Inspection personnel; and
- Equipment needs.

As this list indicates, the sampling plan allows EPA to tentatively schedule such resources as equipment and laboratory services sufficiently in advance of a proposed inspection. The sampling plan is thus an essential tool in investigating RCRA facilities. The Regional Sample Control Coordinator (RSCC) should be contacted at (415) 744-1498 at least two weeks in advance of the inspection in order to facilitate the scheduling of laboratory analyses. The RSCC should be provided with the title page, the Request for Analyses section, and Request for Analyses tables of the sampling plan as far in advance of the inspection as possible.

The abridged sampling plan should be approved by the EPA Chief of the Quality Assurance Management Section (QAMS) before field sampling begins. In addition, the abridged sampling plan should be submitted to ESB to serve as laboratory notification of intended potential sample analyses. Technical assistance for completion of the sampling plan can be obtained by contacting the Chief of QAMS.

### 3.0 HEALTH AND SAFETY PLAN DEVELOPMENT

No site activity should be conducted without a site safety plan. The contents of the safety plan prepared for a site depend on both the hazards known or suspected and the specific tasks planned for the inspection. A health and safety plan to be completed prior to a RCRA inspection is included as Appendix B (this plan can also be found on the G-drive on the LAN). The essential elements of the safety plan include:

- General site information;
- Personal protection equipment (PPE);
- Health and safety precautions;
- An on-site safety meeting;
- Route to nearest hospital;
- Emergency contact telephone numbers;
- Emergency procedures, especially those concerning the appropriate use of PPE in hazardous situations;
- Exposure limit for the contaminants of concern; and
- Chemical and physical hazards of concern.

The site safety plan is prepared by the EPA RCRA inspector or designate and forwarded to the EPA Region IX Health and Safety officer for review. The RCRA inspector must have appropriate training for the level of protection required at the site.

### 3.1 SITE ACCESS

Section 3007 of the RCRA Statute (42 U.S.C.A. §6927) specifies the following regarding the collection of samples for the purposes of developing or assisting in the development of any regulation or enforcing the provisions of RCRA by U.S. EPA:

- That U.S. EPA is authorized to "inspect and obtain samples from any person of any such wastes of any containers or labelling of such wastes";
- That after obtaining samples, prior to leaving the premises, the EPA person shall give to the owner, operator, or agent in charge a receipt describing the sample obtained and if requested a portion of each sample equal in volume or weight to the portion retained; and
- That if any analysis is made of such samples, a copy of the results of such analysis shall be furnished promptly to the owner, operator, or agent in charge.

Although inspectors have the authority to collect samples during an inspection, a facility may refuse to allow an inspector to collect samples if the inspector does not have the safety equipment required by the facility (as per OSHA requirements). In this case, it is generally possible to obtain access by returning with the proper safety equipment. However, other



reasons for denial of access may not be valid and may require obtaining a warrant to conduct the inspection. For more details on obtaining access, refer to the EPA RCRA inspection Manual.

#### 4.0 RECOMMENDED FIELD EQUIPMENT

A generic equipment checklist has been developed in support of sample collection and is presented as Appendix C. It is unlikely that all of the equipment listed in the checklist will be necessary for sampling during a routine RCRA inspection. Inspectors can select the necessary equipment from the checklist based on the type of sampling anticipated for the inspection.

In addition to the sampling equipment, personnel should be equipped with personal protective equipment (PPE), including steel-toed boots, hard hat, safety glasses, and respirator with appropriate cartridges. Also, a cooler or other appropriate shipping container must be obtained prior to sampling.

Sample containers, sampling equipment, and limited PPE may be obtained from the Equipment Management Facility (EMFac) at the EPA Region IX Laboratory in Richmond, California. EMFac is primarily a Superfund support activity but there are currently some supplies and equipment available to other programs including RCRA. The EPA Logistics Management Specialist should be contacted at (415) 744-2162 to obtain sample containers, metal paint cans, and PPE. The EMFac Manager may be contacted at (510) 412-2335 to obtain sampling equipment.

## 5.0 SAMPLE TERMINOLOGY, CONTAINERS, AND PRESERVATION TECHNIQUES

### 5.1 TERMINOLOGY

Some of the common terms used in the sampling program are defined in this section.

- **Sample Media/Sample Matrix** refers to the type of material that is collected as a sample. Sample media refers to the environmental media from which a sample is collected, such as air, water, or soil. Sample matrix specifically refers to the type of sample material within one media type. For example, silt, clay, and loam are different matrices within the medium of soil. A variety of media or sample matrices may be encountered at hazardous waste sites, including surface water, sediments, soil, oily wastes, pure or nearly pure chemicals, and chemical sludges. The media/matrices sampled during a RCRA inspection will depend on site-specific conditions.
- **Environmental Sample** is a sample of water, soil, or sediment that is associated with a RCRA facility but is distant from the source of contamination or waste stream. These samples may contain low concentrations of any single contaminant. Environmental samples do not require the special shipping procedures necessary for hazardous materials.
- **Hazardous Material Sample** is a sample from drums, bulk storage tanks, or obviously contaminated surface impoundments (lagoons), pits, or waste sites. These samples are expected to contain high concentrations of contaminants. Hazardous material samples require special shipping. Inspectors are discouraged from collecting hazardous material samples during routine RCRA inspections.
- **Sample Concentration Designations** refer to the concentration of contaminants expected in a sample. The definitions vary depending on the context being used. For example, high concentrations of a contaminant for health and safety purposes may be considered a medium or low concentration for laboratory analysis, or vice versa. In general, the following designations are recognized:

Low Concentrations - Generally less than 10 parts per million (ppm) of any single contaminant is expected to be detected in low concentration samples. These samples may be shipped as environmental samples.

Note: For concentrations of contaminants in water samples, the ppm unit of measurement is equivalent to mg/l and parts per billion (ppb) is equivalent to ug/l. For soil/sediment samples, ppm is equivalent to mg/kg and ppb is equivalent to ug/kg.

Medium Concentrations - Generally between 10 ppm to 150,000 ppm (15 percent) of a single contaminant is expected to be detected in medium concentration samples. These samples may be shipped as other environmental or hazardous material samples depending on the specific nature of the sample.

High Concentrations - Greater than 15 percent of any single contaminant is expected. In general, all high concentration samples are shipped as hazardous material samples.

IMPORTANT NOTE: For purposes of this guidance manual, only low concentration (environmental) or high concentration (hazardous material) samples will be recognized due to the difficulty in the field in distinguishing medium concentration samples and selecting an appropriate shipping procedure. The EPA inspector must exercise careful judgment in determining appropriate procedures. When in doubt, the sample should be handled as high concentration (hazardous material).

- **Leachate Sample** is a solution produced by the percolation of water through solid materials such as landfills, mine tailing materials, or soils. Such a sample may be either an environmental sample or hazardous material sample, depending on several factors (such as proximity to the source, concentration of the material in the source, infiltration rate of water, solubility, or adsorptivity). These samples are usually collected as surface waters issuing from embankments or impoundment features.
- **Grab or Discrete Sample** represents an instantaneous collection of a single amount of a substance, or an individual sample collected from a single source.
- **Composite Sample** is a combination of individual samples taken at multiple sampling points. The sample composite is collected by removing a fixed amount of the substance and combining it with other similarly collected amounts to produce a single sample for analysis.

The "site composite" involves combining samples from different locations or intervals at a single location on the site and can be used in some circumstances to increase analytical economy. Such a sample may provide useful data about average concentrations of contaminants or about the presence or absence of hazardous constituents at the site. It is advisable to save the discrete samples used in collecting the composite, in the event that analysis of the composite sample indicates high concentrations of any analytes of interest. If this occurred, it would be advisable to go back and analyze the discrete samples used to make up the composite sample (good for enforcement purposes). In general, compositing of samples for organics is not recommended because the mixing of the sample may

cause a loss of certain substances, especially volatiles, that may yield inaccurate results or yield false negative results through dilution. In addition, it should be noted that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

- **Duplicate/Split Sample** is a sample that has been apportioned into two or more containers from a single sample container. Split samples are duplicate samples often given to the owner, operator, site representative, or independent lab. If the split sample is being taken for the operator, the site representative must be contacted prior to sampling to allow for sampling oversight by a designated representative to be present at the time of sampling. Split samples can also be used to provide precision information on analytical procedures (i.e., a measurement of the reproducibility of measurements or a measurement of how close the duplicates are to each other).

Selection of sample types is based on background studies and observations of current site conditions. The EPA inspector will select the sample matrices while conducting the onsite inspection, complete the chain-of-custody documentation, and submit both the samples and the chain-of-custody documentation to ESB or the private laboratory for analyses.

## **5.2 SAMPLE CONTAINERS AND PRESERVATION TECHNIQUES**

Procedures for containing samples are guided by the sample matrix, the suspected level of concentration, and the analysis to be performed.

Samples collected during investigation of RCRA facilities are contained and preserved according to their matrix and the type of analysis scheduled. For a description of the recommended container for various chemical parameters and sample types, the amount of sample required, preservation requirements, and the maximum allowable holding time before sample analyses, refer to Appendix D.

Preservatives are added to retard biological action and to prevent loss of aqueous inorganic species, such as ions and complexes. The standard preservatives used by EPA to preserve environmental or low-concentration water and soil samples are included in Appendix D. Preservation methods are generally limited to the addition of a chemical to the sample, pH control and sample refrigeration. If chemical preservation is determined to be necessary, EPA Region IX recommends preservation in the field as opposed to obtaining sample bottles that have been preserved in advance. The preservation of low organic concentration sediments and soils requires cooling to 4°C. Hazardous material or high-concentration samples are collected in 8-oz glass jars, regardless of matrix, and do not require

preservation.

For samples requiring the addition of acid as a preservative (i.e., metals, volatiles), the adequacy of the preservation should be checked in the field as follows:

- Volatiles: To check on the adequacy of sample preservation, add two drops 1:1 HCl to a pH check vial prior to sample collection. The vial will be filled with sample fluid, the pH of the solution will be checked, HCl will be added as necessary to achieve a pH less than 2, the amount of acid added will be noted, and the pH check vial will be discarded properly. Samples should be collected once the pH check has been performed;
- Sample vials should not be reopened and/or refilled once the sample is collected. If air bubbles are present in a sample vial, the vial should be discarded properly and another vial should be used to collect the sample.
- Metals: For sample preservation, use a pipette to add 1:1 nitric acid to the sample bottle soon after sample collection to adjust the pH to less than 2. Mix the sample by capping and turning the bottle upside down. Check the pH by pouring a small amount of the sample into the bottle cap and checking the pH with pH paper. Discard the liquid in the cap after checking the pH. Repeat if necessary.

### 5.3 SAMPLE ANALYSIS

The purpose of collecting samples of opportunity during RCRA inspections will be to collect data which may be used to determine if a facility is in compliance with RCRA regulations and/or permitted requirements and to determine if additional sampling may be required at a site or facility. Sampling during an inspection may be particularly helpful in aiding inspectors in determining if a solid waste observed during an inspection is a characteristic or a listed hazardous waste.

To determine if a solid waste is a characteristic hazardous waste by sampling, the analytical results of the sampling should indicate whether the sample fails the Toxic Characteristic Leaching Procedure (TCLP) for one or more of the TC contaminants specified in 40 CFR 261.24. Determining that a solid waste is a listed hazardous waste by sampling is not as clear cut. At a minimum, inspectors should determine one or more listed waste codes that the waste of concern may fall under. The analytical results of sampling should indicate whether one or more of the chemical compounds found under these listed wastes is present.

Most samples of opportunity collected during RCRA inspections

will be analyzed using methods outlined in *Test Methods for Evaluating Solid Waste, SW-846* (SW-846). Some of the more commonly used SW-846 analytical methods can be found in Appendix D. Inspectors are encouraged to check for the most recent update of SW-846 in selecting analytical methods.

In order to obtain quality data, inspectors should ensure that the analytical methods chosen match the objective of the sampling effort. With so many environmental analytical methods to choose from, selecting the appropriate method can be quite complex with many variables to consider, such as setting detection limits, dealing with matrix interferences, as well as many others. Prior to any sampling effort, EPA Region IX strongly encourages inspectors to request assistance from ESB in selecting the proper analytical methods to ensure quality data.

#### **5.4 DISPOSAL OF CONTAMINATED MATERIALS**

It is the responsibility of the party conducting the sampling to properly dispose of all waste generated according to local, state, and federal regulations. Disposable clothing and gloves worn during sampling will be placed in plastic garbage bags for disposal as municipal waste. All waste and samples that are hazardous, as defined in 40 Code of Federal Regulations (CFR), part 261, must be contained, transported, and disposed of as a hazardous material. Transportation of hazardous materials must be conducted in accordance with 29 CFR (Department of Transportation [DOT]).

## 6.0 QUALITY ASSURANCE IN SAMPLING

The submission of an abridged sampling plan (Section 2.0) to the laboratory prior to sampling is an essential part of quality control. The sampling plan justifies the rationale for selecting samples and confirms contaminants to be analyzed and methods to be followed. Using appropriate sample containers and proper document control procedures, as described below, are also essential parts of quality assurance in sampling. An essential element of ensuring overall data quality is the documented cleanness of sample containers. EPA personnel must acquire bottles that have been cleaned and tested in accordance with EPA protocol and standards.

The use of quality assurance samples is strongly recommended to assist with evaluating the accuracy of the resulting enforcement data, regardless of how many primary samples are targeted for collection during a sampling event. When sampling equipment is decontaminated and reused in the field, an equipment blank must be collected. For enforcement purposes, inspectors may need to collect blank samples to demonstrate that there was no contamination of samples resulting in false positives.

### 6.1 SAMPLE CONTAMINATION

Contamination is generally understood to mean something that is inadvertently added to the sample during the sampling process (i.e., false positives) and is a common source of error in all types of environmental measurements. Typically, contamination of samples may occur at any of numerous points in the sample collection and analysis process. In the field, contamination may occur during sample collection, handling, storage, or in transport to the lab. After arrival at the lab, contamination may occur during storage, in the preparation and handling process, or during the process of sample analysis.

Equipment used for sample collection is a common route for introducing sample contamination in many types of environmental measurements. Cross-contamination may occur as a result of improper cleaning of sampling equipment. In addition, contamination may occur due to the use of sampling equipment made out of certain materials that may react with the sample itself. It is important to select sampling equipment made out of materials that will not contaminate the sample. For example, if sampling for the presence of extractable organics, do not use equipment or containers made out of plastic or polyvinyl chloride (PVC). For samples collected for organic analyses, EPA Region IX requires that sampling equipment be made of stainless steel, glass, or teflon.

If equipment used in the field is to be reused at multiple sampling locations, decontamination of equipment is recommended. In order to check the effectiveness of the decontamination procedure, equipment blanks are recommended as the most effective



tool for the assessment and control of sample contamination.

EPA Region IX generally recommends that only one type of blank be collected, and that blanks be collected in the following order of preference: equipment blank, field blank, and VOA travel blank.

#### **6.1.1 Equipment Decontamination**

Adequate decontamination of equipment to be reused at multiple sampling locations will help to ensure that cross contamination between samples does not occur. Careless sample handling and dirty sampling equipment can be sources of sporadic contamination, which can affect the measurement process by introducing false positives. The following is an EPA Region IX recommended generic procedure for decontamination of sampling equipment during low-level sampling:

1. Wash with non-phosphate detergent;
2. Tap-water rinse;
3. 0.1N nitric acid rinse (when cross contamination from metals is a concern);
4. Deionized/distilled water rinse;
5. Pesticide grade solvent rinse (when semivolatile and non-volatile organic contamination may be present);
6. Deionized/distilled water rinse (twice); and
7. Organic-free water rinse (HPLC grade water).

The above procedure is not appropriate for every field situation. Clearly document your procedure in the sampling plan.

#### **6.1.2 Equipment Blanks**

An equipment blank should be collected when sampling equipment is decontaminated and reused in the field or when a sample collection vessel (i.e., a bailer or a beaker) will be used. Equipment blanks are defined as samples which are obtained by running organic-free water over or through (whichever is more appropriate) the sample collection equipment after it has been cleaned. EPA Region IX recommends the use of organic-free water to collect blanks that are targeted for organics analysis and deionized/distilled water for blanks that are targeted for inorganics analysis, although this is not required if the source of water has been historically been contaminant-free.

The purpose of the equipment blank is to demonstrate that sampling procedures have not yielded false positive results. Specifically, the equipment blank checks the presence of any contaminants which may have been introduced to the sample through contact with sampling equipment. In addition, the use of an equipment blank is to verify the effectiveness of cleaning procedures. One blank should be collected for each type of sampling device used.

### **6.1.3 Field Bottle Blanks and VOA Travel Blanks**

A field bottle blank may be collected in situations when equipment decontamination is not necessary and when a sample collection vessel will not be used to collect a sample (i.e., with dedicated pumps). The field blank should be collected by pouring appropriate "blank water" (as described in Section 6.1.2) into a bottle at one of the locations where a sample had been collected (a sampling point). EPA recommends collecting one field blank per day when an equipment blank is not collected and when a sample collection vessel will not be used.

EPA recommends collecting one VOA travel blank per shipping container or cooler when water samples are collected for analysis of volatile organic contaminants and when no other blank is collected.

### **6.2 FIELD DUPLICATES**

Duplicate samples refer to samples collected at the same time from the same locations under identical conditions. Field duplicate samples provide a check on the precision of the sampling and analytical procedures. Field duplicates are particularly important for the sampling of heterogeneous wastes, such as soil and material from waste piles, because of the large degree of variability associated with these wastes. Duplicates should be collected from sampling points which are known or suspected to be contaminated. In addition, a rationale for the selection of duplicate locations, or the decision process which was used to select duplicate locations, should be documented.

Field duplicates and background samples will be collected, numbered, packaged, and sealed in the same manner as primary samples and will be submitted "blind" to the laboratory.

### **6.3 BACKGROUND SAMPLES**

Background samples are collected to document ambient concentration levels, which then can be compared to levels found on site, when appropriate. With any sampling program, sampling points beyond the limits of site contamination (i.e., upstream surface water samples) will be identified, if possible. In most instances, samples will be collected to determine if more in-depth sampling is required and to assess compliance with RCRA and other applicable regulations. This provides a means of assessing the true on-site concentration values. Background sample data are typically useful in determining the presence of metals at a site, as opposed to volatiles. Background samples should be analyzed for the complete set of parameters for each matrix. EPA Region IX recommends that ten percent of the samples collected during an investigation be background samples. Background samples should be representative of the sampling and analytical process. In many instances, such as samples collected from drums or samples collected from heterogeneous waste piles, background

sample media will not be available.

Field duplicates and background samples will be collected, numbered, packaged, and sealed in the same manner as primary samples and will be submitted "blind" to the laboratory.

## 7.0 COLLECTION OF SAMPLES OF OPPORTUNITY

Inspectors must remember that samples of opportunity are initial grab samples collected during inspections in order to gather data to determine whether a detailed statistical assessment may be necessary at a site. Based on observations during sampling and the results of samples of opportunity collected, more detailed sampling plans may be necessary to adequately assess site conditions. For additional guidance on development of detailed sampling plans, statistical sampling methods, and related topics, inspectors are encouraged to refer to the guidance documents listed in Section 10.0 (References) of this manual.

Inspectors must recognize the more stringent sample handling, transportation, and disposal requirements when collecting hazardous material samples during RCRA inspections. If hazardous material samples must be collected, then compliance with specific regulations governing the packaging, transportation, and disposal of hazardous materials is required. All waste and samples that are hazardous, as defined in 40 CFR, part 261, must be contained, transported, and disposed of as a hazardous material. Transportation of hazardous materials must be conducted in accordance with 29 CFR (DOT regulations). In addition, the use of air transportation for shipment of hazardous material samples requires compliance with the International Air Transportation Association (IATA) Dangerous Goods Regulations (see Appendix G). Guidance for the packaging and shipping of nonhazardous materials is addressed in Section 9.0.

### 7.1 WATER SAMPLING

This guidance manual does not provide specific information on definitions of size/depth of lakes, decision procedures for the selection of the number, locations, depths of samples, or working examples of lakes, ponds, and impoundments which may have been sampled. For specific guidance on selection of the number, locations, and depths of samples, inspectors should refer to *Guidance for Data Quality Objective Process*, EPA QA/G-4, Final, September 1994. In addition, more information on sampling procedures for water sampling may be found in the *Compendium on ERT Surface Water and Sediment Sampling Procedures*, EPA 540/P-91/005, January 1991.

#### 7.1.1 Surface Water: Sampling Locations, Equipment, and Techniques

Sampling of surface water may be a component of a RCRA inspection. This section describes the equipment, methods of collection, and sample site selection used when sampling surface water. Collection of surface water samples of opportunity may be required to help establish the existence or extent of contaminant migration and to collect data to determine if a more detailed sampling assessment is required. Such data may help investigators identify risks to populations and determine

appropriate remedial actions. Comparisons of water chemistry from sampling points upstream or upgradient to sampling locations both on-site and downstream or downgradient from the site are used to evaluate contaminant releases.

If possible, the surface water drainage in and around a site should be characterized prior to sampling using all available background information, including topographic maps and river basin studies. In general, sampling locations may include rivers, creeks, or streams running through or adjacent to a site, including those bodies of water that may receive surface runoff or leachate from a site. Surface water samples may also be collected from lakes, stock watering ponds, or other types of impoundments.

#### *Surface Water Sampling Locations*

Ease of access to the sampling location is sometimes an important health and safety consideration. Wading for water samples is not recommended in shallow lakes, ponds, and slow-moving rivers and streams because bottom deposits are easily disturbed, resulting in increased sediment in the overlying water column.

Rivers, Streams, and Creeks: Actual sample locations vary with the size of the water body and the amount of turbulence in the stream or river. Generally, with small streams less than about 20 feet wide, a sampling site can be found where the water is well mixed. In such cases, a single grab sample taken at mid-depth in the center of the channel is adequate to represent the entire cross section (a sediment sample can also be collected in the center of the channel). For slightly larger streams, at least one vertical composite should be taken from midstream, with samples taken just below the surface, at mid-depth, and just above the bottom.

Lakes, Ponds, and Impoundments: Sampling locations may include any adjacent bodies of water such as lakes, stock watering ponds, sediment of flood control ponds, marshes, or impoundments that might receive contaminants. The number of water sampling sites on a lake, pond, or impoundment will vary with the depth, size, and shape of the basin.

Standing surface waters have a much greater tendency to stratify than rivers and streams. The relative lack of mixing requires that more subsamples be obtained. In ponds and small impoundments, a single vertical composite at the deepest point may be sufficient. In naturally formed ponds, the deepest point is usually near the center; in impoundments, the deepest point is usually near the dam.

In lakes and larger impoundments, several vertical aliquots may be composited to form a single sample. Again, the number of vertical composites and the depths at which samples are taken are usually at the discretion of the sampling crew.

usually at the discretion of the sampling crew.

**Leachates:** Leachates can be formed when precipitation mixes with wastes. A leachate may enter groundwater systems causing deterioration of the water quality. In areas where the ground surface slopes steeply away from buried wastes, the leachate may "break out" or emerge on the ground surface. This situation is typically encountered at landfills or at the foot of waste residue disposal piles. Samples taken from leachate streams may have to be treated as medium or high-concentration samples, depending on the field evaluation.

### *Surface Water Sampling Equipment*

The equipment needed for surface water sampling during investigations of hazardous waste sites is minimal. In most instances, the sample container serves as the sampling device. The use of highly sophisticated or automatic sample devices is normally not required to collect the limited number of samples addressed by this guidance manual. Refer to Appendix C for the Field Equipment Checklist.

### *Surface Water Sampling Techniques*

Most samples taken during EPA RCRA investigations are grab samples. Typically, surface water sampling involves immersing the sample container in the body of water; however, the following suggestions will help ensure that the samples obtained are representative of site conditions.

- The most representative stream samples are obtained from mid-channel at a depth of about six inches below the surface in a well-mixed stream. For larger streams, at least one vertical composite should be taken from midstream, with samples taken just below the surface, at mid-depth, and just above the bottom;
- Stagnated areas or pools in a stream or river may contain zones of varying pollutant concentrations, depending on the physical/chemical properties of the contaminants and the proximity of these stagnated areas to the site;
- When sampling running water, it is suggested that sampling progress from downstream to upstream to eliminate sediment disturbance in subsequent samples;
- To sample a pond or other standing body of water, the surface area may be divided into grids. A series of samples taken from each grid is combined into one sample, or several grids may be selected at random (for more information on selecting grid sizes, inspectors should refer to *Guidance for the Data Quality Objective Process*, EPA QA/G-4, Final, September 1994).

- Care should be taken to avoid excessive agitation of the water during transfer from source to bottle. Agitation could result in the loss of volatile constituents;
- When collecting samples in 40 mL septum vials for volatile organic analysis (VOA), it is important to exclude any air space in the top of the bottle. For this procedure, the container is slowly filled to overflowing. After sealing, the bottle should be turned upside down and shaken once against the hand, then checked visually for air bubbles. If air bubbles are present, the sample bottle should be discarded. A new VOA vial should be used to collect the sample in order to minimize the loss of compounds by volatilization. In addition, the sampler should verify the adequacy of the preservation of the sample using pH paper and an extra vial which is not used as an actual sample (see procedure outlined in Section 5.2); and
- Do not sample at the water surface unless sampling specifically for an immiscible constituent on top of the water. Instead, the sample container should be inverted, lowered to the appropriate depth, turned up, and held at about a 45° angle with the mouth of the bottle facing upstream. Samplers may need to use the telescoping aluminum pole and clamp technique described in Section 7.1.2 (Surface Impoundments) for sampling in this situation rather than submerging a gloved hand into a potentially contaminated stream.

#### 7.1.2 Surface Impoundments

The sampling approach for on-site surface impoundments depends on such factors as the surface area, depth, and stratification of layers of the impoundment. For the purposes of collecting samples of opportunity as addressed by this guidance, the following are some general guidelines for collecting such samples:

- Several samples should be taken from different points in the impoundment. If the impoundment is large, the surface area may be divided into grids and a sample taken from each grid or from a predetermined number of randomly chosen grids;
- The safest technique for obtaining samples is to use a Teflon beaker or 8-oz glass jar clamped to the end of a telescoping aluminum pole. The sample medium is transferred from the Teflon beaker or jar to an appropriate sample container. The apparatus must be thoroughly decontaminated between samples; and
- Obtaining a sludge sample from the bottom of an

impoundment is limited to the use of the pole/Teflon beaker, which may be employed from the bank to scoop sludge from the bottom.

### 7.1.3 Leachate

One of the principal pathways for off-site movement of contaminants is leachate from buried wastes. Because leachate streams may contain contaminants, it is recommended that samples of leachate be handled and treated as hazardous material samples until reliable data indicate otherwise. The general guidelines for collecting leachate samples outlined below should be followed:

- If possible, leachate streams should be sampled under both low and high flow conditions;
- The sample container is used as the sample collection device because leachate stream samples will be grab samples. Unless prior arrangements have been made with the analytical laboratory, the container of choice is an 8 oz wide-mouth glass jar with a Teflon-lined lid and with a 10 percent head space allowance. The telescoping aluminum pole and clamp technique should be used when collecting leachate samples.
- If the leachate stream flow is low, a shovel or stainless steel spoon may be used to dig a small hole at the sampling point. The hole is allowed to fill with leachate and sufficient sample volume is then obtained. Disturbed and suspended sediments should be allowed to settle before collection of the leachate sample. Any sample turbidity should be noted in the field notebook and on the chain-of-custody form. The shovel or spoon should be properly decontaminated or disposed of after use.

## 7.2 SOIL AND SEDIMENT SAMPLING

The analysis of soil and sediment at the RCRA facility is intended to provide verification of hazardous waste releases, permit violations, the source of contamination, and the existence and extent of waste stream migration. Samplers should take into consideration the factors that contribute to dilution of a contaminant in soils and sediments such as oxidative or photochemical degradation, biological degradation, dispersion by surface runoff and streams, and dispersion due to infiltration by surface water.

Soil and sediment properties vary not only from one location to another, but also among the horizons of a given profile. The variation of the soil and sediment must be considered before sampling. The inspector should develop a concise objective of why the study is needed and the questions the study is to answer.



The EPA inspector must decide on the type of sampling dictated by site circumstances and whether a biased or statistical sampling method is required. The purpose of this guidance is to address the collection of a limited number of samples in order to determine compliance with RCRA regulations and/or permitted requirements and to collect data in order to determine if more in-depth sampling may be required. Statistical sampling is beyond the scope of this SOP guidance. Inspectors may refer to *Principles of Environmental Sampling*, ACS Professional Reference Book (1988) for more information on statistical environmental sampling methods. In the biased sampling approach, which is commonly practiced in RCRA investigations, samples are collected where spills or leaks of contaminants may have occurred. Biased samples are often used for enforcement to prove that contamination exists at a given site. Investigators can determine these areas through a variety of means, including site records, photographs, direct observation of visibly stained and/or discolored soils, or areas lacking vegetation. Sampling of pure product from drums, for example, should normally be collected for high concentration analyses.

#### 7.2.1 Surface Soil

Surface soil sampling under biased conditions may be selected after considering factors such as type of pollutant, length of time the area has been contaminated, the type of soil, and the past use of the area. Surface sampling may be appropriate in situations where the contaminant is easily sorbed, the spill or leak is recent, the soil has a high affinity for that particular pollutant, or if soil is contaminated by wind-or water-borne migration. In addition, surface soil sampling, which usually includes the upper 0 to 3 inches of soil, is necessary to evaluate the on-site exposure pathway. For both grab and composite sample collection, it is important to avoid mixing soil types (unless specifically required) and to collect samples from a uniform depth and from a uniform area.

The following describes sampling techniques and equipment for surface and near-surface soil sampling.

- Grab sample
  1. The most desirable sample collection instrument is a stainless steel spoon. For certain inorganic sampling objectives (such as metals), plastic scoops may be used;
  2. Sample collection devices for true surface sampling (top 0-3 inches of soil) include stainless steel scoops or hand trowels.
- Composite Sampling

1. Composite sampling is sometimes used to minimize sample numbers or to assess direct contact exposure. Compositing is not recommended for collection of VOA samples due to the loss of volatile constituents in the process of mixing the sample. The most desirable method of compositing soil subsamples is within a stainless steel bowl, aluminum pie tin, paper paint bucket, or on aluminum foil. Samples should be stirred continuously for at least 60 seconds; and
2. To provide a more representative sample, three to five subsamples may be collected in a consistent pattern surrounding the designated sample locations and then composited. Typically, by increasing the number of subsamples, the interpretive value of the data is reduced. By compositing samples of widely variable concentrations, those species appearing intermittently or in small quantities may be diluted out or masked by high detection limits imposed by species occurring in high concentrations.

#### 7.2.2 Sediment Sampling

Sediment samples are valuable for locating contaminants of low water solubility and high soil binding affinity. Surface water samples might show trace quantities of contaminants, thus leading EPA inspectors to believe that a waste stream is of minor concern; however, the analysis of sediments might indicate otherwise. Heavy metals and high molecular weight hydrocarbons are examples of contaminants that might be found in greater concentrations in sediments than in the surface waters.

Sediment samples can be collected from rivers, creeks, ponds, flood control ponds, lakes, lagoons, and impoundments.

A review of available background information may indicate the types of substances that may be present in sediments at a site. The following items should be considered when sampling.

- Many pollutants adsorb on sediments having a large surface-to-volume ratio. Therefore, silts and clays typically contain higher concentrations of organic compounds and trace metals than do coarser sediments such as sands and gravels;
- Samples for organic analyses should not be collected from areas exposed to the air during periods of low flow or low recharge; and
- Sediment samples should be obtained from the area nearest the suspected contaminant source.

### *Sediment Sampling Techniques*

Simple techniques can usually be employed for sediment sampling. Most samples will be grab samples, although sometimes sediment taken from various locations may be combined into one sample to reduce the amount of analytical support required. Suggested techniques include the following:

- In small streams with low flow rates or near the shore of a pond or lake, an 8-oz wide-mouth jar may be used to scrape up the sediments and to contain the sample. Four to eight ounces of material should be collected. Stainless steel spoons may aid in sample collection;
- To obtain sediments from larger streams or from a location further from the shore of a pond or lake, a Teflon beaker (attached to a telescoping aluminum pole by a clamp) may be used to dredge sediments. In most circumstances, a number of sediment samples should be collected along a cross-section of a river or stream to characterize the bed material adequately; and
- To obtain sediment from rivers or in deeper lakes and ponds, samples may be obtained by lowering a spring-loaded sediment dredge or benthic sampler to the appropriate depth. The sediments thus obtained are placed into the sample container. The sampling device must be decontaminated between locations.

#### **7.2.3 Waste Piles**

Waste piles may consist of sludges from various processes or contaminated soil excavated during site closure operations. The sampling approach depends on the size or volume of the pile, known or suspected waste constituents, and other physical factors such as soil type, density of the pile, and presence of other material such as crushed steel drums. Because it is likely that waste piles will be heterogeneous, it is best to select as large a test sample as practical for sample preparation.

For waste piles, composite samples may be particularly useful due to the large degree of variability associated with these heterogeneous wastes. Compositing may be useful in overcoming the lack of homogeneity over time or in the distribution of chemical species, but compositing may also dilute peak values of concern. Therefore, if peak concentrations of analytes are important, compositing should be supplemented with grab samples taken at sites where and when high values are suspected.

- For collecting grab or composite samples from waste piles, the pile can be divided into a number of grids corresponding to the number of samples to be taken, and a surface sample taken from each grid using a stainless steel scoop.

### 7.3 COLLECTING SAMPLES FROM CONTAINERS

Techniques for sampling from containers are determined by the type of container, access to the container (opened/closed), and the physical state of the material in the container (solid, liquid, sludge). Please note that inspectors must not sample from tanks, tank trucks, or tank cars until adequate guidance is available.

In general, samples collected from containers and waste sources should be similarly labelled and must be handled and treated as hazardous material samples until reliable data indicate otherwise (see 40 CFR, part 261 for definition of hazardous materials, 29 CFR for DOT regulations, and Appendix G - IATA Dangerous Goods Regulations). If hazardous materials must be collected, then compliance with specific regulations governing the packaging, transportation, and disposal of hazardous materials is required (see 29 CFR, 40 CFR part 261, and IATA Dangerous Goods Regulations). In addition, hazardous materials must be disposed of in accordance with all state and federal regulations. Guidance for the packaging and shipping of hazardous materials is addressed in Section 9.0. Detailed guidelines for collecting such samples may be found in "Compendium of ERT Waste Sampling Procedures," EPA/540/P-91/008. Some general guidelines for collecting samples from drums are presented below.

#### 7.3.1 Drum Sampling: Liquid, Sludge, and Solid Waste

Liquid Waste: Samples can be collected from drums by using a glass tube commonly referred to as a glass thief or drum thief. This sampling device consists of an inexpensive and easily discarded or decontaminated glass tube. The sample is collected by opening the drum and lowering the glass tube slowly through the open bung. If possible, the tubing should be inserted at an angle to help obtain a representative sample. For most liquids, tubing with an inside diameter of 6 to 8 mm is adequate, but a larger bore may be needed for more viscous material. The top end of the tubing is then blocked with a thumb or rubber stopper. The tubing is raised from the drum and held over the sample bottle, while the thumb or stopper is raised slightly to break the vacuum and let the sample trickle slowly into the container. The operation is repeated until adequate volume is obtained. After the sample container is sealed, the tube may be discarded by inserting it back into the drum where it is broken, or cleaned for subsequent use. This sampling device has the advantages of being disposable as well as easily cleaned.

Following are several important notes on sampling liquid wastes from containers:

- A 10 percent head space to allow for expansion of the collected waste should be allowed in any container used;

- Sampling personnel should avoid contact with the material on the outside of the tubing. In addition, samplers must not allow the material spilled on gloves during the sampling process to come in contact with the material from a different drum. Potentially dangerous reactions may occur, which could result in failure of the protective clothing. Where the presence of incompatible materials is suspected, the sampler may wear several disposable gloves. The outer glove can be disposed of after each sampling operation. Gloved hands should never be used in an intended way in which contaminated materials come in contact with gloves, since the chemical compatibility of gloves varies depending on the material from which the gloves were made. The health and safety plan will prescribe PPE requirements;
- A rubber pipet bulb may be used on the sampling tube. Care must be taken to prevent the material from contacting the bulb;
- The sampling team should attempt to determine if multiphase liquid layers are present in the drum by observing the contents of the glass tubing;
- If the sampling party notes any evidence of a reaction (such as light or smoke), all equipment should be abandoned and the site evacuated;
- If the glass tubing becomes clouded or smoky when it is inserted in the drum, it should be withdrawn and discarded since this may indicate the presence of caustics or hydrofluoric acid. A length of rigid Teflon tubing and a Teflon sample container should be substituted; and
- Sampling personnel should avoid opening any unidentified drums or containers without proper PPE and monitoring equipment. The health and safety plan will prescribe PPE requirements.

Sludge Waste: For collection of sludge samples from containers, larger bore glass tubing or an 8-ounce wide mouth glass jar fastened to a length of wooden dowel may be used. A minimum of 20 to 30 grams (g) of concentrated sludge is required for extraction and preparation. This 20 to 30 g sample would be approximately equivalent to an 8-ounce wide mouth glass jar three-quarters full. The sampling apparatus may be discarded with other waste accumulated during the sampling operation.

Solid Waste: Occasionally, a drum containing solid or granular waste material may be encountered. This type of material is often contained in fiberboard drums. An 8-ounce wide mouth glass jar attached to a length of wooden dowel may be used for an open-

top drum, and a brass deflagrating spoon attached to a length of wooden dowel may be used to obtain material through a bung hole. Only 20 to 30 g of this type of material are required.

It is possible that when a glass tube is inserted through a hole in a drum, a solid layer may be encountered below the liquid layer. If the solid layer is soft, it is probably a sludge and the sample may be obtained using the method previously described. If the solid is hard, it could be a hardened sludge, or it may be a less common reactive metal such as sodium. Apply pressure to a length of glass tubing carefully to obtain a small core for analysis. A stainless steel microspatula could be used to remove the material from the end of the tubing. Care should be taken to keep the material from contacting water. It should also be noted whether the material discolors on contact with air.

## 8.0 DOCUMENT CONTROL

Many investigations at RCRA facilities may eventually provide evidence of RCRA regulatory or permit violations under the enforcement provisions of RCRA. All information, data, samples, and documents must be legally defensible, must be treated as evidence and must be retrievable when the project is completed.

### 8.1 DOCUMENTATION

All observations and other pertinent data must be recorded in an individual, bound logbook. It is important that logbook entries be made in ink and be objective, legible, dated, and signed by the person recording the information. Logbooks are helpful for completing reports, for recall of events during possible future testimony, or for use by other EPA personnel if the investigator is no longer available. At a minimum, it is recommended that the logbook contain the following information:

- Project name, site address, date(s), and site identification number;
- Site sketch;
- Sample type, location, and depth descriptions, and sample identification numbers;
- Type of sampling equipment;
- Chronological description of field activities, including date and time of sample collection;
- References to documents associated with the sampling effort, such as other field log books, the sampling and analysis plan, and health and safety plan;
- All variances from approved standard operating procedures, including the sampling and analysis plan;
- Observations and details important to the integrity of the samples that may affect data quality objectives;
- Name of laboratory to receive the samples;
- Recipients of split samples, including the date, time, location of sample transfer, and the identification number of the chain of custody record form;
- Levels of safety protection; and
- Date of entry and signature of inspector.

Logbooks and chain-of-custody records are considered to be accountable documents. Each of these must be retrievable and

accounted for at the end of the project. Official EPA Chain-of-Custody Record forms, Custody Seals, Traffic Report Forms, and Field QC Summary forms may be obtained from the RSCC at QAMS (see Section 0.0).

Sample bottle labels make it possible for individual samples to carry unique identifying codes that are recorded in the logbook for the project. A unique code makes sample handling and differentiation easier and provides a reference code for the laboratory to use when reporting analytical results. Completion of EPA sample bottle labels is addressed in Section 9.1.

## **8.2 CORRECTIONS TO DOCUMENTATION**

If errors are made while recording observations and other information, the error can be corrected at once by drawing a single line through the wrong information, initialing the line, and entering the correct information. Any error correction required after the fact can be accomplished by drawing a single line through the wrong information and entering the correct information. It must be accompanied by a signature and date of entry. Explanations of corrections should be done in a narrative style and must be complete.

## **8.3 PHOTOGRAPHS**

Photographs are important to document the cause-and-effect relationship of the RCRA facility inspection, especially in the areas of environmental damage and permit violations. Whenever samples are collected, photographs should be taken to verify the written description in the field logbook. Photographs should contain an object to portray the scale of the subject being photographed. Immediately after developing, the back side of photographic prints will be labelled with the appropriate information so the field notebook can be used to reference the photos in the proper order. In all cases where a photograph is taken, the following information must be written in the logbook.

- Time, date, location and, if appropriate, weather conditions;
- Complete description of identification of the subject in the photograph, and reason why the photograph was taken;
- The sequential number of the photograph and the film roll number; and
- Name of person taking the photograph.

## **8.4 CONFIDENTIAL INFORMATION**

Any information given to an investigator and declared to be



confidential should be treated as confidential business information (CBI). Justification for the confidentiality claim must be provided at the time of the claim. All confidential information should be stored in a separate locked file and recorded in a logbook for tracking purposes. Such information should be available on a need-to-know basis to appropriate personnel. A check-out system should be used to control access and prevent loss of records. Confidential information must not be reproduced except by approval of the person in charge of the documents. For more information about CBI, contact the Section Chief of the RCRA Permitting Section.

Any data declared confidential according to the provisions of the Toxic Substances Control Act (TSCA; Public Law 94-469) must be received only by a person with the necessary specific clearance. All others should avoid receiving such confidential information.

## **9.0 SAMPLE HANDLING, PACKAGING, AND SHIPPING PROCEDURES**

After samples are collected, they must be handled in a manner which will ensure that their integrity is maintained. Proper packaging and shipping requirements for samples are discussed below.

### **9.1 BOTTLE LABELLING REQUIREMENTS**

Each bottle should be labelled with the following information: sample location, analytical parameter, EPA method number, date of sample collection, project name, time of sample collection, and any preservative added to the sample.

### **9.2 CHAIN-OF-CUSTODY DOCUMENTATION**

An unbroken chain of sample custody, both in the field and the laboratory, is necessary to ensure that no one has tampered with the samples -- an important consideration in legal proceedings. Chain-of-custody records include the logbook, chain-of-custody form (Appendix E), and custody seals (Appendix F). Custody forms are consecutively numbered and must be obtained prior to sampling from the laboratory or from QAMS.

After sample collection and identification, the samples should be maintained under the chain-of-custody procedures. If the sample collected is to be split with the owner or operator of the site or other regulatory entities, it must be aliquoted into similar sample containers. Bottle labels completed with identical information are attached to each of the sample bottles prior to sample collection and are marked as "split." EPA Region IX QAMS recommends that unique codes and sample identification numbers be used on chain of custody forms so that field QC samples cannot be differentiated from primary samples by the laboratory. The field notebook should contain a key for the identification of field QC samples.

Each person involved with the sample must know chain-of-custody procedures. Because samples can serve as legal evidence, the possession of samples must be traceable from the time they are collected until they are introduced in legal proceedings. Chain-of-custody procedures are summarized below.

- A sample is under custody if:
  1. It is in your actual possession;
  2. It is in your view, after being in your physical possession;
  3. It was in your physical possession and then locked in a car or room to prevent tampering; and
  4. It is in a designated and identified secured area.

- Field Custody Procedures

1. To the extent possible, the quantity and types of samples and sample locations are determined before the actual field work. The sample bottle label should be completed and affixed to the container prior to sample collection; as few people as possible should handle the samples.
2. Sample labels are to be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because a ballpoint pen would not function in freezing weather. In addition, EPA Region IX recommends sealing the label to the bottle with a piece of wide clear tape long enough to completely go around the bottle.
3. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. The sample collectors for the samples listed in a chain-of-custody form must sign the upper left box of this form.
4. The inspector must review all field activities to determine whether proper custody procedures were followed during the field work, and must decide if additional samples are required. The inspector should notify the EPA Regional QA Officer of any breach or irregularity in chain-of-custody procedures.

- Transfer of Custody and Shipment

1. Samples are accompanied by a chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to a mobile laboratory, or to the permanent laboratory.
2. Samples will be properly packaged for shipment and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked or secured with fiberglass or nylon strapping tape for shipment to the laboratory. Preferred procedure is to affix two signed and dated chain of custody seals on the front of the cooler and two signed and dated chain

of custody seals on the back of the cooler. The custody seal should be folded over and stuck to the shipping container so the gap between the lid and the body of the shipping container is covered.

3. The responsible party must accept/decline split samples. One of the four appropriate "relinquished by/received by" signature boxes should be signed and dated by the responsible party who accepts the split samples. A copy of the chain of custody is given to the responsible party. If he/she is not present, the copy will be mailed certified to him/her. This communication must be recorded in the field logbook.
4. All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record will accompany the shipment and a copy will be retained by the project leader for the file.
5. The overnight carrier contracted by EPA Region IX for shipment of samples should be contacted when arranging for shipping to assist in completing specific airbill information required, especially when shipping hazardous material samples. The airbill will be retained as part of the permanent chain-of-custody documentation.

#### Receipt for Split Samples

A receipt must be provided for samples split with facility owners. A chain-of-custody form can be modified to serve as a receipt document or the receipt form.

### **9.3 PACKAGING AND SHIPPING PROCEDURES**

The shipper (person signing the shipping papers) is responsible for ensuring that samples are packaged in accordance with the provisions of this manual. All sample containers must be placed inside a strong shipping container. A sturdy metal cooler lined with hard plastic liner is recommended. Based on the concentration of the samples to be shipped, one of the following procedures below is to be followed.

#### **9.3.1 Shipment of Low Concentration Samples**

- Using fiberglass or nylon strapping tape, secure the drain plug at the bottom of the cooler to ensure that water from melting ice does not leak from the cooler.
- Check screw caps for tightness and mark the sample volume level on the outside of large containers with a wax pencil.

- Place a custody seal over each bottle cap. Wrap glass bottles with bubble wrap and tape.
- For large glass containers such as half-gallon jugs for extractable organic analysis, pieces of carved-out plastic foam may be used to help keep the containers in place.
- Small containers, such as 40 mL septum vials for volatile organic analysis, may be placed in small plastic bags, or secured in test tube racks. Padding, such as bubble wrap, should be wrapped around the vials for protection. When shipping the vials with larger containers, steps should be taken to prevent the larger containers from shifting, which could cause the vials to break.
- Place each individual bottle into a Zip-loc plastic bag and seal by taping the plastic bag shut.
- Place the protected bottles in a cooler, which has been double-lined with two large plastic bags. Add double-bagged ice to maintain the proper temperature inside the cooler. Double-bagging the ice will prevent water leakage into the cooler. Loose ice must not be poured into the cooler.
- Fill empty spaces in the cooler with vermiculite, or other appropriate absorbent in order to absorb any spilled material. EPA recommends that Styrofoam™ not be used as an absorbent since the properties of Styrofoam™ do not allow it to be an effective absorbent. Line the bottom of the cooler inside the plastic bag with a 3-inch layer of cushioning and absorbent material such as styrofoam popcorn or vermiculite.
- The chain-of-custody record should be sealed in a large sealed plastic bag attached to the inside of the cooler lid so that it will not be damaged by leaks.
- The lid of the cooler should be closed and the latch fastened. Seal the cooler shut with strapping tape. The cooler should be wrapped completely (twice around) with nylon strapping tape in two locations. Affix four signed and dated custody seals to the cooler, two on the front and two on the back. Cover custody seals with clear tape.
- The following self-adhesive labels should be placed on the outside of the cooler:
  - Name and address of receiving laboratory with return address.

- Label on the top of the cooler indicating "This End Up".
- "Fragile" on two sides (optional)
- Additional labels, such as "Liquid in Glass," are optional.
- The samples should be shipped by overnight carrier by completing the airbill as described in Section 11.2. Personnel should be prepared to open and reseal the cooler for inspection, if required.

It is important to notify the EPA Region IX RSCC by telephone at (415) 744-1498 within 24 hours after sample shipment. Please provide the RSCC with the following information:

- Sampling contractor or EPA staff name(s);
- Site name;
- Total number(s) by concentration and matrix of samples shipped to each laboratory;
- Carrier, airbill number(s), method of shipment (e.g., priority next day);
- Shipment date and intended laboratory receipt date;
- Irregularities or anticipated problems associated with the samples; and
- Whether the current shipment is the final shipment or if additional samples will be shipped under the same case number.

#### 9.3.2 Shipment of Hazardous or High Concentration Samples

IMPORTANT NOTE: If hazardous materials must be collected, then careful attention must be paid to packaging and transportation requirements. In addition, hazardous materials must be disposed of in accordance with all state and federal regulations.

Guidance for the packaging and shipping of hazardous materials is addressed in this section. The ESB laboratory and many private analytical laboratories will not accept unknown hazardous material samples. When collection of a hazardous material sample is warranted, the inspector must be able to properly identify, label, and ship the "dangerous goods" according to appropriate regulations (Appendix G). Specific requirements may be found in 40 CFR 172.402 and the International Air Transport Association (IATA) Dangerous goods regulations (Appendix G). Because the EPA contract carrier uses air transportation, IATA regulations apply. Some of the most common shipping names and associated UN shipping

numbers for dangerous goods include the following: (1) UN 3082 Environmentally hazardous substance, liquid, n.o.s.; (2) UN 3077, Environmentally hazardous substance, solid, n.o.s.; and (3) UN 8027, Other regulated substance. Use of these shipping names also requires use of appropriate labels (i.e., flammable, corrosive), containers, and packaging.

Shipping procedures for flammable liquids (or solids) are similar to the procedures outlined for environmental samples, with the exception that EPA policy requires that the samples be contained in metal paint cans for added security. In addition, ice is not added to the cooler. Follow the procedure outlined in Section 9.3.1 with the following additional steps:

- Line the bottom of the cooler inside the plastic bag with a 3-inch layer of cushioning and absorbent material such as vermiculite.
- To prevent leakage, fill container no more than 90 percent full at 130°F. If an air space in the sample container would affect sample integrity, place that container within a second container to meet the 90 percent requirement.
- Place sample bottle inside a 1-quart (preferred) or 1-gallon metal paint can and cushion it with enough vermiculite between the bottom and sides of the can and bag to prevent breakage and absorb leakage. Pack one bag per can. Use clips to hold can lid secure and tight.
- Place the following information, either hand-printed or in label form, on the metal can:
  - Laboratory name and address
  - "Flammable Liquid, n.o.s. UN1993" or "Flammable Solid, n.o.s. UN1325." Not otherwise specified (n.o.s.) is not used if the flammable liquid (or solid) is identified. Then the name of the specific material is listed before the category (for example, Acetone, Flammable Liquid) followed by its appropriate UN number found in the DOT hazardous materials table at Title 49 of the Code of Federal Regulations (CFR) Part 172.01, (49 CFR 172.101).
  - "Dangerous When Wet" must be used with "Flammable Solid" label if material meets the definition of a water-reactive material.
  - "Cargo Aircraft Only: must be used if net quantity of sample in each package is greater than 1 quart (for "Flammable Liquid, n.o.s.") or 25 pounds (for

"Flammable Solid, n.o.s.").

- Place the metal cans in the cooler. Additional cushioning and absorbent material should be placed between the metal cans by filling all remaining space with vermiculite. The top of the liner should then be tied shut and sealed with tape.
- The custody record should be sealed in a large plastic bag attached to the inside of the cooler lid so that it will not be damaged by leaks. The lid of the cooler should be closed and the latch fastened.
- After acceptance by the overnight carrier, the cooler should be wrapped completely (twice around) with nylon strapping tape at two locations.
- Affix signed and dated custody seals on the front right and left rear aside of the cooler. Cover seals with clear tape.
- The following self-adhesive labels are placed on the outside of the cooler.
  - All labels previously described for the metal cans.
  - Arrows indicating "This End Up" on all four sides.
  - "This End Up" on the top of the lid.



## 10.0 REFERENCES

1. Standard Operating Procedures for the Collection of Samples of Opportunity at EPA Region 8 RCRA Facilities, October 1993.
2. Principles of Environmental Sampling, Edited by Lawrence H. Keith, American Chemical Society, 1988.
3. *Characterizing Heterogeneous Wastes: Methods and Recommendations*, EPA/600/R-92/033, February 1992.
4. *Quality Assurance/Quality Control Guidance for Removal Activities*, Interim Final, EPA/540/G-90/004, April 1990.
5. *Preparation of a U.S. EPA Region 9 Field Sample Plan for EPA-Lead Superfund Projects*, U.S. EPA Region 9, Quality Assurance Management Section, Document Control Number 9QA-05-93, August 1993.
6. Handouts from Hazardous Waste Site Sampling Course (EPA Course 161.5), EPA Region IV, Environmental Services Division.
7. *Compendium of ERT Waste Sampling Procedures*, U.S. EPA, Office of Solid Waste and Emergency Response, EPA/540/P-91/008, January 1991.
8. *Compendium of ERT Surface Water and Sediment Sampling Procedures*, Office of Solid Waste and Emergency Response, EPA/540/P-91/005, January 1991.
9. Test Methods for Evaluating Solid Waste, SW-846, Volumes I-II with updates through IIB (January 1995).
10. *Guidance for Data Quality Objective Process*, EPA QA/G-4, Final, September 1994
11. IATA Dangerous Goods Regulations, 36th Edition, effective January 1, 1995.

APPENDIX A  
Abridged Sampling Plan

# ABRIDGED SAMPLING PLAN (Page 1 of 2)

## I. Site/General Information

Facility/Site Name: \_\_\_\_\_ EPA ID#: \_\_\_\_\_

Address: \_\_\_\_\_

General Location: \_\_\_\_\_

Anticipated Sampling Date(s): \_\_\_\_\_

## II. Site Description

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## III. Sampling Objectives and Rationale (including number and type of field QC samples planned):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## IV. Environmental Samples Requested

### Sample(s) Analysis:

Type/Number of Samples	Test	Method	Type of Bottle	Preservation
_____	VOA	_____	_____	_____
_____	Semivolatiles	_____	_____	_____
_____	Metals	_____	_____	_____
_____	Ignitability	_____	_____	_____
_____	Corrosivity	_____	_____	_____
_____	Reactivity (sulfide)	_____	_____	_____
_____	Reactivity (Cyanide)	_____	_____	_____
_____	TCLP-VOA	_____	_____	_____
_____	TCLP-BNA	_____	_____	_____
_____	TCLP-Herb	_____	_____	_____
_____	TCLP Pesticide	_____	_____	_____
_____	TCLP-metals	_____	_____	_____
_____		_____	_____	_____
_____		_____	_____	_____
_____		_____	_____	_____
_____		_____	_____	_____

## ABRIDGED SAMPLING PLAN (Page 2 of 2)

### V. Field Equipment Requested

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### VI. EPA Inspection Personnel

Personnel/Telephone Number

Responsibility

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### VII. Miscellaneous

Lab Name/Location: \_\_\_\_\_

Facility Contact: \_\_\_\_\_

### VIII. Signature/Approvals

Sample Plan Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

Approved by: \_\_\_\_\_ Date: \_\_\_\_\_

APPENDIX B  
Health & Safety Plan



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF POLICY AND MANAGEMENT  
HEALTH AND SAFETY OFFICE

SITE SAFETY AND HEALTH PLAN

**I DESCRIPTION OF FIELD ACTIVITY**

Site: \_\_\_\_\_ Site Phone: (\_\_\_\_) \_\_\_\_ - \_\_\_\_

Location: \_\_\_\_\_ Superfund : Yes \_\_\_\_ No \_\_\_\_

SSP Prepared By: \_\_\_\_\_ Mail Code ( - - ) Phone 4-\_\_\_\_

Proposed Date of Response/Investigation: \_\_\_\_\_

Purpose/Objective: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Background Review: Complete \_\_\_\_ Preliminary \_\_\_\_

Background Material Attached: Yes \_\_\_\_ No \_\_\_\_

Indicate which of the following information source(s) were consulted:  
State and/or Local Agency, State and/or Federal OSHA, NIOSH, EPA  
files, Site Operator and Local Fire Department.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Overall Hazard Summary: Low \_\_\_\_ High \_\_\_\_

Medium \_\_\_\_ Unknown \_\_\_\_

Route of Exposure: Inhalation \_\_\_\_ Skin Contact \_\_\_\_ Ingestion \_\_\_\_

Map or Sketch Attached: Yes \_\_\_\_ No \_\_\_\_

## II. SITE CHARACTERISTICS

A. Facility Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

B. Hazardous Substance(s) Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

C. Disposal/Storage Methods: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

D. Status: Active \_\_\_\_\_ Inactive \_\_\_\_\_ Unknown \_\_\_\_\_

E. History: (Include accidents or injuries on-site, complaints from public, previous releases and agency reports): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

F. Is personal protective equipment required by Facility/Site Management? List equipment and specific areas where required: \_\_\_\_\_  
\_\_\_\_\_

G. Are employees working at the facility/site monitored for exposure to airborne contaminants? If so, describe situation: \_\_\_\_\_  
\_\_\_\_\_

H. Do employees working at the facility/site participate in an occupational medical monitoring program? If so, are special biological tests performed or Biologic Limit Values (BLVs) used? \_\_\_\_\_  
\_\_\_\_\_

I. Describe medical monitoring procedures for evidence of personnel exposure: \_\_\_\_\_  
\_\_\_\_\_

J. Is there an on-site emergency alarm system? If so, describe alarm: \_\_\_\_\_  
\_\_\_\_\_

K. Is there an eyewash/safety shower available on site? If not, explain alternate procedures (where applicable): \_\_\_\_\_  
\_\_\_\_\_



### III. HEALTH AND SAFETY CONSIDERATIONS:

**A. Hazard Assessment** (Toxic effects, TLV, odor threshold, reactivity, stability, flammability, and operational hazards with sampling, decontamination, etc.) Attach Material Safety Data Sheets for toxic compounds: \_\_\_\_\_

<u>Areas of Concern</u>	<u>Hazard Potential</u> (High, Med, Low)	<u>Precautions</u>
<u>Explosive:</u>	_____	_____
<u>Oxygen Deficient:</u> (e.g. Confined Spaces)	_____	_____
Additional workplan is required for confined space entry.		
<u>Particulates:</u> (dusts, mists, asbestos fibers, etc.)	_____	_____
<u>Toxic Gases/Vapors:</u>		
a. General (HNU meter)	_____	_____
b. Specific: (e.g., Sorbent or Detector Tube)	_____	_____
<u>Skin/Eye Contact:</u>	_____	_____
<u>Ultraviolet (UV):</u>	_____	_____
<u>Heat Stress:</u>	_____	_____
<u>Falling Objects:</u> (stacked drums, etc.)	_____	_____
<u>Falls:</u> pits, ponds, elevated work places)	_____	_____

<u>Radioactive Hazard:</u>	<u>Hazard?</u>	<u>Exposure rate</u>	<u>Source</u>
Background	yes no	_____	_____
Alpha particles	yes no	_____	_____
Beta particles	yes no	_____	_____
Gamma radiation	yes no	_____	_____

**B. Monitoring Instruments and Techniques To Be Used:** (air, environmental, personnel):

	<u>Date calibrated</u>
_____ a. Combustible gas indicator	_____
_____ b. Oxygen concentration meter	_____
_____ c. Radiation survey meter (Type: _____)	_____
_____ d. Organic vapor survey meter (Type: _____)	_____
_____ e. Colorimetric tubes (Type: _____)	_____
_____ f. Other (_____)	_____

#### IV. WORKPLAN INSTRUCTIONS

##### Hazardous Substance Sampling and Field Investigations

A. Level of Protection: A \_\_\_\_ B \_\_\_\_ C \_\_\_\_ D \_\_\_\_

Modifications: \_\_\_\_\_

Surveillance Equipment and Materials: \_\_\_\_\_

B. Entry Procedures: \_\_\_\_\_

C. Field Investigation and Decontamination Procedures:  
Perimeter Establishment: Zones of Contamination Identified? \_\_\_\_\_

Public Perimeter Identified? \_\_\_\_\_ Map/Sketch Attached? \_\_\_\_\_

Notes: \_\_\_\_\_

##### D. EPA Personnel

Name	Field Duties	Cert. Level (B,I,A)*	Initial 24/40hr train.	INSERT DATE		
				Last 8-hr train.	Last Resp. fit-test	Last Med. exam
-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----

E. Work Schedule/Limitations (Heat Stress) :

F. Communications: Radio Call Sign: \_\_\_\_\_  
Frequency/Channel: \_\_\_\_\_

G. Spill Containment Procedures (loose particulate absorbent,  
spill control pillows, spill pads/blankets): \_\_\_\_\_

\* Indicate Basic, Intermediate, or Advanced Certification Levels

H. Decontamination Procedures (contaminated protective clothing, instruments, equipment, etc.): \_\_\_\_\_

I. Disposal Procedures (contaminated equipment, supplies, disposal items, wash water, etc.): \_\_\_\_\_

J. Project Team Leader is responsible to provide each designated EPA employee with a copy of this Site Safety Plan, in addition, pre-entry briefings are to be held prior to initiating any site activity, and at such other times as necessary. Initial ( )

### VII. EMERGENCY PRECAUTIONS:

<u>Compound</u>	<u>Acute Exposure Symptoms</u>	<u>First Aid</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

A. Nearest Hospital Emergency Room. Note: for remote locations, give directions to hospital and attach map.

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

Address: \_\_\_\_\_

Telephone: \_\_\_\_\_

B. Emergency Services (Telephone Numbers)

1. Fire: \_\_\_\_\_

2. Police: \_\_\_\_\_

3. Ambulance: \_\_\_\_\_

C. Poison Control Center of San Francisco  
Toxic and Hazardous Chemicals: 415-476-6600 (24-Hr.)

D. Regional Health and Safety Office: 415-744-1607 or -1606

E. Regional Radiation Representative: Mike Bandrowski 744-1048  
Steve Dean (415) 744-1045.

## VI. APPROVALS

**PLEASE NOTE:** The Project Team Leader is responsible for submitting the site-specific Post-Visit Summary to the Health and Safety Office within two weeks after completing the trip (see Appendix B).

Date:

Project Team Leader: \_\_\_\_\_

Supervisor: \_\_\_\_\_

Health and Safety Office: \_\_\_\_\_

**APPENDIX A**  
**U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 9**  
**OFFICE OF POLICY AND MANAGEMENT**  
**HEALTH AND SAFETY OFFICE**

## ATMOSPHERIC HAZARD GUIDELINES<sup>1</sup>

<u>Monitoring Equipment</u>	<u>Hazard</u>	<u>Ambient Level</u>	<u>Action</u>
Combustible gas indicator	Explosive atmosphere	< 10% LEL	Continue monitoring with caution.
		10%-25%	Continue monitoring with extreme caution, especially as higher levels are encountered.
		> 25% LEL	Explosion hazard! Withdraw from area immediately.
Oxygen % meter	Oxygen	< 19.5%	Monitor wearing SCBA. <b>NOTE:</b> Combustible gas readings are not valid in atmospheres with < 19.5% oxygen.
		19.5%-22%	Continue investigation with caution. SCBA not needed, based on oxygen content only.
		> 25.0%	Discontinue inspection Fire potential. Consult specialist.
Radiation Survey Instrument	Ionizing radiation	3 to 5 times above background (approx 30 - 50 uREM/HR).	Consult Health Physicist.
		> 1.0 mR/hr	Stop work. Consult Health Physicist.

# **APPENDIX A** **ATMOSPHERIC HAZARD ACTION GUIDES (continued)**

<u>Monitoring Equipment</u>	<u>Hazard</u>	<u>Ambient Level</u>	<u>Action</u>
Colorimetric tubes for	Organic and inorganic  vapors/gases	Depends on chemical	Consult standard reference manuals  permissible air concentrations. <sup>4</sup>
Photoionization detector (PID) <sup>2</sup>	Organic vapors/gases	1) Depends on species	Consult standard reference manuals for permissible air concentrations
Standard		2) Total  response mode	Consult EPA  Operating Safety Guides. <sup>5</sup>
Flame ionization detector (FID) <sup>3</sup>	Organic vapors/gases	1) Depends on chemical	Consult standard reference manuals for air concentrations/ toxicity data.
Standard Safety		2) Total  response mode	Consult EPA  Operating Guides

NOTE 1: Reference - Standard Operating Safety Guides, Office of  
Emergency and Remedial Response, Hazardous Response Support  
Division, November, 1984.

2: HNU Photoionizer or other PID instrument.

3: Century Organic Vapor Analyzer (OVA) or equivalent.

4: ACGIH-TLVs, OSHA PELs (29 CFR 1910.120), NIOSH - Pocket Guide  
to Chemical Hazards, MSDSs, etc.

5: Background to 5 ppm above background - Level C  
5 to 500 ppm - Level B

**APPENDIX E**  
**U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 9**  
**OFFICE OF POLICY AND MANAGEMENT**  
**HEALTH AND SAFETY OFFICE**

**POST-VISIT SUMMARY**

Employee(s): \_\_\_\_\_ **Field**  
Activity Date(s): \_\_\_\_\_

Site: \_\_\_\_\_ **City/State:** \_\_\_\_\_

If Superfund, list Site Number: \_\_\_\_\_

1. Protection Level Used: A \_\_\_\_\_ B \_\_\_\_\_ C \_\_\_\_\_ D \_\_\_\_\_

a. Level B/C - Skin protection: Tyvek \_\_\_\_\_ Tyvek/Saranex \_\_\_\_\_  
Acid/Rain \_\_\_\_\_ Other \_\_\_\_\_

b. Level C - Identify Cartridge/Canister \_\_\_\_\_

c. Level D - Provide Justification for Hazard Pay Differential.

2. Monitoring Instruments Used: \_\_\_\_\_ **On-Site Levels**

a. Combustible gas indicator	_____ % LEL
b. Oxygen concentration meter	_____ % Oxygen
c. Radiation survey meter (Type: _____)	_____ mR/hr
d. Organic vapor survey meter (Type: _____)	_____ ppm
e. Colorimetric tubes (Type: _____)	_____ ppm
f. Other ( _____ )	_____

3. List possible chemical exposure: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Did any of the above-mentioned employees experience respirator cartridge breakthrough? If yes, explain. Yes \_\_\_\_\_ No \_\_\_\_\_

4. Equipment Decontamination: a. Clothing b. Respirator c. Monitoring

Disposed: \_\_\_\_\_

Cleaned: \_\_\_\_\_

No Action: \_\_\_\_\_

5. Approximate time in hot zone/exclusion area: \_\_\_\_\_

6. Was Medical attention/exam required for this response: Yes \_\_\_\_\_ No \_\_\_\_\_  
If yes, explain: \_\_\_\_\_  
\_\_\_\_\_

7. Date \_\_\_\_\_ Supervisor's  
Prepared: \_\_\_\_\_ Signature: \_\_\_\_\_ Date: \_\_\_\_\_

For additional comments use reverse, or additional pages.

APPENDIX C  
Equipment Checklist



# APPENDIX C

## FIELD EQUIPMENT CHECKLIST

EQUIPMENT	RECOMMENDED AMOUNT	ACTUAL AMOUNT	CHECKED BY: (INITIAL)
Nylon rope (50')	1 bag		
Strapping tape	2 rolls		
Tape measure (50')	1		
Utility knife	1		
Polyvinyl chloride (PVC) scoops	as needed		
Stainless steel spoons/microspatula	as needed		
Field logbook with pens	1		
Flashlight	1		
Rubber pipet bulb	1		
Drum thief (Coliwasa tube) and rubber stopper	2		
80-oz amber bottles	as needed		
1-liter amber bottles	as needed		
1-liter poly bottles	as needed		
40-ml volatile organic analysis (VOA) vials	as needed		
4-oz glass jars	as needed		
8-oz glass jars	as needed		
Tyvek coveralls	3		
Surgical gloves (indicating the material the gloves are made of)	1 box		
Nitrile gloves	3 pair		
Trash bags (10)	1 box		

<b>EQUIPMENT</b>	<b>RECOMMENDED AMOUNT</b>	<b>ACTUAL AMOUNT</b>	<b>CHECKED BY: (INITIAL)</b>
Shipping labels	as needed		
Chain-of-custody forms	3		
Bottle labels	as needed		
Chain-of-custody forms	3		
Bottle labels	20		
Wooden dowel	1		
Supplies for compositing soil samples (see Section 8.2.1 for options - stainless steel bowl, aluminum pie tin, paper paint bucket)	as needed		
Shovel (leachate sample collection)	as needed		
pH paper or pH meter	one roll of paper or one meter		
Rigid Teflon <sup>TM</sup> tubing	as needed (indicate length)		
Teflon <sup>TM</sup> beaker	as needed		
Aluminum telescoping pole & clamp	as needed		

**NOTE:** The items listed on this checklist as well as the recommended amounts are only intended to be used as a guide to inspectors. It is possible that equipment not listed on this checklist will be needed for a particular sampling event, just as it is likely that the recommended amounts of equipment needed for a particular sampling event will probably vary depending on the sampling event.

Sampling personnel are to be equipped with steel-toed boots, hard hat, safety glasses, and respirator with cartridges. Cartridges are not included in the sample kit because they have expiration dates and should be discarded if expired.

## APPENDIX D

SW-846 Test Methods to Know...

# APPENDIX D

## COMMON SW-846 TEST METHODS TO KNOW ...

From "Test Methods for Evaluating Solid Waste, SW-846, Volume I-II with updates through II-8", January 1995.

PARAMETER/EPA WASTE CODE	METHOD NUMBER	SAMPLE CONTAINER		SAMPLE PRESERVATION S = Solid L = Liquid	HOLDING TIME
		Solid	Liquid		
TCLP zero headspace extraction (volatiles)/ D004	1311/ZHK	<sup>1</sup> 4 oz jar	2 40-mL vials	<sup>1</sup> L-1:1HCl < 2pH S&L-cooled 4°C	14 days
TCLP extraction (semivolatiles , pesticides, herbicides, & metals)/D004	1311/ SVNET	<sup>1</sup> 16 oz jar	2 1-liter amber glass	<sup>1</sup> S&L-cooled 4°C	14 days
Ignitability/ D001	1010	8 oz jar	N/A	N/A	14 days
Reactivity/ D003	SW-846 Ch. 7, Vol. I	8 oz jar	N/A	N/A	ASAP
Corrosivity/ D002  pH Steel	9045	8 oz jar	N/A	N/A	ASAP
	1110	8 oz jar	N/A	N/A	ASAP
Chromium VI	7196	3 oz jar	1 liter poly	S&L-cooled 4°C	24 hours
Mercury	7470	8 oz jar	1 liter poly	L-HNO <sub>3</sub> < 2 pH	28 days
Cyanide	9010	4 oz jar	1 liter poly	L-2mls of 10N NaOH S & L - cooled 4°C	14 days

NOTE: Sample container and preservation requirements are based on environmental or low concentration samples. Hazardous material or high concentration samples are collected in 8-oz glass jars, regardless of matrix, and do not require preservation. Each 8 oz wide mouth glass jar that contains high concentration sample media needs to be placed in a metal paint can for shipment.

<sup>1</sup>For TCLP, if the solids content of the sample exceeds 0.5 percent, the volumes specified for liquids may not be sufficient to perform a TCLP extraction.

N/A	=	Not applicable
C	=	Celsius
oz	=	Ounce
mL	=	Milliliter
HCL	=	Hydrochloric acid
HNO <sub>3</sub>	=	Nitric acid
NaOH	=	Sodium hydroxide
Poly	=	Polyethylene
Amber	=	Glass Amber

# APPENDIX D (Continued)

## COMMON SW-846 TEST METHODS TO KNOW ...

From "Test Methods for Evaluating Solid Waste, SW-846, Volume I-II with updates through II-B", January 1995.

PARAMETER/EPA WASTE CODE	METHOD NUMBER	SAMPLE CONTAINER		SAMPLE PRESERVATION S = Solid L = Liquid	HOLDING TIME
		Solid	Liquid		
Volatiles	8240	4 oz jar	2 40-mL vials	L-1:1HCl < 2pH S&L-cooled 4°C	14 days
Semivolatiles (BNA)	8270	16 oz jar	2 1-liter amber glass	S&L-cooled 4°C	14 days
Pesticides	8080	8 oz jar	80 oz amber	S&L-cooled 4°C	L-7 days S-14 days
Herbicides	8151	8 oz jar	80 oz amber	S&L-cooled 4°C	L-7 S-14
PCBs	8080A	8 oz jar	1 liter amber	S&L-cooled 4°C	7 days
Fuels	8015B	4 oz jar	2 40-mL vials	S&L-cooled 4°C	14 days
Halogenated VOCs	8010A	4 oz jar	2 40-mL vials	L - Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> S&L-cooled 4°C	14 days
<sup>2</sup> Aromatic VOCs	8020A	4 oz jar	2 40-mL vials	L - HCl < 2pH S&L-cooled 4°C	14 days
Combined purgables	8021	4 oz jar	2 40-mL vials	L - HCl < 2pH S&L-cooled 4°C	14 days
<sup>2</sup> Phenols	8041	8 oz jar	1 liter amber	L - HCl < 2pH S&L-cooled 4°C	7 days
Metals	6010/7000 series	8 oz jar	1 liter poly	L-0.1N HNO <sub>3</sub> < 2pH	6 months
Cyanide	9010	4 oz jar	1 liter poly	L-2mls of 10N NaOH S&L-cooled 4°C	14 days
Mercury	7470(L) 7471(S)	8 oz jar	1 liter poly	L - HNO <sub>3</sub> < 2 pH	28 days
Conductivity	9050/ 120.1 <sup>1</sup>	8 oz jar	1 liter poly	S&L-cooled 4°C	28 days
pH	9040(L) 9045(S)	4 oz jar	1 liter poly	S&L-cooled 4°C	ASAP (in field)
Phthalates	8060	8 oz jar	1 liter amber	S&L-cooled 4°C	7 days

NOTE: Sample container and preservation requirements are based on environmental or low concentration samples. Hazardous material or high concentration samples are collected in 8-oz glass jars, regardless of matrix, and do not require preservation.

<sup>1</sup>"Methods for the Analysis of Water and Wastes", EPA document.

<sup>2</sup>It is recommended that Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> be used to preserve samples that are suspected of containing residual chloride, and that Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> be added to the samples before HCl to ensure that free chloride is removed properly.

APPENDIX E

Chain-of-Custody Form and Instructions

## Instructions for Completing

### CHAIN-OF-CUSTODY FORM

#### A. GENERAL:

A chain-of-custody form must be completed for each cooler shipped. (Note: If samples come from multiple sites, one chain-of-custody form should accompany samples from each site). The carbon copies of the original form should be distributed as follows:

Original copy (white)	-	Shipped with samples
First copy (pink)	-	Retained in EPA regional files
Second copy	-	Presented to site owner or mailed if no representatives are on site.

#### B. PREPARATION:

1. Project Number	-	Enter number
2. Project Name	-	Enter number and case number
3. Samplers	-	Enter signature of all samplers who have signed custody seals
4. Station Number	-	Enter sample points/locations listed in sampling plan
5. Date	-	Enter sampling date
6. Time	-	Enter time
7. Comp	-	Check if sample is composite
8. Grab	-	Check if sample is grab
9. Station Location	-	Location description
10. No. of Containers	-	Enter number of containers collected at each station point.
11. Insided slanted lines	-	Enter EPA Method Number(s)
12. Remarks	-	Enter airbill number and custody seal number
13. Relinquished by	-	Signature of one of the samplers. Must match "samplers" at top of custody record
14. Date/Time	-	Enter date and time samples are relinquished to laboratory or to Federal Express
15. Received by	-	Enter name of carrier (Federal Express)
16. Received by lab	-	Signature of individual in laboratory who signed for samples

## CHAIN OF CUSTODY RECORD

[illegible]

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## APPENDIX F

### Chain-of-Custody Seal

## SAMPLE CUSTODY SEAL

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICIAL SAMPLE SEAL

SAMPLE NO.

SIGNATURE

PRINT NAME AND TITLE *(Inspector, Analyst or Technician)*

DATE

SEAL BROKEN BY

DATE

EPA FORM 7500-2 (11-79)

This seal may be placed around each container top in such a manner that attempts to open the container will cause damage to the seal.

Alternatively, this seal may be placed on the front and rear side edge of the shipping cooler instead of on each sample container

Enter shipping date on the seal and sign your name.

**APPENDIX G**  
**IATA Dangerous Goods Regulations**



# DANGEROUS GOODS REGULATIONS

36th Edition. Effective 1 January 1995



UN or ID No.	Proper Shipping Name/Description	Class or Division	Subsidiary Risk	Hazard Label(s)	PG	PASSENGER AIRCRAFT		CARGO AIRCRAFT ONLY		Special Provisions see Subsect. 4.4
						Pkg Instr.	Max Net Qty/ Pkge	Pkg Instr.	Max Net Qty/ Pkge	
A	B	C	D	E	F	G	H	I	J	K
△ 3143	Dye, solid, toxic, n.o.s. †	6.1		Poison Poison Poison Poison Poison	I II II III III	606 613 Y613 619 Y619	5 kg 25 kg 1 kg 100 kg 10 kg	607 615 619	50 kg 100 kg 200 kg	A3 A5
	Dynamite, see Explosive, blasting, type A † (UN 0081)					Forbidden		Forbidden		
	Electric squibs, see Igniters † (UN 0325, UN 0454)									
	Electric storage batteries, see Batteries, etc. † (UN 2794, etc.)									
	Electrolyte (acid) for batteries, † see Battery fluid, acid (UN 2796)									
	Electrolyte (alkali) for batteries, † see Battery fluid, alkali (UN 2797)									
	Electron tubes containing mercury, see Mercury contained in manufactured articles (UN 2809)									
□ 3257	Elevated temperature liquid, n.o.s., at or above 100°C and below its flash point	9				Forbidden		Forbidden		
□ 3256	Elevated temperature liquid, flammable, n.o.s., with flash point above 60.5°C, at or above its flash point	3				Forbidden		Forbidden		
□ 3258	Elevated temperature solid, n.o.s., at or above 240°C	9				Forbidden		Forbidden		
	Enamel, see Paint (UN 1263)									
3166	Engines, internal combustion (LPG powered) including where fitted in machinery or vehicles	9		Miscellaneous		Forbidden		900 and 901 No Limit		A67 A70 A87
3166	Engines, internal combustion (other than LPG powered) including where fitted in machinery or vehicles	9		Miscellaneous		900 and 901 No Limit		900 and 901 No Limit		A67 A70 A87
	Engines, rocket, see Rocket motors, etc. † (UN 0250, UN 0280, UN 0395, etc.)					Forbidden		Forbidden		
1960	Engine starting fluid, with flammable gas	2.1		Flammable gas		Forbidden		200	150 kg	A1
△ 3082	Environmentally hazardous substance, liquid, n.o.s. *	9		Miscellaneous	III	914	No Limit	914	No Limit	A97
△ 3077	Environmentally hazardous substance, solid, n.o.s. *	9		Miscellaneous	III	911	No Limit	911	No Limit	A97
2558	Epibromohydrin	6.1				Forbidden		Forbidden		
2023	Epichlorohydrin	6.1		Poison Poison	II II	609 Y609	5 L 1 L	611	60 L	
	1,2-Epoxybutane, see 1,2-Butylene oxide, stabilized (UN 3022)									
	Epoxyethane, see Ethylene oxide, etc. (UN 1040)									
2752	1,2-Epoxy-3-ethoxypropane	3		Flammable liquid Flammable liquid	III III	309 Y309	60 L 10 L	310	220 L	
	2,3-Epoxy-1-propanal, see Glycidaldehyde (UN 2622)									
	2,3-Epoxypropyl ethyl ether, see 1,2-Epoxy-3-ethoxypropane (UN 2752)									
□ 3272	Esters, n.o.s. *	3		Flammable liquid Flammable liquid Flammable liquid Flammable liquid	II II III III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L	A3
1035	Ethane, compressed	2.1		Flammable gas		Forbidden		200	150 kg	A1
1961	Ethane, refrigerated liquid	2.1				Forbidden		Forbidden		
	Ethanol, see Ethyl mercaptan (UN 2363)									

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UN or ID No.	Proper Shipping Name/Description	Class or Division	Subsidiary Risk	Hazard Label(s)	PG	PASSENGER AIRCRAFT		CARGO AIRCRAFT ONLY		Special Provisions see Subject 4.4
						Pkg Instr.	Max Net Qty/Pkge	Pkg Instr.	Max Net Qty/Pkge	
A	B	C	D	E	F	G	H	I	J	K
△ 3019	Organotin pesticide, liquid, toxic, flammable • flash point 23°C or more	6.1	3	Poison & Flammable liquid Poison & Flammable liquid Poison & Flammable liquid Poison & Flammable liquid	I II II III	603 609 Y609 611 Y611	1 L 5 L 1 L 60 L 2 L	604 611 618	30 L 60 L 220 L	A4 A6
△ 2786	Organotin pesticide, solid, toxic •	6.1		Poison Poison Poison Poison Poison	I II II III III	606 613 Y613 619 Y619	5 kg 25 kg 1 kg 100 kg 10 kg	607 615 619	50 kg 100 kg 200 kg	A5 A6
	Orthophosphoric acid, see Phosphoric acid (UN 1805) Osmic acid anhydride, see Osmium tetroxide (UN 2471)									
2471	Osmium tetroxide	6.1		Poison	I	608	5 kg	608	50 kg	
△ 8027	Other regulated substance †	9		Miscellaneous		906	No Limit	906	No Limit	A48
☐ 8035	Other regulated substance, aromatic extract or flavouring, not falling under the definitions of Classes 1 - 8, liquid †	9		Miscellaneous		906	100 L	906	220 L	
☐ 8036	Other regulated substance, aromatic extract or flavouring, not falling under the definitions of Classes 1 - 8, solid †	9		Miscellaneous		906	100 kg	906	200 kg	
⊗ 3139	Oxidizing liquid, n.o.s. •	5.1		Oxidizer Oxidizer Oxidizer Oxidizer	II II III III	503 Y503 514 Y514	1 L 0.5 L 2.5 L 1 L	505 515	5 L 30 L	A3
3098	Oxidizing liquid, corrosive, n.o.s. •	5.1	8	Oxidizer & Corrosive Oxidizer & Corrosive Oxidizer & Corrosive	I II II III III	Forbidden 501 Y501 514 Y514	1 L 0.5 L 2.5 L 1 L	501 506 515	2.5 L 5 L 30 L	A3
△ 3099	Oxidizing liquid, toxic, n.o.s. •	5.1	6.1	Oxidizer & Poison Oxidizer & Poison Oxidizer & Poison Oxidizer & Poison	I II II III	Forbidden 501 Y501 514 Y514	1 L 0.5 L 2.5 L 1 L	501 506 515	2.5 L 5 L 30 L	A3
1479	Oxidizing solid, n.o.s. •	5.1		Oxidizer Oxidizer Oxidizer Oxidizer Oxidizer	I II II III III	509 508 Y508 516 Y516	1 kg 5 kg 2.5 kg 25 kg 10 kg	512 511 518	15 kg 25 kg 100 kg	A3
3085	Oxidizing solid, corrosive, n.o.s. •	5.1	8	Oxidizer & Corrosive Oxidizer & Corrosive Oxidizer & Corrosive	I II II III III	508 508 Y508 516 Y516	1 kg 5 kg 2.5 kg 25 kg 5 kg	511 511 518	15 kg 25 kg 100 kg	A3
3137	Oxidizing solid, flammable, n.o.s. •	5.1	4.1			Forbidden		Forbidden		
△ 3087	Oxidizing solid, toxic, n.o.s. •	5.1	6.1	Oxidizer & Poison Oxidizer & Poison Oxidizer & Poison Oxidizer & Poison	I II II III III	508 508 Y508 516 Y516	1 kg 5 kg 1 kg 25 kg 10 kg	511 511 518	15 kg 25 kg 100 kg	A3
3100	Oxidizing solid, self-heating, n.o.s. •	5.1	4.2			Forbidden		Forbidden		
3121	Oxidizing solid, water-reactive, n.o.s. •	5.1	4.3			Forbidden		Forbidden		
	Oxirane, see Ethylene oxide, etc. (UN 1040)									

0.5 gram of lithium or lithium alloy or if a solid cathode battery contains more than 1 gram of lithium or lithium alloy, it must not contain a liquid or gas which is considered dangerous unless the liquid or gas, if free, would be completely absorbed or neutralized by other materials in the battery.

Lithium cells and lithium batteries are also regarded as not subject to these Regulations if they meet the following requirements:

**A45(7)** each cell contains not more than 5 grams of lithium or lithium alloy;

**A45(8)** each battery contains not more than 25 grams of lithium or lithium alloy;

**A45(9)** each cell or battery is the type proved to be non-dangerous by testing in accordance with the *United Nations Recommendations on the Transport of Dangerous Goods, Tests and Criteria (UN Document ST/ST/AC.10/11)*. Such testing must be carried out on each type prior to the initial transport of the type; and

**A45(10)** cells and batteries are designed or packed in such a way as to prevent short circuits under the normal conditions of transport.

△ **A46** Mixtures of solids which are not subject to these Regulations and flammable liquids may be transported under this entry without first applying the classification criteria of Division 4.1, providing there is no free liquid visible at the time the substance is packaged and the packaging is leak-proof.

△ **A47** Genetically modified micro-organisms which are infectious must be transported as UN 2814 or UN 2900.

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**A48** Packaging tests are not considered necessary.

**A49** Other inert material or inert material mixture may be used at the discretion of the appropriate authority of the State of origin, provided this inert material has identical phlegmatizing properties.

**A50** Mixtures of solids which are not subject to these Regulations and poisonous liquids may be transported under this entry without first applying the classification criteria of Division 6.1, providing there is no free liquid visible at the time the substance is packaged and the packaging is leak-proof. This entry must not be used for solids containing a Packing Group I liquid.

**A51** Carbon, activated (UN 1362) and Carbon, animal or vegetable origin (non-activated) (UN 1361) in powdered, granulated or lump form, are not subject to these Regulations when:

**A51(a)** in the case of lumps, the carbon has been cooled for 4 or more days since manufacture; or

**A51(b)** in the case of powdered carbon or of granulated carbon in a granule size less than 8 mm, the carbon has been cooled for 8 or more days since manufacture either by being air-cooled in thin layers or by a process ensuring an equivalent degree of cooling; or

**A51(c)** in the case of carbons made by processes which reduce the flammable volatile material, they cannot be ignited by a match and they meet the requirements of the following self-heating test:

#### SELF-HEATING TEST FOR CARBON

##### Apparatus

(1) **Oven:** A laboratory oven fitted with internal air circulation and capable of being controlled at  $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$ .

(2) **Wire mesh cube:** Construct an open top cube, 100 mm side, from phosphor-bronze gauze 18,000 mesh per square centimetre (350 × 350 mesh). Insert it inside a slightly larger, well-fitting cube, made of phosphor-bronze gauze 11 mesh per square centimetre (8 × 8 mesh). Fit the outer cube with a handle or hooks so that it can be suspended from above.

(3) **Temperature measurement:** A suitable system to measure and record the temperature of the oven and in the centre of the cube. Chromel-alumel thermocouples, made from 0.27 millimetre diameter wire, are suitable for measuring the temperature range expected.

##### Procedure

Fill the cube with carbon and tap down gently, adding carbon until the cube is full. Suspend the sample in the centre of the oven which has been preheated to  $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . Insert one thermocouple in the centre of the sample and the other between the cube and the oven wall. Maintain the temperature of the oven at  $140^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for 12 hours and record the oven temperature and the temperature within the sample.

##### Results

(1) Non-activated carbon, non-activated charcoal, carbon black, lamp black fail the test if the temperature within the sample at any time during the 12 hours exceeded  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ).

(2) Activated carbon, activated charcoal fail the test if the temperature within the sample at any time during the 12 hours exceeded  $400^{\circ}\text{C}$  ( $672^{\circ}\text{F}$ ).

△ **A52** Mixtures not meeting the criteria for flammable gases (Division 2.1) must be transported under UN 3163.

△ **A53** This substance is not subject to these Regulations when coated.

△ **A54** This substance is not subject to these Regulations when in any other form.

△ **A55** Solvent extracted soya bean meal containing 1.5% or less oil and 11% or less moisture, which is substantially free of flammable solvent, is not subject to these Regulations.

△ **A56** This entry applies to articles which may be classified in Class 1 in accordance with 3.1.1 which are life-saving vehicle air bags or seat-belts, when transported as component parts and when packaged as for transport have been tested in accordance with the External Fire (Bonfire) Test, Test series 6(c) of Part I of the *UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria*, with no explosion of the device, no fragmentation of device casings, and no projection hazard or thermal effect which would significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity. These air bags or seat-belts when installed in vehicles or in completed vehicle components such as steering columns and door panels are not subject to these Regulations. The quantities given in Columns H and J of 4.2 (List of Dangerous Goods) refer to the net mass of the finished article.

**Note:** For the carriage of a self-propelled vehicle, see Packing Instruction 901.

**A57** Receptacles must be so constructed that explosion is not possible by an increase of internal pressure; otherwise, except for UN 2555, the substance must be classified as Class 1.

△ **A58** An aqueous solution containing 24% or less alcohol by volume is not subject to these Regulations.

**A59** A tire assembly unserviceable or damaged is not



## Dangerous Goods Regulations

solids when tested in accordance with 3.4.2.2(b)(i) (chips, if necessary, crushed and sieved to a particle size of less than 1.25 mm).

**A87** The "Miscellaneous Dangerous Goods" label is not required when the article is not fully enclosed by packaging, crates or other means that prevent the ready identification of the article.

- △ **A88** Zirconium wire, sheets and strip, dry 254 microns or thicker, are not subject to these Regulations for air transport.

**A89** In determining the ammonium nitrate content, all nitrate ions for which a molecular equivalent of ammonium ions is present in the mixture shall be calculated as ammonium nitrate.

- △ **A90** Ammonium nitrate fertilizers of this composition and within these limits are not subject to these Regulations if shown by a trough test not to be liable to self-sustaining decomposition and providing they do not contain an excess of nitrate greater than 10% by mass (calculated as potassium nitrate). See Tests and Criteria, Part IV of the *UN Recommendations on the Transport of Dangerous Goods* (UN Document ST/SG/AC.10/11) for trough tests.

- △ **A91** A nitrocellulose solution containing not more than 20% nitrocellulose may be transported under the requirements for "Paint", UN 1263 or UN 3066, or "Printing Ink", UN 1210, as appropriate.

- △ **A92** Lead compounds which, when mixed in a ratio of 1:1000 with 0.07 M (molar) hydrochloric acid and stirred for one hour at a temperature of  $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , exhibit a solubility of 5% or less are considered insoluble (see ISO 3711:1990).

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A108**

- △ **A93** A heat-producing article is not subject to these Regulations when the heat-producing component or the energy source is removed to prevent unintentional functioning during transport.

- △ **A94** Not used.

**A95** This entry is not to be used for Polychlorinated biphenyls (UN 2315).

**A96** Only formulations which, in laboratory testing, neither detonate in the cavitated state or deflagrate, which show no effect when heated under confinement and which exhibit no explosive power may be transported under this entry. The formulation must be thermally stable, i.e. the SADT is  $60^{\circ}\text{C}$  or higher for a 50 kilogram package. Formulations not meeting these criteria must be transported under the appropriate provisions of Division 5.2.

- △ **A97** The assignment of substances to this entry is to be decided by the appropriate national authority.

- △ **A98** Radioactive material in an excepted package which also meets the criteria for another class/division must be classified, packed, marked, labelled and documented in accordance with the provisions relating to the other class/division. The Shipper's Declaration must also contain the information required by 6.7.3. In such cases, this information need not be shown on the air waybill.

**A99** Subsidiary risk label not required if the toxicity arises solely from the destructive effect on tissue.

- **A100** Gasoline, motor spirit and petrol must be assigned to this entry regardless of variation in volatility.

- **A101** This substance may be carried under provisions other than those of Class 1 only if it is so packed that the percentage of water will not fall below that stated at any time during transport. When phlegmatized with water and inorganic inert material the content of urea nitrate may not exceed 75% by mass and the mixture must not be capable of being detonated by Test 1(a)(i) or Test 1(a)(ii) in the *UN Recommendations on the Transport of Dangerous Goods, Tests and Criteria*.

- **A102** This listing includes aluminium ashes, aluminium dross, aluminium potlining, aluminium skimmings, pot skimmings, spent cathodes, spent potliner, and waste cathodes.

- **A103** Not subject to these Regulations if containing less than 100 grams flammable, non-toxic, liquefied gas.

- **A104** The poison subsidiary risk label should not be used.

- **A105** Sulphur is not subject to these Regulations when it is transported in quantities of less than 400 kg per package, or when it has been formed to a specific shape, e.g. prills, granules, pellets, pastilles or flakes.

- **A106** This entry may only be used for samples of chemicals taken for analysis in connection with the implementation of the Chemical Weapons Convention.

They may be transported on a passenger or cargo aircraft providing prior approval has been granted by the appropriate authority of the State of origin or the Director General of the Organization for the Prohibition of Chemical Weapons. For instructions on shipping such samples contact the national competent authority.

The substance is assumed to meet the criteria of Packing Group I for Division 6.1. Subsidiary risk labelling is not required.

A copy of the document of approval showing the quantity limitations and the packing requirements must accompany the consignment.

**Note:** The transport of substances under this description must be in accordance with chain of custody and security procedures specified by the Organization for the Prohibition of Chemical Weapons.

- **A107** This entry only applies to machinery or apparatus containing dangerous goods as an integral element of the machinery or apparatus. It must not be used for machinery or apparatus for which a proper shipping name already exists in 4.2 (List of Dangerous Goods).

- **A108** The provisions of Special Provision A1 apply to this entry for Packing Group I only.





## PACKING INSTRUCTION 906

- △ OPERATOR VARIATIONS: BA-01, CI-01, SK-03, SW-01, TW-09
- △ The General Packing Requirements of Subsection 5.0.2 must also be met.
- △ For ID 8027 UN specification packaging is not required.
- ▽ For ID 8035 and ID 8036 only, the following specification packagings must be used.  
Combination and single packagings are permitted.
- For ID 8035 liquids:

### COMBINATION PACKAGINGS

#### INNER PACKAGINGS

Desc.	Glass, Earthenware	Plastic	Metal (not aluminium)	Aluminium	Glass ampoule
Spec.	IP1	IP2	IP3	IP3A	IP8
Maximum quantity	5.0 L	10.0 L	25.0 L	25.0 L	0.5 L

#### OUTER PACKAGINGS

Desc.	Steel drum	Aluminium drum	Plywood drum	Fibre drum	Plastic drum	Steel jerrican
Spec.	1A2	1B2	1D	1G	1H2	3A2
Desc.	Plastic jerrican	Wooden box	Plywood box	Reconstituted wood box	Fibreboard box	Plastic box
Spec.	3H2	4C1 4C2	4D	4F	4G	4H1 4H2

### SINGLE PACKAGINGS

Desc.	Steel drum	Aluminium drum	Plastic drum	Steel jerrican	Plastic jerrican	Composite packagings (plastic) (see 10.2.16)
Spec.	1A1 1A2	1B1 1B2	1H1 1H2	3A1 3A2	3H1 3H2	all (see Table 5.0.C)

For ID 8036 solids:

### COMBINATION PACKAGINGS

#### INNER PACKAGINGS

Desc.	Glass, Earthenware	Plastic	Metal	Plastic bag*	Fibre can or box	Paper bag, lined	Plastic film bag
Spec.	IP1	IP2	IP3 IP3A	IP5	IP6	IP10	5H4
Maximum quantity	5.0 kg	25.0 kg	25.0 kg	25.0 kg	5.0 kg	25.0 kg	50.0 kg

\* A plastic bag inner packaging is forbidden in 4H1 expanded plastic box outer packaging.

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## PACKING INSTRUCTION 906 (continued)

COMBINATION PACKAGINGS									
OUTER PACKAGINGS									
Desc.	Steel drum	Aluminium drum	Plywood drum	Fibre drum	Plastic drum	Steel jerrican			
Spec.	1A2	1B2	1D	1G	1H2	3A2			
Desc.	Plastic jerrican	Wooden box	Plywood box	Reconstituted wood box	Fibreboard box	Plastic box			
Spec.	3H2	4C1 4C2	4D	4F	4G	4H1 4H2			
SINGLE PACKAGINGS									
Desc.	Steel drum	Aluminium drum	Plywood drum (with inner plastic liner)	Fibre drum (with inner plastic liner)	Plastic drum	Steel jerrican	Plastic jerrican	Plastic film bag	Composite packagings (plastic) (see 10.2.16)
Spec.	1A1 1A2	1B1 1B2	1D	1G	1H1 1H2	3A1 3A2	3H1 3H2	5H4	all (see Table 5.0.C)
<b>Note:</b> For ID 8035 and ID 8036, the words "Aromatic Extract" or "Aromatic Flavouring" must be added immediately adjacent to the name "Other Regulated Substance" on the package.									



## PACKING INSTRUCTION 911

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OPERATOR VARIATIONS: CI-01, FM-06, SK-03, SW-01, TW-09

The General Packing Requirements of Subsection 5.0.2 must also be met.

*Combination and single packagings are permitted.*

### COMBINATION PACKAGINGS

#### INNER PACKAGINGS

Desc.	Glass, Earthenware	Plastic	Metal	Paper bag	Plastic bag*	Fibre can or box	Glass ampoule	Paper bag, lined
Spec.	IP1	IP2	IP3 IP3A	IP4	IP5	IP6	IP8	IP10
Maximum quantity	5.0 kg	10.0 kg	10.0 kg	5.0 kg	5.0 kg	5.0 kg	0.5 kg	5.0 kg

\* A plastic bag inner packaging is forbidden in 4H1 expanded plastic box outer packaging.

#### OUTER PACKAGINGS

Desc.	Steel drum	Aluminium drum	Plywood drum	Fibre drum	Plastic drum	Steel jerrican
Spec.	1A2	1B2	1D	1G	1H2	3A2
Desc.	Plastic jerrican	Wooden box	Plywood box	Reconstituted wood box	Fibreboard box	Plastic box
Spec.	3H2	4C1 4C2	4D	4F	4G	4H1 4H2

### SINGLE PACKAGINGS

Desc.	Steel drum	Aluminium drum	Plywood drum (with inner plastic liner)	Fibre drum (with inner plastic liner)	Plastic drum	Steel jerrican
Spec.	1A1 1A2	1B1 1B2	1D	1G	1H1 1H2	3A1 3A2
Desc.	Plastic jerrican	Woven plastic bag	Plastic film bag	Paper bag	Composite packagings (plastic) (see 10.2.16)	
Spec.	3H1 3H2	5H2 5H3	5H4	5M2	all (see Table 5.0.C)	

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**PACKING INSTRUCTION 914**

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**OPERATOR VARIATIONS:** CI-01, FM-06, SK-03, SW-01, TW-09

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The General Packing Requirements of Subsection 5.0.2 must also be met.

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*Combination and single packagings are permitted.*
**COMBINATION PACKAGINGS**
**INNER PACKAGINGS**

Desc.	Glass, Earthenware	Plastic	Metal	Glass ampoule	
Spec.	IP1	IP2	IP3 IP3A	IP8	
Maximum quantity	5.0 L	5.0 L	10.0 L	0.5 L	

**OUTER PACKAGINGS**

Desc.	Steel drum	Aluminium drum	Plywood drum	Fibre drum	Plastic drum	Steel jerrican
Spec.	1A2	1B2	1D	1G	1H2	3A2
Desc.	Plastic jerrican	Wooden box	Plywood box	Reconstituted wood box	Fibreboard box	Plastic box
Spec.	3H2	4C1 4C2	4D	4F	4G	4H1 4H2

**SINGLE PACKAGINGS**

Desc.	Steel drum	Aluminium drum	Plastic drum	Steel jerrican	Plastic jerrican	Composite packagings (plastic) (see 10.2.16)	Cylinders
Spec.	1A1	1B1	1H1	3A1	3H1	all (see Table 5.0.C)	As permitted in Packing Instruction 200

**914**