FORT GEORGE G. MEADE, MARYLAND

HAZARDOUS WASTE ANALYSIS PLAN

Prepared for:
Fort George G. Meade
Directorate of Public Works
Environmental Division

2023

Contents

Acronyms and Abbreviations

AFCEE	Air Force Center for Environmental Excellence
AFIERA	Air Force Institute for Environmental, Safety & Occupational Health Risk Analysis
CFR	Code of Federal Regulations
CHSSF	Controlled Hazardous Substance Storage Facility
COMAR	Code of Maryland Regulations
DLA	Defense Logistics Agency
DOD	Department of Defense
DOL	Directorate of Logistics
DOT	United States Department of Transportation
DPW	Directorate of Public Works
EESOH-MIS	Enterprise Environmental, Safety and Occupational Health — Management Information System
EMO	Environmental Management Office
EPA	United States Environmental Protection Agency
ERD	Environmental Restoration Directorate
ERG	Environmental Research Group, LLC
FSC	Federal Supply Class
FMMD	Fort George G. Meade
HAZWOPER	Hazardous Waste Operations and Emergency Response
HMIS	Hazardous Material Information System
HSWA	Hazardous and Solid Waste Amendments
HW	hazardous waste
HWMP	Hazardous Waste Management Plan
HWPS	Hazardous Waste Profile Sheet
IMCOM	Army Installation Management Command
LPE	linear polyethylene
LSN	Local Stock Number
MCC	maximum contaminant concentration
MDE	Maryland Department of the Environment
NSN	National Stock Number
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
SDS	Safety Data Sheet
SWDA	Solid Waste Disposal Act
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	treatment, storage, and disposal facilities
U.S.	United States

1. Introduction

1.1 Purpose and Objective

The cornerstone of the Resource Conservation and Recovery Act (RCRA) hazardous waste program is the requirement of generators to properly identify and characterize, through waste testing and/or acceptable knowledge, all hazardous wastes that are generated, treated, stored, or disposed of at their site. Waste analysis is the pivotal activity for properly ensuring that generators on Fort Mead, Maryland (FMMD) comply with the applicable regulations for proper waste storage and disposal.

This Waste Analysis Plan presents the methodology to comply with waste analysis requirements of 40 Code of Federal Regulations (CFR), Sections 264.13 and 268.7, and Code of Maryland Regulations (COMAR) Title 26 Subtitle 13 Disposal of Controlled Hazardous Substances. This plan applies to the hazardous waste sampling and analysis procedures that will be routinely conducted as a requirement of the RCRA Part B permit for the Controlled Hazardous Substance Storage Facility (CHSSF) located in Building 2250. Through the use of the procedures described herein, in order to demonstrate that items planned for disposal at the CHSSF, a program that complies with Federal, State, and local requirements by ensuring that, at a minimum, the following objectives are met.

(a) Sufficient information is available about wastes to determine whether the wastes considered for management at the CHSSF fall within the scope of the facility's permit.
(b) Additional information is available about the wastes to manage the wastes properly once they are accepted.

Waste testing involves identifying and verifying the chemical and physical characteristics and composition of a waste by performing a detailed chemical and physical analysis of a representative sample of the waste. FMMD may also apply acceptable knowledge of the waste in lieu of testing the waste, as specified. This plan will be reviewed by the FMMD Environmental Management Office (EMO) annually or when significant operating or procedure changes occur or when new tenants are added. Appropriate revisions to the plan will be made at these times.

The sections which follow provide information which allows these objectives to be met through the steps below:

1. Design an adequate sampling plan that includes:
    a. Choosing the proper sampling point(s)
    b. Determining the correct number of samples to be taken
    c. Determining the volume of the samples to be taken
2. Determine the type of waste, its general character, and its containment structure (i.e., drum, tank).

3. Select the proper samples.
4. Select the proper sample container and closure.
5. Observe all safety procedures and precautions.
6. Handle the samples properly.
7. Identify each sample and protect it from tampering.
8. Record all pertinent sample information on the sample label and in the appropriate log.
9. Fill out Chain of Custody Record / Analysis Request Form with each sample.
10. Determine parameters to be analyzed and testing methods.
11. Deliver or ship the samples to the laboratory for analysis.

After a waste analysis has been performed, the characteristics of the waste will be documented for future reference in a Hazardous Waste Profile Sheet (HWPS). Additionally, the statistical and analytical data will be entered in Enterprise Environmental, Safety and Occupational Health — Management Information System (EESOH-MIS) and maintained in the Waste Process file and the Hazardous Waste Profile Sheet for record keeping and time management. The Waste Analysis program assigns a date for re-testing of items in terms of years or when changes indicate a need for re-testing a waste stream product.

1.2 Organizational Structure

The Hazardous Waste Management Plan details the overall organizational structure and responsibilities for hazardous waste management at FMMD. This Waste Analysis Plan is meant to be used alongside the FMMD Hazardous Waste Management Plan.

A DD Form 1348-1 must be initiated by the hazardous waste coordinator of the activity which is turning in waste. The DD Form 1348-1 is shown in Appendix 4.

1.3 Facility Description

Fort Meade is an installation of the United States (U.S.) Installation Management Command (IMCOM). The mission of Fort Meade is to command and train its assigned duty units and to support assigned tenants and the U.S. Army Reserves. No major industrial operations occur at Fort Meade, although several small-scale industrial operations are performed under the Directorate of Logistics (DOL), Directorate of Public Works (DPW), and numerous tenant activities.

FMMD is a large quantity generator of hazardous waste. Hazardous waste is generated at several locations through photographic processing and maintenance of Army equipment, vehicles, and aircraft. The wastes are accumulated at designated accumulation areas or transported to and stored in the FMMD permitted 90-Day storage CHSSF, Building 2250, prior to shipment to an approved disposal facility.

Appendix 1 lists the generating operations on FMMD and the processes generating waste.

1.4 Definition of Hazardous Waste

Materials generated by Fort Meade, which are considered hazardous waste and covered by this plan, are defined as any material no longer suitable for its intended manufactured purpose, not recyclable, and/or discarded or abandoned, and is on one or more of the following lists.

- COMAR Title 26 Subtitle 13, Disposal of Controlled Hazardous Substances. Listed and Characteristic Waste
- 40 CFR 302.4 – Environmental Protection Agency (EPA) List of Hazardous Substances and Reportable Quantities
- 40 CFR, Part 261, Sub-parts C & D, Characteristic and Listed Wastes

Fort Meade CHSSF also receives wastes, which though not on designated lists, would violate other regulations, such as the Clean Air Act or Clean Water Act, if put into the local landfill or indiscriminately dumped in the sanitary sewer.

2. Identification of Hazardous Waste

2.1 Sources of Hazardous Wastes

Hazardous wastes at FMMD are generated through routine maintenance operations, elimination of materials whose shelf life has expired, spill cleanup, hospital operations, and laboratory wastes. These activities are conducted in accordance with numerous Department of Army or Department of Defense regulations which result in regimented operations and therefore consistent waste streams.

2.2 Responsibility for Waste Identification

As specified in the FMMD Hazardous Waste Management Plan, the activities and other organizations that produce hazardous wastes as the result of their work are responsible for properly and accurately identifying the waste. The location and list of the activities at FMMD that generate hazardous wastes are provided in the Hazardous Waste Management Plan.

If identification of a suspected waste is not possible, the activity can contact the EMO for assistance in identifying hazardous wastes. Regardless of which organization identifies the wastes, the waste must be identified and characterized in accordance with the procedures specified in Section 3 of this plan.

2.3 Waste Identification Information Sources

The following sources of information about suspected hazardous waste material can be used in the identification of the waste.

- Package information
- National Stock Number (NSN)
- Local Stock Number (LSN)

- Federal Supply Class (FSC)
- DOD Hazardous Material Information System (HMIS)
- Safety Data Sheet (SDS) provided by manufacturers.
- Contacting the manufacturer.
- Waste Disposal Contractor Material Profile Analysis Reports on file.

Laboratory analysis should be used in the identification of suspected hazardous wastes only after all other resources have been utilized.

3. Hazardous Waste Analytical Scheme and Rationale

3.1 Characterization

The waste characterization process will be applied to all new waste streams, periodic reevaluation of existing waste streams, and when inspection of wastes find that the waste does not match the associated HWPS. All waste streams, regardless of generation rate, should be evaluated whenever input material to the waste generating process changes or the process itself changes.

The waste characterization process must be applied to the following.

- New waste streams.
- Periodic reevaluation of existing waste streams.
- Inspections of wastes find that the waste does not match the associated HWPS.

Waste reevaluation will include a review of applicable regulations to determine whether there are any new requirements, identifying any new waste streams, and assessing each waste generating process from start to finish to determine whether there were any significant changes. Any new processes or changes to existing processes identified during the evaluation will require sampling and analysis of the waste. If the result of the reevaluation is uncertain, sampling and analysis will be conducted. The waste reevaluation process is a repeat or update of the process described in section 2.3 Waste Identification Information Sources.

3.2 Selection of Parameters

Information on the parameters must be known in order to treat, store, or dispose of waste in accordance with the conditions of federal and state regulations. The selection of parameters for analysis is based on one or more combinations of the following.

a. Type, source, and characteristics of the waste that show it may contain certain hazardous parameters. For example, if a waste liquid is from transformers, then polychlorinated biphenyls (PCB) should be analyzed; or if a waste liquid is battery acid, then pH and lead should be analyzed.

b. Existing literature that shows certain hazardous parameters can exist for waste from similar processes or waste streams.
c. What parameters will be measured to ensure that no unacceptable waste types are allowed in the CHSSF, including wastes that are not hazardous and do not need to be disposed of through the HWSF. Also, are parameters sufficient to determine the storage compatibility of wastes?
d. How will the acceptance of wastes which are outside the facility's permit be avoided?
e. How will incoming shipments of hazardous wastes be screened to ensure they are as designated on the turn-in documentation?
f. Hazardous characteristics as listed in 40 CFR Part 261 or COMAR, Title 26, Subtitle 13, for wastes whose hazards are unknown or unlabeled.
g. Specific parameters that treatment/storage/disposal contractor may require after the waste is removed from the Fort Meade CHSSF.

Appendix 2 provides a list of the Fort Meade Hazardous Waste Profile Sheet (HWPS) by number and description of the waste. The determination of user knowledge or sampling in this table is a general recommendation. The actual characterization may be different due to site-specific requirements or situations. FMMD does not typically analyze wastes from these waste streams as they are turned in, unless it is suspected that these waste streams contain new wastes, unknown wastes, or after process changes have occurred in a generating facility that carries out the process. The rationale for this is as follows.

a. Analyses have been previously performed on representative samples of the waste streams, which are documented in the HWPS. The HWPS are prepared by each hazardous waste generating facility for each process which they carry. A copy of the HWPS should accompany the turn-in of waste from a specific waste stream. Therefore, sufficient information is available for the proper handling of the wastes by the CHSSF.
b. The processes used by the activities on FMMD are not expected to change. Therefore, there should be little variability in the composition of wastes being turned in. The EMO will maintain a Hazardous Waste Profile database in EESOH-MIS or from earlier files. The generators must be responsible for having EMO assist in preparing the profile the first time a waste is generated, and then will have the profiles available for turn in

3.3 Example Waste Stream Sources

Examples of the sources of the waste streams are listed below to aid in assuring adequate waste analysis.

a. Outdated virgin material: Unused material whose shelf life has expired, and which is readily identifiable from packaging or SDS.
b. Non-spent, no longer needed: Unused material which is not needed for future use in the process.
c. Non-spent, leaking: Unused material which has leaked from its container due to time, exposure, or accidental damage.

d. Container residuals: Materials left in a container after emptying or material rinsed from an empty container.
e. Spent-known contaminant: Wastes generated through routine processes where both the starting product and the contaminant are known.
f. Off-specification material: Unused material which does not meet the specification required for the desired process. The deviation from specifications could be due to either manufacturing error or accidental contamination.
g. Non-spent mix of Virgin materials: A mixture of two or more unused materials which are not needed for future use at the installation.
h. Contaminated with water: Waste streams generated through routine processes where the starting product is known and the only known contaminant is water.

Waste stream types a. through h., above, do not require analysis since the constituents and characteristics of these waste streams are known based on knowledge of the processes which produce them, and which can be verified through existing information sources listed in Section 2.3. Typical parameters for analyses of unknown and new wastes, or wastes derived from investigation or undocumented wastes "Found on Post" items

3.4 Unknown Wastes and/or Found on the Installation

For hazardous products found on the installation and/or unknown wastes, the generators should use any information available in section 2.3 to identify the product to make a waste determination. If the generator cannot determine if the product is a hazardous waste through the process described in section 3, contact the Hazardous Waste Program Manager and/or EMO.

3.5 User Knowledge-Based Waste Determination

User knowledge is an acceptable means of the generator characterizing waste in those situations where the item being disposed is an unused/expired chemical, an article, or where the waste is being managed under a specific exemption or management practice.

When waste characterization is accomplished using generator knowledge, documentation of this determination must occur. The HWPS is an effective tool for both making and documenting this determination. Supporting literature such as product SDS and process descriptions (from governing technical orders, manufacturer literature, or a brief narrative) should accompany this documentation.

The Hazardous Waste Program Manager and EMO can assist in the determination if generator knowledge is sufficient to characterize a given waste. If generator knowledge is unavailable, the waste must be characterized using analytical data to
determine if the waste is hazardous.

3.6 Analytical-Based Waste Determination

Waste streams may require analytical testing to properly characterize the waste. Waste characterization based on analysis is accomplished by the following.

1. Reviewing the process and materials used in generating the waste.
2. Reviewing the regulatory criteria.
3. Selecting appropriate analytical tests to compare applicable parameters/analytes to the regulatory criteria; and
4. Collecting a representative sample of the waste, and having it analyzed accordingly.

The type of sampling (technique) and analysis (testing) performed is dependent on the waste type, physical state, and regulatory requirements. Consult with the Hazardous Waste Program Manager for support with selecting the appropriate sampling and analysis.

Sampling hazardous waste on FMMD is conducted in accordance with Navy Environmental Compliance Sampling and Field Test Procedures, NAVSEA T0300-AZ-PRO-010. The Field Manual guidance for hazardous waste is based on the EPA Hazardous Waste Test Methods SW-846.

The following are example parameters that may be analyzed to determine if the product is hazardous waste.

- Flash point to determine ignitability of the liquid.
- pH to determine corrosivity.
- Toxicity Characteristic Leaching Procedure (TCLP) to analyze the concentration of contaminants in waste.
- Polychlorinated Biphenyls (PCBs)

3.7 Approved Laboratories

FMMD only uses the following approved laboratories to analyze hazardous waste samples.

Laboratory Name	Address	Services
AMA Analytical Services	4475 Forbes Blvd., Lanham, MD 20706	Lead & Microbial Analysis
Phase Separation Science, Inc.	6630 Baltimore National Pike, Baltimore, MD 21228	Comprehensive
ALS Environmental	301 Fulling Mill Road, Middletown, PA 17057	HW Contract Services

4. Waste Parameters and Control Procedures

4.1 Waste Parameter Considerations

Hazardous Waste Program Manager, CHSSF personnel, and/or EMO will determine the parameters will be measured to ensure that characteristics and properties are maintained. Examples of parameters include, viscosity, water content, flash point, organochloride, heavy metals, and compatibility.

In order to avoid accepting waste which are outside the CHSSF permit, the generator will supply the waste information to the CHSSF, as detailed in Section 2.3. This includes the SDS, NSN and other pieces of information.

If the properties fall outside the acceptable characteristics of the permit, the waste would be refused. For wastes provisionally accepted, the CHSSF will submit a representative sample of the waste for analysis. If the properties are within the standards of the permit, the waste will be deemed acceptable.

CHSSF and/or EMO personnel will screen wastes to ensure the waste are agreeable to accept. This is done cross referencing the waste with the HWPS list and/or using the guidance in section 2.3.

4.2 Waste Sampling Quality Assurance/Quality Control Procedures

The following steps will be taken to ensure wastes are sampled to ensure representativeness of the waste.

- Drums and tanks will be sampled using a coliwasa device.
- Drums will be sampled depending on the number of drums received by the generator.
- If out of specification drums are received, all remaining drums in that shipment may be sampled.

The Hazardous Waste Program Manager and CHSSF personnel will make the appropriate determination of methodology to measure each parameter, in accordance with NAVSEA T0300-AZ-PRO-010 and EPA Hazardous Waste Test Methods SW-846.

The following steps will be taken to ensure Quality Assurance/Quality Control (QA/QC) procedures are followed for sampling and analysis.

- Maintaining a field log of samples taken.
- Following the SW-846 QA/QC procedures for each test.
- Inspecting and maintaining sampling equipment.
- Documenting and completing all sampling and analysis information and forms.

5. Sampling Equipment and Collection Procedures

All personnel collection samples on FMMD must be familiar with the recommended sampling procedures given in various federal and state manuals. A comprehensive section on sampling for hazardous wastes is given in EPA SW-846. This manual is available to personnel and will be reviewed before sampling. For the sampling of water and waste-water, reference will be made to Standard Methods for the Examination of Water and Wastewater.

5.1 Sample Containers

Sampling personnel will acquire all equipment required to collect samples prior to conducting sampling activities. The analytical laboratory chosen to test the samples may provide proper quantity of sample containers.

- Plastic and glass containers are used for collection and storage of hazardous waste samples. The plastic used is linear polyethylene (LPE), which offers the best combination of chemical resistance and low cost. Plastic containers will not be used for wastes containing chlorinated hydrocarbons, ketones, nitrobenzenes, or tetrahydrofuran.
- Glass containers are inert to most chemicals and will be used to collect and store most hazardous waste samples except those that contain strong alkalis or hydrofluoric acid. Glass made from sods will be used. Photosensitive wastes, such as pentachlorophenol, will be stored in amber LPE or brown glass bottles.
- All containers will have tight screw-type lids. Plastic bottles will be provided with screw caps made of the same material as the bottles. No cap liners are usually required. Glass containers will have glass or rigid plastic screw caps, such as bakelite.

It is critical to choose containers for hazardous waste samples that are compatibility with the waste, cost, resistance to breaking and volume. Containers must not distort, rupture, or leak as a result of chemical reactions with constituents of waste samples. Therefore, it is important to have some idea of the properties and composition of the waste. The containers must have adequate wall thickness to withstand handling during sample collection and transport to the laboratory. Containers must be large enough to contain the optimum sample volume. If the samples are to be submitted for analysis of volatile compounds, the samples must be sealed in air-tight containers.

5.2 Sampling Precautions and Protective Gear

Proper safety precautions will always be observed when sampling hazardous wastes. The background information obtained about the waste will be used in deciding the extent of sampling safety precautions to be observed and in choosing protective equipment.

The following is a general list of materials that may be needed for sampling.

1. Personal protective equipment (PPE), including chemical resistant gloves, safety goggles, disposable coveralls, face shield, safety shoes, hard hat, etc.
2. Protective clothing will consist of long-sleeved neoprene rubber coat and pants or a disposable Tyvek coverall. All protective equipment should be verified as impermeable to the material being sampled.
3. Safety equipment, such as available eye wash stations and a first-aid kit.
4. The appropriate supply of sample containers.
5. A sampling coliwasa tube.
6. Trash bag for disposables, buckets, and rinsing water.
7. Shipping and office supplies, chain-of-custody, labels, forms and seals, field notebooks, permanent marker pens, and camera.

6. Sample Collection

Drum sampling can be hazardous to worker safety and health because it often involves direct contact with potentially unidentified wastes. When manually sampling from a drum, the following techniques should be used.

- Samplers should have a small spill kit near them with absorbents to address any spillage.
- Samplers shall wear the appropriate PPE, such as chemical resistant gloves, aprons, and/or eye protection, to protect the health and safety of the sampling personnel.
- Samples will be obtained with either glass rods or vacuum pumps. Contaminated items will not be used. The contaminants may contaminate the sample and may not be compatible with the waste in the drum.
- Sampling-generated waste materials (such as contaminated vials, absorbents, sampling gloves, etc.) should be disposed. Depending on the type of waste sampled, these items may also need to be disposed of as hazardous waste.

Access to a container will affect the number of samples that can be taken from the container and the location within the container from which samples can be taken. Ideally, several samples should be taken from locations displaced both vertically and horizontally throughout the waste. The number of samples required for reliable sampling will vary, depending on the distribution of the waste components in the container. At a minimum with an unknown waste, a sufficient number and distribution of samples should be taken to address any possible vertical anomalies in the waste. Contained wastes have a much greater tendency to be non-randomly heterogeneous in a vertical rather than a horizontal dissection due to the settling of solids and the denser phases of liquids, and/or variation in the content of the waste as it enters the container. Bags, paper drums, and open headed steel drums do not restrict access to the waste and therefore do not limit sampling.

7. Sample Handling and Control

7.1 Sample Identification

Each sample will be properly labeled and sealed immediately after collection.

7.2 Sample Labels

Sample labels will be used to prevent misidentification of samples. A waterproof pen will be used to write on the label and the label will include at least the following information:

- Name of collector.
- Date and time of collection
- Place of collection
- Collector's sample number, which uniquely identifies the sample.

7.3 Sample Seals

Sample seals will be used to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory. Gummed paper or plastic (shrink-fitted) will be used as official sample seals.

7.4 Chain-of-Custody Record / Analysis Request Form

To establish the documentation necessary to trace sample possession from the time of collection, a Chain-of-Custody Record will be filled out and accompany every sample. A FMMD Chain-of-Custody Record/Analysis Request Form is provided in Appendix 3. The Chain-of-Custody portion includes the following minimum information:

- Place of collection (Sample ID)
- Date and time of collection
- Sample type (grab or composite)
- Sample description (waste type)
- Number of containers (1 of 2, etc.)
- Signature of people involved in the chain of possession
- Inclusive dates of possession
- The Fort Meade Analysis Request Form is combined with the Chain-of-Custody Record. The Analysis Request Form portion includes the following information:
- Name of person receiving the sample
- Date of sample receipt
- Analyses to be performed
- Remarks

Samples will be delivered to the laboratory as soon as practical. A Chain-of-Custody Record/Analysis Request Form will accompany the sample. Samples will be delivered to the

person in the laboratory authorized to receive samples. Samples shipped to the laboratory will be properly packaged to avoid leakage or breakage.

7.5 Fort Meade Chain-of-Custody Process

1. Samples taken at the facility or at the site of waste generation shall be transported back to the Environmental Management Office by the sampler. It is the responsibility of the FMMD Environmental Management Office to Prepare:

   (a) A letter to the contract laboratory describing the sample, the type of container the outer package and seals, and the type of analysis required.

   (b) A memorandum to Fort Meade Transportation Office requesting arrangements be made for shipment of this sample with a common express carrier.

2. When these letters have been completed, the letter and sample shall be sent to the facility for packaging. Instructional assistance from the Transportation Office may be required. The sample shall be packaged in a suitable outer package as required by Department of Transportation (DOT) and/or by express carrier guidance. Enclosed within this package shall be the letter to the laboratory.

3. This package along with the memorandum requesting shipment shall be hand-carried by facility personnel to the Transportation Office for shipment authorization. From there it shall be again hand carried to the Transportation Office shipping dock and delivered to the shipper. That shipper shall inspect the packaging and review the memorandum. The shipper shall affix the appropriate shipping labels and then include this package with any others on the next express carrier shipment. Samples shall not remain at the shipping dock for more than one day. In the event a shipment is canceled, the Transportation Office is up from the shipping dock by facility personnel that same day and returned to the facility carrier, it is under shared custody until it is received by the contract laboratory or is returned to the shipper.

4. If the contract laboratory is located within a reasonable distance of Fort Meade, facility personnel may be dispatched to deliver the sample directly to the laboratory.

5. In this chain, tamper-proofing of the sample shall be monitored by facility personnel, ensuring that he is the only individual handling the sample from the time it leaves the Environmental Management Office or sampling site to the time when the shipper accepts the package and secures it with other to go on the next carrier shipment. The contract lab is required to report any discrepancy with package or sample closure as compared to the letter enclosed.

8. Frequency of Analysis

Samples of all waste streams will be taken and analyzed annually or when a new waste, unknown waste, or process change occurs, whichever comes first. Analysis of established waste streams, which are documented with a HWPS, will be re-verified on a yearly basis. This is intended to ensure that the characterization of each waste stream documented on a HWPS is accurate and up-to-date.

There is a schedule for sampling and analysis of FMMD waste streams in the EESOH-MIS program. Generators will be notified when a scheduled analysis of hazardous waste is due. Contact the Hazardous Waste Program Manager for more information.

9. Hazardous Waste Profile Sheet for Bulk Turn-Ins

A Hazardous Waste Profile Sheet will be prepared for each waste stream from each generator which turns in hazardous waste to the FMMD CHSSF. The profile sheets will be maintained by the activity which generates the waste stream, and a copy of the profile will accompany each turn-in or waste from the specific waste stream to the CHSSF.

HWPSs are required for bulk turn-ins, i.e., container larger than 5 gallons. Waste Profiles will be prepared at time of packing for lab pack chemicals.

10. Additional Requirements for Facilities Handling Ignitable, Reactive or Incompatible Waste: Waste Segregation

Incompatible waste stored at the CHSSF will be segregated into separate storage areas. Containers of new, unknown, or process change wastes will be sampled and analyzed in order to determine the waste's characteristics. The CHSSF has been designed to prevent accidents caused from ignitable, reactive, or incompatible wastes being brought together. The layout of the CHSSF is accessible for reference in the FMMD Maryland Generator Improvement Plan.

Appendix 1 - FMMD Hazardous Waste Generators and Processes Generating Wastes

Generating Unit/Activity	Building Number	Processes Generating Waste
Defense Logistics Agency (DLA) Disposition Services	77	Collection of expired and unnecessary materials, products, and wastes
Defense Information School	6500	
Melwood	2501	Facility and grounds operation and maintenance
MWR Auto Craft Shop	6530	Vehicle maintenance
AAFES Main PX	2791	Managing and distribution of food and commercial products
55th Signal Brigade	8485	Vehicle and equipment operation and maintenance
Forensic Toxicology Drug Testing Lab (FTDTL)	2490	Laboratory analysis
ECS 86, (99th RSC)	2120C	Vehicle maintenance
818th (99th RSC)	2121	Vehicle and equipment operation and maintenance
Public Health Command (PHC)	4411	Medical and laboratory operations
Kimbrough Ambulatory Care Clinic (KACC)	2480	Medical and laboratory operations
Skookum Maintenance	2241D	Facility and grounds operation and maintenance
Controlled Hazardous Substance Storage Facility (CHSSF)	2250	Hazardous and non-hazardous waste storage

Appendix 2 - FMMD Hazardous Waste Profiles and Generators

Profile Number	HW Profiles	Waste Codes	Generator
FGGM-18-01	> 500 PPM TRANSFORMER	M001	2250
FGGM-18-03	50-499 PPM TRANSFORMER	MT01	2250
FGGM-18-04	VENTED STORAGE CABINET CARBON FILTERS	D001, D007	FTDTL
FGGM-18-05	SILANIZATION WASTE	D002, F003, F005	FTDTL
FGGM-18-06	EXTRACTION WASTE	D001, F002, F003	FTDTL
FGGM-18-07	GC/MS SAMPLE VIALS	D001, F003	FTDTL
FGGM-18-09	ISOPROPRYL ALCOHOL	D001	2250 /KACC
FGGM-18-10	POTASSIUM CHLORATE	D001	2250
FGGM-18-15	OIL BASED PAINT	D001	2250
FGGM-18-16	PAINT RELATED MATERIAL	D001	2250
FGGM-18-17	SODIUM CHLORATE	D001	2250
FGGM-18-21	FUSEE/FLARE	D001	2250
FGGM-18-23	SILVER NITRATE	D001, D011	KACC
FGGM-18-40	CONTAMINATED DIESEL FUEL	D001, D018	2250
FGGM-18-41	LEAD ACID BATTERY WET	D002, D008	2250
FGGM-18-46.v.3	WASTE FLAMMABLE LIQUIDS	D001, D008, D018, F001, F003	2250
FGGM-18-47	HYDROCHLORIC ACID	D002	2250
FGGM-18-48	DECON KITS M258A1 (GREEN)	D001	2250
FGGM-18-49	DECON KITS M58A1 (BLACK)	D001	2250
FGGM 18-50***	NIGHT VISION IMAGE INTIENSIFIER TUBES	D006,D008	2250
FGGM-18-53	FUEL SPILL CLEAN UP MATERIAL	D001,D018	2250
FGGM-18-58.v.3	BROKEN MERCURY LAMPS	D009	2250
FGGM-15-65	QIAGEN KITS EXTRACTION WASTE	D001	PHC-N
FGGM 18-71	DNA EXTRACTION WASTE	D001	PHC-N
FGGM-18-82	MAGMAX PURE KIT EXTRACTION WASTE	D001	PHC-N
FGGM-18-83	HEMATOLOGY SLIDE WASTE	D001, F003	KACC
FGGM-18-84	LEAD CONTAMINATED AIR FILTERS	D008	AWG
FGGM-18-85	FUEL FILTERS	D001,D018	2250
FGGM-18-86	THIN PREP	D001	KACC
FGGM-18-87	LEAD CONTAMINATED WASH WATER	D008	AWG
FGGM-18-88	LEAD CONTAMINATED/RAGS/PPE	D008	2250
FGGM-18-89	CAVICIDE SURFACE CLEANER WIPES	D001	KACC
FGGM-18-91	CAL STAT PLUS HAND CLEANER	D001	KACC
FGGM-18-92	HYDROGEN PEROXIDE	D001	KACC
FGGM-18-93	AMMONIA INHALANT	D001, D002	KACC
FGGM-18-94	TRIPLE ENZYME CONCENTRATE	D001	KACC
FGGM-18-95	ULTRASONIC CLEANER	D001, D002	KACC
FGGM-18-96	DENTAL AMALGAM	D002, D009	KACC

FGGM-18-97	CHLORHEXIDINE GLUCONATE SOLUTION	D001	KACC
	2020 HW PROFILES		
FGGM-20-01.V.2	ACETIC ACID SOLUTION	D001,D002	KACC
FGGM-20-02	CONTAMINATED GASOLINE	D001,D018	225/2246
FGGM-20-03-A1	OUT OF DATE OR OFF SPEC MEDICAL PRODUCTS	D001,D002	KACC
FGGM-18-66	10% BUFFERED FORMALIN	D001	KACC
FGGM-18-81	CR PHOSPHOR PLATE CLEANER	D001	KACC
FGGM-18-20	PEST AGENTS AND DISINFECTANTS	D001	2250
FGGM-18-50	LEAD SHOT	D008	AWG
FGGM-18-04	ACTIVATED CARBON FILTERS	D007	2250
	2021 HW PROFILES		
FGGM-18-14	FLAMMABLE AEROSOLS	D001	2250
FGGM-18-42	SODIUM HYDROXIDE SOLUTIONS	D002	225
FGGM-18-18	PROPANE GAS CYLINDER	D001	2250
FGGM-18-19	ACEYTLENE GAS CYLINDER	D001	2250
FGGM-18-45	DISINFECTANTS	D002	2250/KACC
	2022 HW PROFILES		
FGGM-18-08	ETHANOL	D001	KACC/2250
FGGM-18-09	ISOPROPRYL ALCOHOL	D001	KACC/2250
FGGM-18-24	HYDROXYLAMINE, HCI	D002	KACC/2250
FGGM-18-25	SODIUM PEROIDATE	D001	KACC/2250
FGGM-18-39	CAUSTIC ALKALI COMPOUNDS	D002	KACC/2250
	NON REGULATED PROFILES		
FGGM-NR-001	R134 A REFRIGERANT GAS	NON REG	2250
FGGM-NR-002	LATEX PAINT	NON REG	2250
FGGM-NR-003	RCRA EMPTY CONTAINERS	NON REG	2250
FGGM-NR-004	ALKALINE BATTERIES	NON REG	2250
FGGM-NR-005	USED ANTIFREEZE	NON REG	2250
FGGM-NR-006	OIL SPILL CLEAN UP MATERIAL	NON REG	2250
FGGM-NR-007	NON PCB LAMP BALLASTS	NON REG	2250
FGGM-NR-008	USED OIL FILTERS	NON REG	2250
FGGM-NR-009	CIDEX OPA	NON REG	KACC
FGGM-NR-010	M8 DETECTOR PAPER	NON REG	2250
FGGM-NR-011	M291 AMBERGUARD-555 DECON KIT	NON REG	2250
FGGM-NR-012	EUGENOL	NON REG	KACC
FGGM-NR-013	IODOFORM PACKING STRIPS	NON REG	KACC

FGGM-NR-014	ARESIN MICROSPHERES	NON REG	KACC
FGGM-NR-015	SIEVE MOLECULAR	NON REG	KACC
FGGM-NR-016	ULTRA SOLUTION KIT	NON REG	KACC
FGGM-NR-017	GLYCERIN USP	NON REG	KACC
FGGM-NR-019	ULTRA SOUND GEL	NON REG	KACC
FGGM-NR-020	FERRIC SUBSULFATE SOLUTION	NON REG	KACC
FGGM-NR-021	OILY RAGS	NON REG	2250
FGGM-NR-022	BD E-Z SCHRUB	NON REG	KACC
FGGM-NR-023	XEROFORM PETROLEUM DRESSING	NON REG	KACC
	2020 NON REGULATED PROFILES		
FGGM-NR-024	ABSORBENT MEDIA	NON REG	2250/2246
FGGM-NR-025	USED OIL	NON REG	2250/2246
FGGM-NR-026	SYNTHETIC OILS	NON REG	2250/2246
FGGM-NR-027	DRY CHEMICAL FIRE EXTINGUISHER AGENT POWDER	NON REG	2250/77A
FGGM-NR-018	TRANSPORT MEDIA	NON REG	2250/KACC
FGGM-NR-028	COOKING OIL	NON REG	2250
	2021 NON REGULATED PROFILES		
FGGM-NR-029	NON REGULATED MATERIAL, SOLID	NONREG	2250
FGGM-NR-030	CARBON DIOXIDE GAS	NONREG	2250
FGGM-NR-031	NON REGULATED MATERIAL, LIQUID	NONREG	2250
	UNIVERSAL WASTE		
FGGM-UW-001	FLUORESCENT LAMPS	U/W	2250
FGGM-UW-002	LITHIUM BATTERIES	U/W	2250
FGGM-UW-004	MERCURY THERMOSTATS	U/W	2250
FGGM-UW-005	HD LAMPS	U/W	2250
	2020 UNIVERSAL WASTE PROFILES		
FGGM-UW-006	UW/PESTICIDES	U/W	2250
	2021 UNIVERSAL WASTE PROFILES		
FGGM-UW-007	NICKEL METAL HYDRIDE BATTERIES	U/W	2250
	2022 UNIVERSAL WASTE PROFILES		
FGGM-UW-008	NICKEL CADMIUM BATTERIES	U/W	2250

Appendix 3 – Sample Chain of Custody Form

Appendix 4 – Sample DD 1348 Form

Appendix 5 – Understanding the Waste Sampling and Analysis Program

A. Overview
B. General Chemistry
C. Metals
D. Microbiology
E. Pesticides, Polychlorinated Biphenyls (PCB), Herbicides
F. Semi-Volatile Organics (VOCs)
G. Specialty Services
H. Volatile Organics

App 5.A - Overview

Introduction

Federal and state laws provide for "cradle to grave" regulation of hazardous wastes. The federal hazardous waste regulations fall under the umbrella of the Resource Conservation and Recovery Act (RCRA) of 1976. The legal framework has been constructed in several steps, including the Solid Waste Disposal Act (SWDA) of 1965, RCRA itself, and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The Environmental Protection Agency (EPA) is primarily responsible for implementing the requirements of RCRA, including development of national regulations and standards, and nationwide administration of the hazardous waste program. The regulations developed under RCRA are found in Title 40 of the Code of Federal Regulations (40 CFR), Parts 260 through 280.

What is a Hazardous Waste?

The first critical step in complying with RCRA hazardous waste regulations is determining if a waste generated by an installation, is a hazardous waste. The definition of a hazardous waste is quite complicated and is found in 40 CFR, Part 261, "Identification and Listing of Hazardous Waste." Because RCRA was adopted as amending the earlier SWDA, RCRA considers all hazardous waste as discarded "solid" waste. The definition of a solid waste includes wastes in solid, semisolid, liquid, or even containerized (compressed) gas form. A solid waste is considered discarded if it is abandoned, recycled (unless used, reused, or returned to the original process), or inherently waste-like. Therefore, a waste must first be a solid waste before it can be a hazardous waste under RCRA.

A solid waste is considered a hazardous waste under RCRA if it can cause injury or death to humans or can pollute the land, air, or water. Before determining if a solid waste meets the criteria for a hazardous waste, it is best to determine if the solid waste is specifically excluded from definition as a hazardous waste. A list of excluded wastes is provided in 40 CFR 261.4(b), "Materials which are not Hazardous Waste." Many of these excluded wastes such as domestic sewage, spent nuclear waste materials and industrial wastewater subject to the Clean Water Act may meet the criteria for hazardous waste, but are nevertheless excluded because of their source.

Under the regulations in 40 CFR 261, there are two basic categories of hazardous wastes: listed wastes, and characteristic wastes.

Listed Wastes

Any solid waste that contains a specifically "listed" hazardous waste, regardless of the concentration, is regulated as a hazardous waste. The EPA has developed four specific lists of chemicals addressing over 500 specific hazardous waste sources. The four types of listed hazardous wastes as outlined in Subpart D of 40 CFR 261, "Lists of Hazardous Wastes" are:

1. Hazardous waste from nonspecific sources such as solvents, plating solutions, and chemical manufacturing processes (**"F" wastes**)
2. Hazardous waste from specific sources which include wastes from industrial processes which employ chemicals and result in generation of an unusable waste (**"K" wastes**)
3. Discarded commercial chemical products, off-specification species, container residues and spill residues considered hazardous waste (**"U" wastes**) and
4. Discarded commercial chemical products, off-specification species, container residues and spill residues identified as acute hazardous waste (**"P" wastes**).

The F, K, U and P designations also serve as part of the waste identification number for each of the four types of listed hazardous wastes.

Characteristic Wastes

Characteristic hazardous wastes are solid wastes that may not be specifically listed under the F, K, U, or P codes, but which exhibit one or more characteristics of ignitability, corrosivity, reactivity, or toxicity. Specific criteria for each characteristic are defined in 40 CFR Subpart C, "Characteristics of Hazardous Waste." Characteristic wastes are assigned a waste code beginning with the letter "D". Ignitable wastes (D001) have low flashpoints (<140oF or 60oC), can cause spontaneous combustion and/or can create a fire hazard. Corrosive wastes (D002), have a pH of less than 2 or greater than 12.5, or are capable of corroding steel at a certain rate (>6.35mm/year). Reactive wastes (D003) are unstable and are capable of violent reactions or can generate toxic cyanide or sulfide vapors. There are many other categories of D003 reactive materials, such as: 1) explosive, 2) reacts violently with water, 3) reacts violently when exposed to air, and 4) shock sensitive. Consult 40 CFR Part 261 for descriptions of reactive wastes.

Waste codes D004 through D043 are applied to toxicity characteristic wastes. These include eight metals, six organic herbicide/pesticide compounds and 26 other organic compounds. Toxicity characteristic wastes contain one or more specific chemical constituents at concentrations equal to or higher than those listed in 40 CFR 261.24, "Toxicity Characteristic." The concentrations are determined by analysis of the leachate from the waste using the Toxicity Characteristic Leaching Procedure (TCLP).

RCRA regulations require all appropriate waste codes be applied to a hazardous waste. For example, a spent solvent containing more than 10% methyl ethyl ketone before use, should be assigned the waste code F005 (code F from the listed waste requirements), and, depending on the results of ignitability and TCLP tests, would probably also be assigned waste codes D001 (ignitability) and D035 (toxicity, methyl ethyl ketone). Once a waste is determined to be hazardous, no further testing is required, and the waste may be manifested as such. However, waste haulers and treatment, storage, and disposal facilities (TSDFs) may not accept the waste without additional analysis/characterization.

The EPA has also promulgated rules that apply to materials which are mixed with, derived from, or contain hazardous wastes. These rules require media which are contaminated with or

derived from hazardous wastes to be managed as hazardous wastes until they no longer contain the waste, no longer exhibit the characteristic of the waste, or until the waste is delisted. These rules are described in detail in Title 40 CFR 261.3, "Definition of Hazardous Waste."

Is Testing Required?

Under 40 CFR 262.11, "Hazardous Waste Determination," generators of solid wastes must determine if their wastes are hazardous. If the solid waste is not specifically excluded in 40 CFR 261.4(b), the generator may either test the waste or apply knowledge of the waste in light of the materials or the processes used. To determine whether a waste is in fact a hazardous waste, it is generally acceptable practice to apply user knowledge of the waste, although it may not be possible to accurately determine all the applicable waste codes without testing. However, it is generally not acceptable to categorize a waste as nonhazardous based solely on user knowledge of the waste. For most practical purposes, the generator should characterize the nature of each waste stream on at least a yearly basis or more often if the waste generating process changes.

As part of the Hazardous and Solid Waste Amendments, many RCRA hazardous wastes are restricted from land disposal unless they are treated first to substantially diminish their toxicity and reduce the likelihood hazardous constituents will migrate from the disposal site. As part of the EPA's Land Disposal Restriction (LDR) rules (40 CFR 268), each waste shipment must be accompanied by a notification stating whether the restricted waste meets specific treatment standards promulgated for hazardous constituents. In most cases the notification can only be completed after laboratory analysis of the waste. If a generator bases a LDR notification solely on user knowledge of the waste, supporting documentation must be kept on record under 40 CFR 268.7, "Waste Analysis and Recordkeeping." User knowledge of the waste is not usually sufficient to determine whether or not the waste is restricted from land disposal.

Are There Additional Sampling Requirements for Permitted Facilities?

More rigorous requirements apply to RCRA-permitted installations which treat, store, or dispose of hazardous wastes (TSD Facilities). Except for small quantity generators, a RCRA permit is required if a facility stores hazardous waste for more than 90 days prior to shipment off-site for treatment or disposal. Under 40 CFR 264.13, "General Waste Analysis," TSD facilities must obtain a detailed physical and chemical analysis of a representative sample of the waste. In addition, a TSD facility must develop and conform to a Waste Analysis Plan (WAP) which is submitted to the EPA with the RCRA permit application. If a TSD facility accepts hazardous waste from an off-site generator, the facility must inspect and analyze each waste shipment to determine that it matches the waste identity as specified on the waste manifest. These requirements are reiterated under the LDR restrictions.

A Waste Analysis Plan has two main objectives: to ensure sufficient information is available to determine if the wastes fall within the scope of the facility's permit; and to ensure the facility

has sufficient information about the wastes to treat, store, or dispose of them in accordance with the regulations. According to 40 CFR 264.13 (b), the WAP must include the following elements:

- The parameters each waste will be analyzed for and the rationale for these parameters.
- Test methods.
- Sampling methods for obtaining representative samples.
- Sampling and analysis frequency.
- Waste analyses off-site generators have agreed to supply.
- Procedures used to ensure wastes received from off-site generators match the identity listed on the manifest.

It is good management practice for hazardous waste generators who do not require a permit to develop a similar plan specific to their wastes. The EPA publication, "Waste Analysis Plans: A Guidance Manual," can assist in developing a WAP, and provides useful information on sampling methods. WAPs are also discussed in AL/OE Technical Report 1994-0109, "A Risk-Based Approach for the Management of Total Petroleum Hydrocarbons in Soil," (October 1994) published by the Armstrong Laboratory Occupational and Environmental Health Directorate, now known as the Air Force Institute for Environmental, Safety & Occupational Health (ESOH) Risk Analysis (AFIERA).

What are the Required Test Methods?

Detailed instructions for conducting the TCLP waste analysis are found in SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," and are incorporated by reference into 40 CFR 261, Appendices II and III. SW-846 contains step-by-step instructions for performing the TCLP extraction on solid, liquid, and multi-phase wastes. Also listed in SW-846 is the appropriate analytical method for each hazardous constituent required to determine if the waste contains a contaminant in excess of the maximum contaminant concentration (MCC) regulated under 40 CFR Part 261. The TCLP itself is a method for leaching hazardous constituents from the solid portion of the waste and is used only if the solids constitute more than 0.5% of the waste by weight. The laboratory can also forego the extraction if: 1) total waste analysis of the waste shows the concentrations of the analytes are so low, an extract of the waste could not contain analytes at concentrations above the regulatory limits (below the MCC); or 2) analysis of any liquid portion of the waste contains such high concentrations of hazardous constituents that, even accounting for dilution, the entire waste sample would be hazardous.

Appendix III of 40 CFR 261 provides references which list actual chemical analytical methods used to determine the concentrations of hazardous constituents in the liquid fractions and extracts of waste samples. All the methods are fully described in SW-846. These or other approved methods should be used in order for analytical results to be considered valid in determining whether a waste is hazardous. (NOTE: A laboratory may modify the analytical method if they can demonstrate competency of the method to the EPA or when challenged (i.e., a lawsuit). Also, states may require the use of their own methods. Always check with local

regulators and TSDFs for required analytical methods.) A waste sample need not be analyzed for all listed hazardous constituents, only those that are most likely to be present based on the source of the waste.

Waste samples must be analyzed promptly in order for the results to be considered valid. For example, volatile organic compounds can escape from sample containers over time. For this reason, EPA recommends that maximum holding times (the time between actual sample collection and laboratory analysis/extraction) be applied to certain categories of samples.

What are the Required Sampling Methods?

Many laboratories will provide sample containers and specify required minimum sample volumes for individual waste types and physical states. The most important determinants of sampling method and volume are the physical state of the waste (liquid, solid, sludge), the waste container (drum, tank, pile), accessibility, waste variability, and safety concerns. Detailed sampling recommendations and guidance are provided in SW-846, Chapter 9 (Field Manual; Volume 2). For solids, 500 grams in a glass container is usually adequate. Liquid sample volumes vary from one liter to approximately eight liters, depending on the number of analysis parameters and solids content. Sample jars containing volatile compounds must be completely filled to minimize volatilization of contaminants from the liquid into the "head space" (the space between the liquid surface and the container cap).

Sampling is performed with a device appropriate for the waste being sampled. Weighted bottles or composite liquid waste samplers (coliwasa) are appropriate for sampling liquids in drums, pits, or tanks. Augers, triers, and shovels are useful for sampling solid wastes in piles, containers, or other locations.

The aim of the sampling method is to obtain a sample or samples which are representative of the waste stream. The installation must use an understanding of the waste generating and handling process to ensure samples are representative. Some wastes separate into distinct layers with time, and representative samples must include aliquots (sample portions) from each layer. It may also be important to use a statistical or random sampling scheme that provides for the collection of representative samples.

Several criteria must be considered in determining how many samples are required, how sampling locations are selected, and how frequently sampling should be repeated. If an installation generates a highly uniform waste stream from a single process location, one sample collected annually may be sufficient. However, if a single waste stream is a mixture of materials generated in several locations under varying conditions through time, more samples may be required, and composite sampling may be appropriate. At a minimum, sampling must be repeated if the waste generating process changes in a material way, or if inspection of the waste reveals it has changed.

Appendix I of 40 CFR 261 lists specific guidance documents that detail sampling protocols for different waste types. Waste samples collected in accordance with these protocols are considered representative by the EPA. The protocols include standards developed by the American Society for Testing and Materials (ASTM) and portions of SW-846. The EPA documents "A Compendium of Superfund Field Operations Methods" (EPA/540/P-87/001) and "RCRA Groundwater Monitoring: Draft Technical Guidance" (EPA/530-R-93-001) are recommended reading. In addition, the "AFCEE Model Field Sampling Plan" is a source of hazardous waste sampling methods approved by the Air Force Center for Environmental Excellence (AFCEE).

What are the Safety Concerns Related to Sampling?

Hazardous waste sampling should only take place in compliance with a detailed, facility-specific health and safety plan. Personnel performing the sampling should have all required Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) training and may be required to participate in a medical monitoring program.

Under most circumstances, the minimum personal protective equipment worn by a waste sampler is coated Tyvek coveralls, gloves, hard hat, rubber boots, splash protection, face shield, and air purifying respirator (level "C"). Air monitoring for oxygen content, organic vapors, and explosive atmospheres should be conducted during sampling. These minimum requirements apply to known waste only. Level C personal protection should be upgraded to include acid resistant clothing when corrosive wastes are known or suspected. If benzene or some other carcinogenic compound is present for which no adequate air purifying filter is available, respiratory protection must be upgraded to self-contained breathing apparatus (level "B"). Where little is known about the constituents of a waste stream, a minimum of level B personal protection should be worn until air monitoring or preliminary testing indicate a downgrade is permissible. Consult the installation Bioenvironmental Engineer for operation-specific health and safety practices and protective equipment requirements.

Samplers should always be aware of the potential hazards associated with hazardous wastes and be prepared to respond appropriately. Extreme care should be taken in inclement weather or conditions where ingress and egress are difficult. To prevent sparking, metal containers should be electrically grounded and nonferrous tools and sampling equipment used. Bulging and corroding drums should only be opened by specially trained personnel with the proper equipment. Tanks and other confined spaces must only be entered by certified personnel in compliance with OSHA standards.

Sampling personnel should work in teams and have current first aid training. Emergency phone numbers for fire, police and ambulance should be posted by readily accessible telephones in case of an emergency. Directions to the nearest hospital trauma center should be written down and available in case of injury.

What are the Requirements for Handling and Shipping Samples?

A sample of hazardous waste is subject to all the management requirements of the hazardous waste unless the sample is managed in accordance with the requirements of 40 CFR 261.4 (d) "Exclusions," which states the sample must be in transit or in storage awaiting transit to a laboratory for analysis to be exempt from the normal RCRA requirements. Excessive storage times may require the installation to comply with RCRA standards when handling the samples. The minimum requirements for managing samples prior to shipment to a laboratory include:

- Storage in a secure area away from excessive heat, cold, and moisture.
- Storage in tight packaging to prevent evaporation or leakage.
- Samples of incompatible wastes should be packaged separately.
- Sample containers must be protected from breakage utilizing bubble wrap and vermiculite; and
- Samples must be packaged, labeled, and marked in accordance with all relevant Department of Transportation (DoT) requirements for hazardous materials (49 CFR 172-179).

Transportation of samples does not require use of hazardous waste manifests and permitted hazardous waste haulers. However, carriers approved by the United States Department of Transportation to transport hazardous materials (as opposed to hazardous waste) should be utilized to ship properly packaged, marked, and labeled.

Where Can Samples be Analyzed?

There is no universal EPA certification program for laboratories performing hazardous waste sample analysis. However, the laboratory must be capable of performing extractions and analysis in accordance with SW-846 or other approved methods in order for analytical results to be valid and usable. Certain states have their own certification programs for hazardous waste analysis. Be sure to check with the laboratory to ensure that they are properly certified if applicable. The Air Force Institute for ESOH Risk Analysis (AFIERA), DSN 240-5454, can provide consultant support and arrange for sample analysis at their facility. You can visit the AFIERA web site at http://sg-www.satx.disa.mil/iera. The Air Force Center for Environmental Excellence, Environmental Restoration Directorate, (AFCEE/ERC), DSN 240-5244, can provide additional information on laboratory resources and quality control issues. You can visit the AFCEE/ERC web site at http://www.afcee.brooks.af.mil/er/erhome.asp

Many hazardous waste treatment and disposal facilities offer laboratory services as well, but the generator is not required to use these laboratories. Some large hazardous waste generators utilize on-site laboratories, but most use outside facilities. Laboratories can be identified through trade magazines, telephone directories or word of mouth.

For More Information

1. Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, Edition III, as updated (SW-846). (SW-846 is found in Appendices II and III of 40 CFR 261. Copies of

SW-846 and its updates may be ordered from the Superintendent of Documents, Government Printing Office, Washington, DC 20402 (202) 512-1800. The GPO document number is 955-001-00000-1.)

2. Waste Analysis Plans: A Guidance Manual, EPA/530-SW-84-012
3. A Method for Determining the Compatibility of Hazardous Wastes, EPA/600-2-80-076
4. Personal Protective Equipment Guides, EPA/735-F-93-00X (contact NCEPI at 800-490-9198 for more information about the guides available in this series)
5. A Compendium of Superfund Field Operations Methods (EPA/540/P-87/001)
6. RCRA Groundwater Monitoring: Draft Technical Guidance (EPA/530-R-93-001)
7. The Air Force Center for Environmental Excellence (HQ AFCEE) at http://www.afcee.brooks.af.mil/
8. TSD Central Internet Access: http://www.tsdcentral.com

References

1. Title 29 CFR, Part 1910.120, HAZWOPER
2. Title 40 CFR, Parts 261 through 268, Protection of the Environment
3. Title 49 CFR, Parts 172 to 179, Transportation
4. Waste Sampling Protocols (this document is found in Appendix I of 40 CFR 261)
5. NIOSH/OSHA Pocket Guide to Chemical Hazards
6. Air Contaminants-Permissible Exposure Limits, OSHA 29 CFR 1910.1000
7. RCRA/Superfund Hotline (800) 424-9346
8. Worker Safety Hotline (202) 523-8148
9. EPA Office of Solid Waste Test Method Hotline (703) 821-4789
10. EPA Internet Access: http://www.epa.gov
11. A Risk-Based Approach for the Management of Total Petroleum Hydrocarbons in Soil, AL/OE, October 1994.

App 5.B - General Chemistry

All general inorganic analyses are performed in accordance with federal and state guidelines and the requirements of the National Pollutant Discharge Elimination System (NPDES). Where applicable, analyses will conform to the criteria specified in 40 CFR Part 136.

Analyte	Method
Alkalinity	SM 2320B
Anions: Bromide, Chloride, Fluoride, Nitrate, Nitrite, o-Phosphate, Sulfate	EPA 300.0, 9056A
Biochemical Oxygen Demand (BOD), Carbonaceous Biochemical Oxygen Demand (CBOD)	SM 5210B
Chemical Oxygen Demand (COD)	EPA 410.4
Conductivity	EPA 120.1, SM 2510B
Cyanide	SM 4500 CN-E, EPA 9012B
Available Cyanide	ASTM D6888
Hexavalent Chromium	SM 4500 CR-B, EPA 7196A
Nitrogen, Ammonia	SM 4500 NH3-D
Nitrogen, Total Kjeldahl	EPA 351.2
pH	SM 4500 H+-B, EPA 9040C
Phenolics, Total	EPA 420.2
Phosphorous, Total	SM 4500 P-F
Solids, Total	SM 2540B
Solids, Total Dissolved	SM 2540C
Solids, Total Suspended	SM 2540D
Solids, Total Volatile	EPA 160.4
Sulfide	SM 4500 S2-D
Total Organic Carbon	SM 5310B, SM 5310C

App 5.C - Metals

EPA methods 6010C (ICP-AES), 6020A (ICP-MS) and 7470A/7471B (CVAA) are used for the analysis of aqueous and solid samples in environmental and other matrices. EPA Methods 200.7 (ICP-AES), 200.8 (ICP-MS) and 245.1 (CVAA) are used in the analysis of drinking water and wastewater samples. EPA Method 1631E is utilized for low-level Mercury analysis.

Analyte	Matrix	EPA Method
Metals (ICP-AES)	Aqueous or Solids	6010C
Metals (ICP-MS)	Aqueous or Solids	6020A
Metals (ICP-AES)	Drinking Water or Wastewater	200.7
Metals (ICP-MS)	Drinking Water or Wastewater	200.8
Mercury	Drinking Water or Wastewater	245.1
Mercury	Water	7470A
Mercury	Solids	7471B
Mercury (low-level)	Water	1631E

App 5.D - Microbiology

These tests are typically used for large volume studies.

Analyte	Matrix	Method
Chlorophyll A	Natural waters	SM 10200H.2
E. Coli	Water/Biosolids	EPA 1103.1
Fecal Coliform	Water/Biosolids	SM 9222D
Fecal Streptococcus	Natural waters	SM 9230C
Heterotrophic Plate Count	Natural waters	SM 9215B
Total Coliform	Natural waters	SM 9222B
Total Coliform/E. Coli	Potable water	SM 9223B

App 5.E - Pesticides, Polychlorinated Biphenyls (PCB), Herbicides

The quantification of organochlorine pesticides, herbicides and polychlorinated biphenyls (PCBs) plays a significant role in assessing the impact of these compounds on the environment, including potential effects on the food chain. Concentrations of pesticides and PCBs are determined by extracting the sample and analyzing the extract using a dual column gas chromatograph (GC) with electron capture detectors (ECD). Herbicides are assayed by extracting the sample, derivatization, and analysis of the extract by dual column GC-ECD.

Analyte	EPA Method
Chlorinated Pesticides	8081B
Organophosphorus Pesticides	8141A
Polychlorinated Biphenyls	8082A
Herbicides	8151A
Chlorinated Pesticides + PCBs (wastewater)	608

App 5.F - Semi-Volatile Organics (VOCs)

Semi-Volatile Organic (SVOC) compounds include basic, neutral and acidic extractable organic analytes that are determined by Gas Chromatography-Mass Spectrometry (GC-MS).

EPA method 8270D is used to determine SVOC concentrations in surface water, ground water and solid samples as typically associated with environmental investigation and remediation projects. EPA method 625 is applicable to the analysis of wastewater samples. Select subsets of the full SVOC list can be useful and cost-efficient when historical site information is available. One of the more commonly used subsets is the analysis for Polynuclear Aromatic Hydrocarbons (PAH) compounds that are sometimes associated with petroleum contamination.

Analyte	EPA Method
Semi-Volatile Organics	8270D
Semi-Volatile Organics (wastewater)	625
Polynuclear Aromatic Hydrocarbons	8270D
Polynuclear Aromatic Hydrocarbons (low-level)	8270D-SIM

App 5.G - Specialty Services

Service	Method
Low Level Perchlorate	EPA 6850
Explosives (including IS prep)	EPA 8330 B
Nitroglycerine + PETN	EPA 8330 B
White Phosphorus	EPA 7580
PCB Congeners	EPA 8082
Low Level Alkylated PAHs	EPA 8270m
Dissolved Gasses	RSK 175
Low Level Mercury	EPA 1631
Chemical Warfare Degradation Products	
1,4-Oxithiane + 1,4 Dithiane / RTI-SOP	RTI-SOP / EPA 8270m
Thiodiglycol / RTI-SOP	RTI-SOP/ High performance liquid chromatography (HPLC)
Organophosphorus Pesticides	EPA 8141
Ethylenediaminetetraacetic acid (EDTA)	
Formaldehyde	EPA 8315A
Glycols	EPA 8015
Alcohols	EPA 8015
Available Cyanide	ASTM D6888
Grain Size with Hydrometer	ASTM D422
VOCs in Air	TO-15
Air Phase Petroleum Hydrocarbons	MA-APH
Permanent Gases in Air	ASTM 2504
Elutriate and Pore Water Preparation	

App 5.H - Volatile Organics

The concentrations of Volatile Organic Compounds (VOCs) are determined using purge & trap extraction followed by Gas Chromatography-Mass Spectrometry (GC-MS). For Gasoline Range Organic (GRO) analyses, Gas Chromatography-Flame Ionization Detector (FID) is used. Different methods are utilized for the varying sample matrices. EPA method 8260C is used for the analysis of surface water, ground water and solid samples, while EPA method 624 is used for wastewater samples. EPA method 8015D is used in the analysis of soil and water samples for GRO compounds.

Analyte	EPA Method
Volatile Organic Compounds	8260C
Volatile Organic Compounds (wastewater)	624
Total Petroleum Hydrocarbon GRO	8015D

Appendix 6 – EPA Waste Code Threshold Cheat Sheet

1 mg/kg = 1 mg/L = 1 ppm

HW ID	Waste	Level
D001	Ignitable, flash point	<140 F
D002	Corrosive, pH	0-2 or 12.5-14
D003	Reactive: Hydrogen cyanide	250 ppm
D003	Reactive: Hydrogen sulfide	500 ppm
D004	Arsenic	5 ppm
D005	Barium	100 ppm
D006	Cadmium	1 ppm
D007	Chromium	5 ppm
D008	Lead	5 ppm
D009	Mercury	0.2 ppm
D010	Selenium	1 ppm
D011	Silver	5 ppm
D012	Endrin	0.02 ppm
D013	Lindane	0.4 ppm
D014	Methoxychlor	10 ppm
D016	2,4-D	10 ppm
D017	2,4,5-TP (Silvex)	1 ppm
D018	Benzene	0.5 ppm
D019	Carbon tetrachloride	0.5 ppm
D020	Chlordane	0.03 ppm
D021	Chlorobenzene	100 ppm
D022	Chloroform	6 ppm

HW ID	Waste	Level
D023	o-Cresol	200 ppm
D024	m-Cresol	200 ppm
D025	p-Cresol	200 ppm
D026	Cresol	200 ppm
D027	1,4-Dichlorobenzene	7.5 ppm
D028	1,2-Dichloroethane	0.5 ppm
D029	1,1-Dichloroethylene	0.7 ppm
D030	2,4-Dinitrotoluene	0.13 ppm
D031	Heptachlor	0.008 ppm
D032	Hexachlorobenzene	0.13 ppm
D033	Hexachlorobutadiene	0.5 ppm
D034	Hexachloroethane	3 ppm
D035	Methyl ethyl ketone	200 ppm
D036	Nitrobenzene	2 ppm
D037	Pentachlorophenol	100 ppm
D038	Pyridine	5 ppm
D039	Tetrachloroethylene	0.7 ppm
D015	Toxaphene	0.5 ppm
D040	Trichloroethylene	0.5 ppm
D041	2,4,5-Trichlorophenol	400 ppm
D042	2,4,6-Trichlorophenol	2 ppm
D043	Vinyl chloride	0.2 ppm

HW ID	Waste	Level
F001	Tetrachloroethylene	6 ppm
	Trichlorethylene	6 ppm
	Methylene chloride	30 ppm
	1,1,1-Trichlorethane	6 ppm
	CCl4	6 ppm
	Trichlorofluoromethane	30 ppm
	1,1,2-Trichloro-1,2,2-Trifluoroethane	30 ppm

F002	Tetrachloroethylene	6 ppm
	Trichlorethylene	6 ppm
	1,1,1-Trichlorethane	6 ppm
	Chlorobenzene	6 ppm
	1,1,2-Trichloro-1,2,2-Trifluoroethane	30 ppm
	o-Dichlorobenzene	6 ppm
	Methylene chloride	30 ppm
	1,1,2-Trichloroethane	6 ppm
F003	Xylene (Dimethyl benzene)	30 ppm
	Acetone	160 ppm
	Ethyl Acetate	33 ppm
	Ethyl Benzene	10 ppm
	Ethyl Ether	160 ppm
	Methyl Isobutyl Ketone	33 ppm
	n-butyl alcohol	2.6 ppm
	Cyclohexane	0.75 ppm
	Methanol	0.75 ppm
F004	Cresols	5.6 ppm
	Cresylic Acid	11.2 ppm
	Nitrobenzene	14 ppm
F005	Toluene (Methyl Benzene)	10 ppm
	MEK	36 ppm
	Carbon Disulfide	4.8 ppm
	Isobutanol	170 ppm
	Pyridine	16 ppm
	Benzene	10 ppm
	2-ethoxyethanol	Combustion (CMBST)
	2-nitropropane	Combustion (CMBST)