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CCP-CM-014

Revision 1

CCP
SUMMA® Canister Headspace Gas System

(Equipment #HSG-SUMMA-01)

Equipment Description

EFFECTIVE DATE: 12/29/2010

Larry Porter

PRINTED NAME

APPROVED FOR USE

RECORD OF REVISION

Revision Number	Date Approved	Description of Revision
0	04/26/2007	Initial issue.
1	12/29/2010	Minor revision to update references to the *Waste Isolation Pilot Plant Hazardous Waste Facility Permit.*

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LIST OF ACRONYMS AND ABBREVIATIONS

ALARA	As Low As Reasonably Achievable
CCP	Central Characterization Project
CBFO	Carlsbad Field Office
CFR	Code of Federal Regulations
DOE	Department of Energy
EPA	Environmental Protection Agency
FRS	Field Reference Standard
HC	Hazard Category
HEPA	High Efficiency Particulate Air
HSG	Headspace Gas
M&TE	Measuring and Test Equipment
MCU	Mobile Characterization Unit
PCB	Polychlorinated biphenyls
PPM	parts per million
QC	Quality Control
RCT	Radiation Control Technician
RWP	Radiological Work Permit
TID	Tamper Indicating Device
TRU	Transuranic
UHP	Ultra High Purity
VCR	Video Cassette Recorder
VOC	Volatile Organic Compounds
WIPP	Waste Isolation Pilot Plant
WIPP WAC	Waste Isolation Pilot Plant Waste Acceptance Criteria

SUMMARY

The Headspace Gas (HSG) sampling using SUMMA® Canister Direct Sampling Method (Equipment No. HSG-SUMMA-01) headspace sampling activities involves sampling and analyzing the headspace gas of vented Transuranic (TRU) waste drums destined for the Waste Isolation Pilot Plant (WIPP). This Equipment Description identifies the steps needed to perform manual HSG sampling of TRU waste containers using a side port needle assembly. This sampling is conducted at a facility specified by the Host site. After sampling, the SUMMA® Canisters are sealed and prepared for shipment/transport to an approved laboratory for analysis.

The drum HSG is analyzed for hydrogen/methane and Volatile Organic Compounds (VOCs). The activity described in this Equipment Description will only be performed on vented TRU waste drums that are in compliance with the container equilibrium requirements as documented in the *Waste Isolation Pilot Plant Hazardous Waste Facility Permit*, Attachment C, *Waste Analysis Plan* (Ref. 1).

HSG sampling is performed manually. HSG sampling operations are required to ensure compliance with Central Characterization Project (CCP), *CCP Transuranic Waste Characterization Quality Assurance Project Plan*, CCP-PO-001 (Ref. 2).

CHARACTERIZATION EQUIPMENT DESCRIPTION

The analytical methods are equivalent in performance to those specified by the Department of Energy (DOE)-Carlsbad Field Office (CBFO) for the TRU waste container HSG characterization as follows:

- "Modified Method TO-14 for the Gas Chromatography/Mass Spectrometry Determination of Volatile Organic Compounds in Waste Container Headspace"
- American Society of Testing and Materials (ASTM) Method 1946-82, "Standard Method for Analysis of Reformed Gas by Gas Chromatography"
- EPA-SW-846, method 8260B, "Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry"

The laboratory is required to analyze blind audit samples. These audit samples are part of the Performance Demonstration Program. Details of this program are in the Performance Demonstration Program Plan for Analysis of Simulated Headspace Gases, current version.

This Equipment Description is a central coordinating link among the engineering design documents, the facility authorization basis, and implementing procedures. This Equipment Description does not originate requirements or basis information, but rather

collects that information into a convenient usable form. The Equipment Description consolidates information about the SUMMA® Canister HSG System into one document.

1.0 SYSTEM DESCRIPTION

This HSG sampling protocol employs a canister-sampling system to collect HSG samples for analysis and Quality Control (QC) purposes without the use of a manifold system. Direct canister HSG sampling (SUMMA® Canisters or equivalent canisters) employs a system to collect HSG samples for analysis without the use of an online manifold as shown in Figure 1. Rather than attaching sampling heads to an online manifold, a needle probe attached to a SUMMA® canister penetrates through an existing filter vent, side sample port, port dart, or other approved filter vent to obtain the gas sample. However, SUMMA® canister sampling may be part of an online integrated sampling/analysis system (see Figure 1).

Canisters are evacuated to 0.0039 inches (0.10 mm) Hg prior to use and attached to a changeable filter connected to the appropriate sampling head. The sampling head(s) must be capable of either punching through the metal lid of the drums (and/or rigid poly liner when necessary) while maintaining an airtight seal when sampling through the drum lid, penetrating a filter or septum in the orifice of the self-tapping screw, or maintaining an airtight seal for sampling through a pipe overpack container filter vent hole to obtain the drum headspace samples. Field duplicates must be collected at the same time, in the same manner, and using the same type of sampling apparatus as used for HSG sample collection. Field blanks shall be samples of room air collected in the immediate vicinity of the waste-drum sampling area prior to removal of the drum lid. Equipment blanks and field-reference standards must be collected using a purge assembly equivalent to the standard side of the manifold described above. These samples shall be collected from the needle tip through the same components (e.g., needle and filter) that the HSG samples pass through.

The sample canister, associated sampling heads, and the HSG sample volume requirements ensure that a representative sample is collected. When an estimate of the available HSG volume of the waste container can be made, less than 10 percent of that volume should be withdrawal. A determination of the sampling head internal volume shall be made and documented. The total volume of HSG collected during each HSG sampling operation can be determined by adding the volume of the sample canister(s) attached to the sampling head to the internal volume of the sampling head. Every effort shall be made to minimize the internal volume of the sampling heads.

Each sample canister used with direct canister methods has a pressure/vacuum gauge capable of indicating leaks and sample collection. If a canister pressure/vacuum gauge indicates an unexpected pressure change, determination of whether the change is a result of ambient temperature and pressure differences or a canister leak shall be made. This gauge shall be helium-leak tested to 1.5E-07 standard cubic centimeters

per second (cc/s), have all stainless steel construction, and be capable of tolerating temperature up to 125°C.

Sample collection in SUMMA® or equivalent canisters using standard HSG sampling methods meets the general guidelines established by the U.S. Environmental Protection Agency (EPA) in the Compendium Method TO-14, *Re-determination of Volatile Organic Compounds (VOC) in Ambient Air using SUMMA® Passivated Canister Sampling and Gas Chromatography Analysis* (Ref. 4).

Sample canisters, as illustrated in Figure 1, are leak-free, stainless steel pressure vessels, with a chromium-nickel oxide (Cr-NiO) SUMMA®-passivated interior surface, bellows valve, and a pressure/vacuum gauge. Equivalent designs, such as Silco Steel canisters, may be used so long as the leak proof and inert nature of the canister interior surface is demonstrated and documented.

All sample canisters have Video Cassette Recorder (VCR) fittings for connection to sampling and analytical equipment. The pressure/vacuum gauge is mounted on each manifold. The canister is helium-leak tested to 1.5E-07 cc/s, has all stainless steel construction, and is capable of tolerating temperatures up to 125°C. The gauge range is capable of operating in the leak test range as well as the sample collection range.

The direct canister process can be performed in any existing site facility or located outside of facility, provided that adequate climate controls, weather protection, and radiological controls are provided. A High Efficiency Particulate Air (HEPA) Filtration System is not needed during the HSG sampling to support the sampling method. Therefore, a host facility description of the proposed sampling location is not part of this document. Suitable areas may include climate controlled storage areas where drum equilibration is being performed or other climate-controlled drum storage locations. The Host site may elect to setup a special sampling facility for HSG sampling. However, the climate-controlled area must be maintained at a minimum temperature of 65°F during drum sampling.

1.1 Examination

HSG sampling is performed in an appropriate radiation containment area on waste containers that are in compliance with the container equilibration requirements (i.e., 72 hours at 18°C or higher).

TRU waste drums may be sampled through existing drum filter or through several other filter types and sample ports. To sample the drum HSG through the drum's filter, the protective cap over the filter must be removed. This operation results in mechanically removing the protective cap without damage to the filter. Once removed, a hollow needle, sealed at the tip with a small opening close to the tip, is pressed through the carbon filter and into the headspace beneath the drum lid. The sample is drawn into the

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SUMMA® Canister. The needle is removed from the filter, surveyed, and disposed of as contaminated waste.

For side-port sampling, the needle is pressed through the side-port and into the headspace beneath the drum lid. To assure that the sample collected is representative, all of the general method requirements, sampling apparatus requirements, and QC requirements shall be met in addition to following requirements that are pertinent to drum HSG sampling through the filter (see Attachment C).

Personnel performing HSG sampling are trained and qualified in accordance with CCPQP-002, *CCP Training and Qualification Plan* prior to performing work (Ref. 5).

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2.0 FACILITY, MAJOR COMPONENTS, AND SUBSYSTEMS

2.1 Facility

2.1.1 Transuranic Waste Process Flow

Because this operation can be performed in existing drum storage areas or designated sampling areas the flow process may vary. The direct sampling process is basically portable equipment that can be simply moved to the drum storage location. The SUMMA® Canister system is an apparatus and not a facility. Therefore, drums may or may not be relocated depending on the storage conditions of the drums and the Safety Basis that covers the proposed area for sampling. However, predetermined and approved drums are identified and staged by the Host site for testing. Drum equilibration and drum handling is the responsibility of the Host site.

During sample collection, the drum's filters are sealed to prevent outside air from entering the drum and diluting and/or containing the sample. The sampling of drum HSG by penetrating the filter consists of a side-port needle, a filter to prevent particles from contaminating the gas Sample, and an adapter to connect the side-port needle to filter. To prevent cross contamination, the sample head is cleaned or replaced after sample collection, after field-reference standard collection, and after field-blank collection.

The following requirements shall also be met:

- If HSG samples are to be composited, ensure that the waste stream for the drums being sampled in each batch are the same by reviewing the Container Traveler, Visual Examination Data Sheets, or Real Time Radiography Data Sheets.

- The housing of the filter shall allow insertion of the sampling needle through the filter element or sampling port with septum that bypasses the filter element into the drum headspace.

- The side-port needle shall be used to reduce the potential for plugging.

- The purge assembly shall be modified for compatibility with the side-port needle.

Collecting a sample:

- Open the valve on the SUMMA® canister and allow the canister pressure to reach equilibrium. Close the valve on the canister. Remove the needle assembly from the canister and hand it to the Radiation Control Technician

(RCT) for survey and proper disposal as contaminated waste. The operation is repeated using one needle and one canister assembly per sampling event.

- Drums are prepared for shipment: the RCT surveys for fixed contamination and releases the canister for shipment prior to removing it from the sample area. A valve-locking device and Tamper-Indicating Device (TID) are attached to the individual SUMMA® canister.

Chain-of- Custody:

- Samples are prepared for shipping according to the packing and shipping requirements presented in CCP-PO-001, and Title 49 Code of Federal Regulations (CFR) Transportation regulations.

- Shipping/transport of the SUMMA® canisters will be processed through the Host site shipping/transportation department. Special care should be taken to maintain the preservation of temperature.

- The SUMMA® Canisters are labeled, attaching a gas sample canister tag to individual SUMMA®.

- Samples are prepared for shipping accordance with requirements of Attachment C1 and 49 CFR Department of Transportation regulations.

- Sample containers are packed with foam inserts or other type of protection to prevent any damage to the SUMMA® canisters and special care should be taken to maintain the preservation of temperature.

- Temperature recording devices are placed inside the shipping container to assure that samples are maintained in a temperature range between 0 and 40°C.

- Just before shipping, frozen ice packages are placed inside of the shipping container. Ice packs are not placed in a direct contact with temperature recording devices.

- The sample chain-of-custody documentation is placed together with the sample inside the sealed or locked shipping container.

- TIDs are placed outside of locked/sealed shipping container.

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2.1.2 Unit Description

The SUMMA® Canister consists of sampling equipment and cannot be considered a typical facility. The Major Components listed below and Figures 1 and 2 provide adequate unit description.

2.1.3 Major Components

The major components for the SUMMA® canister unit consist of the following:

- 250 mL SUMMA® canisters cleaned and certified
- Needle assemblies containing:
    - 3 inches by 1/16 inch Side Port Needle
    - Swagelok 1/4 inch by 1/16 inch Reducing Union
    - Swagelok 1/4 inch Tube Adapter Gland
    - Cajon 1/4 inch VCR Nut
    - Cajon VCR Filter Gasket (0.5 micron)
    - 1/16 inch Swagelok Union Tee (Duplicate assembly)
    - 1/16 inch Teflon Tubing (Duplicate assembly)
    - Plastic Protective Cap
    - Ambient Pressure Meter (Calibrated and listed in the Measuring and Test Equipment [M&TE] database)
    - Ambient Temperature Thermometer (Calibrated and listed in the M&TE database)
    - Dataloggers (Calibrated and listed in the M&TE database)
    - Min/Max Memory Thermometer (Calibrated and listed in the M&TE database)
    - Latex or Equivalent Gloves
    - TID
    - A gaseous Field Reference Standard (FRS) containing at least six of the target compounds listed in CCP-PO-001(Ref. 2) (Manufacturer supplied Certificate of Analysis is submitted to and maintained by the CCP M&TE Coordinator. The standard is listed in the M&TE database.)
    - Ultra High Purity (UHP) nitrogen

- Tools:
    - 5/16 inch wrench
    - 1/2 inch wrench
    - 9/16 inch wrench
    - 1-1/8 inch wrench
    - 5/8 inch wrench
    - 3/4 inch wrench
    - 5/64 inch Allen wrench
    - Vise (recommended)
    - Filter cover blank
    - Latex cover material and rubber O-ring
    - Canned or compressed air or equivalent
    - HEPA system
    - Filter vent cap
    - Valve locking device
    - Vinyl tape

- Sample Port Assembly:
    - Septa
    - Septum seal cap
    - Flat metal plate
    - Clamps
    - Omegascope®
    - Penetrating

NOTE

SUMMA® Canisters are equipped with pressure gauges that display pressure or vacuum relative to atmospheric pressure (i.e., initial gauge reading of greater than, or equal to, 22 inches Hg); full samples are less than 4 inches Hg.

- Single Unit Needle Assembly

  For illustration of Single Unit Needle Assembly, see Figure 1, Single Canister Sampling Components. Single Unit Needle Assemblies consist of five components. Needle assemblies are less than 2 mL internal volume. See Attachment C for Single Unit Needle Assembly process.

- Duplicate Unit Needle Assembly
  For illustration of Duplicate Unit Needle Assembly, see Figure 2, Duplicate Canister Sampling Components. Duplicate Unit Needle Assemblies consist of seven components. Needle assemblies are less than 2 mL internal volume. See Attachment C for Duplicate Unit Needle Assembly process.

2.1.3.1 Other Components

Because this is a single sample unit there are no other components other than listed in the Major Components section of this document.

2.1.3.2 Subsystems

The software listed below complies with the requirements of CCP-QP-022, *CCP Software Quality Assurance Plan* (Ref. 6).

- Nomad® Data Logger Software
- Dickson® Data Logger Software

2.1.3.3 Civil and Structural

The SUMMA® Canister system is not a facility but rather a group of components.

2.1.3.4 Chemical and Process

The WIPP WAC (Ref. 3) requires that TRU waste not contain explosives, corrosives, or compressed gases. Non-radionuclide pyrophoric materials are prohibited at WIPP. Additionally, flammable VOCs are restricted to less than 500 parts per million (ppm) within payload container headspace (a level that would not challenge the integrity of the container). Polychlorinated biphenyls (PCBs) are also limited to less than 50 ppm. Therefore, chemical hazards are not expected to result in significant consequences or significantly contribute to accidents involving radiological materials. Hazardous

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materials are present in less than reportable quantities or threshold planning quantities. Based on the chemical inventory (chemicals are limited to small quantities used in maintenance or contamination in mixed TRU waste), it is not anticipated that threshold quantities of the Occupational Safety and Health Administration Process Safety Management Standard (29 CFR 1910.119) would be exceeded (Ref. 74).

Host sites (generators) ensure that TRU waste is not in free-liquid form, that minor residual liquids remaining in well drained internal containers (e.g., bottles, cans) do not exceed 1-inch (2.5 centimeters [cm]) in the bottom of any container and that the total liquid in the waste package does not exceed 1 volume percent. There are no compressed gases used in this process.

2.1.3.5 Electrical Power

There are no electrical components or requirements.

2.1.3.6 Instrumentation and Control

See Major Components.

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3.0 DESIGN REQUIREMENTS

3.1 Specific Requirements

While quantitative design requirements have not been identified for the SUMMA®, the system must be capable of assuring that fissionable material in its inspected drums does not exceed that permitted by the WIPP WAC (Ref. 3). The facility at which the SUMMA® operates must also establish that the system, in its site-specific implementation, meets 10 CFR 830 (Ref. 8), 10 CFR 835 (Ref. 9), and other requirements applicable to that site.

3.2 Codes and Standards

While codes and standards have not been identified as design requirements, a number of codes and standards have been used in the “as-built” system and are identified, where applicable.

4.0 OPERATIONAL INFORMATION

4.1 System Control Features

4.1.1 Emergency Shutdown Devices

There are no Emergency Shutdown Devices required. Sampling can be stopped at any time without a radiological release or hazard to the immediate workers.

4.1.2 Fire Protection

There is no fire protection required other than portable fire extinguishers.

4.1.3 Radiation and Other Hazards

4.1.3.1 As Low As Reasonably Achievable (ALARA)

Radiological posting is used to alert personnel to the presence of radiation and radioactive materials and to aid in minimizing exposures and preventing the spread of contamination. Radiological posting are installed before work begins, and updated periodically when changes in radiological conditions occur or are expected.

The area of operation around the characterization equipment may be posted as Controlled Area that bounds a larger area of operations around the equipment. Each access point to a Control Area [835.2] shall be posted, whenever radiological areas or radioactive material areas are not expected to receive a total effective dose equivalent of more than 0.1 rem (0.001 sievert) in a year [835.602 (a)] (Ref. 9). Routine contamination surveys should be performed of the immediate area of the sampling.

Radiological areas are posted with signs containing the standard radiation symbol with black or magenta lettering on yellow background [835.601 (b) and 835.601 (c)] [1]. The radiological postings are displayed to signify the actual or potential radiological conditions of the area. Postings are maintained in a legible condition and updated based on the most recent survey results. Signs and labels shall contain the standard radiation-warning trefoil colored magenta or black on yellow background. Lettering shall be either magenta or black. Magenta is the preferred color over black [835.601 (a)] Ref. 9). Unless circumstances do not permit, the standard radiation warning trefoil should be oriented with one blade downward and centered on the vertical axis. Lettering should not be superimposed on the standard radiation-warning trefoil (Ref. 10) size of the lettering used on the sign should not detract from the clarity of the standard radiation-warning trefoil (Ref. 10). See also DOE G 441.1-10 *Posting and Labeling for Radiological Control Guide for use with Title 10, CFR Part 835, Occupational Radiation Protection* (Ref. 11).

Physical barriers are used to designate the posted boundaries, when required by the Host site Radiological Work Permit (RWP). All work conducted in these areas is controlled by the approved Host site RWPs. All physical barriers shall be placed so that they are clearly visible from all directions and various elevations. They should not be easily walked over or under, except at identified access points. Rope, tape, chain, and similar barriers used to designate the boundaries of posted areas should be yellow and magenta in color. No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions [835.501 (e)][1] (Ref. 2).

4.1.3.2 Nuclear Criticality Safety

Per DOE-STD-1027-92 (Ref. 12), criticality hazards are not a concern for Hazard Category (HC)-III facilities Isotope inventory thresholds for HC-III facilities, established in Attachment 1 of the referenced DOE-STD-1027-92 (Ref. 12), preclude the potential for a criticality event.

PROCESS EVALUATIONS

A criticality evaluation of the individual equipment/processes/facilities is not needed due to the insufficient inventory of fissionable material mandated by HC-III classification, provided an Inventory Control Program is in place.

The minimum theoretical quantity of Pu 239 necessary for criticality, assuming favorable configuration, moderation, and reflection is 450 grams (American Nuclear Standards Institute/American Nuclear Society 8.7-1998 [Ref. 13]). Although a package might contain material favorable for moderation or reflection, inadvertent repackaging into a critical configuration is very improbable due to the low inventory of fissile material and the waste form geometry.

WIPP WAC criteria and Acceptable Knowledge evaluations precluded any TRU waste drum(s) being processed for headspace analysis that would challenge criticality safety. DOE facilities where this equipment may operate is normally operated under a Safety Analysis or documented safety basis document, which establishes bound limits and inventory controls for TRU waste drums.

TRANSURANIC WASTE DRUM DOSE RATE LIMITS

External Dose Rates

Drum handling and radiological control requirements are determined by the external radiation dose rate. Survey records are used to determine the sum of gamma and neutron dose rates at 30cm from the drum surface. External radiation at 30 cm from drum surface should be less than 200 mrem/hr. Drum staging areas and the perimeter of the SUMMA® sampling area are normally posted and controlled as a Radiation Area

during operations. The drum can be accepted for examination when the above conditions are met. When the external radiation at 30 cm from the drum surface is greater than 200 mrem/hr, the RCT is notified that a special posting is required. Each person performing work at the Host site must sign a RWP. Normal operations of this type only require the operators of the SUMMA® Canister sampling to sign a monthly RWP.

Waste Drum Contamination on Surface

The surface records are checked to verify that the surface contamination levels on the exterior surface of the drum do not exceed the limits for removable, total contamination, specified below:

Alpha Contamination on Drum Surface

- Waste drums are not acceptable if removable alpha contamination on the drum surface exceeds 20-dpm/100 cm^2.

Beta-Gamma Contamination on Drum Surface

- Waste drums are not acceptable if removable beta-gamma contamination on the drum surface exceeds 200-dpm/100 cm^2.

4.1.3.3 Industrial Hazards

A Process Hazard Review was performed to analyze hazards associated with the HSG Systems (Ref. 13). The most common hazards associated with SUMMA® Canister systems are high voltages, and pinch points. These hazards are addressed in safety training for personnel who operate the system. (See CCP-HSP-011, *CCP HSG Drum Sampling Health and Safety Plan,* for additional information [Ref. 14]).

4.1.3.4 Radiological Hazards and Precautions

Hazards associated with the sampling process may include chemical and radiation exposure. SUMMA® canisters are equipped with pressure gauges that display pressure or vacuum relative to atmospheric pressure. Because of the altitude difference between the Host site and the certified laboratory, vacuum (in inches of mercury) reading from SUMMA® gauges may be different at the Host site compared to the certified laboratory location.

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5.0 MAINTENANCE

Only qualified and trained personnel shall perform maintenance.

6.0 REFERENCES

1. *Waste Isolation Pilot Plant Hazardous Waste Facility Permit*, Attachment C, *Waste Analysis Plan,* Santa Fe, New Mexico, New Mexico Environment Department

2. CCP-CM-001, *CCP Equipment Change Authorization and Documentation*

3. CCP-HSP-011, *CCP Headspace Gas Drum Sampling Health and Safety Plan*

4. CCP-PO-001, CCP *Transuranic Waste Characterization Quality Assurance Project Plan*

5. CCP-QP-002, *CCP Training and Qualification Plan*

6. CCP-QP-022, *CCP Software Quality Assurance Plan*

7. CFR 29, *Occupational Safety and Health Standards, Subsection 1910.119, Hazardous Materials, Code of Federal Regulations*, U.S. Department of Energy, Washington, DC

8. 10 CFR 830, *Nuclear Safety Management, Subpart B, Safety Basis Requirements, Code of Federal Regulations*, U.S. Department of Energy, Washington, DC

9. 10 CFR 835, *Occupational Radiation Protection*, U.S. Department of Energy, Washington, DC

10. ANSI 1989 ANSI (American National Standards Institute) 1989, ANSI N2.1-1971 (R1989), *Radiation Symbol*, New York, New York.

11. DOE G 441.1-10 *Posting and Labeling for Radiological Control Guide for use with Title 10, CFR Part 835, Occupational Radiation Protection*

12. DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for ANSI 1998 Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, CN1

13. ANSI/ANS-8.7-1998: *Guide for Nuclear Criticality Safety in Storage of Fissile Materials*

14. DOE/WIPP-02-3122, *Transuranic Waste Acceptance Criteria for the Waste Isolation Pilot Plant (WIPP WAC)*

15. Compendium Method TO-14, *Re-determination of Volatile Organic Compounds (VOC) in Ambient Air using SUMMA® Passivated Canister Sampling and Gas Chromatography Analysis*, Environmental Protection Agency

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Attachment 1 – Figures

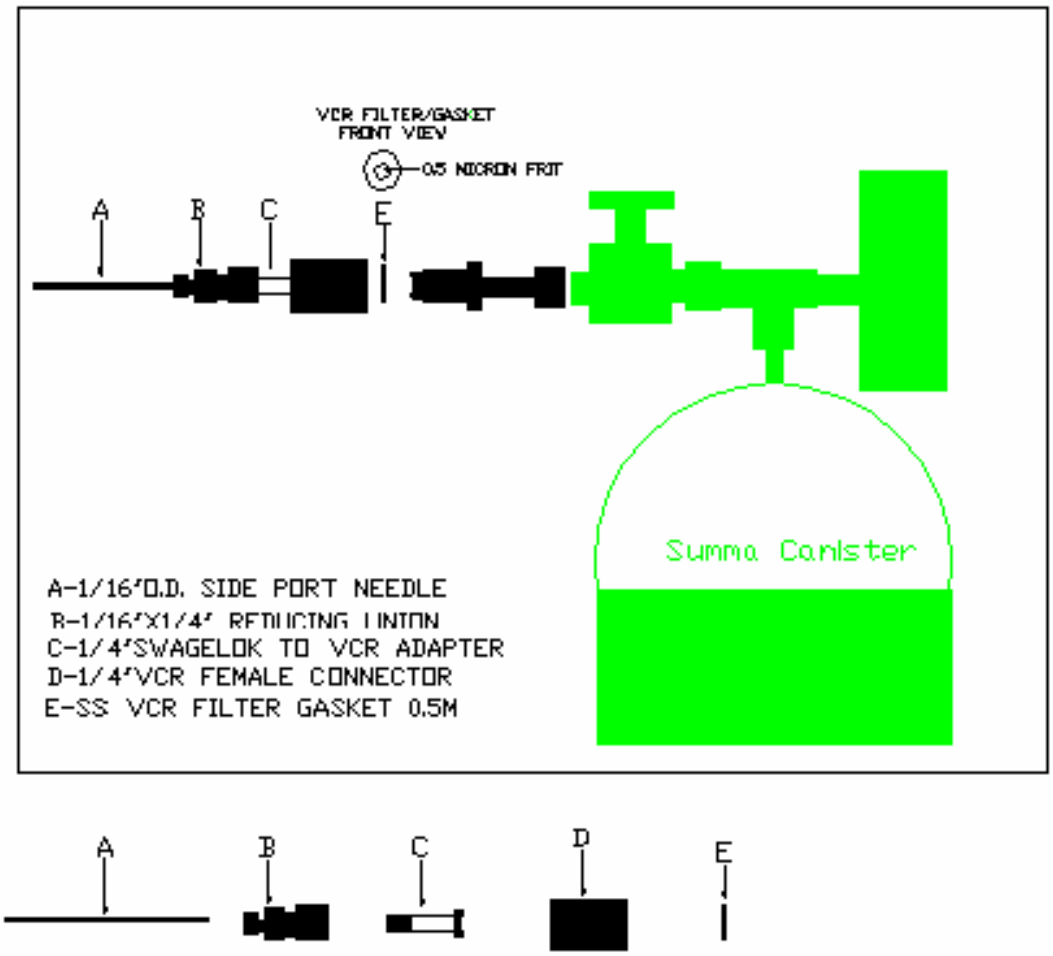

Figure 1. Single Canister Sampling Components

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Attachment 1 – Figures (Continued)

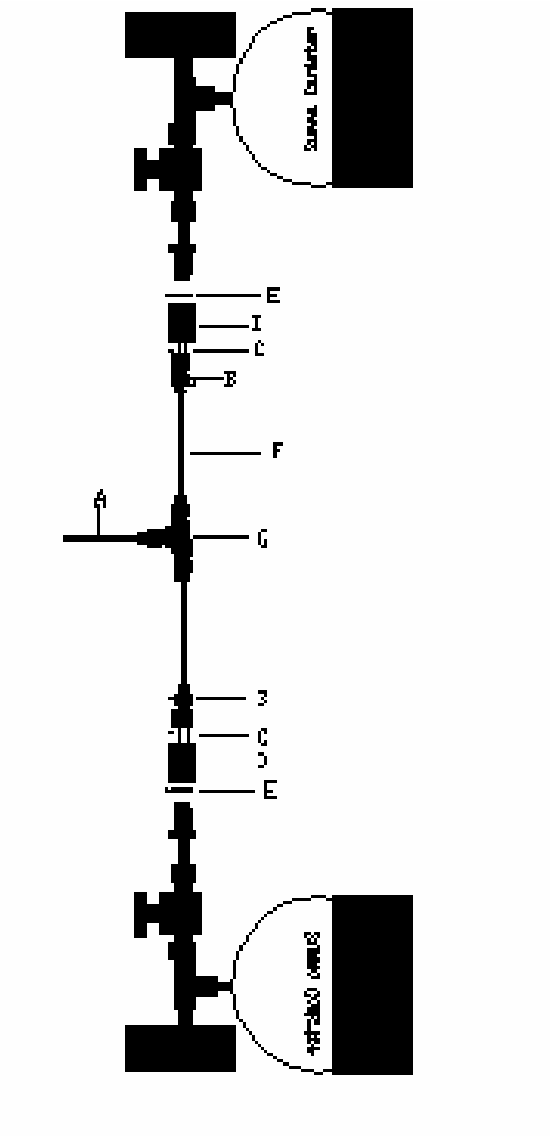

Figure 2. Duplicate Canister Sampling Components

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Attachment 1 – Figures (Continued)

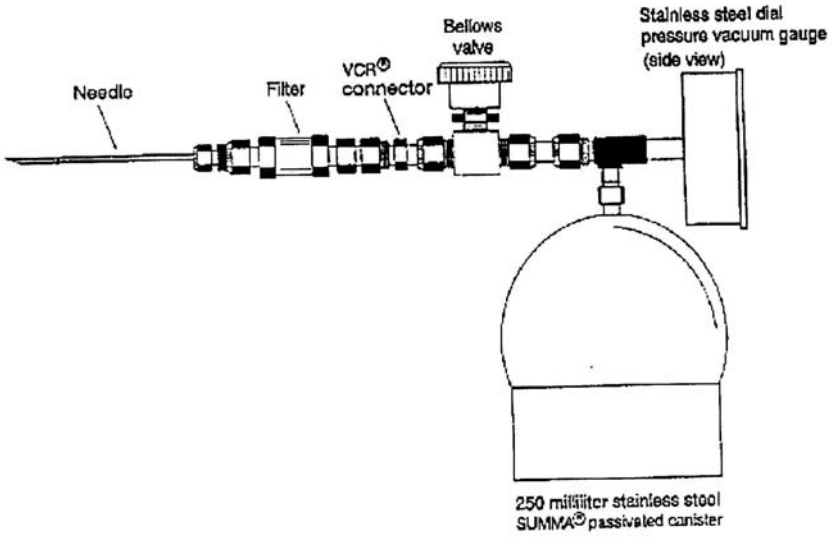

Figure 3. Schematic Diagram of Direct Canister with the Poly Bag Sampling Head

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Attachment 1 – Figures (Continued)

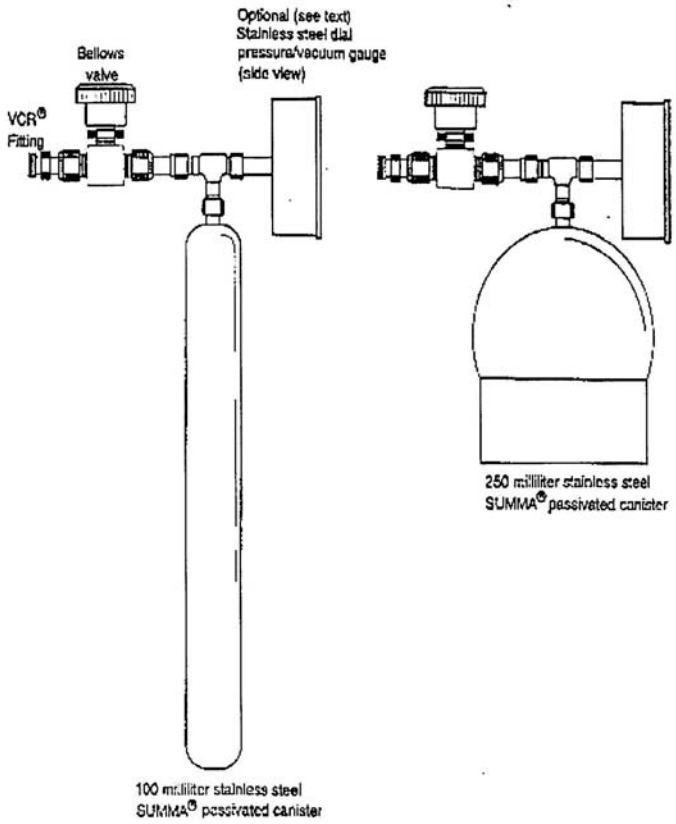

Figure 4. SUMMA® Canister Components Configuration (Not to Scale)

Attachment 2 – HSG Examination (Sampling**)**

The following sample steps are typically performed:

1. The operator ensures that needle assemblies and SUMMA® canisters have been appropriately certified and prepared, verifying the presence of the Cajon VCR filter gasket.

2. Ensure a sampling batch number has been assigned.

3. Checks that canisters are appropriately prepared by ensuring they are evaluated to at least 22 inches Hg.

4. Records the following data.
    a. Date
    b. Ambient pressure and temperature
    c. Canister El number
    d. Drum ID Number
    e. Drum Barcode number (if applicable)
    f. Canister starting gauge pressure
    g. Needle assembly cleaning batch number
    h. Canister cleaning batch number

5. Attaches needle assemblies to canisters as follows:
    a. Ensures presence of Cajon VCR filter gasket. If a needle assembly does not have a filter gasket it may not be used for sampling.
    b. Attaches needle assembly to canister and hand tightens.
    c. Torques needle assembly to 10 to 12 foot pounds.
    d. Ensures that the waste container has equilibrated for a minimum of 72 hours at greater than 18 °C (65 °F) prior to sampling by reviewing the data logger temperature recording.
    e. Downloads and saves the temperature information onto the computer.

6. Sample Collection

7. Open valve on SUMMA® Canister and allow the canister pressure to reach equilibrium (less than approximately 4 inches Hg). If the gauge does not reach less than approximately 4 inches Hg, then obtain a new canister and needle assembly and resample.

8. Close valve on SUMMA® Canister.

9. Ensure that the operation personnel remove the needle assembly from the canisters and hands it to the RCT for proper disposal as contaminated waste.

Attachment 2 – HSG Examination (Sampling) (Continued)

10. Records the data.

11. The gas samples take approximately 2 to 5 minutes to reach equilibrium.

12. Method and type of sampling is defined by CCP procedures.

Duplicates - Two separate, independent samples collected simultaneously from the same source using a duplicate sampling needle assembly (one needle connected to two SUMMA® canisters); stored in separate containers, and analyzed independently; duplicates are used to document the precision of the sampling and analysis process.

Field blank - Samples of room air collected in the sampling area in the immediate vicinity of the waste container to be sampled using the sampling port are collected daily prior to sample collection; field blanks are collected and analyzed per sampling batch. Field blanks are collected to evaluate background levels of program required analytes to assess the sampling system and the analytical system cleanliness, and to determine the impacts of ambient contamination, if any, on the sample results.

Field Reference Standard (FRS) - Used to assess the accuracy with which the sampling/analysis system collects and analyzes the samples. The FRS contains a minimum of six of the analytes listed in CCP-PO-001, at concentrations within a range of 10 to 100 ppm by volume and greater than the Method Detection Limit of each compound. FRSs are collected at a frequency of one per sampling batch. FRSs have a known valid relationship to a nationally recognized standard (e.g., National Institute of Science and Technology, if available). If National Institute of Science and Technology-traceable standards are not available and commercial gases are used, a Certificate of Analysis from the manufacturer documenting traceability is required.

Sampling Batch - A suite of samples of similar matrix (i.e., gas or solid) collected using the same type of sampling equipment within a specified time period. A batch can be up to 20 samples (excluding QC samples), all of which shall be collected within 14 days of the first sample in the batch.

Composite Sample - If samples are to be composited by the laboratory, containers used must be from the same waste stream with no more than 20 containers being included in a single composite sample.

Single Sample - Containers that must be analyzed individually.

Attachment 2 – HSG Examination (Sampling) (Continued**)**

SINGLE/DUPLICATE UNIT NEEDLE ASSEMBLY PROCESS

- Single Unit Needle Assembly:

  [A] Inspect all components for damage, **AND** blow down each item with compressed air (e.g., canned air, compressed UHP nitrogen).
  [B] Place a ¼ inch VCR female nut onto a ¼ inch Swagelok tube adapter to VCR gland.
  [C] Install the ¼ inch Swagelok nut, ferrule backing ring, **AND** ferrule onto the ¼ inch tube adapter.
  [D] Insert the ¼ inch Swagelok tube adapter into the ¼ inch fitting on the ¼ inch by 1/16 inch Swagelok reducing union.
  [E] Ensure that the ¼ inch tube rests firmly on the shoulder of the fitting.
  [F] Gently tighten the nut, finger tight.
  [G] Hold the fitting body with a backup wrench, **AND** tighten the nut 1/2 to 1 turn.
  [H] Insert the open end of the needle into the 1/16 inch fitting on the 1/4 inch by 1/16 inch Swagelok reducing union.
  [I] Ensure that the needle rests firmly on the shoulder of the fitting.
  [J] Gently tighten the nut, finger tight.
  [K] Hold the fitting body with a backup wrench, **AND** tighten the nut 3/4 to 1 1/2 turns.
  [L] Snap the 1/4 inch VCR filter onto the VCR gland.
  [M] Install the plastic protective cap into the 1/4 inch VCR nut, if applicable.
  [N] Repeat steps [A] through [M] for all needle assemblies required.
  a. 1/16 inch outer diameter side port needle
  b. 1/16 inch by 1/4 inch reducing union
  c. 1/4 inch Swagelok to VCR adapter
  d. 1/4 inch VCR female connector
  e. SS VCR filter gasket (0.5 microns)

- Duplicate Unit Needle Assembly process:

  [A] Inspect all components for damage, **AND** blow down each item with compressed air (e.g., canned air or compressed UHP nitrogen).
  [B] Prepare two single-unit needle assemblies without needles per steps [A] through [F] above.
  [C] Snap a ¼ inch VCR filter onto each of the two VCR glands.
  [D] Install the plastic protective caps into the ¼ inch VCR nuts, if applicable.
  [E] Install Teflon tubing sections into the two single unit needle assemblies in place of the needles.
  [F] Gently tighten the nuts, finger tight.

Attachment 2 – HSG Examination (Sampling) (Continued)

[G] Hold each fitting body with a backup wrench, AND tighten the nuts ¾ to 1 ½ turns.
[H] Install a needle in the 1/16 inch Swagelok tee.
[I] Ensure the needle rests firmly on the shoulder of the fitting.
[J] Gently tighten the nut, finger tight.

[K] Hold the fitting body with a backup wrench, **AND** tighten the nut ¾ to 1 ½ turns.
[L] Install the two Teflon tubes from the two needle assemblies into the 1/16 inch tee.
[M] Ensure that the Teflon tubes rest firmly on the shoulder of the fitting.
[N] Gently tighten the nuts, finger tight.
[O] Hold the fitting body with a backup wrench, **AND** tighten the nut ¾ to 1 ½ turns.
[P] Repeat steps [A] through [O] for all Duplicate Needle Assemblies required.

a. 1/16 inch outer diameter side port needle
b. 1/16 inch by ¼ inch reducing union
c. ¼ inch Swagelok to VCR adapter
d. ¼ inch VCR female connector
e. SS VCR filter gasket (0.5 microns)
f. 1/16 inch outer diameter Teflon tubing (6 inches to 8 inches long)
g. 1/16 inch Swagelok union tee

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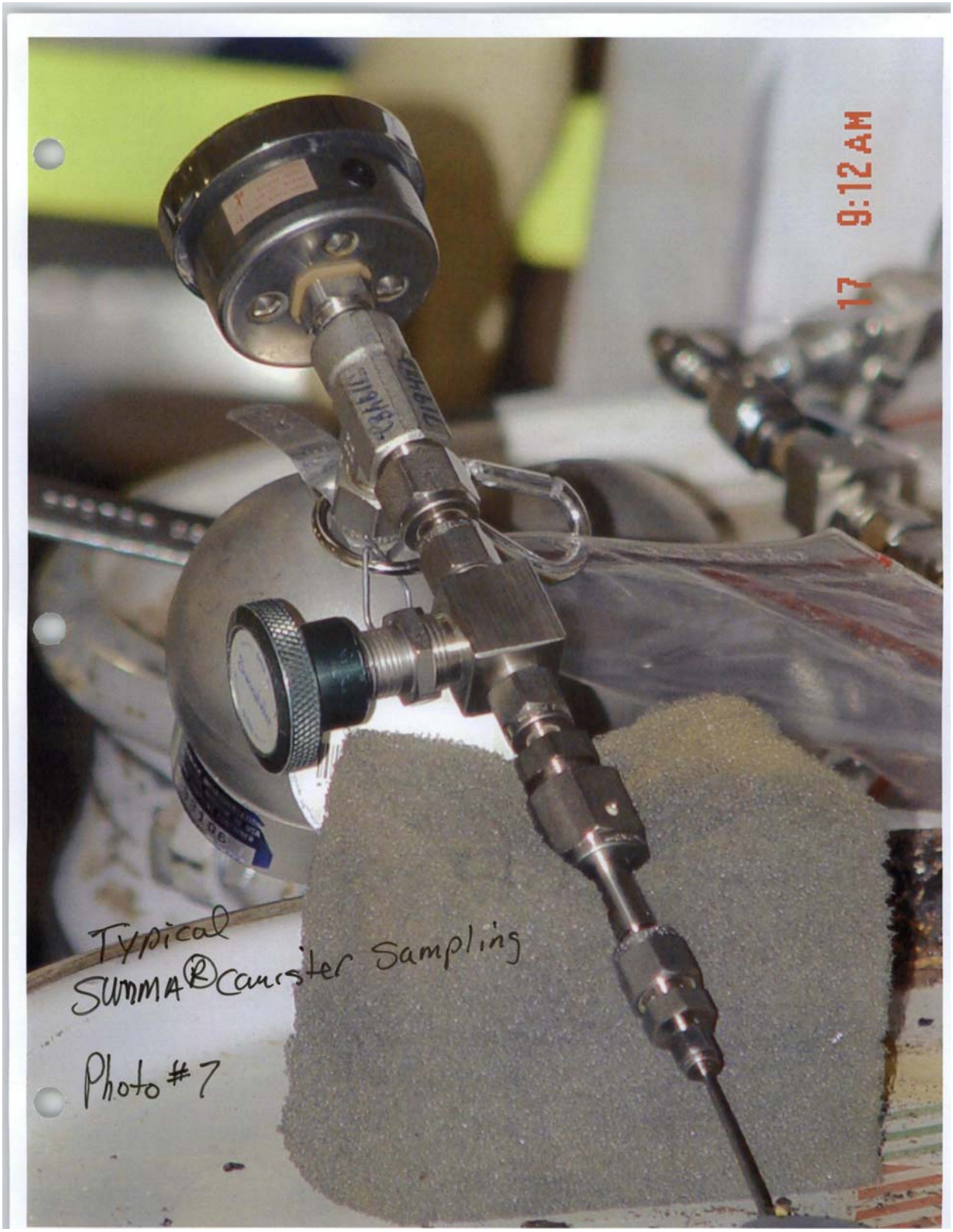
Attachment 3 – Photos