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DER 25214 DS

TITLE: AREA IV CHARACTERIZATION PROJECT - SOIL SAMPLING PROCEDURE

APPROVALS

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REV. LTR.	REVISION	APPROVAL/DATE
A	<p>Incorporate Sample Collection Center procedure. Add procedure revision control section, including redline change requirements. Add checklist summary of procedure. Revise soil datasheet for clarity; add datasheet for rinseate. Change volume requirement to "fill sample container." Delete recording of data in both the datasheet and the logbook. Define responsibilities for logbook, datasheets, and chain-of custody forms. Add the chain of custody form in the appendix reserved. Delete "crew leader" and "PIC"; define personnel and their responsibilities. Delete training requirement for "Hazardous Waste Worker Training; add requirement for training in use of HNU instrument. Delete matrix spike QA sample (lab spikes all samples). Delete repetition of radioactivity and organic vapor action limits. Incorporate sample container sealing and labeling into procedure; delete previous TBD appendices. Change H&S Officer to H&S representative, RP&HPS manager to RP&HPS management. Make miscellaneous changes for clarity. Revise to incorporate training and initial sampling experience.</p>	<p><u>[Signature]</u> Originator</p> <p><u>[Signature]</u> 12/2/94 Assoc. Program Manager</p> <p><u>[Signature]</u> 12/2/94 General Oper. Manager</p> <p><u>[Signature]</u> Engineering</p> <p><u>[Signature]</u> 12/2/94 QA</p> <p><u>[Signature]</u> For PDR RP&HPS</p> <p><u>[Signature]</u> 12/2/94 Health & Safety</p> <p>DER 25015 (C)</p>

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1. PURPOSE

This procedure defines the methods to be used when collecting and storing soil samples for the Area IV Radiological Characterization Program (Reference 2.1). This soil sampling is being performed to characterize the radioactive properties of the soils in Area IV so that the results may be used as evidence of freedom from contamination or as a basis for follow-up actions such as additional characterization or remediation (Reference 2.1).

This procedure addresses sampling of surface or subsurface soil for radiological evaluation and measurement of in-soil gamma radiation at sampling locations. It also covers administrative control of soil samples and soil sample analysis documentation. The procedure starts with the Sampling Crew receiving directions from the Sampling Manager on where to sample. Sample handling ends with the shipment of the samples from the Sample Collection Center to the analytical laboratory or to a disposal site (if surplus sample material is returned by the laboratory after analysis). The procedure also includes receipt and distribution of analysis reports received from the laboratory.

Sampling locations will have been selected on the basis of random selection, evidence of elevated gamma radiation and likelihood of possible radioactivity due to known activities in an area. The locations and background information of such locations are discussed in the Field Sampling, Analysis, and Data Management Plan (Reference 2.1).

Portions of Area IV are known to be radiologically contaminated. These are addressed by other programs. The Area IV Radiological Characterization Program focuses on areas that are thought to be free from contaminants; however, health and safety precautions are defined in this procedure to alert operators to potential hazards associated with contamination migration.

2. REFERENCES

- 2.1 A4CM-ZN-0004, "SSFL Area IV Radiological Characterization Field Sampling, Analysis, and Data Management Plan"
- 2.2 A4CM-AN-0002, "Area IV Characterization, Health and Safety Plan"
- 2.3 A4CM-ZR-0007, "Area IV Characterization and Monitoring Safety Assessment"
- 2.4 A4CM-SP-0001, "SSFL Area IV Gamma Survey Procedures in Support of the Site Radiological Characterization Study"

3. SPECIAL EQUIPMENT, MATERIALS

- 3.1 Field Logbook
- 3.2 Field Datasheets (soil sampling)
- 3.3 Rinseate Datasheets (equipment rinseate sampling)
- 3.4 Sample containers - glass (provided by the analytical laboratory)

- 3.5 Sample container labels (provided by the analytical laboratory)
- 3.6 Custody seal labels (provided by the analytical laboratory)
- 3.7 Chain of Custody Forms (provided by the analytical laboratory)
- 3.8 Power soil auger
- 3.9 Small hand auger with sample collection split-tube attachment
- 3.10 Depth probe tool (capability for probing to 12 in.)
- 3.11 Mixing container - stainless (volume sufficient for mixing 1-1/2 liters of soil without spillage)
- 3.12 Spatula - stainless steel (sized for mixing 1/2 to 1-1/2 liters of soil)
- 3.13 Tongs for removal of rocks from soil in the mixing container
- 3.14 Soil scoop - stainless and/or disposable polystyrene (sized for transfer of soil from the mixing container to the funnel at the sample container)
- 3.15 Funnel for transfer of sample from auger to sample container
- 3.16 Field transport container for sample containers
- 3.17 Sample shipping container (provided by the analytical laboratory)
- 3.18 Buckets for tool cleaning
- 3.19 Scrub brush for tool cleaning
- 3.20 Water, drinking quality and deionized, for tool cleaning
- 3.21 Detergent - Alconox, Sparkleen, or equivalent
- 3.22 5-gallon containers to store potentially contaminated water from tool cleaning
- 3.23 HNU Model 101 photoionization detector & calibration gases
- 3.24 Ludlum 12 counter with GM beta/gamma detector or equivalent.
- 3.25 Ludlum 2221 scaler and a gamma detector probe or equivalent with a handling bail for lowering into a 3-ft long hole
- 3.26 Personal protective equipment

4. GENERAL REQUIREMENTS

4.1 Safety Precautions/Special Instructions

4.1.1 Safety Precautions

All personnel performing this procedure shall be trained on the information contained in the Health and Safety Plan (Reference 2.2), the Safety Assessment (Reference 2.3), and this procedure.

Level D personnel protection equipment (PPE) will be utilized for this project unless the Health and Safety representative determines that the working conditions require additional protection (Reference 2.2). Additional PPE requirements will be provided by written recommendations from the Health and Safety representative to the Sampling Manager. The health physics technician shall ensure that the identified PPE is worn by Sampling Crew personnel.

Health and safety information shall be entered in the Field Logbook. Written instructions from the Health and Safety representative shall be attached in the Field Logbook. This shall include, as a minimum, PPE specifications from the Health and Safety representative and safety instructions or special precautions. Entries during sampling operations shall include calibration data for HNU photoionization detector and entries recording the finding of unexpected conditions or substances relative to potential safety concerns. In the event of such findings notifications to the appropriate authorities shall be made and noted in the Field Logbook (e.g., notices of chemical substances to the Health and Safety representative and notices of radioactivity to Radiation Protection and Health Physics Services management).

No smoking shall be permitted except in designated areas.

The health physics technician shall be responsible for monitoring the Sampling Crew for heat stress related symptoms; however, each crew member shall be trained in the symptoms and shall provide appropriate notification if such symptoms are observed.

4.1.2 Special Instructions

4.1.2.1 Procedure Control

A single designated working copy of this procedure shall be used by the Sampling Crew. It shall be designated on the cover page as "Working Copy." The working copy shall be taken to sampling locations by the Sampling Crew to permit convenient reference to it.

The procedure working copy may be redlined to indicate changes which become necessary. The changes must be approved by at least the Sampling Manager and ETEC Quality Assurance representative. Radiation Protection and Health Physics Services (RP&HPS) must approve and sign any changes affecting radiation safety. The program manager must approve and sign any changes affecting cost or schedule.

When an approved change to the procedure is made, work affected by the change will not begin until the change has been documented in the working copy and the Sampling Crew has had an opportunity to read the change.

receive and distribute analysis reports received from the laboratory, and receive, store, and ship excess sample material which may be returned from the laboratory.

Health and Safety Representative

The Health and Safety representative shall serve as the safety advisor for the duration of the project, provide guidance on interpretation of data related to safety, and advise on appropriate levels of worker protection. Detailed responsibilities are presented in the Health and Safety Plan (Reference 2.2).

4.1.2.5 Training

All Sampling Crew personnel must be trained on the information in the Health and Safety Plan (Reference 2.2), the Safety Assessment (Reference 2.3), and this procedure. The training must provide a thorough understanding of the soil sampling procedure. In addition, personnel must be trained in the following specific areas:

1. Proper use of the HNU photoionization detector
2. Finding grid locations of sampling locations specified by the Sampling Manager
3. Proper use of soil sampling equipment
4. Proper sealing and labeling of soil sample containers
5. Proper cleaning of contaminated sampling equipment
6. Proper use of Chain of Custody Forms.

The following training courses must be completed by all field personnel, as required by the Health and Safety Plan (Reference 2.2).

1. Course # 4013, "Radiation Safety"
2. Course # 4044, "Cardio Pulmonary Resuscitation"

4.1.2.6 Screening of Soil Sample Locations for Radiation

As a precautionary measure the health physics technician shall examine all soil sample locations for the presence of radioactivity using a Ludlum 2221 gamma detector or equivalent. The health physics technician shall record the findings of the radiation screening on the Field Datasheet for the location.

If the detector reading exceeds 21,500 cpm (~100 μ R/hr), the health physics technician shall direct the Sampling Crew to stop all sampling activities, and shall then notify RP&HPS management and the Sampling Manager, and request direction.

4.1.2.7 Screening of Soil Sample Locations for Volatile Organic Chemicals

As a precautionary measure for personnel safety, all sampling locations shall be examined for the presence of volatile organic chemicals by the use of an HNU detector calibrated to isobutane. The examination shall be done by a crew member trained in the use of the HNU detector. The health physics technician shall record the findings of the chemical screening in the Field Datasheet for the sampling location. This examination will be conducted before soil sampling as detailed in Section 5.

If an indication of isobutane greater than 2 ppm is detected, the health physics technician shall direct the Sampling Crew to leave the area immediately, and shall then notify the Health and Safety representative and Sampling Manager and request direction.

4.1.2.2 Procedure Sign Offs

The steps outlined in this procedure must be adhered to. The health physics technician shall sign each datasheet in the space provided to verify that all procedure steps were followed and completed, and that all data entries are valid.

4.1.2.3 Sample Collection Center

The Sample Collection Center is the designated location for processing samples for shipment to the analytical laboratory and for control of samples pending shipment. It is located in Building 009 in the storage space between Rooms 123 and 125. Access to the lockable room is controlled by the Sample Collection Center Custodian. The Center provides a secure location for maintain custody integrity for stored samples.

4.1.2.4 Staff

The following paragraphs identify the personnel required to perform this procedure, along with their respective responsibilities.

Sampling Manager

The Sampling Manager is generally responsible for implementing the soil sampling portion of the Field Sampling, Analysis, and Data Management Plan (Reference 2.1) and is specifically responsible for providing soil sampling specifications (location, depth, type, etc) to the health physics technician, specifying the sampling sequence, providing general oversight of the Sampling Crew, and ensuring that all required equipment specified in Section 3 is available.

Sampling Crew

The Sampling Crew shall be comprised of at least three people, one of whom shall be a health physics technician. The health physics technician shall have overall responsibility for day-to-day activities of the Sampling Crew, and shall have the following specific responsibilities:

1. Make all required log entries in the Field Logbook and datasheets.
2. Ensure that data entered are correct and that all steps of this procedure are adhered to. The datasheets shall be signed in order to satisfy this requirement.
3. Calibrate and operate the Ludlum 12 & 2221 gamma detector for all radioactivity measurements.

A Sampling Crew member who has been trained in the calibration and operation of the HNU instrument shall be responsible for the instrument, and shall conduct all HNU measurements. The Sampling Crew members shall collect all soil samples using the appropriate collection equipment, and clean all sampling equipment after all soil samples have been collected with the equipment available.

Sample Collection Center Custodian

The Sample Collection Center Custodian shall be responsible for the operation of the Sample Collection Center. The Custodian shall coordinate with the health physics technician for transfer of samples from the field to the Sample Collection Center, control samples and maintain their custody integrity while they are stored there, ship samples to the analytical laboratory, maintain a record of sample location and status,

4.1.2.8 Screening of Soil Samples for Radiation

The health physics technician shall examine all soil samples after their collection for the presence of radioactivity, using a Ludlum 2221 gamma detector or equivalent. The health physics technician shall record the findings of the radiation screening on the Field Datasheet for the sample.

If the detector reading exceeds 21,500 cpm (~100 μ R/hr), the health physics technician shall direct the Sampling Crew to stop all sampling activities, and will then notify RP&HPS management and the Sampling Manager and request direction. No sample showing a detector reading greater than 21,500 cpm shall be transferred to the Sample Collection Center unless approval has been granted by the Sampling Manager and RP&HPS management.

4.1.2.9 Documentation and Chain of Custody

Documentation of all soil samples collected shall be maintained as outlined in the detailed procedure (Section 5). The documentation used is described in this section.

A Field Logbook shall be used to record observations and information which may be pertinent to the interpretation of results of the soil sample analyses (e.g., soil coloration, presence of foreign objects nearby, proximity to geological features, etc.). The Field Logbook shall be maintained by the health physics technician.

Field Datasheets (Appendix A) shall be filled out as the sampling procedure is performed to record the pertinent data as described in Section 5. The health physics technician shall be responsible for data entry and shall sign the completed datasheet to document that the data entered are valid and that the procedure was followed and completed.

Rinseate Datasheets (Appendix B) shall be filled out during sampling of the rinseate from cleaning of sampling and handling equipment, as described in Section 5.4. The health physics technician shall be responsible for data entry and shall sign the completed datasheet to document that the data entered are valid and that the procedure was followed and completed.

The Chain of Custody Form (Appendix C) will be initiated and maintained for all soil samples collected in order to maintain sample custody control and traceability. Responsibility for completing the entries is described in Appendix C.

The Sample Collection Center Log (Appendix D) shall be maintained by the Sample Collection Center Custodian to maintain a record of sample status. It shall be kept at the Sample Collection Center.

A RP&HPS instrument Qualification Report (Appendix E) shall be used to record data for the gamma detector functional performance checks performed daily (at the beginning, middle, and end of the shift) when a detector is in use to support soil sampling. The health physics technician is responsible for the performance checks and recording the data.

documented in the Daily Instrument Qualification Report (Appendix C). If the instrument fails to qualify, a new instrument must be used or the failed instrument must be repaired and recalibrated. The health physics technician shall perform and document the qualification checks.

4.1.2.15 Quality Assurance Sampling

Soil sampling will be supported by collection of quality assurance samples for analysis (Reference 2.1). Quality assurance sample data will be compared to data from survey and screening area sampling as part of the data validation process. The following quality assurance samples will be collected. More details of these samples are provided in Reference 2.1.

1. Field duplicate sample. A blind duplicate (or split) sample is an aliquot of a sample taken from the same container as the primary field sample and analyzed as a separate sample. The field sample will be mixed and then split into separate samples to obtain the primary and field duplicate samples.
2. Equipment rinseate sample. An equipment rinseate sample is a sample of the water that has been used to rinse the sampling equipment after decontamination following sampling.

4.2 Limits

- 4.2.1 Sampling Crew personnel and all other authorized personnel shall stop all sampling activities if Ludlum 2221 gamma detector reading exceeds 21,500 cpm (~100 μ R/hr).
- 4.2.2 Sampling Crew personnel and all other authorized personnel shall immediately leave an area if the HNU detector reading exceeds 2 ppm isobutane.

4.3 Prerequisites

- 4.3.1 Prior to initiating sampling tasks the Sampling Manager shall verify that all training requirements (Section 4.1.2.3) have been met by all members of the Sampling Crew. Evidence thereof shall be available in the personnel files maintained by ETEC QA/Training.

- 4.3.2 Prior to initiating sampling tasks the Sampling Manager shall review this document with the Sampling Crew.

- 4.3.3 Prior to initiating sampling tasks, the Health and Safety representative shall determine the proper personnel protection equipment. A listing of this equipment shall be entered in the Field Logbook by the health physics technician.

- 4.3.4 A Field Logbook shall be available and maintained by the health physics technician, who shall record all pertinent information specified herein.

4.4 Sequence of Activities

- 4.4.1 Major segments of this procedure (Sections 5.1 through 5.5) must be done in the sequence shown. Furthermore, as equipment is used for sampling activities, and thus becomes potentially dirty or contaminated, Section 5.4 (Tool Cleaning/Decontamination) must be implemented before sampling begins at another sampling location.

4.1.2.10 Sample Packaging

The glass sample containers shall be sealed, labeled, and placed in sealed plastic bags to contain the sample in the event of glass breakage. The plastic bag will be placed in a protective shipping container for handling to prevent container breakage during field handling and transport to the analytical laboratory.

4.1.2.11 Soil Sample Volume

The soil sample volume will be that needed to fill a sample container (~1/2 liter). This will be obtained from soil collected using the split-tube attachment of the hand auger. Two split-tube volumes will be collected for regular samples. Four volumes will be collected when a field duplicate sample is collected also.

4.1.2.12 Soil Sample Specifications

The following soil sample information shall be provided by the Sampling Manager to the Sampling Crew for each sample to be obtained. This information shall be entered in the Field Logbook by the health physics technician.

1. Sampling location (survey block identifier and coordinates within the block)
2. Type of sample (surface, subsurface with depth specified, or field duplicate)
3. Number of samples to be collected at each location
4. Sample identification numbers. The format is A4CM-YY-XXXX, where YY is the last two digits of the year, XXXX is a sequential number for the sample.

4.1.2.13 Sample Transfer and Control

Sample transfer and control involves documentation of the transfer of samples from the field to the Sample Collection Center, storage, handling, and shipment of samples, and final receipt of analysis documentation. The Chain of Custody Form (Appendix C) will be used to provide continuous documented responsibility for each sample from collection until completion of analysis. The responsibility at Area IV will be with one or more Sampling Crew members and the Sample Collection Center Custodian. After a soil sample has been collected the health physics technician will assume responsibility by signing the Chain of Custody Form in the "samplers signature" space. The health physics technician (or another Sampling Crew member to whom custody has been transferred) will transport the sealed and labeled soil sample to the Sample Collection Center when leaving the field. (Soil samples must be transferred to the Sample Collection Center whenever a Sampling Crew member cannot provide physical custody.) The Sample Collection Center Custodian will then take custody of the soil sample and initiate shipping activities or storage pending shipping.

4.1.2.14 Instrument Calibrations

The HNU Model 101 photoionization detector shall be inspected and calibrated to the manufacturer's instructions prior to work start-up of each sampling day. The Sampling Crew member to whom HNU photoionization detector responsibility has been assigned shall document the inspection and calibration in the Field Logbook. Recalibration is required after cleaning the lamp or when background levels drift. The instrument is sensitive to humidity and may require periodic lamp cleaning if it is humid.

The Ludlum 12 and 2221 gamma detectors shall be qualified at shift start, mid-shift, and at shift end when sampling will be conducted. The qualification checks shall be

4.4.2 The procedure steps within the major segments must be done in sequence unless otherwise noted.

- 5.2.11 Scan the area to be sampled, using a Ludlum 2221 gamma detector. Record the readings on the Field Datasheet.
- 5.2.12 Examine the area for the presence of volatile organic chemicals using the HNU photoionization detector. Record the readings on the Field Datasheet.
- 5.2.13 Confirm that no foreign objects or bedrock prevent the depth(s) required at the location (~12 in. deep) from being achieved. Use a suitably sharpened steel rod to probe to at least 12 inches from the planned borehole. If the depth cannot be achieved, request the Sampling Manager to define the course of action. Otherwise, proceed to Section 5.2.14. If sampling depth is to be determined in some part by the depth of bedrock, verify with the Sampling Manager that the maximum depth achieved is reasonable for bedrock and record that depth on the Field Datasheet.
- 5.2.14 If surface soil sampling is to be conducted, proceed to Section 5.3.1. If only subsurface soil sampling is to be conducted, proceed to Section 5.3.2.
- 5.3 Soil Sampling
 - 5.3.1 Surface Soil Sampling
 - 5.3.1.1 Make sure all the preparation steps in paragraph 5.2 has been completed.
 - 5.3.1.2 Remove a soil sample at the specified location using the small hand auger with a clean sample collection split-tube attachment.
 - 5.3.1.3 Transfer the soil from the split-tube to the mixing container.
 - 5.3.1.4 Repeat Sections 5.3.1.2 and 5.3.1.3 to collect the second soil sample volume and transfer the soil to the mixing container. The second sample shall be collected at a location near the first sample. The same sampling equipment may be used without recleaning since the samples will be mixed.
 - 5.3.1.5 If a field duplicate sample is to be collected at this location, repeat Sections 5.3.1.2 and 5.3.1.3 two more times to provide four sample volumes in the mixing container. Collect the additional samples at locations as near the first sample as practical. The same sampling equipment may be used without recleaning because the samples will be mixed.
 - 5.3.1.6 Survey the sampling location with the HNU photoionization detector. Record the maximum reading on the Field Datasheet.
 - 5.3.1.7 Thoroughly mix the sample in the mixing container with a clean metal spatula and remove as many rocks and pebbles as possible. If the soil volume remaining after rock removal is less than that needed to fill a sample container (or two sample containers if a field duplicate sample is to be provided) repeat Sections 5.3.1.2 and 5.3.1.3, and remix the sample in the mixing pan.
 - 5.3.1.8 Transfer soil from the mixing container to a clean sample container using a scoop and a funnel to place the soil in the sample container. Transfer enough soil to fill the container.

- 5.3.1.9 Enter the sample data on the Field Datasheet. Enter the time of sampling, sampling depth, sample identification number as specified by the Sampling Manager in the format defined in Section 4.1.2.12.
- 5.3.1.10 Scan the sample container with the Ludlum 2221 gamma detector. Record the maximum reading on the Field Datasheet.
- 5.3.1.11 Close and seal the sample container:
1. Place a clean lid on the container.
 2. Seal the seam of the lid and container with plastic electrical tape.
 3. Sign and date a custody seal (performed by the health physics technician).
 4. Affix the custody seal across the seam of the lid so that the lid cannot be removed without tearing the seal.
- 5.3.1.12 Fill out the sample container label (done by the health physics technician). The label is affixed to the container as received from the analytical laboratory. Enter the following information in the spaces provided:
1. Sample Enter the identification number specified by the Sampling Manager in the format defined in Section 4.1.2.12.
 2. Location Enter "SSFL Area IV". (The project location coordinates will be entered on the Field Datasheet, but not on the container label in order to maintain the anonymity of the field duplicate samples.)
 3. Analysis Leave blank. (This information will be added later by the Sample Collection Center Custodian.)
 4. Date and Time Enter date and time.
 5. Preservative Enter "None".
 6. Client Enter "Rocketdyne".
- 5.3.1.13 Place the container in a new clear plastic bag and seal the bag with tape. Take care that the tape does not obscure the information on the sample container label.
- 5.3.1.14 Enter information in the Chain of Custody Form for the sample collected. A new form shall be used for each trip to the field since at the end of each trip the Chain of Custody Form will be placed with the samples in the Sample Collection Center. The health physics technician shall record the following information, then sign in the space provided for samplers signature:
1. Sample No Enter the sample ID number on the sample container label.
 2. Date and Time Enter date and time.
 3. Location Enter "SSFL Area IV".
- 5.3.1.15 Place the sample container in the field transport container.
- 5.3.1.16 If a field duplicate sample is specified for this location and depth, repeat Sections 5.3.1.8 through 5.3.1.15 to prepare and document the sample.
- 5.3.1.17 Auger a hole extension (at least 12 inches below the surface of the ground) to enable the gamma detector probe to be inserted over its entire length.
- 5.3.1.18 For "In-Soil Measurement" measure the gamma activity in the hole by making one 1-minute count with the Ludlum 2221 gamma detector lowered to the full depth of the hole extension. Record the 1-minute count on the Field Datasheet.

- 5.3.1.19 Return all soil remaining in the mixing container and soil removed to reach the sampling depth to the hole.
- 5.3.1.20 Write the sample identification number on a yellow flag and place it at the sampling location.
- 5.3.1.21 Brush-off as much soil as possible from the soil handling equipment (mixing container, mixing spatula, transfer scoop, funnel, & etc.) and place them in the back of the truck to assure that they are not reused before cleaning according to Section 5.4.
- 5.3.1.22 Record on the Field Datasheet any comments concerning the sampling activities which might aid evaluation of the data and health physics technician sign the datasheet.
- 5.3.1.23 If a sample is to be collected at another depth at this location, proceed to Section 5.3.2.

5.3.2 Subsurface Soil Sampling

- 5.3.2.1 Make sure all the preparation steps in paragraph 5.2 has been completed.
- 5.3.2.2 Using the power auger, bore a hole into the designated sample area to the specified sample depth (Section 5.2.2). The hole will have a 6-in. diameter.
- 5.3.2.3 At locations for which the sampling depth is to be determined by the nature of the soil removed (e.g., depth of a debris layer), observe the soil as it is removed. Record the nature of the soil (i.e., color, texture, moisture, and content of foreign material) on the Field Datasheet.
- 5.3.2.4 At locations for which sampling depth is determined by the depth of bedrock and/or the nature of the soil removed, report the results of Sections 5.3.2.9 and 5.3.2.13 to the Sampling Manager. The Sampling Manager shall specify the sampling depth. If it was necessary to sample at that depth, digging another hole at a nearby location will be specified.
- 5.3.2.5 Place the small hand auger with the extension rod and sample collection split-tube attachment into the hole. Remove a soil sample from the bottom of the hole by extending the hole by 6-in. (Position the auger to place the hole extension toward the side of the 6-in.-diameter hole to accommodate collection of additional soil planned for the same hole)
- 5.3.2.6 Remove the auger from the hole and transfer the soil to the mixing container.
- 5.3.2.7 Repeat Sections 5.3.2.5 and 5.3.2.6 to provide the second sample volume into the mixing container. The same sampling equipment may be used without recleaning because the samples will be mixed.
- 5.3.2.8 If a field duplicate sample is to be collected at this location, repeat Sections 5.3.2.5 and 5.3.2.6 two more times to provide four sample collection split-tube volumes in the mixing container. The same sampling equipment may be used without recleaning because the samples will be mixed.
- 5.3.2.9 Scan the sampling location with HNU detector. Record the maximum reading on the Field Datasheet.

- 5.3.2.10 Thoroughly mix the sample in the mixing container with a clean metal spatula and remove as many rocks as possible. If the soil volume remaining after rock removal is less than that needed to fill a sample container (or two sample containers if a field duplicate sample is to be provided) repeat Sections 5.3.2.5 and 5.3.2.6, and remix the sample in the mixing pan.
- 5.3.2.11 Transfer soil from the mixing container to a clean sample container using a scoop and a funnel to place the soil in the sample container. Transfer enough soil to fill the container.
- 5.3.2.12 Enter the sample data on the Field Datasheet. Enter the time of sampling, sample identification number as specified by the Sampling Manager in the format defined in Section 4.1.2.12.
- 5.3.2.13 Scan the sample container with the Ludlum 2221 gamma detector. Record the maximum reading on the Field Datasheet.
- 5.3.2.14 Close and seal the sample container:
1. Place a clean lid on the container.
 2. Seal the seam of the lid and container with plastic electrical tape.
 3. Date and sign a custody seal (performed by the health physics technician).
 4. Affix the custody seal across the seam of the lid so that the lid cannot be removed without tearing the seal.
- 5.3.2.15 Fill out the sample container label (done by the health physics technician). The label is affixed to the container as received from the analytical laboratory. Enter the following information in the spaces provided:
1. Sample Enter the sample identification number specified by the Sampling Manager in the format defined in Section 4.1.2.12.
 2. Location Enter "SSFL Area IV". (The project location coordinates will be entered on the Field Datasheet, but not on the container label in order to maintain the anonymity of the field duplicate samples.
 3. Analysis Leave blank. (This information will be provided on the Chain of Custody Form.
 4. Date and Time Enter date and time.
 5. Preservative Enter "None".
 6. Client Enter "Rocketdyne".
- 5.3.2.16 Place the container in a new clear plastic bag and seal the bag with tape. Take care that the tape does not obscure the information on the sample container label.
- 5.3.2.17 Enter information on the Chain of Custody Form for the sample collected. A new form will be used for each trip to the field. The health physics technician shall record the following information, then sign in the space provided for samplers signature:
1. Sample No Enter the sample ID number on the sample container label.
 2. Date and Time Enter date and time.
 3. Location Enter "SSFL Area IV".
- 5.3.2.18 Place the sample container in the field transport container.
- 5.3.2.19 If a field duplicate sample is specified for this location and depth, repeat Sections 5.3.2.11 through 5.3.2.18 to prepare and document the sample.

- 5.3.2.20 Auger a hole extension. (at least 6-in. below the power auger finished depth)
- 5.3.2.21 Measure the gamma activity (in-soil radiation) in the hole by making one 1-minute count with the Ludlum 2221 gamma detector lowered to the full depth of the hole. Record the 1-minute count on the Field Datasheet.
- 5.3.2.22 write the sample identification number on a yellow flag and place it at the sampling location.
- 5.3.2.23 Return all soil remaining in the mixing container and soil removed to reach the sampling depth to the hole.
- 5.3.2.24 Brush-off as much soil as possible from the soil handling equipment (mixing container, mixing spatula, transfer scoop, funnel, & etc.) and place them in the back of the truck to assure that they are not reused before cleaning according to Section 5.4.
- 5.3.2.25 Record on the Field Datasheet any comments concerning the sampling activities which might aid evaluation of the data and health physics technician sign the datasheet.

5.4 Tool Cleaning/Decontamination

Since contamination of equipment is not always easily discernable, it is necessary to assume that all sampling equipment is contaminated until shown otherwise. The following steps shall be taken to clean/decontaminate sampling tools prior to collecting soil samples. Cleaning/decontamination may take place before or after sampling at a sampling location. Sampling tools and sampling equipment include everything which could transfer contamination between samples, i.e. metal spatula, mixing container, soil auger, etc.

- 5.4.1 Set up cleaning buckets in the equipment cleaning area.
- 5.4.2 Add detergent and cleaning water to the wash bucket and allow the equipment to soak until soils are soft and then scrub the equipment with a brush until clean. The cleaning solution may be reused for cleaning other equipment unless it has accumulated too much soil to be usable.
- 5.4.3 Using as little water as possible, rinse the equipment with clean water into the rinse bucket, making sure all rinse water drains into the bucket.
- 5.4.4 If the equipment rinsed was used for a sample specified by the Sampling Manager for an equipment rinseate sample, repeat Section 5.4.3 while collecting the rinseate water samples in the glass and plastic sample containers.
- 5.4.5 Air dry the equipment and place them in the clean equipment container.
- 5.4.6 Check the dried equipment for contamination using the Ludlum 12 counter with a GM Beta/ Gamma detector. If scan indicates that the equipment are still radioactively contaminated, repeat steps 5.4.1 through 5.4.5 until equipment are clean. Record the readings on the radiation survey sheet, Form 732A and place it in the log book.
- 5.4.7 If the equipment decontaminated was used for sampling and sample handling at a location for an equipment rinseate sample, perform the following steps to collect that sample. Otherwise, proceed to Section 5.4.20.

- 5.4.8 Rinseate Samples Prepare a Rinseate Datasheet. Enter the date, time, names of cleaning crew personnel, and the project identification number of the sample collected with the equipment for which the rinseate is to be sampled.
- 5.4.9 Collect a water sample for tritium analysis. Collect the sample in the glass sample container having no preservative. Use a clean water sample container and a clean funnel to collect the rinseate sample.
- 5.4.10 Enter the sample data on the Rinseate Datasheet. Enter the time of sampling and the sample identification number.
- 5.4.11 Collect the sample for the other analyses in the plastic sample container. Use the same sample collection container and funnel used in Section 5.4.9 to collect the rinseate sample for tritium analysis. CAUTION: The plastic sample containers contain 12 ml of 8N HNO₃ Acid. Be careful not to spill the acid when handling the sample container.
- 5.4.12 Shake the sample container well to mix the pre-added 8N HNO₃ in the container with the sample to reduce the sample PH to below 2.
- 5.4.13 Enter the sample data on the Rinseate Datasheet.
Enter the time of sampling and the sample identification number.
- 5.4.14 Scan the sample containers with the Ludlum 2221 gamma detector. Record the maximum reading on the Rinseate Datasheet.
- 5.4.15 Close and seal the sample containers:
1. Place clean lids on the containers.
2. Seal the seams of the lids and containers with plastic electrical tape.
3. Sign and date a custody seals.
4. Affix the custody seals across the seams of the lids so that neither lid can be removed without tearing the seal.
- 5.4.16 Fill out the sample container labels and Enter the following information in the spaces provided:
1. Sample Enter the sample identification number specified by the Sampling Manager.
2. Location Enter "SSFL Area IV".
3. Analysis Enter "For Tritium Analysis" on the glass container, and leave it blank on the plastic container.
4. Date and Time Enter date and time.
5. Preservative Enter "None" for the glass container and "8N HNO₃" for the other plastic container.
6. Client Enter "Rocketdyne".
- 5.4.17 Place the containers in new clear plastic bags and seal the bags with tape. Take care that the tape does not obscure the information on a sample container label.
- 5.4.18 Complete the Chain of Custody Form for the sample collected. A new form will be used for each trip to the field. The health physics technician shall record the following information, then sign in the space provided for samplers signature:
1. Sample No Enter the sample ID number on the sample container label.
2. Date and Time Enter date and time.
3. Location Enter "SSFL Area IV".

- 5.4.19 Place the sample containers in the field transport container to transfer them to the Sample Collection Center.
- 5.4.20 The soak solutions and rinse solutions shall be transfer to and retained in a suitable container specified by Environmental Protection. The container shall be properly labeled and stored per Environmental Protection instructions. The soak solutions and rinse solutions shall remain in storage until the equipment rinseate samples have been analyzed by the radiochemistry laboratory, or shown to be free from radioactive or chemical contamination by RP&HPS and Environmental Protection.

5.5 Sample Collection Center Operation

The actions of Sections 5.5.1.1 and 5.5.1.2 are the responsibility of the health physics technician or an alternate Sampling Crew member to whom custody of the samples has been transferred by signatures on the Chain of Custody Form(s). The custody transfer of Section 5.5.1.3 is the joint responsibility of the health physics technician (or alternate having sample custody) and the Sample Collection Center Custodian. The remaining actions of this section are the responsibility of the Sample Collection Center Custodian.

- 5.5.1 Transferring a Soil Sample from the Field to the Sample Collection Center
 - 5.5.1.1 Notify the Sample Collection Center Custodian that samples are ready to be transferred to the Sample Collection Center.
 - 5.5.1.2 Transport field transport container containing the sample(s), Chain of Custody Form(s), and datasheets (field and rinseate, if applicable) to the Sample Collection Center.
 - 5.5.1.3 Transfer custody of each sample by signing its associated Chain of Custody Form. The Sampling Crew member having custody will sign in the next available "Relinquished By / Date" space. The Sample Collection Center Custodian will sign in the next "Received By / Date" space. If the Sample Center Custodian is not available at the time of sample delivery, the health physics technician will act as the Custodian and follow the sample receiving procedures of Sections 5.5.1.4 through 5.5.1.6. Custody transfer will be accomplished when the Custodian is available.
 - 5.5.1.4 Document receipt of the samples in the Sample Collection Center Logbook (Appendix D), by entering the sample project identification number, the date and time the sample was received, the name of the person who delivered the soil sample, the date and time the soil sample was collected, and the soil sample gamma measurement (from the Field Datasheet).
 - 5.5.1.5 Make a copy of the Chain of Custody Form. File the copy in the Log Book located inside the Sample Collection Center. Store the original with the sample.
 - 5.5.1.6 Store the soil samples and their respective original Chain of Custody Forms in the designated storage area of the Sample Collection Center. Note: Whenever the Sample Collection Center is unmanned, all entrances to this center must be locked and properly secured to preclude access to the soil samples by unauthorized personnel.

5.5.2 Sample Shipment

5.5.2.1 The Sampling Manager will provide direction to ship specific soil samples to the analytical laboratory for analysis.

5.5.2.2 Complete the Chain of Custody Form(s):

1. Enter an "X" in the appropriate analysis columns for each sample to identify the analyses to be performed. These analyses will be specified by the sampling manager.
2. Enter "observations, comments, volumes, special or additional test" as specified by the Sampling Manager
3. Sample type or matrix ("Soil" or "Water")
4. Total number of containers (sum of "containers column entries)
5. Method of shipment
6. Special shipment - handling or storage requirements (as specified by the Sampling Manager - probably none)

5.5.2.3 Prepare the specified soil samples for shipment by first wrapping them in the bubble plastic wrapping and then placing them vertically in a laboratory-supplied shipping container. Place the original Chain of Custody Forms inside the shipping container and prepare the container for shipment. Prepare the shipment paperwork per the laboratory's instructions and Rocketdyne procedures.

5.5.2.4 Scan the container with a gamma survey meter to ensure that the package dose rate is less than 1/2 mR/hr at contact and thus exempt from labeling as a radioactive material since there is less than the limited quantity of radioactive material present in the soil, in accordance with shipping regulations 49CFR173.421.
If the exposure rate at contact is less than 100 μ R/hr, the radiation concentration in the soil is less than 0.002 μ Ci/g (2000 P.Ci/g) and therefore the soil is not classified as radioactive material (SR 49CFR173.403(y)).
Record the reading as a general comment in the Sample Collection Center Logbook.

5.5.2.5 Document shipment of the samples in the Sample Collection Center Logbook. Note the date and time of the shipment and the shipper number.

5.5.3 Sample Analysis Receipt

5.5.3.1. The results of the soil sample analyses performed by the analytical laboratory will be received, either directly or as a copy from the recipient, by the Sample Collection Center Custodian. Receipt of the soil sample analyses will be recorded in the Sample Collection Center Logbook by noting the date and time the analysis was received, the lab analysis report number (including the analysis transmittal number), and the status of soil sample.

5.5.3.2. Forward copies of the analysis reports to the Sampling Manager and to the manager of RP&HPS.

5.5.4 Returned Sample Receipt

After the analytical laboratory has analyzed samples and the post-analysis holding period has passed, the samples will normally be discarded directly by the laboratory.

If they do not meet the laboratory criteria for their disposal (e.g., they have been determined to be mixed waste), however, they will be returned for disposal by ETEC. Such samples will be stored in the Sample Collection Center pending disposal.

- 5.5.4.1 Record the receipt of returned samples in the Sample Collection Center Logbook, noting the date and time of receipt, the name of the person and company making the delivery, and the soil sample project identification number.
- 5.5.4.2 Take physical custody of returned samples by signing Chain of Custody Form(s) accompanying them.
- 5.5.4.3 Store returned samples in a post-analysis storage area of the Sample Collection Center until authorization is given for shipment or disposal. Soil samples returned after analysis must be stored in a location different from samples which have yet to be analyzed.

6. COMPLETION REVIEW AND APPROVAL

6.1 Procedure Complete:

Sampling Manager _____ Date _____

Associate Program Manager _____ Date _____

Quality Assurance _____ Date _____

Appendix A Field Datasheet

FIELD DATASHEET

Date: _____ Time: _____

SAMPLING CREW

Health Physicist _____ 2nd Crew Member _____ 3rd Crew Member _____

LOCATION

Survey Block _____ Block Coordinates: _____
North _____ East _____

Location Data (if alternate method used): _____

LOCATION SURVEY

Radiation Reading (cpm) _____ Volatiles Reading (ppm) _____

EXCAVATED SOIL SURVEY

Volatiles: _____
Surface Reading (ppm) _____ Subsurface Reading (ppm) _____

SAMPLE SURVEYS

<u>Time</u>	<u>Depth (ft)</u>	<u>Sample Identification Number</u>	<u>Reading (cpm)</u>
_____	_____	A4CM- _____ - _____	_____
_____	_____	A4CM- _____ - _____	_____
_____	_____	A4CM- _____ - _____	_____

IN-SOIL MEASUREMENTS

Counting Rates: _____
Time _____ Surface Reading (cpm) _____ Time _____ Subsurface Reading (cpm) _____

INSTRUMENTS USED

Instrument Electronics: _____
Model No. _____ Serial No. _____

Radiation Detector: _____
Model No. _____ Serial No. _____

HNU Detector: _____
Model No. _____ Serial No. _____

GENERAL COMMENTS

All required procedure steps were followed and completed and data entered are correct.

Print name _____ Sign _____ Date _____

Appendix B Rinseate Datasheet

RINSEATE DATASHEET

Date: _____	Time: _____		
<u>CLEANING CREW</u>	_____	_____	_____
	Health Physicist	2nd Crew Member	3rd Crew Member
<u>SAMPLE COLLECTED WITH EQUIPMENT</u>			
Sample Location Identification Number: A4CM- _____ - _____			
<u>SAMPLES</u>			
	<u>Time</u> _____	<u>Rinseate Sample I.D. Number</u>	<u>Gamma Reading (cpm)</u>
Tritium:	_____	A4CM- _____ - _____	_____
Other:	_____	A4CM- _____ - _____	_____
<u>INSTRUMENT USED</u>			
Instrument Electronics:	_____	_____	_____
	Model No.	Serial No.	
Radiation Detector:	_____	_____	_____
	Model No.	Serial No.	
<u>GENERAL COMMENTS</u>			
All required procedure steps were followed and completed and data entered are correct.			
_____	_____	_____	_____
Print name	Sign	Date	

Appendix C. Chain of Custody Form

This appendix contains the Chain of Custody Form provided by the analytical laboratory for controlling and documenting custody of samples collected using this procedure. The responsibilities for entering the information on the form are listed below.

1. Preprinted information
 - a. Client name and address
 - b. Project name
 - c. Analysis types (in the "Parameters" columns)

2. Health physicist technician at the time of sampling
 - a. Sample No (laboratory sample control number preprinted on the collection bottle label)
 - b. Date and Time
 - c. Location" (Enter the project sample identification code, in the format defined in Section 4.1.2.12)
 - d. # containers (for the sample identified on the line; probably one in every case)

3. Health physicist technician and Sample Collection Center Custodian at the time of sample transfer to the Sample Collection Center
 - a. Relinquished by (health physics technician) and Received by (Sample Collection Center Custodian)
 - b. Date and page ___ of ___ in the upper right of the form

4. Sample Collection Center Custodian in preparation for shipment
 - a. Enter an "X" in the appropriate analysis columns for each sample to identify the analyses to be performed. These analyses will be specified by the Sampling Manager.
 - b. Enter "observations, comments, volumes, special or additional test" as specified by the Sampling Manager
 - c. Sample type or matrix ("Soil" or "Water")
 - d. Total number of containers (sum of # containers column entries)
 - e. Method of shipment
 - f. Special shipment - handling or storage requirements (as specified by the Sampling Manager - probably none)

5. Sample Collection Center Custodian and shipper at time of shipment
 - a. Relinquished by (Sample Collection Center Custodian) and Received by (shipper)

Appendix F Soil Sampling Procedure Checklist

This checklist summarizes the steps in the soil sampling procedure. The referenced sections of the procedure are the full procedure steps corresponding to each summary item.

1.0 Prerequisites

- 1.1. Ensure sampling equipment is clean before each sample collection.
- 1.2. If the HNU detector reading exceeds 2 ppm, stop sampling and notify the Health & Safety representative and the Sampling Manager.
- 1.3. If the Ludlum 2221 detector reading exceeds 21,500 cpm, stop sampling and notify RP&HPS management and the Sampling Manager.

2.0 Surface Soil Sampling

- 2.1. Complete preparations for field sampling operations. (Para. 5.2)
- 2.2. Find the sampling location, clear the area, scan for radiation and volatiles, and confirm that there are no obstacles to prevent sampling. (Para. 5.2.9 thru 5.2.13)
- 2.3. Remove the number of soil samples specified from the upper 6 in. of the cleared area using hand auger and transfer them to the mixing container. (Para. 5.3.1.2 thru 5.3.1.6)
- 2.4. Mix the soil and remove rocks. (Para. 5.3.1.7)
- 2.5. Transfer soil to fill sample container. (Para. 5.3.1.8 and 5.3.1.9)
- 2.6. Measure the sample gamma radiation and record the readings. (Para. 5.3.1.10)
- 2.7. Close, seal, and label the sample container. (Para. 5.3.1.11 thru 5.3.1.13)
- 2.8. Complete the Chain of Custody Form. (Para. 5.3.1.14)
- 2.9. Place the sample container in the field transport container. (Para. 5.3.1.15)
- 2.10. If a field duplicate sample is required, repeat Steps 2.3 through 2.9. (Para. 5.3.1.16)
- 2.11. Extend the sample hole to a 12-in. depth using the hand auger. (Para. 5.3.1.17)
- 2.12. Insert the Ludlum 2221 gamma detector in the hole and make one 1-min count. Record the reading on the Field Datasheet. (Para. 5.3.1.18)
- 2.13. Return excess soil to the hole and place soil sampling tools in the truck for later transport and cleaning. (Para. 5.3.1.19 and 5.3.1.21)
- 2.14. If sampling is complete, finish the Field Datasheet and proceed to the next sampling location. Otherwise, proceed with subsurface sampling. (Para. 5.3.1.22 and 5.3.1.23)
- 2.15. When Sampling Crew members cannot continue physical custody of samples, transfer the samples to the Sample Collection Center. (Para. 5.5.1.1 thru 5.5.1.6)

3.0 Equipment Cleaning

- 3.1. Set up buckets in the cleaning area. (Para. 5.4.1)
- 3.2. Remove surplus soil from the equipment. (Para. 5.4.2)
- 3.3. Soak and scrub the equipment with a scrub brush in the wash bucket (detergent and water). (Para. 5.4.3)
- 3.4. Rinse the tools by pouring water over them into the rinse bucket. (Para. 5.4.4 and 5.4.5)
- 3.5. Collect rinseate samples if specified for equipment cleaned. (Para. 5.4.7 thru 5.4.18)
- 3.6. Allow the equipment to air dry. (Para. 5.4.6)
- 3.7. Check the dried equipment for contamination using the Ludlum 12 detector. Repeat the tool cleaning if they are still contaminated.
- 3.8. Seal the dried equipment in the clean plastic bags.
- 3.9. Pour the soak water and the rinse water into a designated container. Seal, label, and store the container per Environmental Protection instructions. (Para. 5.4.19)

4.0 Subsurface Soil Sampling

- 4.1. If surface samples were just collected at the location, proceed to Step 4.4.
- 4.2. Complete preparations for field sampling operations. (Para. 5.2)
- 4.3. Find the sampling location, clear the area, scan for radiation and volatiles, and confirm that there are no obstacles to prevent sampling. (Para. 5.2.9 thru 5.2.13)
- 4.4. Using the power auger bore a 6-in. diameter hole vertically at the sampling location to the sampling depth. Minimize mixing of soil layers. (Para. 5.3.2.2 thru 5.3.2.4)
- 4.5. Remove the number of soil samples specified using the hand auger and transfer them to the mixing container. (Para. 5.3.2.5 and 5.3.2.9)
- 4.6. Prepare the sample, measure in-soil gamma radiation, store samples, and clean used equipment as described in Steps 2.4 through 3.9. (Para. 5.3.2.10 thru 5.4.20)

FACILITY OR PROJECT NAME AND PROGRAM NO.:				CONFIGURATION SUMMARY RECORD		TYPE OF RELEASE		
DOCUMENT NO.	REV.	TITLE	NO. OF SHEETS	YES	NO	CONCEPTUAL		
AACM-SP-0002	A	SOIL SAMPLING PROCEDURE FOR AREA IV CHARACTERIZATION PROJECT	29	X		NEW		
						REVISED A	X	
						VAULT ONLY		
						OBSOLETION		
						AS-BUILT		
							PRINT DISTRIBUTION	
							NAME	LOC. QTY
							A. KLEIN	T487 DRR
							B. SHEIKVAND	T487 8
							P. RUTHERFORD	T100 1
							S. REEDER	T038 1
							L. MOUNTFORD	T487 1
							R. HARDY	T009 1
							P. HORTON	T009 DRR
							R. TUTTLE	T100 1
							B. SUJATA	T486 1
							G. GAYLORD	T038 DRR
							J. ERMAN	T486 1
							ETEC FILES	T038 1
							J. CLEVELAND	T487 DRR
ORIGINATOR		DATE	LEVEL 1: "FOR CUSTOMER APPROVAL" <input type="checkbox"/> "APPROVED BY CUSTOMER" <input type="checkbox"/>					
B. SHEIKVAND		12/2/94						
MANAGER		DATE	COMMENTS					
T. CLEVELAND		12/2/94						
QUANTITY ASSURANCE		DATE						
S. REEDER		12/2/94						
FUNDING MANAGER		DATE						
G. GAYLORD		12-2-94	DOCUMENT READY FOR RELEASE TO SURVEY CREW					
MGR. RESP. FOR APPROVAL		DATE						
B. SHEIKVAND		12/2/94						
REVIEW CHAIRMAN		DATE						
DOCUMENT(S) REVIEWED:		REVIEW NO.	G.O. NO.	SUBACCT. NO.	RECORDER	RELEASE DATE		
YES <input type="checkbox"/> NO <input type="checkbox"/>			96340	43000	M. Diskerlog	12/2/94		