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WIPP Site Effluent and Hazardous Materials Sampling Plan

Cognizant Section: Site Environmental Compliance

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ACRONYMS AND ABBREVIATIONS

CFR	*Code of Federal Regulations*
CMRO	Central Monitoring Room Operator
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
MSDS	Material Safety Data Sheet
PCB	polychlorinated biphenyl
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RFA	Request for Analysis
RWP	Radiological Work Permit
SCBA	self-contained breathing apparatus
STC	Sampling Team Coordinator
SW-846	EPA SW-846, Test Methods for Evaluating Solid Wastes Physical/Chemical Methods
TRU	Transuranic
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

This document describes the environmental sampling activities for characterization of effluents and waste at the Waste Isolation Pilot Plant (WIPP) site that do not fall under an existing monitoring program. Rather than maintaining a separate plan for each specific area, or specific procedures, this plan contains guidelines incorporating all of the environmental sampling into one sampling plan, and provides one document identifying sampling protocol, suggested analytical parameters, and quality assurance requirements. This plan does not apply to personnel monitoring, environmental monitoring, or industrial hygiene sampling. Specific sampling protocols are described in WP 02-EC1001, Characterization Sampling, Shipping, and Documentation.

Throughout this document, the WIPP Site Effluent and Hazardous Materials Sampling Plan will be referred to as the "plan" and "transuranic (TRU)-mixed and PCB (polychlorinated biphenyl)-containing TRU-mixed waste" will be referred to as "TRU-mixed waste."

The purpose of this plan is to provide a guide for all types of effluent and waste sampling at the WIPP site that are not addressed by an established monitoring program. The areas of interest are as follows:

- Underground storage tanks
- Hazardous and TRU-mixed waste characterization
- Site effluent
- Spill response
- Contaminated soils
- Contaminated debris
- Site environmental investigations
- Site remediations
- Waste Handling Building sumps

This plan outlines methods for sampling, container use, preservation techniques, sample custody, suggested analyses, data review, and validation.

Each sampling area is addressed differently. There are different requirements for different types of samples and sample media. The intent of this plan is to allow the flexibility to collect samples using the best possible method for the given situation.

The Quality Assurance Project Plan for WIPP Site Effluent and Hazardous Material Sampling, WP 02-EC.05, addresses the quality assurance/quality control measures to be taken when using this plan.

2.0 PERSONNEL [1]

The sampling team will be the primary group responsible for the implementation of this plan. The sampling team will consist of at least two sampling personnel, one of whom may be the sampling team coordinator (STC). In the event that two qualified sampling

team members are not, available non-qualified personnel may participate in the sampling event. Personnel performing the actual sampling must be qualified sampling team members. Non-qualified personnel may only take notes in the field sampling logbook and serve as a safety watch, which may include contacting the Central Monitoring Room Operator (CMRO) and other personnel in the event of an emergency.

The STC will serve as the Quality Assurance Officer, whose responsibilities will include determining the validity of the sample collected. This is done by verifying that the sampling technique, preservation, containment, and shipping are adequate to ensure a representative sample that will produce valid data.

The STC will be the member of the sampling team to determine the type of sampling technique to be used. If additional consultation with other groups on-site is needed, it is the responsibility of the STC to make those contacts. The STC will review all documentation and data after the process is complete.

The STC will be responsible for scheduling the sampling activities, coordinating safety reviews, and arranging for preliminary surveys when necessary.

The sampling team personnel are responsible for maintaining two sampling logbooks in accordance with procedure WP 02-EC1001.

Each member of the sampling team will be trained according to the requirements of the Resource Conservation and Recovery Act (RCRA), and will be part of the RCRA training matrix on-site. All members of the sampling team will complete ST-01, WIPP Sampling Team Qualification Card, and the prerequisite training identified on the card, prior to performing sampling tasks without the direct supervision of a qualified person. It is recommended that a U.S. Environmental Protection Agency (EPA) approved, or equivalent, sampling course that includes proper sampling techniques and sampling quality control management be attended by each member of the sampling team.

All sampling team assistants will complete STA-01, WIPP Sampling Team Assistant Qualification Card, and the prerequisite training identified on the card. Sampling Team Assistants may perform all sampling duties not requiring the use of Level A or B personal protective equipment (PPE). However, the sampling team assistant must be under the direct supervision of a qualified sampling team member.

3.0 SAMPLING ACTIVITIES

3.1 Communication

Prior to leaving for off-site sampling activities, sampling personnel will sign out from their designated work locations to indicate their off-site sampling location. The STC will make arrangements to have an effective, two-way communication device at the sampling location. The communication device must be fully operational for the entire sampling event. The device must be able to send and receive messages from all locations where sampling activities will be conducted (e.g., if a cell phone is used, the

battery must be fully charged and the phone must be able to access a service area during the entire sampling event). Notification of emergencies shall be made directly to the CMRO. The communication equipment will be maintained in the presence of the sampling team while performing off-site activities.

3.2 Sampling Protocol

Sampling protocols may vary according to each waste stream. Each waste stream shall be evaluated independently.

3.2.1 Underground Storage Tanks [2]

The WIPP site has two underground storage tanks for diesel and unleaded fuel. These tanks are equipped with leak detection devices that will alarm if a leak occurs. If a leak occurs, sufficient core soil samples to determine the spread or location of the leaking fuel are required. Guidance for the initial sampling area and the initial number of samples to collect is found in EPA SW-846, Test Methods for Evaluating Solid Wastes Physical/Chemical Methods (SW-846). The New Mexico Environment Department may determine additional locations to sample and the number of additional samples to be collected for complete delineation of the spill area.

3.2.2 Hazardous and TRU-Mixed Waste Characterization [3]

Most hazardous waste determinations at the site can be made by Material Safety Data Sheets (MSDSs) or information from the WIPP Waste Information System. In some instances, sampling is required.

In the event a hazardous or TRU-mixed waste sample must be collected from a radiological area, a sampling plan will be developed jointly by Radiological Control personnel and the STC. The plan shall be covered by a Radiological Work Permit (RWP), must follow all appropriate sampling protocols, and must address beryllium exposure in accordance with WP 12-IH.02-9, WIPP Industrial Hygiene Program - Beryllium Exposure Prevention Program. Additionally, PCB exposure and sampling requirements, if applicable, should be addressed in the sampling plan.

The STC will select analytical parameters for samples taken from the fire suppression sumps in the Waste Handling Building. The selection of analytical parameters for these samples shall be based on process knowledge and may include hazardous constituents, beryllium, gross alpha, gross beta/gamma, and PCBs.

3.2.3 Spill Response [1]

In the event of a spill, the sampling team may be called to collect samples for cleanup verification or PCB analysis after the initial cleanup has been completed. If the spill is in a radiological area, Radiological Control personnel will survey the known or suspected TRU-mixed waste spill and the STC, in conjunction with Industrial Hygiene, shall determine whether sampling for hazardous constituents or PCBs is needed. Sampling

protocols and procedures shall be in accordance with WP 02-EC1001 and this sampling plan. A RWP shall be used if the sampling is to occur in a radiological area.

3.2.4 Contaminated Soils

Due to the remoteness of many areas at the site, there is the possibility of site soils being contaminated by an unknown substance. In this event, soil samples will be collected by the sampling team to identify possible contaminants, the extent of contamination, and the course of remediation. Additionally, samples of site soils may be collected by the sampling team to verify the completion of spill remediation.

3.2.5 Contaminated Debris [4]

Debris is defined in 40 *Code of Federal Regulations* (CFR) §268.2, "Definitions" as "solid material exceeding a 60mm particle size that is intended for disposal and that is a manufactured object; or plant or animal matter; or natural geologic material." Since this covers a large range of materials, sampling will be performed as needed on a case-by-case basis.

3.2.6 Site Remediations [5]

Samples to determine the levels of contaminants in an area to be remediated, or samples to determine if remediation technologies used were sufficient, will be the responsibility of the sampling team. If possible, a follow-up sample of a remediated area will be taken within 72 hours of the initial cleanup to determine if sufficient remediation was performed.

3.2.7 Site Investigations

In the event that site investigations are required to verify compliance with various permits or to locate contaminated areas, samples will be collected in accordance with this plan.

3.3 Sampling Devices

This plan addresses a variety of media that may be sampled by sampling team members. Due to various media and constituents being analyzed, there are many methods for sample collection.

Care should be exercised to ensure that representative samples are taken from all areas of concern. Representative samples should be taken at different locations or depths encompassing the entire population of the concerned media. When appropriate, the EPA suggests that either grab or composite samples be collected. A grab sample is an individual sample collected from a single location at a specific time. Composite samples consist of discrete grab samples mixed together to characterize the average composition for any one day.

The different types of sampling devices routinely used for sampling activities at the WIPP, along with the appropriate media for each sampling device, are discussed below. In some situations, combinations or variations of these sampling tools may be needed. The final decision on which sampling devices to be used will be made by the STC.

3.3.1 Coliwasa

A coliwasa is a glass, plastic, or metal tube with a tapered stopper at the bottom. The stopper is released; the instrument is inserted into the material; and the stopper is retracted, holding the sample inside the tube. The coliwasa is used when sampling containerized, liquid substances.

3.3.2 Weighted Bottle

A weighted bottle is used to sample liquids from the bottom of a vessel. This sampler consists of a glass or plastic bottle, a stopper, a sinker, and a line to raise, lower, and pull out the stopper. The bottle is lowered into the vessel and the stopper pulled when the bottle reaches the bottom of the vessel.

3.3.3 Dipper

A dipper is a beaker or similar container attached to a telescoping pole, so that samples from different locations can be collected by a person standing in one location. This apparatus is used primarily for surface sampling.

3.3.4 Auger

An auger is used for hard or packed sample media, primarily soils. It has spiral blades and a central shaft. It is used in a rotating motion, much like a drill, to loosen the material so that it can be scooped or shoveled.

3.3.5 Scoops and Trowels

Scoops and trowels are either metal or plastic hand tools used to dig or move material. The amount of sample needed will determine which one of these similar devices will be used.

3.3.6 Soil Sampler

A soil sampler is a stainless-steel device used to collect small soil samples. This is primarily used when analyzing soils for volatile constituents.

3.3.7 Peristaltic Pump

A peristaltic pump will mechanically pull a liquid sample. The pump could decrease the sampling time when large samples are needed or the depth from the surface or opening to the sample media is considerable.

3.3.8 Bailer

The bailer is a plastic tube used for sampling liquids. The ball valve located at the inlet allows liquids into the bailer and liquids are sealed in it when the bailer is retrieved.

3.3.9 Tool Decontamination

When possible, the sampling team will use disposable tools. New tools will be used for each sampling event. Disposable equipment must be kept clean and free of contamination prior to sampling.

In order to prevent sample contamination, nondisposable tools may require cleaning before they are used to collect a sample. After sampling activities are complete, the tools must be cleaned to remove any residual material. Deionized water or an appropriate detergent may be used to perform the cleanings. Wash water should be collected in a container and evaluated to determine if it must be disposed of as hazardous waste.

If decontamination of the sampling tools is not possible or practical, the tools may be discarded at the discretion of the STC. If applicable, the tools shall be discarded as hazardous or TRU-mixed waste.

3.3.10 Maintaining Sampling Equipment

Sampling tools and other equipment must be kept in a controlled area, preferably locked, in order to maintain the integrity of the tools and to prevent sample cross-contamination. If field measurements are needed calibrated instruments may be borrowed from Environmental Monitoring and Hydrology. When applicable, field measurements will be verified by specifying them as parameters requested for analysis by the contract laboratory.

3.4 Quality Assurance Samples

3.4.1 Field Duplicates and Blanks

Field duplicates will be collected at specified frequencies and are employed to document precision. The precision resulting from field duplicates is a function of the variance of waste composition, the variance of sampling technique, and the variance of the analytical technique. Duplicates will be collected in the same manner as samples. When a duplicate sample is drawn, the technique, location, and amount should be identical to the corresponding sample. Documentation and identification of duplicate samples shall reference the sample identification of the original sample.

A field bank should be collected each time liquid samples are collected for analysis at the contract laboratory. Field blanks are used to verify the accuracy of sampling and analytical techniques, the condition of sample preservatives, and incidental contamination at the sampling site. The field blank shall be deionized or reagent grade water.

Equipment rinseates will be collected at specified frequencies and will vary according to the probability of contamination or cross-contamination. Equipment rinseates are analyzed to detect any contamination from the equipment, previously collected samples, or conditions during the sampling activity. Rinseates are collected from using deionized or reagent water used to rinse the equipment.

The sampling team will collect field duplicates and rinseates as instructed by the STC. As a best management practice, one out of every ten samples will be a field duplicate and/or equipment rinseate.

3.4.2 Nonconforming Samples

In the unusual event that a sample is identified by the contract laboratory as a nonconforming sample (i.e., a sample has exceeded the holding time for a specific test, or has lost identity) another sample shall be taken of the media and submitted to the contract laboratory for analysis. If another sample cannot be taken, discussions between the lab manager and the STC may be held indicating that the test be run on the sample as received. Any impact on the test results shall be noted and the discussion shall be documented and included as part of the analytical file.

3.5 Sample Containers

Samples must be contained in a manner suitable for the requested analyses. Suggested sampling containers for each type of sample are listed in Table 1.

3.6 Sample Preservation

Samples shall be preserved as applicable immediately following collection. The different preservatives to be used are listed in Table 1. The contract laboratory representative and the STC will determine the applicability of sample preservation for samples that are not compliance regulated or samples containing high ionic strength brine water.

Preservatives should be stored in proper chemical lockers. Care should be taken not to store incompatible chemicals in the same locker. Guidelines for the handling and storage of the preservative chemicals are available in the hazardous materials management plan or from the Industrial Hygienist.

4.0 SAFETY

4.1 Material Safety Data Sheets [3]

MSDSs or process knowledge will be the main source of safety information when approaching a sampling activity. The MSDS contains information that will be used when deciding the appropriate sample container and how the material should be sampled. The MSDS also contains information on the necessary PPE when required.

4.2 Industrial Hygiene

When an MSDS is not available, or the substance to be sampled is of unknown composition, the Industrial Hygienist will be responsible for determining the safest way to sample the substance and the PPE that is required. If the Industrial Hygienist is absent a Certified Safety Professional will make the determination. Examples of the levels of PPE are included in Attachment 1, Personal Protective Equipment.

4.3 Personal Protective Equipment [5]

Personal protective equipment that becomes saturated due to spillage or splashes during sampling, shall be evaluated for disposal via the Request for Disposal process outlined in WP 02-RC3108, Request for Disposal. Noncontaminated PPE shall be disposed of as nonhazardous waste.

All PPE and sampling equipment used while sampling TRU-mixed waste shall be disposed of as TRU-mixed waste.

The results of PPE integrity verification and PPE disposition shall be entered into the Field Sampling Logbook.

4.4 General Safety and Sample Integrity [3]

Safety of the sampling activity shall be evaluated before sampling commences. When there are unknown materials or potentially dangerous conditions, all appropriate precautions should be taken. Sample collectors shall avoid contact with any of the media being sampled. Training will be provided to ensure the safety of the sampling activities, but every situation is different and shall be approached with caution.

Safety goggles and appropriate gloves are required when handling preservatives. MSDSs must be current and readily available.

Sample integrity is an issue closely related to safety. Poor sampling or preservation techniques can invalidate sample integrity and the analytical results. This will require another sample to be collected and possibly preserved. The risk of injury to sampling team members will be increased due to additional handling of containers and additional exposure to sample media and preservatives. Sampling team members shall follow all

sampling protocols in accordance with this plan and procedure WP 02-EC1001 to ensure that sample integrity is maintained when samples are collected and preserved.

In addition to hazards posed by materials to be sampled, there are other dangers that may be encountered. The area around the WIPP site is undeveloped and contains many tripping and falling hazards, as well as buried electric and gas lines, animals, and insects that could be harmful to the sampling team members. All persons involved in sampling activities shall be aware of the sampling location's surroundings. If necessary, the STC shall have surveys conducted to map locations of buried lines. Adverse weather conditions pose additional hazards to sampling team members. When possible the STC should plan sampling activities so that weather conditions such as extreme heat, lightning, and high winds do not pose a threat to the health and safety of the sampling team members.

Even when the utmost care is taken, an emergency situation can occur as a result of an unanticipated event. To minimize the impact of an emergency, sampling team members should be aware of basic first aid, have immediate access to a first aid kit, and be able to communicate with the CMRO.

Before personnel function as part of the sampling team, they will have a medical examination in accordance with the requirements in WP 15-HS.02, Occupational Health Program. The initial examination includes:

- Spirometry
- Basic Physical Examination
- Complete Blood Count
- Urinalysis
- Chest X-ray (optional)
- Respirator Medical Evaluation Questionnaire
- Documentation of current tetanus vaccination

The examination will document the initial quality of a sampling team member's health and ensure the maintenance of good health. Annual examinations, in accordance with WP 15-HS.02, will be performed if the individual remains on the sampling team. Unscheduled medical examinations should be performed in the event of an accident, illness, exposure, or suspected exposure to toxic materials. Personnel will not participate in further sampling team activities until cleared by the medical director.

5.0 ANALYSES

5.1 General Field Parameters

General field parameters, such as pH, temperature, and conductivity, may be performed in the field by the sampling team members. If it is not possible to perform these tests when the sample is taken, the analyses should be performed as soon as possible. These tests will aid in determining how the sample is contained, preserved, and analyzed. If a sample is of unknown composition, the characteristics of the material

give the sampler an idea of what the composition might be, making it easier to determine the analyses needed to be conducted by the analytical laboratory.

5.1.1 pH Measurement

In most cases, the pH will be measured by the contract laboratory. For purposes of shipping, pH may be measured in the field using pH strips. As required, the pH of a substance may be measured per WP 02-EM1005, Groundwater Serial Sample Analysis, or applicable instrument instructions. The pH can be measured only if the sample media is aqueous or multiphase with the aqueous part of the sample media being at least 20 percent of the total volume.

5.1.2 Temperature Measurement

When it is necessary to determine the temperature of a substance, it will be measured per WP 02-EM1005 or the applicable instrument instructions.

5.1.3 Conductivity Analysis

When it is necessary to determine the conductivity of a solution, it will be measured per WP 02-EM1005 or the applicable instrument instructions.

5.2 Qualitative and Quantitative Analyses

Sample analyses must be specified on the Request for Analysis (RFA) form sent to the contract laboratory with the samples. Common analyses are listed in Table 2. The contract laboratory will be responsible for providing the results to the qualitative and quantitative analyses according to their contract. SW-846 methods, when available, are suggested for analyses of all parameters. The contract laboratory may deviate from SW-846 if the laboratory method is at least as accurate as the suggested SW-846 method. The contract laboratory shall present the deviations from SW-846 for approval at the time of contract placement.

6.0 TRANSPORTATION [6,7]

6.1 Shipment of Samples for Laboratory Analysis

Samples being transported to a laboratory for the purpose of testing to determine their characteristics or composition are exempted from RCRA regulations under 40 CFR §261.4(d), "Exclusions." However, sample shipment shall be coordinated with Transportation Operations to ensure that the applicable U.S. Department of Transportation (DOT) regulations for packaging and shipping have been met. Shipments of samples that are hazardous materials as defined by the DOT will be completed in accordance with WP 08-NT3101, Shipment of Nonradioactive Hazardous Materials, or WP 08-NT3110, Shipment of Radioactive Materials. Verification of this process shall be indicated by a signature from a designated Transportation Operations representative on the Shipping Authorization form in accordance with WP 15-PM3525.

7.0 RECORDS

Use of this plan does not directly generate records. However the user is directed to other procedures which will result in generation of additional records.

8.0 REFERENCES

40 CFR §261.4(D), "Exclusions"

40 CFR §268.2, "Definitions"

STA-01 WIPP Sampling Team Qualification Card

ST-01 WIPP Sampling Team Assistant Qualification Card

WP 02-EC.05, Quality Assurance Project Plan for WIPP Site Effluent and Hazardous Materials Sampling

WP 02-EC1001, Characterization Sampling, Shipping, and Documentation

WP 02-EM1005, Groundwater Serial Sample Analysis

WP 02-RC3108, Request for Disposal

WP 08-NT3101, Shipment of Nonradioactive Hazardous Materials

WP 08-NT3110, Shipment of Radioactive Materials

WP 12-IH.02-9, WIPP Industrial Hygiene Program - Beryllium Exposure Prevention Program

WP 15-HS.02, Occupational Health Program

| WP 15-PM3525, Preparation and Processing of Shipping Authorization

Table 1 - Containers, Preservatives, and Holding Times

Name	Amount	Container	Preservation	Max Hold
pH	25 mL	P,G	None	24 hours
Nitrate/Nitrite	250 mL	P	$\leq 4^oC$, pH<2 with H_2SO_4	28 days
Sulfide	250 mL	P,G	$\leq 4^oC$, add Zinc Acetate	7 days
Sulfate	250 mL	P,G	$\leq 4^oC$	28 days
Total Metals	1L	P,G	pH<2 with HNO_3	6 months (28 days for Hg)
TCLP Metals	1L	P	$\leq 4^oC$	6 months (28 days for Hg)
Oil and Grease	1L	G	$\leq 4^oC$, pH<2 with HCl	28 days
Total Organic Carbon (TOC)	40 mL (2)	AG	$\leq 4^oC$, pH<2 with HCl	28 days
Total Volatiles	40 mL (2)	G, Teflon	$\leq 4^oC$,4 drops HCl	14 days
TCLP Volatiles	40 mL (2)	AG with Septum Lid	$\leq 4^oC$	14 days
Total Semivolatiles	1L (3 L for complete QC)	AG	$\leq 4^oC$	7 days
TCLP Semivolatiles	1L (2)	AG	$\leq 4^oC$	7 days
Total Suspended Solids (TSS)	100 mL	P	$\leq 4^oC$	7 days
Total Dissolved Solids (TDS)	100 mL	P	$\leq 4^oC$	7 days
PCBs	1L	AG with PTFE Lined Cap	$\leq 4^oC$, 0.008% $Na_2S_2O_3$	7 days
BTEX	40 mL (4)	AG with Septum Lid	25 drops (2.5 mL HCl)$\leq 4°C$	14 days

G - Glass
P - Polyethylene
AG - Amber Glass
* Numbers in parentheses indicate the number of containers of the specified volume that are needed for analysis

Table 2 - Common Analytical Parameters

Program	Potential Analyses
Hazardous Waste Characterization	- pH - Ignitability - TCLP metals, semivolatiles, and volatiles - TSS - TOC
Soil Samples	- Na - Mg - Cl - Ca - K - Metals, if applicable - Oil and Grease, if applicable
Site Effluent	- Metals - pH - Conductance - TOC - Volatiles - Semivolatiles
TRU-Mixed Waste Samples	- pH - Ignitability - TCLP metals and organics - TSS - TOC - Gross alpha and gross beta/gamma - PCBs

Attachment 1 - Personal Protective Equipment

There are four levels of personal protective equipment that are used when approaching a hazardous material. These levels are as follows:

A - Full positive-pressure suit
- Full-face piece self-contained breathing apparatus (SCBA) or positive-pressure supplied air respirator with escape SCBA
- Totally encapsulated chemical protective suit
- Inner and outer chemical resistant gloves
- Hard hat (if appropriate)
- Chemical resistant steel toe boots

B - Positive-pressure suit
- Full-face piece SCBA or positive-pressure supplied-air respirator with escape SCBA
- Hooded chemical resistant clothing
- Inner and outer chemical resistant gloves
- Chemical resistant steel toe boots
- Disposable boot covers

C - Full-face or half-mask air purifying respirator
- Hooded chemical resistant clothing
- Inner and outer chemical resistant gloves
- Steel toe boots
- Disposable boot covers

D - Work uniform
- Steel toe boots (if appropriate)
- Safety glasses (if appropriate)
- Work gloves (if appropriate)
- Hard hat (if appropriate)

If necessary the level of personal protective equipment to be used will be determined by the MSDS or the Industrial Hygienist.