

CL-057R

SAMPLING SOILS AND SOLIDS

Revision: 5

Date Effective: Sept. 2017

Dugway Proving Ground EPA ID Number: UT3750211259

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1.0 Scope and Application

This method provides procedures to collect soil and solid waste samples regulated by the regulatory compliance program at US Army Dugway Proving Ground (DPG). General quality control (QC) guidelines for sampling, sampling equipment, and chain-of-custody (COC) are found in the DPG Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan* (QAPP). A method schematic is provided in Figure 1.

2.0 Scientific Basis

Soil and solid samples will be collected in a manner that is safe and ensures that samples are contaminant free, representative, and consistent with the objectives of the QAPP. Sample collection is a critical step in the process of obtaining technically sound and legally defensible analytical data. Sampling events must be well planned and provide waste treatment and regulatory personnel with sufficient information to characterize the site and make correct disposal decisions.

3.0 Terminology

This section lists in alphabetical order all terms, abbreviations, and acronyms unique to understanding this method.

- CAS[®] – Chemical Abstracts Service[®]
- Chemical agent – Any of several highly toxic chemical compounds (including GA, GB, GD, GF, HD, HN1, HN3, Lewisite, HT, T, and VX) that are intended for use in military operations.
- COC – chain-of-custody
- CTD – Chemical Test Division
- Decontamination – The process of decreasing the amount of chemical agent on any person, object, or area by absorbing, neutralizing, destroying, ventilating, or removing chemical agents.
- DPG – US Army Dugway Proving Ground
- Field Duplicate – Duplicate samples collected in the field to establish the overall precision of the sampling and analytical process. Duplicates are required when new or unknown waste sources are collected and are handled like routine samples in the laboratory.
- GA – tabun, ethyl N,N-dimethylphosphoroamidocyanide (CAS[®] No. 77-81-6)
- GB – sarin, isopropyl methylphosphonofluoridate (CAS[®] No. 107-44-8)
- GD – soman, pinacolyl methylphosphonofluoridate (CAS[®] No. 96-64-0)
- GF – cyclohexyl methylphosphonofluoridate (CAS[®] No. 329-99-7)
- HD – distilled mustard, bis-2-chloroethyl sulfide (CAS[®] No. 505-60-2), a blister agent
- HN1 – bis (2-chloroethyl) ethylamine (CAS[®] No. 538-07-8), a blister agent
- HN3 – tris-2-chloroethylamine (CAS[®] No. 555-77-1), a blister agent
- Lewisite – dichloro (2-chlorovinyl) arsine (CAS[®] No. 541-25-3), a blister agent
- mL – milliliter
- PPE – personal protective equipment
- QAPP – Quality Assurance Program Plan

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- QC – quality control
- Rinse blank – A sample collected in the field to demonstrate that no cross-contamination has occurred during sampling. For liquid and soil samples, use one rinse blank per field sample lot when using non-disposable sampling equipment. Rinse blanks are not required when disposable sampling equipment is used.
- Sample collection lot – Twenty or fewer samples collected from the same waste description during a single shift by a single team of sampling personnel. Each field sample lot for soil is accompanied by field QC samples including a field duplicate and an equipment rinse blank when using non-disposable sampling equipment.
- VX – O-ethyl s-(2-diisopropylaminoethyl) methylphosphonothioate CAS® 50782-69-9, a persistent nerve agent.

4.0 Safety

Generally, regulatory compliance samples have been exposed to chemical agent and subsequently decontaminated. Handle all samples with caution. For all operations involving chemical agents, comply with all US Army safety rules and regulations. Be familiar with and follow safety guidelines contained in safety data sheets for the chemicals being used or sampled.

Sample-collection personnel performing this method will be trained in the use of personal protective equipment (PPE).

Before sampling, sample-collection personnel will fully understand the waste to be sampled and take appropriate safety precautions. Exercise caution when opening drums or other sealed containers. Wear the following minimum PPE: gloves, a smock or coveralls, and an appropriate respirator.

Obtain appropriate clearances before entering restricted areas. Transport samples using only government- or contractor-owned vehicles. Do not transport samples in private vehicles.

5.0 Apparatus and Reagents

The following items may be required to collect soil samples:

- Ice chest with ice or blue-ice packs
- Sampling logbook
- COC/Analysis Request form
- Clean sampling equipment such as a stainless-steel spoon, scoop, or thief
- Clean certified clear-glass sample containers with Teflon® lined lids
- Sample container labels
- PPE
- Equipment decontamination materials and solutions

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6.0 Standards and QC

Field QC samples are intended to provide a measure of the quality of the sampling activities. Sample-collection personnel are responsible for correctly collecting field QC samples.

Field duplicates are required when new or unknown waste sources are collected. Sample collection personnel collect field duplicates in the same manner as other samples in the sample collection lot. Collect one rinse blank per sample collection lot when nondisposable sampling equipment is used. Rinse blanks are not required when disposable sampling equipment is used. Collect rinse blanks between samples after the equipment decontamination final rinse. Collect a sufficient volume, at least 50 milliliters (mL), to permit adequate analysis of the rinsate.

7.0 Procedure

To sample soils or solids, sample collection personnel will perform the following procedures:

- Plan sampling operations
- Collecting soil or solid samples
- Delivering samples to the laboratory, and
- Decontaminating equipment.

7.1 Planning Sampling Operations

To plan the sampling operation, technical personnel will perform the following tasks:

- Develop a sampling plan
- Obtain sample containers
- Clean sampling equipment.

7.1.1 Develop a Sampling Plan

Develop a detailed, written, sampling plan for each sample type or sampling event before any sampling is attempted. Before sampling, train sample-collection personnel in the proper implementation of sampling objectives and sampling techniques. Consider the following general guidelines when developing a sampling plan:

- Soils and solids may be heterogeneous, and representative samples must be taken. There are two main approaches to sampling in large areas.
 - A statistical approach involves laying out a grid and sampling all or some number of randomly chosen coordinates. Statistical sampling is thorough, but sampling and analytical costs are often higher.
 - An observational approach uses site history and a walkthrough to choose areas to sample. Sampling and analytical costs may be lower, but there is a possibility of biased findings.
- Samples from a large area may be composited if allowed by the project plan. However, care should be taken to minimize handling when sampling comparatively volatile

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compounds, such as GB, to reduce possible losses. Portions of individual samples may be reserved in the event that further investigation is needed.

- The sampling plan must be consistent with the objectives of the QAPP.
- Include, at a minimum, the following items:
 - Required PPE
 - Sampling equipment to be used
 - Selected locations(s) of sampling and the intended number of samples
 - Required sample volumes
 - Types (i.e., composite, grab, etc.) of samples to be taken
 - Sample preservation
 - Number and type of QC samples required

7.1.2 Obtain Sample Containers

Obtain containers for samples, field duplicates, and rinse blanks . Regulatory compliance soil samples are to be collected in new, pre-cleaned, 3-ounce minimum, clear-glass containers. Select sample container materials based on factors such as compatibility, resistance to breakage, and volume. Sample volume is specified by the laboratory and depends on variables such as the parameters to be analyzed, QC requirements, and method detection limit requirements.

7.1.3 Clean Sampling Equipment

Before sample collection, clean the stainless-steel spoon, scoop, shovel, and other sampling equipment that will be used to collect soil samples with soap and water. Rinse the equipment three times with distilled water. Collect the spent cleaning liquid in a drum designated for liquid, chemical agent-related wastes.

7.2 Collecting Soil or Solid Samples

To collect soil or solid samples, sample-collection personnel will consider the following guidelines for soil samples:

- Use a trowel, shovel, or hand corer to obtain surface soil samples to a depth of 6 inches.
- Use a hand-powered auger and a corer to obtain soil samples to a depth of about 3 feet
- Use a small, split-spoon sampler with metal liners that has been modified for hand use to sample to shallower depths.
- Use a drill rig to collect deeper samples. Many drilling systems use a split-spoon or split-barrel sampler that is driven by a weight through a hollow stem auger. Such devices disturb samples less than continuous coring samplers do. However, sampling through hollow-stem augers is time-consuming because the sampler must be inserted and withdrawn at each interval (usually retrieving 18 inches of sample at a time). Hollow-stem augers allow groundwater sampling through the auger if the boring reaches

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the water table.

Sample-collection personnel will consider the following guidelines for solid samples:

- Carefully obtain a representative sample by breaking or cutting the solid material to fit in the sample container. Sample handling should be minimized when sampling for comparatively volatile compounds, such as GB, to reduce possible losses.
- Other sampling techniques, such as air monitoring or swipe sampling, should be considered if solid samples cannot be easily obtained using nondestructive techniques.
- Composite samples, if necessary, will be based on specific project requirements.
- Place soils or solids in a sample container and seal it as soon as samples are collected, with an effort to minimize headspace.
- Label sample containers at the time of sample collection with the following information:
 - Sample collection date and time
 - Sample location and source
 - Sample identification number
 - Required analyses
 - Preservation used (if applicable)
 - Sampler's name and initials
- Place samples on ice or blue-ice packs
- Document sample collection by recording the following pertinent information related to sample collection as it occurs using a logbook or worksheet:
 - Sampling personnel
 - Sample collection date
 - Sample collection time for each sample
 - Location of material sampled
 - Sample identification (drum number, barcode number, etc.)
 - Description of material sampled (i.e., historical information, description of phases, color, odor, etc.) including the following:
 - Suspected sample composition
 - Identifying marks or numbers on the sample container (if any)
 - Sample collection method and description
 - PPE worn
 - Unusual or hazardous conditions
 - Other observations.
- Complete the COC/Analysis Request form before submitting samples to the laboratory. The information on the COC/Analysis Request form must be consistent with the information recorded in the field records. Indicate on the COC/Analysis Request form

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(see the QAPP) which analytes are to be determined and note unusual or potentially hazardous conditions.

7.3 Delivering Samples to the Laboratory

To deliver samples to the laboratory, sample-collection personnel will place samples in an ice chest with ice and immediately transport the samples and COC/Analysis Request form to the laboratory under COC procedures as described in the QAPP. Avoid excessive exposure to heat or sunlight. If unable to relinquish samples to the laboratory, maintain possession/custody of the samples or physically secure them under your control until arrangements can be made.

7.4 Decontaminating Sampling Equipment

Following sample collection, clean the stainless steel spoon, scoop, shovel, and other sampling equipment with soap and water. Rinse the equipment three times with distilled water. Collect the rinse water in a drum designated for liquid chemical agent-related wastes.

8.0 Data Reduction and Assessment

The relative percent difference between duplicate samples and the equipment rinse blank results may relate to sample collection. Inform sample-collection personnel of any problems with these QC indicators to facilitate continuous improvement in the sample collection process.

9.0 References

US Army Dugway Proving Ground (DPG), Utah, Waste Permit, Attachment 1-10, *Central Hazardous Waste Storage Facility (CHWSF) Quality Assurance Program Plan*.

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Figure 1
Method Schematic

