Waste Analysis Plan

NASA Goddard Space Flight Center

Medical and Environmental Management Division, Code 250

Greenbelt, Maryland 20771

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Prepared by:

DDC-4C Environmental Team

PREFACE

This NASA Goddard Space Flight Center (GSFC) Waste Analysis Plan (document; 250-WAP-2019.1) has been developed by the GSFC Medical and Environmental Management Division. The purpose of this plan is to document procedures for characterizing wastes at GSFC, Greenbelt Campus, in order to determine if they exhibit characteristics of a hazardous waste.

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EXECUTIVE SUMMARY

This Waste Analysis Plan (WAP), herein referred to as the WAP, was prepared in compliance with federal and state hazardous waste regulations. The WAP is designed to describe the process to characterize solid waste at Greenbelt to ensure proper disposal; describe the process to follow when encounter unknown materials; and implement these practices. This WAP is applicable to the Greenbelt, Maryland location only.

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LIST OF ACRONYMS AND ABBREVIATIONS

CFR	Code of Federal Regulations
COC	Chain of Custody
COMAR	Code of Maryland Annotated Regulations
DI	Deionized
DRO	Diesel Range Organics
EPA	Environmental Protection Agency
FMD	Facilities Management Division
GRO	Gasoline Range Organics
GSFC	Goddard Space Flight Center
L	Liter
LDR	Land Disposal Restriction
MEMD	Medical and Environmental Management Division
MSDS	Material Safety Data Sheet
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated Biphenyls
PPE	Personal Protective Equipment
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SDS	Safety Data Sheet
TOX	Total Organic Halogens
TSCA	Toxic Substance Control Act
TSDF	Treatment, Storage, Disposal Facility
UHC	Underlying Hazardous Constituent
VOC	Volatile Organic Compounds

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1.0 Introduction

DANGER- For characterization of unknown materials – DO NOT TOUCH - refer to Section 5 for proper handling.

Requests for waste characterization of planned or existing waste streams shall be evaluated in accordance with this WAP. A waste characterization will be performed for the sole purpose of disposing of the waste with respect to applicable local, state, and federal waste disposal regulations. Waste characterizations are not intended to be used for any health, safety, or industrial hygiene purposes.

Solid waste, including hazardous waste generated or discovered at Goddard is to be managed in accordance with GPR 8500.3, Waste Management. Any waste discovered by or referred to MEMD that is suspect or potentially hazardous shall be evaluated in accordance with this WAP. Waste will be properly characterized prior to each waste shipment or disposal action. A report generated by the hazardous waste database will validate waste sample frequency using the data contained within the waste profile information. Furthermore, waste received into the Less-than 90-Day Facility will follow the procedures outlined in 250-PG 8500.3.3 (Less-than 90-Day Facility and Program Procedures) to ensure all waste(s) received into the facility have proper characterization.

Waste must be properly characterized in accordance with 40 CFR 262.11, 40 CFR 268, and 49 CFR 171. For this reason, MEMD shall adhere to the following plan when characterizing waste generated at GSFC. Waste will be classified into two categories:

1. Bulk wastes are wastes that can be shipped in a single container in quantities of 5 gallons or more. When characterizing characteristic waste, analytical testing may need to be performed in order to address the Underlying Hazardous Constituents (UHCs).
2. Lab pack wastes are wastes in containers of 5 gallons or less in volume and are shipped by themselves or over-packed with other waste containers of similar characteristics. All hazardous waste lab packs will be sent to an approved Treatment, Storage, and Disposal Facility (TSDF) for incineration.

Prior to waste being received into the Less-than 90-Day Facility an initial evaluation is performed at the point of generation. Waste profile review, including previous analytical listing, generator knowledge, and characterization frequency will be compared to existing documentation in the hazardous waste database.

If necessary, a qualitative assessment can be performed in order to confirm or further characterize the waste for the purpose of disposal. The documentation from this qualitative assessment can be used for creating a preliminary waste profile in order to receive waste into the Less-than 90-Day Facility. The tool used to perform the qualitative assessment will be the HazCat® kit maintained by MEMD. The assessments shall be conducted inside of the fume hood located in the Less-than 90-Day Facility or in an appropriate field location. The HazCat kit shall be used in accordance with the manufacturer's instructions and follow the flowchart provided by the manufacturer as instructed.

Table 1: Change History Log

Revision	Effective Date	Description of Changes	Approval
Baseline		Initial Release	
2018.1	11/1/2018	Section 1: Updated the regulatory reference to 49 CFR 170 to 49 CFR 171 Section 4.5: Moved sample location from COC requirement to sample log requirement. Section 6.3: Added MEMD contractor as the customer for the COC.	Lixa Rodriguez-Ramon 11/06/2018
2019.1	11/1/2019	Section 1: added " DANGER- For characterization of unknown materials – DO NOT TOUCH - refer to Section 5 for proper handling". Finalized 2018 reviews and created new revision 2019.1	

2.0 Pre-Sample Data Collection

a. Before sampling, estimate the composition (based on generator knowledge of chemicals used and the process generating the waste) and compare it to the characteristic limits for hazardous waste 40 CFR 261.20 through 261.35. The Environmental Protection Agency (EPA) codes are grouped into similar analytical groups (for instance, metals are D004 through D011). For multiple containers of the same waste stream, a composite sample is taken and analyzed.

b. If a waste characteristic is estimated to be well above regulatory limits, except for poly chlorinated biphenyl (PCB) wastes, then the waste may be designated as a hazardous waste for that characteristic without analysis. If a waste is believed to contain a UHC, based on generator knowledge, an analytical sample must be taken to determine the concentration of UHC's relative to land disposal restrictions (LDR) treatment standards.

c. If the characteristic is estimated to be well below the limit, except for PCB wastes, then the waste may be designated as non RCRA regulated waste. If the waste is likely to be near the limit, then collect a sample and analyze it for that parameter. If PCBs are suspected, they should be analyzed to determine how they should be classified (wastes with PCBs between 50 and 500 ppm are MT01, wastes above 500 ppm are M001).

d. All known or suspected PCB lamp ballasts are classified without analytical testing as Maryland Universal Waste; Used Lamp Ballasts.

e. If waste is going to be stored or accumulated in containers or tanks that have been reused (e.g. rented tanks or roll-offs or reused HM containers), the user must make sure the containers are either free of contamination or have proof of original contamination or constituents. In cases where the previous contents cannot be documented it may be necessary to collect a sample of residual or rinse from the container prior to any GSFC waste being added. This sample shall have a formal Chain of Custody (COC) and be stored as required and sent for analysis if necessary.

3.0 Generator Interview

As part of the characterization process each generator will be interviewed using the "Generator Interview Questionnaire (see Appendix B)". The purpose of this questionnaire is to provide details of the waste being generated. For bulk and lab pack wastes, the waste initially shall be characterized using the interview questionnaire to determine sampling criteria. These wastes shall be re-sampled every three years or whenever the process changes.

For lab pack wastes, after the interview has concluded and sufficient user knowledge was obtained, no further sampling is needed. If a proper characterization cannot be determined by generator knowledge, then the waste shall be sampled. Hazardous lab pack waste is subject to the alternative treatment standards found in 40 CFR 268.42, which states requirements for incineration of lab pack items thus excluding the identification of UHCs. No lab pack waste at GSFC will contain the following waste codes: D009, F019, P010, P011, P012, P076, P078, U134, and U151. Waste containing these waste codes will be fully characterized to identify any UHCs and will comply with the bulk certification outlined in 40 CFR 268.

4.0 Sample Collection and Documentation

DANGER- For characterization of unknown materials – DO NOT TOUCH - refer to Section 5 for proper handling.

Sampling will be performed both for field analysis (e.g. pH) and for collection of samples for shipping to an off-site MEMD approved laboratory.

4.1 Gathering Supplies

The following table will assist in determining the number and sizes of sample bottles required for aqueous samples, using the following table. Sample containers are to be provided by the laboratory, pre-cleaned and preserved according to EPA specifications for the methods. Containers are stored in clean areas to prevent exposure to fuels, solvents, and other contaminants.

Table 2: Common Waste Sampling Parameters and Containers

Parameter	Container	Preservative	Min. Sample Size
Corrosivity (pH)	Plastic	≤4ºC	250 ml
Ignitability	Glass	≤4ºC	250 ml
Reactivity (Cyanide)	Plastic	≤4ºC	250 ml
Reactivity (Sulfide)	Plastic	≤4ºC	250 ml
TCLP Metals	Glass/plastic	≤4ºC	100g
TCLP Volatiles	Glass vials	≤4ºC	2 x 40 ml
TCLP Semi-volatiles	Glass	≤4ºC	1000 ml
TCLP Pesticides	Glass	≤4ºC	1000 ml
TCLP Herbicides	Glass	≤4ºC	1000 ml
Diesel Range Organics (DRO)	Glass	≤4ºC	1000 ml
Gasoline Range Organics (GRO)	Glass vials	≤4ºC	3 x 40 ml
Polychlorinated Biphenyls (PCBs) in oil	Glass	≤4ºC	2 oz
Total Organic Halogen (TOX)	Glass	≤4ºC	250 ml

Collection of these volumes will ensure the laboratory receives enough sample material to perform the required analyses. It is likely that waste volume will be limited, so have an adequate quantity of 250-ml, 500-ml and 1liter (L) bottles on hand to match the volume required. If all of the toxicity characteristic leaching procedure (TCLP) parameters are to be analyzed, two 1 L bottles of the sample should provide sufficient volume. These volumes assume that the waste is a liquid. If waste is a solid, (containing more than 0.5% Total Suspended Solids), then the sample will need to be extracted, which will require that two 4 oz. glass jars be collected. For a complete waste characterization provide two 8 oz. glass jars. For samples with a solid matrix, 100 grams is the minimum requirement. Make the necessary quantity adjustment for solids with less weight. When sampling soils/solids for DRO, a 4 oz. glass jar is needed. When analyzing soils/solids for GRO or other volatile organic compounds (VOC), a Terra Core Kit must be used to collect and preserve the sample properly. This must be obtained from the lab in advance or ordered through an independent vendor.

4.2 Standard Sampling Operating Procedures

- Transport equipment to the sampling location. Label sample containers as described in Section 4.4.
- Mark the required information in the sample log (samplers' names, date, time of sample collection, sample numbers) as described in Section 4.5.
- Don personal protective equipment for sampling, including lab coat or apron, gloves, and eye protection.
- Decontaminate any sampling equipment. Apply dilute Alconox if there is any visible contamination. Scrub with clean brush and thoroughly rinse off soap with tap water and follow with a DI water rinse. If the container is clean, rinse with tap water followed by DI water.
- Open waste containers SLOWLY to avoid rapid discharge of gas and/or liquids.
- For waste containers of 5 gallons or less, you may stir with a compatible mixer.
- For sampling from a container of 5 gallons or less, pour into sample bottle(s) through a funnel.
- For larger containers, do not mix. Sample waste using a Coliwasa sampling tube, ensuring sectional layers of the waste are collected.
- Samples that are to be analyzed in a laboratory should be placed directly into clean, laboratory supplied bottles.
- If samples are to be analyzed for VOCs, fill bottles so as to leave no headspace (i.e., a reverse meniscus must be observed before sealing and no bubbles present once container is capped securely).
- For all other containers, leave adequate headspace in containers to allow for thermal expansion of the sample material and mixing of sample.
- Fill out the COC as described in Section 5.1.
- Wrap bubble wrap around each glass sample container and fix with tape.
- Place large plastic bag in cooler and open to enclose samples and subsequent bags of ice.
- Place the sample containers in the cooler. If plastic bottles are being used, alternate them with glass containers to reduce the chance of breakage.
- Place ice contained in zip-lock bags on top of all sample containers within the cooler. Use as much ice as space allows.
- Seal large plastic bag to provide second barrier for melting ice to prevent the cooler from leaking. (optional)
- Place top two COC Record forms in a clear re-sealable plastic bag and tape it to the inside of the cooler lid. Retain bottom copy of form and keep it with field logs.
- Decontaminate equipment (Section 4.7) and properly dispose of waste generated during sampling (Section 4.8).
- Take the sample chests to the location designated for laboratory pickup or to Federal Express for shipment.

4.3 Sample Numbering

The primary sample ID number should be the container serial number if available. In the event there is no serial number the profile number shall be used. When using the container serial number, the profile ID number should be noted as well.

If a composite sample is taken note each container serial number in the sample log for that entry. If profile number is not available due to insufficient information because of unknown status see the Appendix D Unknown Container Procedures for the correct sample ID procedures.

Each sample consists of all of the material collected for analysis at one place, at one time, and of one matrix. The sample ID number for each sample shall be used to identify the sample on the sample log file, hazardous waste database, sample container, and on the COC Record. The sample ID number provides a consistent identifying code of all of the analytical results for a single sample.

4.4 Sample Container Labeling

The container serial number or a preliminary profile ID number should be used as the sample ID number. If a profile number is not available due to insufficient information because of unknown status see the Appendix D Unknown Container Procedures for the correct sample ID procedures.

4.5 Sample Log

The samples are recorded in a log of sample collection activities and the analytical test requested. Potential for future legal actions dictates that the sample log is consistent and complete, therefore any waste sampling activity needs to be entered into the log immediately. Samplers shall adhere to the sample log guidelines listed in this document.

When recording an entry into the sample log record the following data:

- Date collected – date sample was collected;
- Sample ID number – see Section 4.3 of this document. If this is from an unknown, the sample ID is documented as pending and the unknown ID should be documented in the column labeled unknown ID;
- Sample Location- indicated by building number and room;
- Sampler – initials of person taking the sample;
- Analytical test – place “X” in the column that represents the analytical test the sample should undergo;
- Other – this is used to note any additional testing required outside the routine waste parameters;
- Report # - this field is to record the lab’s report number found on the analytical report;
- Date received – date MEMD received the lab report; and
- Comments – any notes that may be relevant to the sample or analytical test(s).

Fully document all deviations from the sampling plan or changes in sampling procedures. Problems, delays, or any unusual occurrences such as improper equipment, or breakdowns should be included, along with resolutions and recommendations. Summarize the content and conclusions of all relevant meetings, discussions, and telephone conversations in which the sampler is involved. Include the names and affiliations of all personnel involved.

All equipment used to make measurements must be identified by type, manufacturer and serial number, along with the date of calibration.

For each delivery or shipment of samples to a laboratory, record the following information in the Sample log.

a. Custody procedures;
b. Packing and shipping procedures (record air bill numbers); and
c. Name, address, telephone number, and contact of the laboratory performing the analysis.

4.6 Sample Packaging Requirements

The representative from MEMD performing the sampling operations is responsible for packing and shipping the samples from the field to the laboratory. Samples must be properly packaged for shipment and dispatched to the laboratory for analysis with a signed COC Record enclosed in the shipping container box or cooler. Shipments that are sent to an on-site laboratory or a laboratory nearby that does not require the use of a common carrier must be transferred in accordance with local regulations. Sample packaging procedures that are used to ensure samples arrive at the laboratory with the COC Record intact are listed in Section 4.2.

4.7 Equipment Decontamination

Sampling devices and instruments should be decontaminated as soon as possible after sampling. This includes the beakers used for pH measurement and mixer paddles. If equipment has come in contact with oil or grease, clean the equipment with Alconox and water. Wash equipment in the nearest available sink and air dry the equipment.

4.8 Waste Handling Procedures

Non-investigative waste, such as litter and garbage, shall be collected on an as-needed basis to maintain each site in a clean and orderly manner. This waste shall be placed in the Less-than 90-Day Facility trash containers.

Waste used for field testing (pH) should be returned to the applicable waste container at the end of analysis and collection of samples for laboratory analysis. Wash water generated by cleaning and rinsing of a pH probe shall be disposed in the sink when cleaning equipment.

5.0 Unknown Waste Characterization

5.1 Unknown Waste Handling Precautions

DANGER- IMMEDIATELY STOP AND CALL 911 IF ANY OF THE FOLLOWING ARE NOTED

- UNEXPLAINED CRYSTALS
- FUMING CONTAINER
- UNCONTAINED LEAKING CONTAINER
- SOUNDS ARE COMING FROM THE CONTAINER

WARNING- STOP AND GATHER MORE HELP TO EVALUATE IF THE FOLLOWING ARE NOTED

- CONTAINED LEAKING CONTAINER

- CRYSTALS WITH POSSIBLE EXPLANATION
- ETHER /TetraHydroFuran MORE THAN ONE YEAR OLD.
- ORGANIC PEROXIDE.

5.2 Procedures for Characterizing Unknown Waste Containers

1. **Gather all equipment needed for the evaluation. This may include:**

a. Flash light;
b. Camera;
c. Note book, pen, marker
d. Eye protection; and
e. Gloves.

2. **Initial Assessment - Perform a visual observation and collect information.**

a. A MEMD team member will perform an initial assessment to document some basic observations on the container in question in order to identify the contents. Some key information that must be gathered **before handling** the container is listed below:

i. Who found the container and what they were doing when they found it;
ii. What is the composition of container (poly, metal, glass, etc.);
iii. What is the type of container (drum, cylinder, box);
iv. Are there any markings (DOT, manufacture);
v. What is the physical condition of container (new, clean, rusty, dirty);
vi. Are there signs of leaking; bulging/pressurization, or other stress;
vii. Where is the physical location of container (Building/Room, Well ID #, Tank ID #, etc.);
viii. What is the current organization owning the space where the container was found; and
ix. What are the current process(es) where container was found?

b. Based on the information gathered during the initial assessment, is it safe to move the container in question? If yes, then move the container to a well-ventilated and safe location for further evaluation and continue to step 3.

If we cannot conclude the container is safe to move then (i.e., DANGER or WARNING conditions are present) the container and area around the container should be secured to ensure the safety for the center and personnel. MEMD shall contact Code 360, Code 240, and the owner to address the best way to manage the security of the container until such a time where a decision has been made to safely move the container. After the container is secured, continue to step 2c.

c. MEMD will perform an additional assessment as needed. This is done by obtaining historical information of previous organizations and their operations from resources readily available at Goddard. Some sources of information for the questions listed below could be obtained from the Building FOM, facilities, Code 360, historical databases such as WinTrak-G and lastly, previous EPCRA reports.
d. What historical organization(s) occupied the space where the container was found?
e. What historical process(s) took place in the area where the container was found?

f. Document interviews with current and historical occupants of the area.
g. This and the documentation collected during the initial assessment will serve as a formal part of the characterization process.
h. Once the container has been secured, a determination will be made by a team consisting of highly experienced professionals, as described above, about whether or not the container can be safely opened and sampled. If the container is considered safe to open, then continue to step 3.
i. If the container is not considered safe to open or the material inside is thought to be reactive, then a specialist will be consulted to manage the container and material in question.
j. Once this is complete, the research conducted shall be entered into the hazardous waste database so that a formal waste profile can be documented.

3. Material characterization.

a. In accordance with the Waste Analysis Plan, a qualified person may begin to use the process (within this appendix) until the flow chart tells you to stop for safety reasons. At that point, contact a specialist to safely move and stabilize the container for proper management and disposal.
b. A representative sample may be obtained and analyzed by a laboratory in accordance with the Waste Analysis Plan.
c. The unknown container should be marked and labeled with the following ID numbering system. YYYYMMDD-XXX where:
   i. YYYY represents the 4 digit year
   ii. MM represents the 2 digit month
   iii. DD represents the 2 digit day
   iv. XXX is the daily sequential number (001; 002; etc.)
   v. The YYYYMMDD-XXX represents the ID number that shall be used to track the sample in the sample log and on the chain of custody. Once the analytical results are returned to MEMD a more accurate waste profile can either be created or amended.
   vi. The numbering system may change to reflect documenting the HMMS waste serial number once MEMD has sufficiently proven the waste profile associated with the serial number can be changed without compromising the data quality.

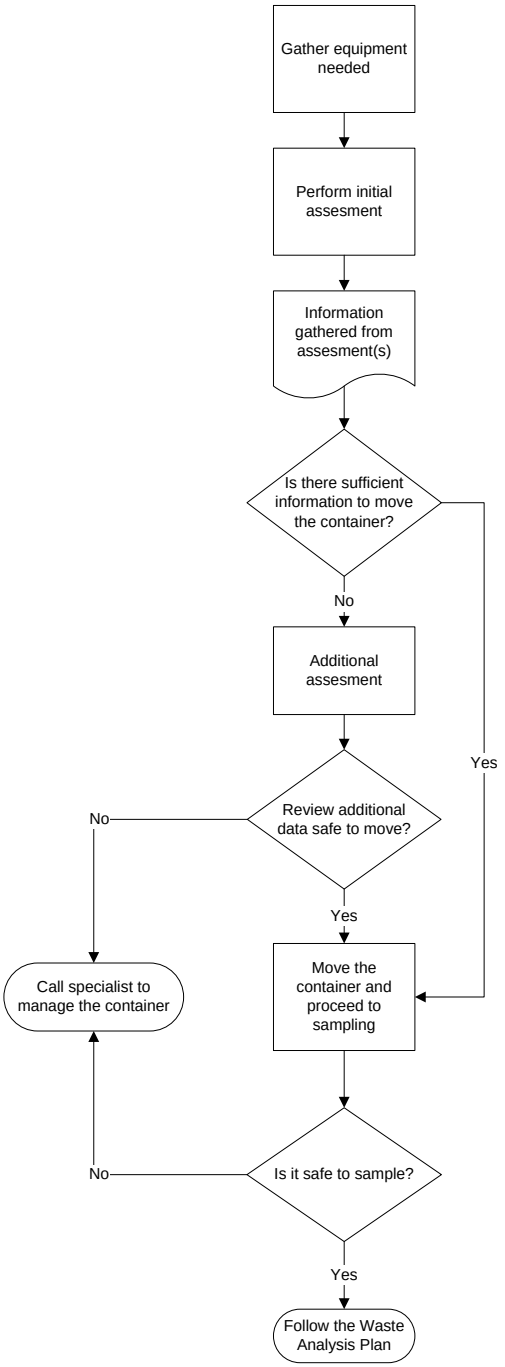
4. Decisions

a. When is it safe to move? Based on the information collected during the initial (2a) and additional assessments (2c), a team consisting of highly experienced professionals from MEMD will determine if it is safe to move the container to a location where the contents may be further evaluated. The team shall consist, as a minimum, of a Civil Servant (CS) program manager and contract program manager. It is considered safe to move when the following conditions can be met.
   i. When the origin of the container is consistent with the location and processes where it was discovered and that knowledge is from a viable source.

ii. When knowledge of processes provides the assurance that no reactive materials are present in the container (you are not dealing with a Danger situation as stated in the beginning of this procedure).
iii. Based on the initial assessment the container integrity is good. If not, can it be over packed for safe transportation?
iv. Once all of the above conditions provide positive answers to support it is safe to move then a member of the contract program management team with concurrence from the CS program manager may give permission to have the container moved to a location where the contents can be further evaluated.

b. When is it safe to sample?
i. When we are certain the contents of the container are not consistent with a Danger situation as stated in the beginning of the procedure. If in Warning situation the concerns must be addressed.
ii. When the origin of the container is consistent with the location and processes where it was discovered and that knowledge is from a trustworthy source.
iii. When knowledge of processes provides the assurance that no reactive materials are present in the container (you are not dealing with a Danger situation as stated in the beginning of this procedure).
iv. Once all of the above conditions provide positive answers to support it is safe to sample then a member of the contract program management team with concurrence from the CS program manager may give permission to have the container sampled in accordance with the waste analysis plan.
v. All information gathered through this process should be documented on the “MEMD Unknown Container Evaluation Questionnaire” located in Appendix D.

Figure 1: Unknown Waste Characterization Flow Chart



6.0 Sample Custody and Documentation

Thorough documentation is required to support sample validity. The documentation must verify that the samples are representative, were collected in accordance with the requirements of the Sampling and Analysis Plan, and are not vulnerable to tampering before being received by the laboratory. Documentation must tie the specific sample ID numbers to specific wastes and locations.

Sample documentation and COC procedures include:

a. Completed sample collection labels attached to all sample containers.
b. Records of sampling operations documented in sample logs or related forms. Records include sample type, sample matrix, sampling method, field test methods and quality control (QC) procedures. A table may be used to present this information.
c. Identification of every sample container on a COC and all custody transfers documented.
d. Custody of the samples with all discrepancies in the field operations resolved or duly recorded.

The following subsections should be used to generate the required sample documentation.

6.1 Chain of Custody

An overriding consideration for environmental measurement data is the ability to demonstrate that samples have been obtained from the locations stated and that they have reached the laboratory without alteration. Documentation of security, field handling criteria, shipment, laboratory receipt, and laboratory custody until disposal, provides evidence of proper processing. Documentation consists of a COC that is completed by the Sample Custodian.

6.2 Field Custody Procedures

The Field Sample Custodian or Sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. As few people as possible should handle the samples. A sample is considered to be "in custody" for legal proceedings if it is:

a. In a person’s actual possession;
b. In view after being in physical possession;
c. In a secured area restricted to authorized personnel only.

If any one of these is not in place at all times, the chain-of-custody is broken.

The Contractor Program Manager or designee shall review all field activities to determine whether proper custody procedures were followed during the field work and whether additional samples are required. The Sampler or Sample Custodian shall notify the MEMD Civil Servant Program Manager of any breach or irregularity of COC procedures.

6.3 Chain of Custody Records

There are many transfers of custody during the course of a sampling program, from time of collection through final sample disposal. All sample containers must be accompanied by a COC to document these transfers. A separate COC shall be prepared by the Field Sample Custodian

or Sampler for each sampling event. In this program, a pre-numbered Chain-of-Custody accompanies each shipping container. This record lists the sample containers that are in the shipping container, and serves as the packing list for the container. The serial number on the form becomes the identifying number for the shipping package.

The following information will be included on each COC:

a. NASA Goddard Space Flight Center or MEMD contractor as the client.
b. The Sample Taken Date and Time
c. The initials for the person Sampled By are entered.
d. The code (liquid, solid, and gas) for Sample Matrix.
e. The number of samples.
f. The analyses to be performed.
g. Special instructions or comments may be entered in this space.
h. The signature of the person relinquishing custody Relinquished By is entered.
i. The signature of the laboratory logger as the person receiving custody Rec'd By is entered.
j. The Date/Time custody is transferred is indicated.

The COC identifies which pairs of sample containers were collected for the same analysis, and identifies the sample containers that were filled with samples for use as QC samples.

Upon completion of the packing of each shipping container, the Field Sample Custodian shall confirm the completeness of the COC by signing the COC

Field COC terminates upon laboratory receipt of the samples. The laboratory should complete the “received by” sections on the COC and return the original signed record to the Contractor Program Manager. If there are any discrepancies between the COC and the contents of the shipping container, the samples in question will be segregated from normal sample storage and the laboratory will immediately notify the Civil Servant Project Manager.

6.4 Custody Transfer

Transfer of custody and shipment procedures are as follows:

a. Each sample shipping container shall be accompanied by a properly completed COC. The original of the record and first copy shall be included in the container. The Field Sample Custodian shall keep a copy of the completed form as part of the permanent documentation and send a copy of the COC to the Contractor Program Manager.
b. When transferring possession of samples, individuals relinquishing and receiving shall sign, date, and note the time of the transfer. This record documents custody transfer from the Field Sample Custodian to another person, to a mobile laboratory, to the permanent laboratory, or to/from a secure storage area.
c. If the sample container is sent by common carrier, a Bill of Lading shall be used. Bill of Lading receipts shall be sent to the Contractor Program Manager for retention with the sample results. If sent by mail, the package shall be registered with return receipt requested. Commercial carriers and the US Postal Service are not required to sign off on the COC as long as it is sealed inside the package with the sample container and the custody seals remain intact.

6.5 Laboratory Custody Requirements

Once the samples reach the laboratory, they shall be checked against information on the COC form for anomalies. The condition, temperature, and appropriate preservation of samples shall be checked and documented on the COC form. Preservation for this program is cooling to 4 degrees C only. A temperature blank should be included in each cooler for the laboratory to check without disturbing samples. The occurrence of any anomalies in the received samples and their resolution shall be documented in laboratory records and the laboratory must contact the Project Manager for resolution of the problem. All discrepancies, their resolution, and the identity of the person contacted must be documented in the project file. The laboratory is to provide a copy of the corrected paperwork to the Program Manager where appropriate.

The laboratory will follow all policies and procedures detailed in their laboratory quality assurance plan.

7.0 Sample Analysis

Routine samples should be analyzed using method(s) listed below. Refer to SW-846 for Analysis and Methods not listed in the table below. Guidance for typical sampling used at GSFC can be found in Appendix C.

Table 3: Waste Sample Analysis Methods

Analysis	Method (SW-846)
Corrosivity (pH)	Chapter 8.2, Method 9040C
Ignitability	Chapter 8.1, Method 1010A or 1020B
Reactivity - Cyanide	Chapter 7.3
Reactivity - Sulfide	Chapter 7.3
TCLP Pesticides	1311 prep/8081B
TCLP Herbicides	1311 prep/8151A
TCLP Metals	1311 prep/6010D,6020B and 7000B
TCLP Volatiles	1311 prep/8260B
TCLP Semi-Volatiles	1311 prep/8270D
DRO	8015C
GRO	8015C
PCBs	8082A
TOX	9020B

7.1 Holding Times

Samples should be analyzed as soon as possible after collection. Many samples are not stable for lengthy periods following collection, so daily shipment to laboratories is very important. The following holding times listed below are the maximum amount of time that the samples may be held before analysis from time of collection and still be considered valid. Samples exceeding these holding times are not valid for compliance and must be retaken.

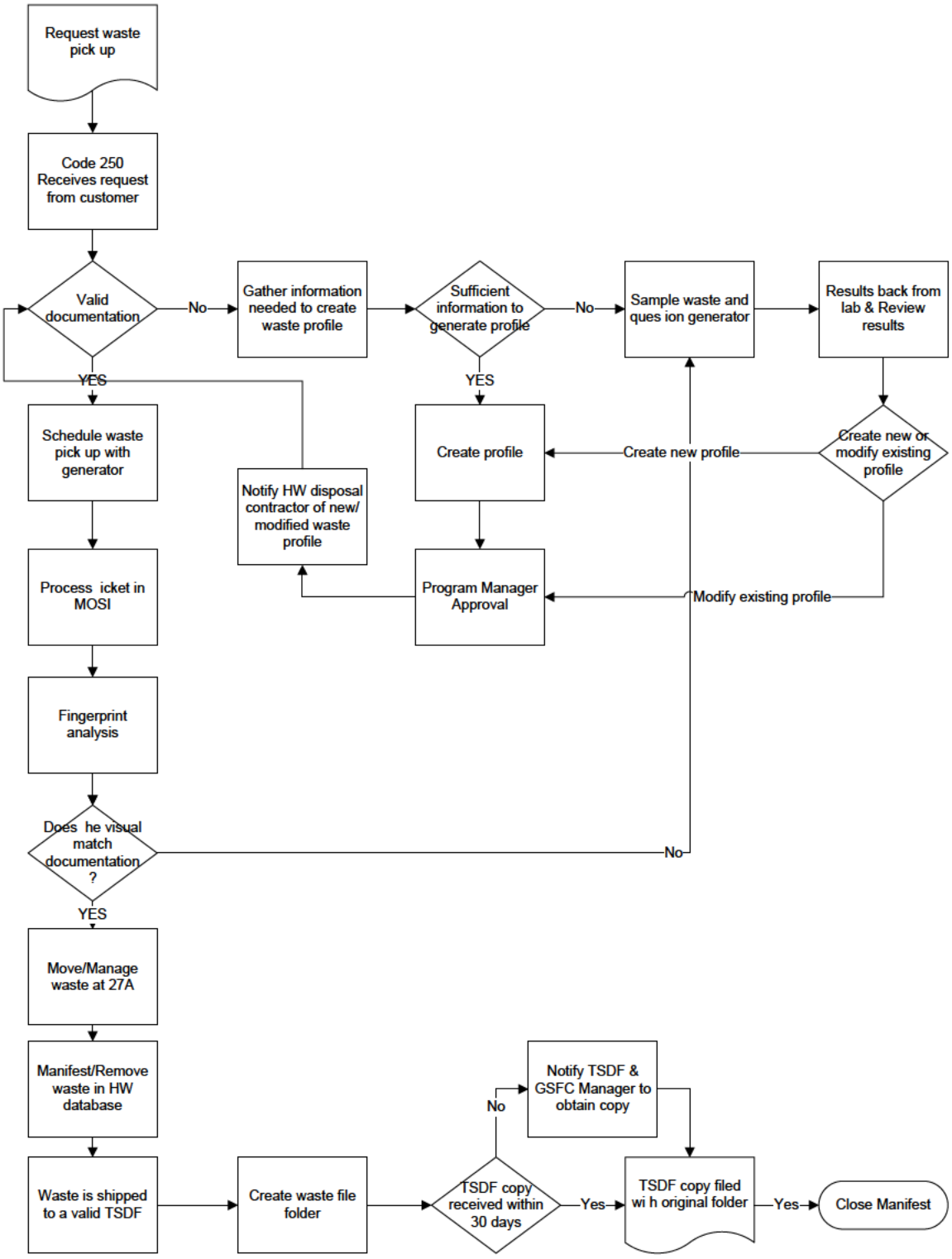
Table 4: Waste Sample Holding Times

Name	Methods (SW846)	Time to Extraction (days)
Ignitability	1010A/1020B	NA
Corrosivity (pH)	9045C	NA
Reactivity (Cyanide)	Ch. 7.3.	NA
Reactivity (Sulfide)	Ch. 7.3.	NA
TCLP Metals	1311; 6010B, 6020B & 7000	28 (Hg), 180 (other Metals)
TCLP Pesticides	1311; 8081B	7 Liquids/14 Solids
TCLP Herbicides	1311; 8151A	7 Liquids/14 Solids
TCLP Volatiles	1311; 8260B	14
TCLP Semi volatiles	1311; 8270D	14
DRO	8015C	7 Liquids/14 Solids
GRO	8015C	7 Liquids/14 Solids
PCBs	8082A	7 Liquids/14 Solids
TOX	9020B	28

8.0 References

a. Public Law 42 U.S.C. Section 6002, Resource Conservation and Recovery Act (RCRA)
b. Toxic Substance Control Act (TSCA), Title I of 1976
c. 40 Code of Federal Regulations (CFR) Parts 170 and 260-282, RCRA Regulations
d. SW-846 EPA Hazardous Waste Test Methods
e. 29 CFR 1910, Hazardous Waste Operations and Emergency Response
f. Code of Maryland Annotated Regulations (COMAR), Title 26 Maryland Department of the Environment
g. GPR 8500.3, Waste Management

Figure 2: Waste Validation Flow Diagram



Appendix A: Definitions

A.1 **Composite Sample –** Collecting equal amounts of waste from each container, when there are multiple containers of the same waste, and placing those amounts in one container to make a sample for analysis that is representative of the total waste stream.

A.2 **Corrosivity –** The waste characteristic that renders aqueous wastes (solid wastes dissolved in water) hazardous. Corrosive aqueous wastes have a pH less than or equal to 2 (acidic) or greater than or equal to 12.5 (alkaline). Corrosive liquid wastes readily corrode or dissolve metal or other materials, and/or injure flesh**.**

A.3 **Hazardous Waste (HW)** – A solid waste (gas, liquid, or solid state) whose properties pose a threat to human health or the environment. A solid waste is classified as hazardous if it is specifically listed in 40 CFR 261, or in state-specific regulations COMAR 26.13.02 or if it exhibits ignitability, corrosivity, reactivity, and/or toxicity characteristics.

A.4 **Ignitability** – The hazardous waste characteristic that identifies wastes that can readily catch fire and sustain combustion as defined in 40 CFR 261.21, or in state-specific regulations COMAR 26.13.02.11. These wastes have a flash point of less than or equal to 140 degrees Fahrenheit (60 degrees Centigrade), or are classified as an oxidizer in 49 CFR 173.151.

A.5 **Lab Pack** – Small containers of hazardous waste in over packed containers.

A.6 **Reactivity –** The hazardous waste characteristic that identifies wastes that readily explode or undergo violent reactions. Wastes that are normally unstable react violently with water, form potentially explosive mixtures with water, form toxic gases when mixed with water, are capable of detonation or explosive reaction, or are a forbidden Class A or Class B explosive would be classified as hazardous based on their reactivity.

A.7 **Toxicity –** The hazardous waste characteristic that identifies wastes that are likely to leach dangerous concentrations of any of the toxic chemicals listed in 40 CFR 261.24, or in state-specific regulations COMAR 26.13.02.14, above specified levels.

A.8 **Waste Analysis Report** – Any report generated from data collected within the hazardous waste database that lists the dates that wastes need to be characterized and what they need to be characterized for. In addition any certified analytical reports received from a laboratory that analyzed samples from GSFC.

Appendix B: Generator Interview Questionnaire

Primary Point of Contact		Alternate Point of Contact	
Name		Name	
Phone		Phone	
Code		Code	
Building		Building	
Room		Room	
Date of Interview		RCRA Training	
SAA		E-Mail	
RCRA Training		Waste Type	
E-Mail		Waste Name	

Code Generating Waste	
Waste Name	
Describe in detail the chemical(s) being used (with quantity and concentration). Supply SDS for each	
Describe in detail the process which takes place. (include reactions and possible by-products of the reaction)	
Is the possibility of cross-contamination present? If so, describe.	
Does waste contain any Mercury, Hydrofluoric Acid, Arsenic compounds or NO or NO_x compounds?	

I certify that the knowledge contained herein is accurate to the best of my knowledge.

Printed name	Signature	Date

Appendix C: Sampling Procedure Guidance

	Procedure										
Waste Type	**TCLP**	**Metals**	**VOCs**	**SVOCs**	**TOX**	**Total CN**	**React CN**	**Flash Point**	**pH**	**Nickel**	**PCB**
Cleaning with solvents	X	*	X	*	*			X			
Aqueous liquids	X	X	*	*	*				X	X	
Corrosive liquids	X	*							X	X	
Corrosive Plating shop waste	X	X				*	*		X	X	
Flammable Plating shop	X		X	X				X			
Shop Parts Cleaners	X	X	X	X	X			X			
Coatings/Paints (solid/liquid)	X	X	X	*	*			*			
Wipes	X	*	X	*				*	*		
Oils		X	*	*	X			*			*
Coolants	X	X							*	*	
Transformer Oil					*						*
Paint chips		X									*

The table listed above should be used only as guidance for establishing the appropriate analytical procedure to request from the lab. User knowledge, MSDS/SDS sheets and previous analytical reports can be used to confirm or guide the proper analytical procedure.

X – Recommended analytical test for this type of waste
* - Optional/additional analytical test for this type of waste depending on the process and generator knowledge

Appendix D: MEMD Unknown Container Evaluation Questionnaire

MEMD representative(s) performing evaluation	
Container Serial Number	
Date of visual inspection (MM/DD/YYYY)	
Location of inspection (BLDG-RM)	
Obtain equipment	Flashlight Camera Gloves Notebook; Pen; Marker
Person who found the container and what they were doing when they found it	
Composition of container (poly, metal, glass, etc.)	
Type of container (drum, cylinder, box)	
Any markings (DOT, manufacture)	
Physical condition of container (new, clean, rusty, dirty)	
Signs of leaking; bulging/pressurization, or other stress	
Physical location of container (Building/Room, Well ID #, Tank ID #, etc.)	
Current organization owning the space where the container was found	
Current process(s) where container was found	

Person Interviewed	Contact Information	Role (FOM, FMD, etc.)	Noteworthy comments
Person Interviewed	Contact Information	Role (FOM, FMD, etc.)	Noteworthy comments

Names of MEMD representatives reviewing safety issues (2b)	
List the names of other people involved in determining if the container is safe to move	
Note basis of decision here	
Names of MEMD representatives reviewing safety issues (2e)	
Note basis of decision here	