Sample Collection

Nuclear Secured / Radiation Safety

NS-RS-PR-302, 0

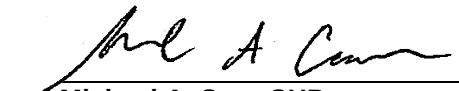
Date Effective: 11 August 2019

History and Approvals

History

Revision	Intent Y/N	Purpose description
0	Y	For Issue (Partial Rebrand CS-FO-PR-003)

Approvals

Preparer:  8/5/2019

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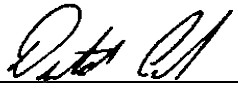
Approver:  8/14/2019

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1. Purpose and Scope

1.1. Purpose

This procedure provides guidance for the collection of soil, water, sediment, and vegetation samples to ensure sample integrity and that the specified data quality objectives (DQOs) are satisfied for reliable and defensible sample data results.

1.2. Scope

This procedure applies to all Nuclear Secured (NS) personnel and subcontractors that perform sampling activities where the NS Radiation Protection Plan (RPP) has been implemented, specifically, for the performance of radiological surveys and sampling for radiological hazards.

2. References

2.1. ASTM C 998-90, *Standard Practice for Sampling Surface Soil for Radionuclides*.

2.2. USGS, *Techniques of Water-Resource Investigations – Book 9, National Field Manual for the Collection of Water-Quality Data; Chapter A4, Collection of Water Samples*.

2.3. NS-RS-PR-102, *Project Records Management*

2.4. NS-RS-PR-300, *Performance of Radiological Surveys*

2.5. NS-RS-PR-303, *Sample Chain-of-Custody and Control*

3. General

3.1. Definitions

3.1.1. *Biased Sample* – Non-random sample collected based on professional judgment or other indicator such as survey results.

3.1.2. *Composite Sample* – Sample created by combining several subsamples from the same area.

3.1.3. *Field Duplicate* – Discrete sample collected at the same location as another sample.

3.1.4. *Grab Sample* – Single sample collected at a particular time and place.

3.1.5. *Split Sample* – Grab or composite sample which has been split into 2 samples.

3.1.6. *Systematic Sample* – Randomly selected sample location or sample collected using a specified sampling grid based on a random starting location.

3.2. Responsibilities

Depending on personnel qualifications and the size of the project, project personnel may be assigned multiple roles and/or responsibilities.

3.2.1. NS Radiation Safety Officer

The NS Radiation Safety Officer (RSO) maintains and oversees the implementation of the NS RPP. The RSO shall ensure that radiation safety, radioactive materials management, and radiological operations procedures and programs are kept up to date such that they comply with current regulations and incorporate current and relevant industry practices and regulatory guidance.

3.2.2. Project Manager

The Project Manager (PM) is responsible for ensuring that the proper program procedures and programs are implemented on the project site as required by customer agreements and contracts. The PM is responsible for ensuring that these programs and procedures are properly incorporated into project specific plans and procedures. The PM is responsible for ensuring that the NS RPP and client programs and procedures, as applicable, are available for use by project personnel.

3.2.3. Project Health Physicist

The Project Health Physicist (PHP) is responsible for assisting the RSO in providing health physics support to the PM and Radiation Protection Supervisor (RPS). This includes technical support to ensure procedural and regulatory compliance and to ensure that the project-specific Data Quality Objectives (DQOs) are met.

3.2.4. Radiation Protection Supervisor

The Radiation Protection Supervisor (RPS) is responsible for implementing the NS RPP at the project location. The RPS manages and oversees the project personnel in regards to radiation safety and reports directly to both the PM and the RSO.

3.2.5. Health Physics Technicians

Health physics personnel are responsible for the survey and release of sampling tools and equipment and for field screening samples.

3.2.6. Project Personnel

Project personnel are responsible for following the applicable work plans and procedures when performing sampling and for documenting sampling locations as necessary.

3.3. Precautions and Limitations

3.3.1. Contact the analytical laboratory to ensure the proper sample quantities are collected to support the specified analyses to ensure the data quality objectives are met.

3.3.2. Preserve samples as directed by the laboratory.

3.3.3. Maintain and ship samples at the necessary temperatures as directed by the laboratory based on the sample media and analyses to be performed.

3.3.4. To prevent cross contamination, equipment used for sample collection should be cleaned and surveyed as necessary after each sample; otherwise, use single-use disposable sampling equipment.

3.3.5. Use caution when implementing and evaluating field duplicate samples as these are separate discrete samples from the original sample collected.

3.3.6. Custody seals should be used to ensure sample integrity.

4. Pre-Requisites / Requirements

4.1. Identify the types of analyses required based on the sample media and the radionuclides of concern.

4.2. Establish DQO's and sampling protocols such as the purpose for sampling, number of sample, sample volumes, detection sensivities, reporting limits, methods of analysis, etc to ensure defensible and reliable sample data.

4.3. Sample locations shall be established based on the purpose of sampling and shall be randomly selected or biased based on professional judgment or survey results.

4.4. Establish a sample log, Attachment 7.2 or equivalent.

4.5. Establish an alphanumeric sample ID system or nomenclature.

4.6. Identify the frequency of quality control sampling. As a minimum, QC sampling should be performed at a frequency of 5% or one QC sample per 20 samples collected or fraction thereof.

4.7. Sample containers shall be new or verified as not contaminated.

4.8. Sample containers shall be constructed of polyethylene, glass or other material approved by the analytical laboratory and shall be sealable to prevent any leakage of sample.

4.9. Groundwater samples shall be collected from only properly installed and developed wells.

4.10. Samples shall be labeled using indelible ink or an adhesive sample label.

5. Procedure

5.1. Sample Identification and Labeling

5.1.1. Complete a Sample Label, Attachment 7.1 or equivalent, at the time of sample collection or record the data necessary for generating the sample label. Sample information includes but is not limited to the following:

- Type of sample (Background, Biased or Systematic)
- Grab sample or composite
- Sample media
- Date and time of sample
- Sample location
- Other info (e.g., sample depth)
- Sample collectors name or initials

5.1.2. Generate and assign a uniques sample ID using an alphanumeric code or numbering system established by project management using identifiers that communicate information about the sample such as the project name, survey unit or area, type of sample, sample media and a sequential number.

5.1.3. Enter the sample ID and information into the sample log, Attachment 7.2 or equivalent.

5.1.4. Field screen collected samples with survey instruments and complete a survey or communitcate the survey information on the sample.

5.1.5. Mark the sample container with the sample ID, date and time of the sample and the samplers name using indelible ink or affix a sample label, Attachment 7.1 or equivalent.

5.1.6. Mark the sample container or sample label with any additional information as necessary.

5.2. Soil

5.2.1. Document each sampling location using a survey map and identify it by placing a flag or other marker at the sampling location.

5.2.2. Sample locations may be moved as necessary based on obstructions and as approved by project management.

5.2.3. Perform direct radiation measurements at the sample location before sample collection if required by the project work plans and record the survey results.

5.2.4. Remove large surface debris and vegetation from the area to be sampled. The area should be large enough to provide an adequate sample volume.

5.2.5. For surface samples, sample the top 6-inches or as specified in the project work plans.

5.2.6. For subsurface samples, using a Geoprobe®, split spoon sampler or augers, penetrate the surface and collect samples at the specified depth or at regular intervals as specified by the project work plans. If subsurface objects (such as roots and rocks) prevent full penetration, then move the location as necessary.

5.2.7. Do not include vegetation, rock, or other debris with the sample

5.2.8. Using a clean tool or gloved hand, push the soil into a sample container.

5.2.9. Collect the necessary sample volume in accordance with project documents and sample analysis requirements

5.2.10. Mark the sample container with the applicable sampling information as specified in Section 5.1.

5.2.11. Document the sampling locations on a survey map or log using GPS.

5.2.12. Clean and survey the sampling tools, as necessary, before collecting another sample in accordance with Section 5.8.

5.3. Sediment

5.3.1. Select sediment sampling equipment based on the depth of water.

5.3.2. Collect sediment samples from sufficient locations to obtain the necessary sample volume in accordance with project documents and sample analysis requirements.

5.3.3. Using a clean tool or gloved hand, push the sediment into a sample container and remove large rocks, sticks or foreign objects from the sample, as practical.

5.3.4. Mark the sample container with the applicable sampling information as specified in Section 5.1.

5.3.5. Document the sampling locations on a survey map or log using GPS.

5.3.6. Clean and survey the sampling tools, as necessary, before collecting another sample in accordance with Section 5.8.

5.4. Surface Water

5.4.1. Using a clean container, dip water from the selected location, being careful to avoid the collection of surface debris, vegetation or bottom sediment.

5.4.2. Subsurface samples may be collected at specific depths using a Van Dorn sampler or equivalent.

5.4.3. Stratified samples may be collected using calawisa tubes or equivalent.

5.4.4. Transfer and filter (if necessary) the water into the sample container.

5.4.5. Collect the necessary volume of water in accordance with project documents and sample analysis requirements

5.4.6. Preserve each sample as directed by the analyzing laboratory.

5.4.7. Mark the sample container with the applicable sampling information as specified in Section 5.1.

5.4.8. Document the sampling locations on a survey map or log using GPS.

5.4.9. Clean and survey the sampling tools, as necessary, before collecting another sample in accordance with Section 5.8.

5.5. Groundwater

5.5.1. Purge/bail the well prior to sampling (typically one or more well volumes).

5.5.2. Collect the necessary volume of water in accordance with project documents and sample analysis requirements

5.5.3. Transfer and filter the water into an appropriate sized sample container.

5.5.4. Preserve each sample as directed by the analyzing laboratory.

5.5.5. Mark the sample container with the applicable sampling information as specified in Section 5.1.

5.5.6. Document the sampling locations on a survey map or log using GPS.

5.5.7. Clean and survey the sampling tools, as necessary, before collecting another sample in accordance with Section 5.8.

5.6. Vegetation

5.6.1. Collect the necessary volume of vegetation in accordance with project documents and sample analysis requirements

5.6.2. Mark the sample container with the applicable sampling information as specified in Section 5.1.

5.6.3. Document the sampling locations on a survey map or log using GPS.

5.6.4. Clean and survey the sampling tools, as necessary, before collecting another sample in accordance with Section 5.8.

5.7. Quality Control

5.7.1. Matrix spikes and blank samples are typically provided by the analytical laboratory and are not addressed in this procedure.

5.7.2. For split samples, obtain enough sample material from a single location to make up two separate samples. Empty the contents of the container(s) into a clean bucket or other mixing container of suitable size.

5.7.3. Thoroughly mix the sample to ensure a homogenous mixture.

5.7.4. Split the sample material in two samples and place each in its own clean sample container.

5.7.5. For field duplicate samples, collect a separate discrete sample from the original.

5.7.6. Label each sample and identify one sample as the sample and the other as the QC split or field duplicate sample.

5.8. Tool Cleaning

5.8.1. Remove any bulk loose material from the sampling tools using paper or cloth towels.

5.8.2. Decontaminate tools with water and detergent or damp rags, as appropriate and allow the tools to dry.

5.8.3. Rinse sampling tools.

5.8.4. Survey the samplling tools, as necessary, between sample collections to prevent any potential for cross-contamination.

5.8.5. Collect all cleaning supplies, solutions and rinsate for disposal.

5.8.6. Dispose of materials as radioactive waste if appropriate.

6. Records

6.1. Surveys

6.2. Sample Log

6.3. Chain-of-Custody

6.4. Sample Analyses

7. Attachments and Forms

7.1. Sample Label

7.2. Sample Log (example)

Attachment 7.1 **Sample Label**

Sample ID:		
Location:		
Date / Time:	/	
Matrix:	□ Soil □ Sediment	□ Water □ Other_____
Method	□ Grab	□ Composite
Type:	□ FSS □ Info	□ Characterition
Type	□ Biased	□ Systematic
Survey Info:		
Collector		

Attachment 7.2 **Sample Log (example)**

Sample ID	Description / Location	Sample Type[a]	Matrix[b]	Date

a Final Stauts (FS), Characterization, Scoping, Information, etc.
b Soil, Sediment, Surface Water, Vegetation, etc.