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environmental restoration project

A Department of Energy Environmental Cleanup Program

Environmental Restoration Project
Standard Operating Procedure

for:

Field Logging, Handling, and Documentation of Borehole Materials

☐ **NES Approved**

Responsible Division Leader: Doug Stavert	Signature & Date
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Revision Log

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Field Logging, Handling, and Documentation of Borehole Materials

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Field Logging, Handling, and Documentation of Borehole Materials

1.0 PURPOSE

This Standard Operating Procedure (SOP) describes the process for field logging, handling, and documentation of borehole materials at the Los Alamos National Laboratory (Laboratory) ER Project.

2.0 SCOPE

This SOP is a mandatory document and will be implemented by all ER Project participants when field logging, handling, and documenting borehole materials for the ER Project.

3.0 TRAINING

3.1 All users of this SOP are trained by reading the procedure, and the training is documented in accordance with QP-02.02.

3.2 3.2 The Field Team Leader (FTL) will monitor the proper implementation of this procedure and ensures that relevant team members have completed all applicable training assignments in accordance with QP-02.02.

4.0 DEFINITIONS

4.1 *Borehole Materials*– are anything that may emanate from the subsurface during a drilling project, and typically consist of soil, core, cuttings, rubble, rock chips, groundwater, and drilling fluids (gas, vapor, and liquid).

4.2 *Borehole Material Management* — the collection, documentation, storage and control of borehole materials and records. The Drilling and Field Support Teams are responsible for implementing borehole material management activities at the drill site under the oversight and support of the Subsurface Technologies Team. All borehole materials are managed as waste materials pursuant to SOP-01.06. As such, borehole materials management is subject to a site specific and ER approved Waste Characterization Strategy Form (WCSF) for each drilling project.

4.3 *Core* — is a cylindrical section of rock, or fragment thereof, that is taken as a sample of the interval penetrated by a core bit and that is brought to the surface for examination and/or analysis.

4.4 *Core Run*—is the process of drilling and recovering a length of core; also the piece of core recovered from a core barrel during the core run.

4.5 *Curation/Disposal Strategy* — A strategy summarizing a specific project's plans for borehole material handling, curation and disposal. Includes planned depth of boreholes, number of samples to be removed, and a schedule for these activities. The curation strategy also allows the Field Team a place to describe options in borehole material curation available in this SOP (Attachment H).

4.6 *Cuttings*—are materials produced during drilling that are removed from the borehole.

4.7 *Drilling Documents*— consist of the following: Equipment and Supplies Checklist, Photographic Log (when necessary), Field Borehole Analytical Sample Removal Checklist, Field Screening Log, Borehole Log, Curation/Disposal Strategy, and drilling guidance documents.

4.8 *Drilling Guidance Document* — a document summarizing the location, objectives and operation guidelines for a specific borehole. Included are details and exceptions relevant to the logging, handling, documentation and curation/disposal strategy of borehole materials for the borehole (i.e. Field Implementation Plan (FIP) or Scope of Work (SOW)).

4.9 *Field Support Facility* — is located at Building TA-3-271 and houses the Field Support Facility (FSF). The FSF consists of equipment designed to effectively process and preserve borehole materials.

4.10 *Rubble*—are pieces of core with diameters smaller than half the diameter of whole core, such that reconstruction between individual pieces is not possible.

4.11 *Sample*—a physical entity, collected in the field that is the original source material for all-subsequent analyses and testing activities.

4.12 *Site-Specific Health and Safety Plan (SSHASP)*—A health and safety plan that is specific to a site or ER-related field activity that has been approved by an ER health and safety representative. This document contains information specific to the project including scope of work, relevant history, descriptions of hazards by activity associated with the project site(s), and techniques for exposure mitigation (e.g., personal protective equipment [PPE]) and hazard mitigation.

4.13 *Subsample*—a selection or aliquot from a sample that may or may not be representative of the sample.

4.14 *Waste Characterization Strategy Form (WCSF)*—a document that presents the Acceptable Knowledge (AK) for waste to be generated during a project. AK incorporates the history of releases and known contaminants in the vicinity of the site and from upgradient locations that could potentially impact the project site. Using the AK and anticipated waste forms to be generated, a preliminary waste determination is done (e.g., radioactive waste, NM Special Waste). Based on the waste determination, the analytical suite for

waste characterization sampling is developed. The document also outlines on-site waste management procedures such as storage areas and segregation.

5.0 BACKGROUND AND PRECAUTIONS

5.1 This procedure prescribes the specific borehole material management methods to be followed and documentation to be prepared during handling and field logging of selected borehole materials identified in the site guidance documents and WCSF. A copy of these documents, with supporting references and forms, will be available at the drill site at all times. This SOP will be used in conjunction with an approved SSHASP. Also, consult the SSHASP for information on and use of all PPE.

5.2 This procedure is limited to the activities necessary to take custody of core and cuttings from drill rig personnel, conduct field screening, remove time sensitive analytical samples and subsamples for preliminary characterization, complete photo documentation when necessary, perform field structural and lithologic description, and mark, package, and temporarily store the borehole materials at a drill site Borehole Material Storage Trailer. The collection of borehole fluids will be controlled in accordance with ER-SOP-01.02.

5.3 The requirements of this procedure are subject to modification depending on the exact nature of the borehole being drilled, as delineated in a drilling project guidance document (e.g. a FIP or SOW).

6.0 RESPONSIBLE PERSONNEL

The following participants are responsible for activities identified in this procedure.

6.1 Focus Area Leader

6.2 Team Leader

6.3 Quality Program Project Leader

6.4 Users of this procedure

7.0 EQUIPMENT

Borehole material management field equipment will be assembled before initiation of field activities. The Borehole Material Management Core Logging Trailer will contain the following equipment: core racks and/or cuttings trays, borehole material boxes, work table, photography apparatus, and container labeling and packaging equipment. The unit will be well lighted and will be heated and ventilated. The unit will be secure, and operated as a limited access facility. A checklist of suggested equipment and supplies needed to implement this procedure is provided in Attachment A.

8.0 PROCEDURE

Note: Subcontractors performing work under the ER Project's quality program may follow this standard operating procedure (SOP) for borehole material logging, handling and documentation or may use their own procedure(s) as long as the substitute meets the requirements prescribed by the ER Project Quality Management Plan, and is approved by the ER Project's Quality Program Project Leader (QPPL) before the commencement of the designated activities.

Note: ER Project participants may produce paper copies of this procedure printed from the controlled-document electronic file located at http://erinternal.lanl.gov/home_links/Library_proc.htm. However, it is their responsibility to ensure that they are trained to and utilize the current version of this procedure. The author may be contacted if text is unclear.

Note: Deviations from SOPs are made in accordance with QP-04.02 and documented in accordance with QP-05.07.

This procedure describes the handling of the subset of borehole materials to be curated from the time they are withdrawn from the borehole to the time they are ready to be transported to the ER Project's FSF for curating and archiving. For the purposes of this SOP, borehole material may also refer to other solid materials, such as drive samples or augured materials. These activities will be performed under the direction of the FTL.

In rare drilling situations, core and cuttings handling procedures will be performed in sequential order. However, drilling often occurs at a rate that requires prioritization of those handling procedures. In addition, samples collected for time sensitive analyses require prioritization of those handling procedures. A drilling project typically has periods of high production interspersed with slow periods. It is critical to perform field screening, determine recovery, and collect accurate depths, photographs (when necessary), and samples during periods of high production. Less critical handling functions (e.g., logging, boxing, labeling, washing, screening, geologic study, and stratigraphic interpretation) may be accomplished during slow periods. The FPL, FTL, and technical team leadership should evaluate the borehole handling procedures on a case-by-case basis to maintain quality yet allow efficient drilling production. If possible, modification to handling methods should be described in the guidance documents and documented on-site in the FTL notebook pursuant to QP-05.07.

8.1 Borehole Material Staging

The driller or helper will collect the core or cuttings according to drilling methods outlined in the project guidance documents. Borehole materials will be field screened in the exclusion zone (HAZWOPER site) or access control zone (other sites) prior to subsequent handling.

At sites where collection of hazardous samples is not a concern, section 8.1.1 can be dispensed with and material staging may proceed directly to section 8.1.2. Such a determination will be made in preparation of the project guidance documents. However, a Field Screening Log (Attachment G) will be completed by a qualified individual noting that the material does not exhibit hazardous properties.

8.1.1 Field Screening

Drilling technique and site-specific conditions will dictate how borehole materials will be field screened to ensure participant health and safety (H&S). Specific field screening procedures will be outlined in the SSHASP and guidance documents. Field screening should ensure participant H&S and not delay drilling production.

8.1.1.1 Once the borehole material has been placed on the workbench, qualified field support participants under oversight of the Health Physics Group (ESH-1) and/or the Industrial Hygiene and Safety Group (ESH-5) will screen the borehole materials for radioactive/hazardous constituents. This screening will be performed for two purposes: 1) to collect field screening data that will determine the immediate hazards due to handling of the borehole materials at the site, and 2) to determine the levels of certain radiological and non-radiological characteristics for comparison with FSF health and safety based acceptance criteria for borehole materials.

8.1.1.2 Field screening values for penetrating radiation, radiologically contaminated particles, and volatile organic compound contamination will be recorded on the Field Screening Log (Attachment G). The prescribed field screening techniques and FSF acceptance levels are shown in Table 8.1-1. A comparison of field screening results also will be made with the action levels for radiation and organic vapors established in the SSHASP. If readings indicate activity or concentrations above action levels, then drilling activities will immediately be suspended, all participants will be removed to the field support area and will remain at the site (in case of potential radiological contamination).

8.1.1.3 If the readings are below the FSF acceptance criteria, the borehole material is now available for movement to the Core Logging Trailer and subsequent transport to the FSF.

TABLE 8.1-1

Health and Safety Based Acceptance Criteria for Borehole Materials Submitted To The Field Support Facility

HAZARD	SCREENING METHOD	ACCEPTANCE CRITERIA
Penetrating Radiation	Beta/Gamma (e.g. pancake GM) Detector	<100,000 dpm/100 cm^2 @ 1 in from sample
Beta/Gamma Radiation	Beta/Gamma Detector	<100,000 dpm/100 cm^2
Alpha Radiation	Alpha Detector	<1,000 dpm/100 cm^2
Volatile Organic Compounds	PID[1], FID[2], colorimetric indicator tubes	<5.9 ppm total VOC
Metals	EPA method SW 6010	Acceptable exposure limits[3]
Tritium	Portable tritium monitor, or liquid scintillation counting for borehole material taken from tritium-contaminated areas.	<50,000 pCi/L

[1] Photo ionization detector
[2] Flame ionization detector
[3] Acceptable level (mg/m^3) = occupational exposure limit.

8.1.2 Borehole Materials to Core Logging Trailer

Upon the determination that borehole materials are safe to handle, the following steps will be implemented:

8.1.2.1 Field support participants will obtain the depth interval for each run from the driller and assign the run number. Field support participants will ensure that the core is not switched end-for-end during any transport.

8.1.2.2 A run marker (Attachment C) (i.e., pink index cards) will be prepared for each core or cuttings run.

8.2 Temporary Packaging of Time Sensitive Analytical Samples

Many time-sensitive analyses require that analytical samples be collected, containerized, and preserved immediately after the borehole materials are brought to the surface. The requirement for the removal of analytical

samples directly from the drill site will be delineated in the site-specific guidance documents.

8.3 Measurement and Determination of Material Loss

8.3.1 Measurement of Run Interval for Core Samples

8.3.1.1 Starting at the top of the core run, pieces of core will be fitted together to reconstruct larger sections of core. If possible, rubble will be reconstructed to accurately represent the interval from which it was recovered.

8.3.1.2 The core will be measured with a steel engineering tape to the nearest 0.1 ft. Record the amount of core drilled and recovered on the Run Marker (pink index card), the Core Log, and as required by project specific guidance. Total core loss can not be determined until the next run is recovered.

8.3.2 Determination of Core Loss

Note: *If a core loss is indicated after measuring the core, field support participants and the driller will determine the interval(s) at which the loss(es) occurred. This SOP suggests the following guidelines:*

8.3.2.1 Assign the core loss to obvious loss zones.

8.3.2.2 If there are no obvious loss zones, assign the core loss to the lowermost rubble zone in that run.

8.3.2.3 If there are no rubble zones, place the loss at the bottom of the run.

8.3.3 Enter the borehole ID, the core loss interval, and the total amount of true core loss on a "Lost Core Marker" (white index card) and place in the proper location.

8.4 Marking Core (Depth Notation and Stripes)

8.4.1 Measure the core to the nearest 0.1 foot with a steel engineering measuring tape. The top of the run will be the starting point for measurement. If the top of the run is angled (e.g., a fracture) and does not match with the previous run, the starting point will be the axis of the core. Indicate footage on the cores at 1-foot intervals. *Do not mark footages on the inside of the core boxes because the core may be repackaged and footages invalidated.*

8.4.2 Orientation stripes need to be marked on the core to show top vs bottom of run. Use red and blue permanent markers to place parallel orientation stripes on core (see Attachment E). An alternative method for marking depths and orientation stripes may be used depending on the condition of the borehole material. Orientation stripes on bagged or packaged cuttings, rubble, and dissaggregated core are not required,

unless a reasonable attempt has been made to preserve the uphole/downhole respective position of the material

8.5 Core Photography

Field photography of the core prior to excessive handling is a reliable method to document the approximate in-situ condition of the core and provides a visual record in the event of core destruction. Depending upon the requirements of the site-specific guidance documents, core may be photographed with either a still or video camera or both, while core is in the inner tube and after the core has been logged (Attachment F) and boxed.

8.6 Core Logging

8.6.1 Borehole materials logging will be performed by a qualified field team member (preferably a geologist) pursuant to currently endorsed ER Project guidance for stratigraphic nomenclature and lithologic description. Logging of borehole materials will follow geologic guidance outlined in SOP-03.06 and SOP-03.09.

8.6.2 Complete the Borehole Log (Attachment D).

8.7 Removal of Analytical Samples (Core)

8.7.1 Sampling of Borehole materials will be completed and documented by a qualified field team member pursuant to SOP-01.02, SOP-01.03, and SOP-01.04.

8.7.2 Remove the analytical sample from the core or cuttings and place a marker (blue index card), at the location the sample portion was removed. Log the sample as removed from the core or cuttings on the Field Borehole Analytical Sample Removal Checklist (Attachment B).

8.8 Core Box Loading and Storing

8.8.1 8.8.1 Box the core/cuttings/rubble with the top or lowest depth of the run at the lower left corner and with core orientation maintained (Attachment E). Rule of thumb is “going downhole, load core/cuttings left to right, front to back in core box”.

8.8.2 Transfer all markers (Run-pink, Lost Core-white and Analytical Sample Removed-blue) from their position in the core rack to their corresponding position in the core box during the loading process.

8.8.3 Core boxes can be stored on site. Refer to SOP-12.02 for specific procedures on transportation and admittance of borehole materials to the FSF.

8.9 Lessons Learned

During the performance of work, ER Project participants will identify, document and submit lessons learned in accordance with QP-03.02, located at: http://erinternal.lanl.gov/home_links/Library_proc.htm.

9.0 REFERENCES

ER Project participants may locate the ER Project Quality Management Plan at http://erinternal.lanl.gov/home_links/Library_proc.htm.

The following documents are cited within this procedure:

QP-02.02, Personnel Orientation and Training

QP-03.02, Lessons Learned

QP-04.02, Standard Operating Procedure Development

QP-04.04, Record Transmittal to the Records Processing Facility

QP-05.07, Notebook Documentation for Environmental Restoration Technical Activities

SOP-01.02, Sample Containers and Preservation

SOP-01.03, Handling, Packaging, and Shipping of Samples

SOP-01.04, Sample Control and Field Documentation

SOP-01.06, Management of Environmental Restoration Project Wastes

SOP-03.06, Fracture Characterization

SOP-03.09, Geologic Mapping of Bedrock Units

SOP-12.02, Transportation and Admittance of Borehole Materials to the Field Support Facility

10.0 RECORDS

The FTL and FSF Curatorial Staff are responsible for submitting the following records to the Records Processing Facility in accordance with QP-04.04:

- Equipment and Supplies Checklist for Field Logging, Handling, and Documentation of Borehole Materials,
- Field Borehole Analytical Sample Removal Checklist,
- Borehole Log (1 page)
- Field Photographic Log (1 page)

- Field Screening Log (1 page)
- Curation/Disposal Strategy

11.0 ATTACHMENTS

The document user may employ documentation formats different from those attached to/named in this procedure—as long as the substituted formats in use provide, as a minimum, the information required in the official forms developed by the procedure. These forms may be located at internet address http://erinternal.lanl.gov/Quality/forms.htm.

Attachment A: Equipment and Supplies Checklist for Field Logging, Handling, and Documentation of Borehole Materials (1 page)

Attachment B: Field Borehole Analytical Sample Removal Checklist (1page)

Attachment C: Run Markers (1 page)

Attachment D: Borehole Log (1 page)

Attachment E: Marking and Boxing Core (1 page)

Attachment F: Field Photographic Log (1 page)

Attachment G: Field Screening Log (1 page)

Attachment H: Curation/Disposal Strategy (2 page)

Using a token card, click here to record "self-study" training to this procedure.

If you do not possess a token card or encounter problems, contact the RRES-ECR training specialist.

EQUIPMENT AND SUPPLIES CHECKLIST FOR FIELD LOGGING, HANDLING, AND DOCUMENTATION OF BOREHOLE MATERIALS

- ____ Engineering measuring tape
- ____ Colored temporary markers
- ____ Desk
- ____ Core racks
- ____ Work table/surface
- ____ Indelible marker pens
- ____ Hand lens
- ____ Grain-size chart
- ____ Polystyrene core cradles
- ____ Knifes/blades
- ____ Chisel
- ____ Magnet
- ____ Rags and sponges
- ____ PVC core trays
- ____ Non-tearing, waterproof labels
- ____ Cuttings containers
- ____ Field Borehole Analytical Sample Checklist
- ____ Polystyrene run blocks
- ____ Miscellaneous office supplies
- ____ Safety equipment
- ____ Container labeling and packaging equipment
- ____ Wire mesh sieve
- ____ Waxed cardboard boxes and divider (specifications depend on core diameter)
- ____ Polyethylene Lay-Flat tubing
- ____ Impermeable packaging
- ____ Pocket transit (0-360 degree)
- ____ Rock hammer
- ____ Dilute HCl (per WCSF control)
- ____ Heat sealer
- ____ 4" x 6" index cards
- ____ Photographic equipment
- ____ Video graphic equipment
- ____ Computer
- ____ Spray bottle
- ____ Filament tape
- ____ Rock breaker/or rock saw
- ____ Protractor
- ____ Binocular microscope with light
- ____ Electric power
- ____ Standard rock-color chart
- ____ Field Video Log
- ____ Field Photographic Log
- ____ Field Bit Cutting Log
- ____ Borehole Log
- ____ Daily Drilling Summary
- ____ Field Screening Log
- ____ Geologic dictionary and other references and volumes
- ____ Chain-of-Custody/Request for Analysis Forms
- ____ Polyethylene sheeting

Other: sink, buckets, tubs, water for washing core & chips, chip trays, chip tray funnels, chip tray storage boxes, sample containers, ziplock bags, broom, mop, cleaning fluid, paper towels, rain gear, radio, telephone, beeper, hazard tape, clipboards, first aid kit, ear plugs, ear muffs, bookshelf, calendar, clock, hardhat, hard-toe shoes, drum liners, garbage bags, garbage cans, microwave, coffee maker, chairs, etc.

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FIELD BOREHOLE ANALYTICAL SAMPLE REMOVAL CHECKLIST
Field Support Facility

Recipient:_____ Address:_____

Print Name

Organization:_____

Form Completed By:_____ _____ Page ____ of___

Print Name Date

Borehole ID:_____ TA/FU_____ /_____

FIELD BOREHOLE ANALYTICAL SAMPLE INFORMATION			CHECKLIST		
Field borehole Analytical Sample Bar Code Number (SpecID)	Affixed	Interval Removed: Date Removed:	Marker?	Marked & Tagged?	Packaged? Described?

FIELD BOREHOLE ANALYTICAL SAMPLE TRANSFER

Person Releasing Custody:		Person Accepting Custody:	
Print Name/Signature	Date/Time	Print Name/Signature	Date/Time

Checked By: (**FSF USE ONLY)**

Print Name/Signature Date/Time

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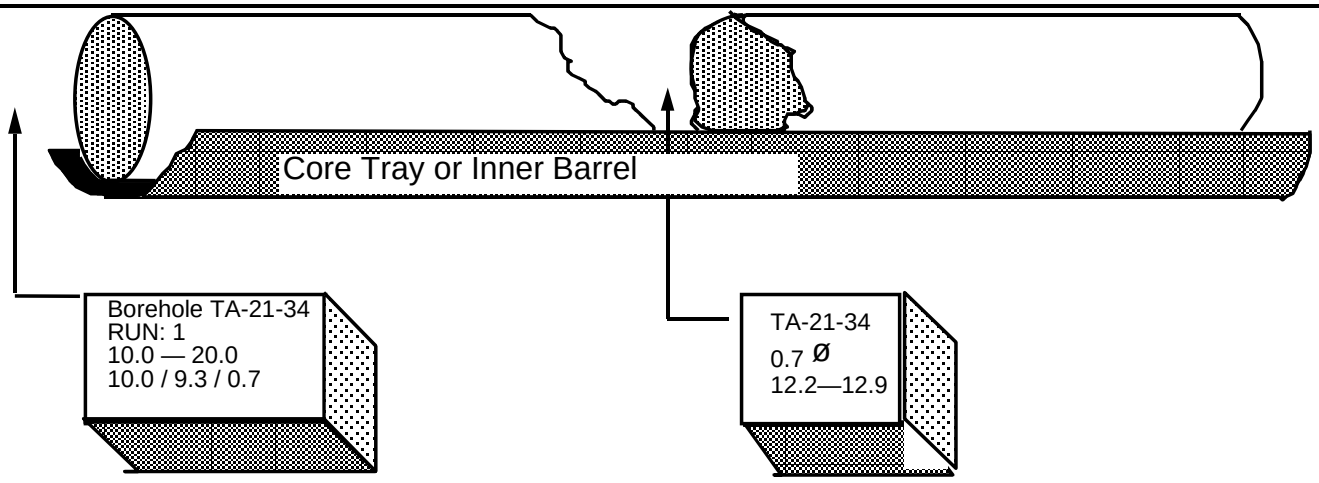
MARKER PLACEMENT



Run Marker

Lost Core Marker

Example of Marker Placement

Borehole ID Number Run Number Footage Interval Drilled/ Recovered/ Lost

Run Marker

Borehole ID Number Amount Lost Core Loss Interval

Core Loss Marker

BOREHOLE LOG

Field Support Facility

Borehole ID:_____ TA/FU:____/_____ Drill Depth From:___ To_____ Page __of ___

Driller:_____ Box:_____ Start Date/Time:___ End Date/Time___

Print Name

Drilling Equipment/Method:_____

_____

_____

Sampling Equipment/Method:_____

_____

_____

Depth (Feet)	Recovery (feet per feet/ %)	Field Borehole Analytical Sample #	Field Screening Results	Top/Bottom of Core in Box	Lithology – Petrology - Soil	Graphic Log	Lithologic Unit	Notes

Prepared By:		Checked By:	
_____	_____	_____	_____
Print Name/Signature	Date	Print Name/Signature	Date

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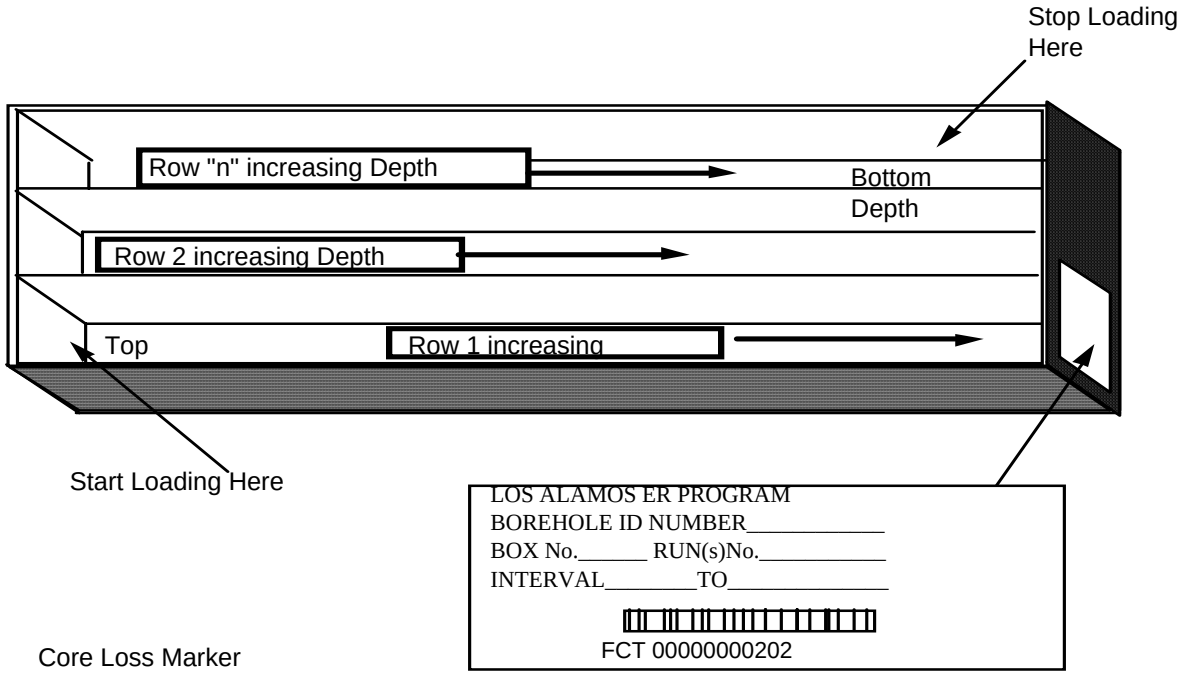
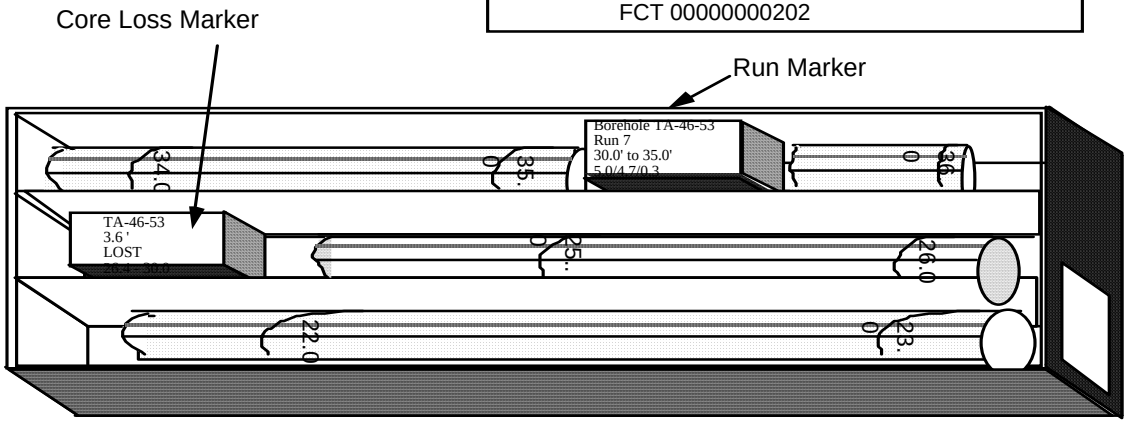
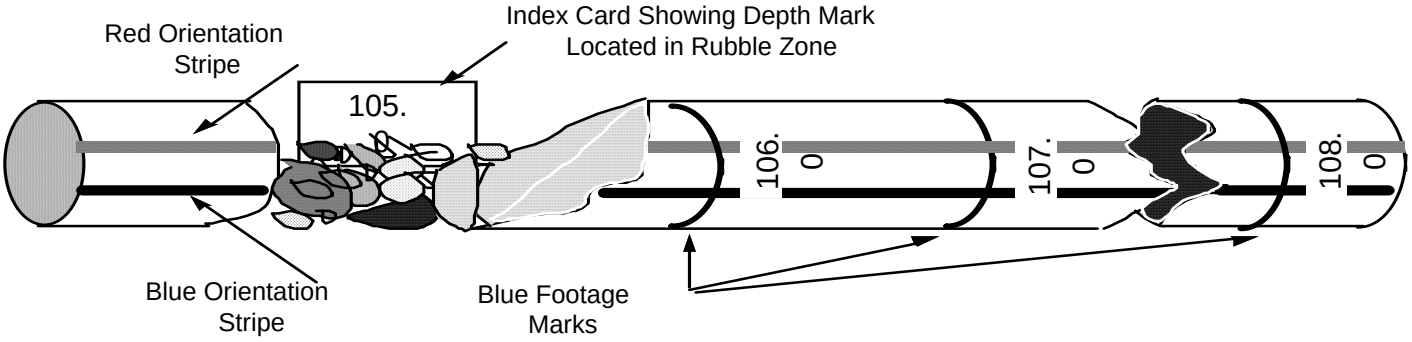

Stop Loading Here
Row "n" increasing Depth
Bottom Depth
Row 2 increasing Depth
Top
Row 1 increasing
Start Loading Here
LOS ALAMOS ER PROGRAM
BOREHOLE ID NUMBER_____
BOX No._____ RUN(s)No._____
INTERVAL_____TO_____
FCT 00000000202


Core Loss Marker
Run Marker
Borehole TA-46-53
Run 7
30.0' to 35.0'
5.0/4.7/0.3
TA-46-53
3.6 '
LOST


Red Orientation Stripe
Index Card Showing Depth Mark Located in Rubble Zone
105.
106.
107.
108.
Blue Orientation Stripe
Blue Footage Marks

FIELD PHOTOGRAPHIC LOG

Field Support Facility

Roll	Exposure				Run		Box		Other
No.	ASA	No.	F-stop	Speed	No.	Interval	Bar Code #	Interval	

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FIELD SCREENING LOG

Field Support Facility

TA/FU:_____/_____ Borehole ID:_____ Checked By:_____ Page___of___

Print Name Date

Run		Hazard	Screening Method	Reading	Acceptance Criteria		Technician's Certification
No.	Interval				BELOW	ABOVE	

SOP-12.01

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{Insert name of Borehole, e.g., R-15} Curation and Disposal Strategy

This borehole material curation/disposal strategy (CDS) provides guidance for the curation of {R-15} borehole materials (core, cuttings, chips, and groundwater) at the Field Support Facility (FSF) until curation objectives are met. In addition, the CDS provides a strategy for disposal of {R-15} borehole materials from the FSF. Borehole material curation includes volume minimization as an integral objective and is a component of borehole material waste management. The objective of the CDS is to ensure consistency of curation and proper disposal of borehole materials pursuant to Laboratory waste-management protocols.

{R-15} is located at TA-{?} in {Mortandad Canyon} in the {east-central part} of the Laboratory. Since 1951, radioactive wastewater has been discharged into upper {Mortandad Canyon}. The history of discharges to, potential sources of contamination in, and previous investigations of {Mortandad Canyon} are presented in detail in the {Mortandad Canyon} Workplan.

Curation Plan

The following {R-15} borehole materials will be curated at the Field Support Facility (FSF) pursuant to LANL-ER-SOPs 12.01 and 12.02, and revisions:

{List only those applicable}

- Hollow Stem Auger (HSA) Core;
- Air Rotary (AR) Core;
- Cuttings;
- Chips; and
- Groundwater.

Core and cuttings will be curated placed into treated cardboard boxes, and chips will be washed on-site and stored in plastic trays. Selected intervals of core and cuttings will also be packaged and heat sealed in Core-Protec™ aluminum foil on-site and stored in the FSF pending analysis selection. These specially packaged materials are an archived set of borehole materials which may be selected as ER analytical samples for a variety of moisture sensitive analysis identified in the {R-15} Field Implementation Plan (FIP). These specially packaged materials must not freeze.

Groundwater samples will be collected from each saturated interval capable of yielding enough volume. A split of each sample may be archived at the FSF in refrigerators as backup for sample analysis, if needed. The archived sample will consist of four 1-L collapsible poly containers as follows: 1-unfiltered, non-acidified; 1-unfiltered, preserved with HNO3;1 filtered, non-acidified; and 1 filtered, preserved with HNO3.

Based on projections outlined in the {R-15} Field Implementation Plan, approximately __ feet of core; __ feet of cuttings; __ box of rock chip trays; and __ gallons of {R-15} groundwater, will be curated or archived at the FSF.

Disposal Strategy

An ER-approved {R-15} Waste Management Strategy Form (WCSF) provides guidance for on-site waste management of borehole materials such as cuttings and groundwater. All borehole materials (wet or dry) generated at the {R-15} site are field screened for beta/gamma radiation. In addition, all dry materials are also field screened for alpha radiation and Volatile Organic Compounds (VOCs). The {R-15} WCSF allows that clean solid borehole materials (no field screening hits) may be utilized at the site as site restoration material. Therefore, following a curation period identified below for additional study and characterization needs, solid borehole materials will be returned to the {R-15} site using a “cradle to grave” disposal strategy.

The {R-15} WCSF also allows that clean groundwater (no analytical hits) may be discharged pending an approved Notice of Intent (NOI) to discharge from the New Mexico Environment Department (NMED). If groundwater exhibits analytical hits, the groundwater will be transported to and disposed of at the Radiological Liquid Disposal Facility (RLDF) at TA-50.

The {R-15} borehole materials curated at the FSF will each be managed by a disposal strategy as follows:

Borehole Material	Preservation	Curation Period	Disposal Strategy
HSA Core	Boxed	1 year from TD	Return to site
AR Core	Boxed	5 years from TD	Return to site
Cuttings	Boxed	6 months from TD	Return to site
Chips	Boxed Trays	5 years from TD	Return to site
Groundwater	Refrigerator	1 year from TD	RLDF at TA-50
AR Core Core-Protec™	Core-Protec™	1 year from TD	Return to site
Cuttings Core-Protec™	Core-Protec™	1 year from TD	Return to site