

YMP-054-R0 YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT OFFICE
7/12/91 DOCUMENT APPROVAL SHEET

Title BRANCH TECHNICAL PROCEDURE: FIELD LOGGING, HANDLING, AND DOCUMENTING BOREHOLE SAMPLES	NO. BTP-SMF-008 [X] Q [] Non Q
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APPROVAL

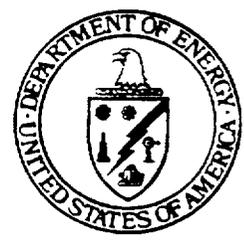
T&MSS Assistant PROJECT MANAGER: Original	W.V. Macnabb	7/6/89
signed by	Signature	Date
DIRECTOR OF QUALITY ASSURANCE:	Edwin L. Wilmot	7/7/89
	Signature	Date
YMP Branch Chief (OTHER, AS REQUIRED)	Uel S. Clanton	7/6/89
	Signature	Date

REVISION 0 EFFECTIVE DATE: 7/14/89

REVISIONS

	INITIAL AND DATE			
	REVISION 1	REVISION 2	REVISION 3	REVISION 4
PROJECT MANAGER:	E.L. Wilmot 10/16/90	<i>[Signature]</i> 7/15/91		
DIRECTOR, QA:	D.G. Horton 10/26/90	<i>[Signature]</i> 7-15-90		
YMP Branch Chief (OTHER, AS REQUIRED)	U.S. Clanton 10/26/90	<i>[Signature]</i> 7/15/91		
M.B. Blanchard	10/26/90			
EFFECTIVE DATE:	10/26/90	7/15/91		

Complete Revision



TRAINING REQUIRED YES N/A NUMBER OF DAYS REQUIRED FOR TRAINING 1

COMMENTS:
SELF STUDY FOR
PERSONNEL BASELINED
TO MAINTAIN PROCEDURE

[Signature] 7/15/91
TRAINING OFFICER/TRAINING MANAGER DATE

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1.0 PURPOSE AND SCOPE

This procedure defines the Yucca Mountain Site Characterization Project Office (YMPO) requirements and responsibilities for documentation, handling, lithologic and structural logging, core photography, and packaging of Yucca Mountain Site Characterization Project (YMP) borehole samples and specimens at surface-based borehole sites.

2.0 APPLICABILITY

This procedure applies to Field Operations (FO) staff of the Field Test Control Department (FTCD) documenting, handling, field logging, photographing, and packaging cores and cuttings acquired at YMP surface-based drill sites, exclusive of any samples and specimens requiring alternative handling as directed by the Sample Overview Committee (SOC).

3.0 DEFINITIONS

NOTE: Terms in this procedure are used as defined in the Project Glossary. The following additional definitions are adopted for the purpose of this procedure.

3.1 CORE

Core consists of a cylindrical section of rock, taken as a sample of the interval penetrated by a core bit and brought to the surface for examination and/or analysis.

3.2 CORE RUN

A core run is an attempt to drill and recover a length of core; also, the core recovered from the core barrel after the core run.

3.3 CUTTINGS

Cuttings are chips of rock produced during drilling that are removed from the borehole by circulation of drilling fluids.

3.4 DAILY ACTIVITIES LOG

The Daily Activities Log (DAL) is a daily, chronological record of activities (using a 24-hour timeclock [0000-2400 hrs]) that occur during drill site operations. It is kept in a paginated, hardbound notebook.

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3.5 DISCREPANCY

A discrepancy exists when incorrect documentation or notation is discovered after completion of the immediate activity or form.

3.6 RUBBLE

Rubble consists of fragments of core from a single interval, the individual diameters of which average less than one half the diameter of the whole core. They are broken in such a manner that reconstruction between individual pieces is impossible.

3.7 SAMPLE

A sample is part of a population whose properties are studied to gain information about the whole or group. Examples of samples include core, cuttings, and fluids collected at YMP borehole sites.

3.8 SAMPLE OVERVIEW COMMITTEE

The SOC is comprised of representatives from Las Alamos National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratories, U.S. Geological Survey, Technical and Management Support Services, YMPO, FTCD, and Quality Assurance (QA). It was formed to ensure a balance between YMP sample needs, acquisition, and use, and the need to curate samples for a long period of time.

3.9 SPECIMEN

A specimen is a subsection or portion which has been removed from a sample or remnant and tracked individually.

3.10 UNIQUE IDENTIFIER

A unique identifier (ID) is a designation that sets a documentable object or event apart from similar entities. It may consist of an assigned number, a name, an alpha-numeric designation, or a set of data items that collectively serve to specify the entity. Examples of unique IDs used in this procedure include borehole ID, container ID, sample ID, or specimen ID.

4.0 RESPONSIBLE PARTIES

NOTE: The following YMP individuals or organizations are responsible for activities identified in Section 5.0 of this procedure:

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1. FO Manager
2. FO Shift Supervisor (SS)
3. FO Geologist
4. FO Geotechnician
5. FO Administrative Assistant

NOTE: FO Staff may consist of the FO Manager, FO SS, FO Geologist, and/or FO Geotechnician.

5.0 PROCEDURE

NOTE: A flowchart of the following processes described in this procedure is attached as Figure 1.

NOTE: All forms in this procedure shall be filled out as the information becomes available.

NOTE: Activities performed during this procedure will be performed in accordance with YMP Administrative Procedure (AP)-6.2Q, Management and Operations of Sample Handling Activities at Borehole Sites.

<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
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INITIAL SAMPLE HANDLING

FO Staff	1.	Maintain controlled access to logging trailer by maintaining visual contact, locking, or other means, as necessary. Maintain Field Facility Access Log (Attachment 1), according to instructions on back of log.
	2.	Determine sample type. <ol style="list-style-type: none"> a. If cuttings, go to Step 33. b. If core, continue.
	3.	Take custody of inner barrel and core on drill rig floor. Mark barrel to ensure

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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
FO Staff		that core will not be switched end-for-end during transport to logging trailer. Obtain run number and interval from driller or designee. If core is in a solid inner barrel, extrude inner sleeve and mark sleeve, as above.
	4.	Carry barrel or sleeve to logging trailer. Open barrel or sleeve to expose core. Fill out polystyrene foam (foam) Run Marker with run number and interval, and place it at top of core run. Fill out foam Information Markers and place them appropriately in sleeve, as necessary.

INITIAL VIDEOTAPING OF CORE

5. Place scale marked in 0.1-foot intervals and annotated with the borehole ID beside the core. Ensure that:
 - a. Proper cassette is identified and in video camera.
 - b. Markers are legible and visible.
 - c. Camera is securely affixed to camera rack assuring consistent distance to core, and is focused.
 - d. Core is well lighted.
 - e. Camera is set on Record mode.
 - f. Track speed is set correctly.
6. Videotape core run with high-resolution video camera. Complete Field Photographic Log (Attachment 2), according to instructions on back of log.

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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
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FO Staff	7.	Write following information on videotape cassette: borehole ID, run number(s), dates, tape number, and total footage interval documented by the tape. Lock tape in a cool, dark location until transfer to the FTCD.
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REMOVING SPECIMENS

FO Geologist	8.	Determine if there are SOC instructions for specimen removal. a. If no, go to Step 10. b. If yes, select specimens to be removed according to SOC instructions and approval.
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FO Staff	9.	Process specimens: a. Cut foam to length of specimen to be removed and label foam with temporary specimen designation. Remove specimen. Mark all artificial breaks sustained during handling with parallel heavy black lines on both sides of break. Put foam in place of specimen. b. Package specimen according to specifications and approved procedures of Principal Investigator (PI). Label packaging material with temporary designation.
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NOTE: Final depth notations will be determined in Step 21.

CORE STAGING

FO Geologist	10.	Match top of core to bottom of core from previous run. Fit pieces of core together to reconstruct longer sections of core. Fit rubble zones to represent as nearly as possible their in situ intervals.
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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
FO Staff	11.	Draw nonorientation marks (*) on both sides of break when the pieces of core cannot be fitted together across the break.
	12.	Mark all artificial breaks sustained during handling with parallel lines on both sides of the break.
	13.	Carefully wipe the core with a dry cloth, if necessary, exercising caution to avoid disturbing unconsolidated zones or rubble.
	14.	Draw short alignment marks perpendicular to and across closely-spaced, parallel breaks, staggered horizontally.
	15.	Use red and blue permanent markers to place parallel orientation stripes on core, red on right, from top to bottom.
FO Geologist	16.	Measure length of core to nearest 0.1 ft (+/- 0.2 ft). Determine if length of core recovered equals length of core cut, for each core run. <ul style="list-style-type: none"> a. If yes, go to Step 20. b. If no, continue.
	17.	Determine if length of core recovered is greater than length of core cut. <ul style="list-style-type: none"> a. If yes, reconcile interval with last unrecovered core interval. Then go to Step 20. b. If no, continue.
	18.	Determine unrecovered core interval(s) as follows, after recovering the next run:

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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
FO Geologist		<ul style="list-style-type: none">a. If the bottom of the first run doesn't fit with the top of the second run, place unrecovered core interval at bottom of first run.b. If the bottom of the first run fits with the top of the second run, assign losses to rubble zones, between nonorientation marks, or to other intervals in the run, based on communication with driller, information from rig floor, previous drilling experience in similar rock, etc.
	19.	Fill out Unrecovered Core Marker and place it at location of unrecovered core, as determined above. Place unrecovered core marks (Ø) on core on both sides of unrecovered interval.
	20.	Record amount of core drilled, recovered, and unrecovered on Run Marker and Shift Drilling Summary (Attachment 3), according to instructions on back of summary.
	21.	Circumscribe (as much as possible) the core with footage marks at one-foot intervals (carrying depths from previous run). Write depths beside the footage marks. When a footage mark falls within a rubble zone, write depth on an index card and place appropriately.
	22.	Determine if specimens have been removed, as described in Steps 8-9. <ul style="list-style-type: none">a. If no, go to Step 25.b. If yes, continue.

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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
FO Geologist	23.	Complete Field Specimen Removal Checklist and Contract (Specimen Contract; Attachment 4), according to instructions on back of contract. Affix duplicates of specimen ID labels to contract and packaging material containing specimen. Fill out Field Specimen Removed Label and affix to foam marker.
	24.	Ship specimen and copy of Specimen Contract to PI/designee, release them directly to PI/designee, or temporarily store at field trailer before shipment to FTCD.

FINAL VIDEOTAPING OF CORE

FO Staff	25.	Videotape staged core as described in Steps 5-7.
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GEOLOGICAL FIELD LOGGING

FO Geologist	26.	Log structural features on Structural Log (Attachment 5), according to instructions on back of log.
	27.	Log lithologic features on Lithologic Log (Attachment 6), according to instructions on back of log.

REMOVING SPECIMENS

- | | | |
|--|-----|---|
| | 28. | Determine if there are SOC instructions for specimen removal. |
| | a. | If yes, repeat Steps 8b, 9, 23, and 24. |
| | b. | If no, continue. |

PACKAGING AND LABELING CORE

FO Staff	29.	Place waxed cardboard container fitted with foam cradles on core rack, parallel to core. Break core as little as possible to fit in container.
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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
FO Staff	30.	Load core, foam markers, and rubble (bagged in lay-flat tubing and labeled with depth interval and orientation stripes) into container, starting in lower left corner, filling each successive row from left to right.
	31.	Affix labels listing borehole ID, sample type, container ID, and interval of sample in container to downhole end of base and lid of container.
	32.	Seal each container with nylon filament tape.

CUTTINGS HANDLING

FO Geologist	33.	Collect representative cuttings at specified intervals for curation.
	34.	Mark each bag with borehole ID, date, and depth interval. If a sample was not collected, place a marker (with uncollected sample information) in place of uncollected sample.
	35.	Log cuttings lithology as described in Step 27.
	36.	Load cuttings and markers into containers, similar to the method described in Step 30. Label and seal containers as described in Steps 31-32.

TEMPORARY STORAGE OF SAMPLES, SPECIMENS AND FIELD RECORDS

FO STAFF	37.	Temporarily store borehole samples, specimens, and records in access-restricted facility, protected from inclement weather.
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<u>RESPONSIBLE PARTY</u>	<u>STEPS</u>	<u>PROCEDURE</u>
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SUMMARY REPORTING

- | | | |
|--------------|-----|--|
| FO Staff | 38. | Maintain DAL. Entries will be legible, concise, in indelible black ink, and initialed. Incoming FO Staff shall read the day's entries and shall initial and date applicable DAL pages. |
| FO Geologist | 39. | Complete Shift Drilling Summary (Attachment 3), according to instructions on back of summary. |

RECORDS

- | | | |
|----------|-----|--|
| FO Staff | 40. | Duplicate all original field records prior to transmittal to the FTCD. |
|----------|-----|--|

MONITORING OF SITE ACTIVITIES

- | | | |
|--|-----|--|
| | 41. | Identify discrepancies. Cross through discrepancies, correct original document, and initial and date correction. If correction is not self-explanatory, attach sheet to original describing correction made. |
| | 42. | Identify any nonconformances to this procedure and process in accordance with YMPO Quality Management Procedure (QMP)-15-01. |

6.0 REFERENCES

NOTE: Refer to the latest revision of documents listed below unless otherwise stated.

6.1 REQUIREMENTS DOCUMENTS

None

6.2 INTERFACE DOCUMENTS

Project Glossary, YMP/89-15

AP-6.2Q, Management and Operations of Sample Handling Activities at
Borehole Sites

QMP-15-01, Control of Nonconformances

7.0 FIGURES AND ATTACHMENTS

Figure 1, BTP-SMF-008 Flowchart

Attachment 1, Field Facility Access Log

Attachment 2, Field Photographic Log

Attachment 3, Shift Drilling Summary

Attachment 4, Field Specimen Removal Checklist and Contract

Attachment 5, Structural Log

Attachment 6, Lithologic Log

8.0 RECORDS

Records packages of documentation generated as a result of this procedure shall be assembled and submitted to the appropriate Local Records Center in accordance with requirements specified in approved procedures. QA records shall be those records so designated by the YMPO during the processes described in this procedure.

The following QA Records are generated by this procedure.

1. Field Facility Access Log
2. Field Photographic Log.
3. Shift Drilling Summary.
4. Field Specimen Removal Checklist and Contract
5. Structural Log

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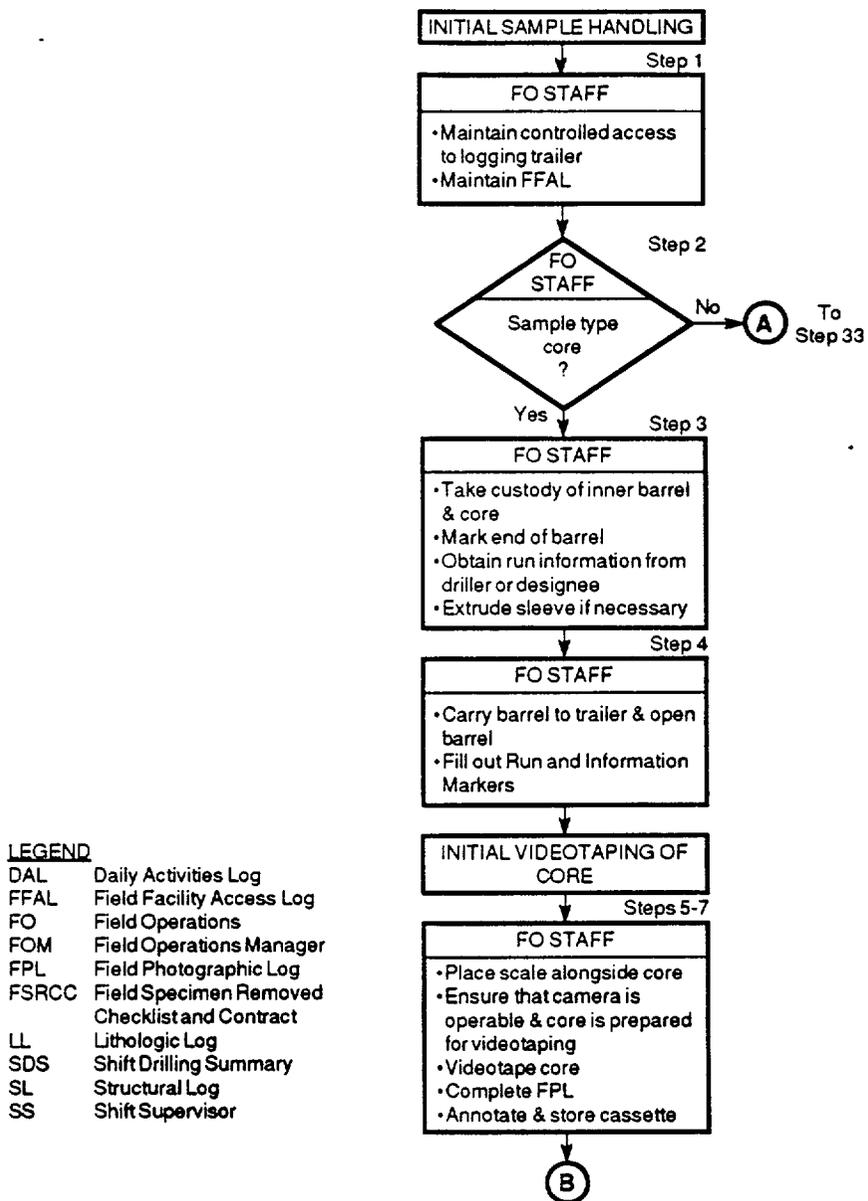
6. Lithologic Log.
7. DAL
8. Core videotape

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LEGEND

- DAL Daily Activities Log
- FFAL Field Facility Access Log
- FO Field Operations
- FOM Field Operations Manager
- FPL Field Photographic Log
- FSRCC Field Specimen Removed Checklist and Contract
- LL Lithologic Log
- SDS Shift Drilling Summary
- SL Structural Log
- SS Shift Supervisor

Figure 1 - BTP-SMF-008 Flowchart

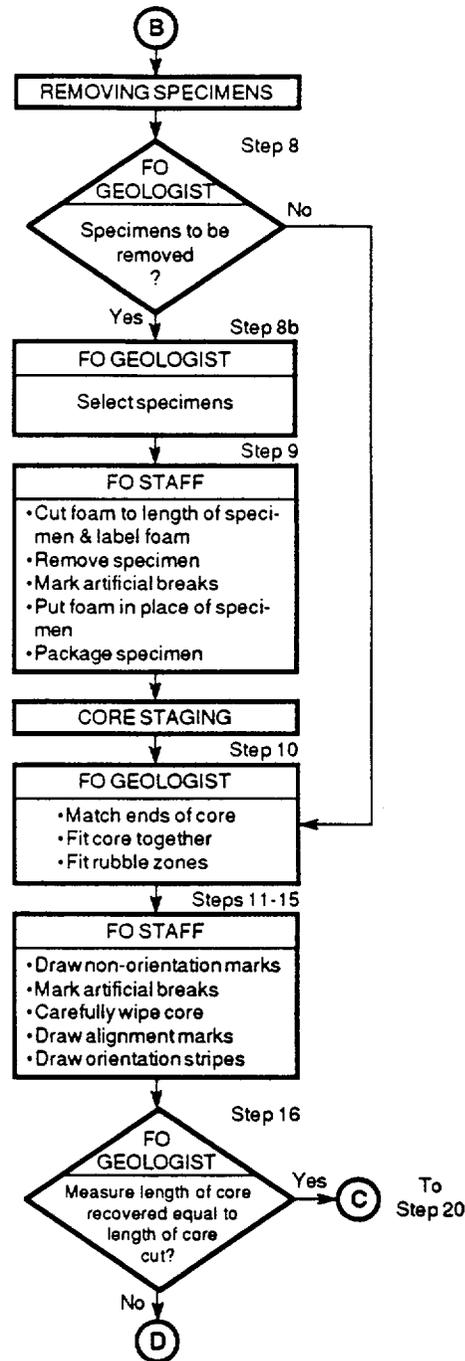


Figure 1 - BTP-SMF-008 Flowchart (continued)

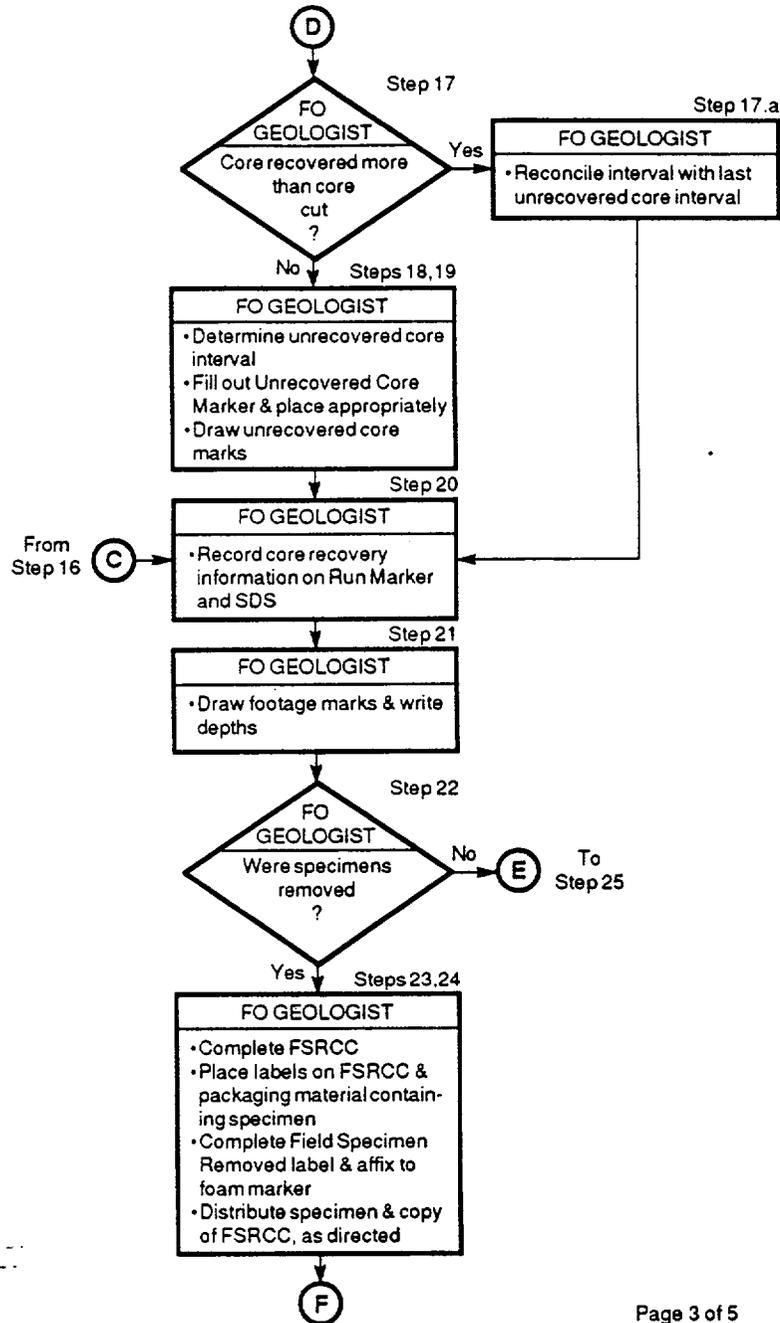


Figure 1 - BTP-SMF-008 Flowchart (continued)

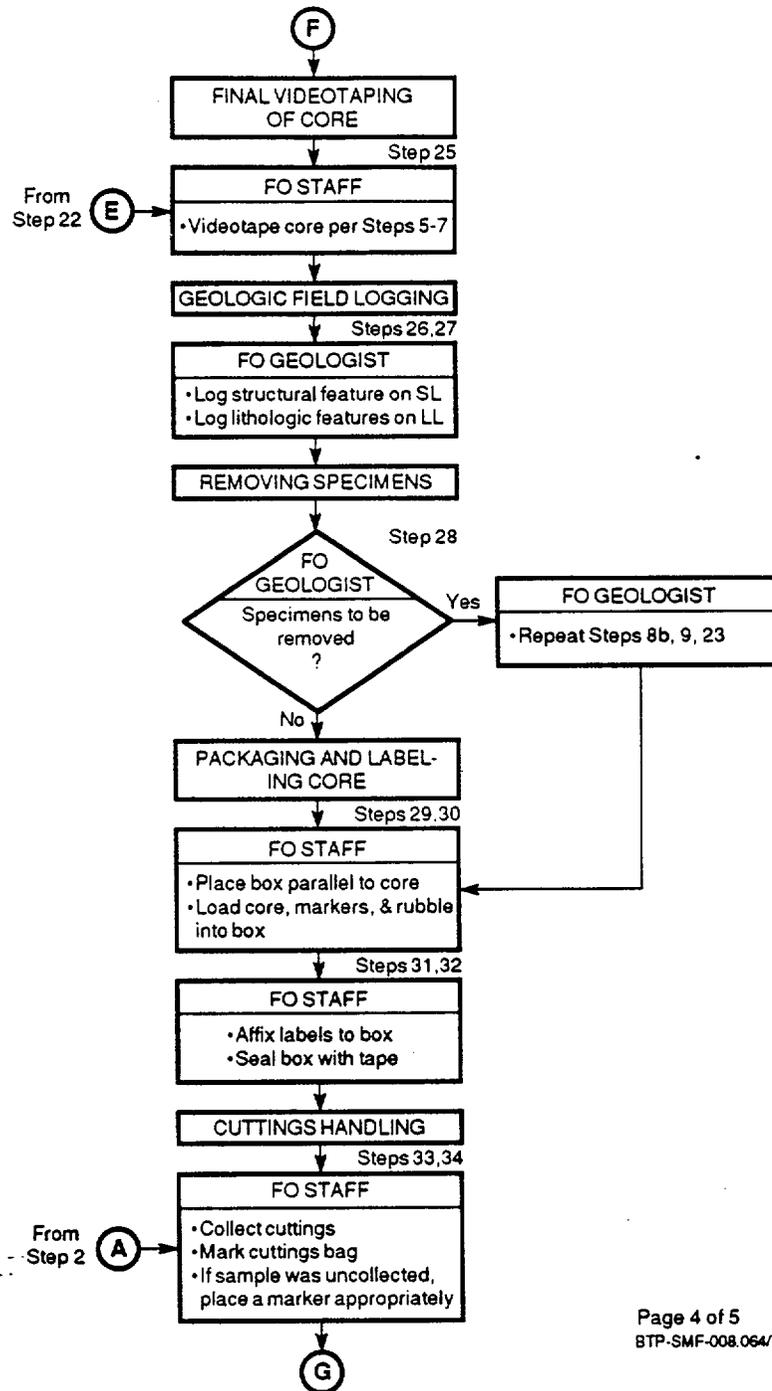


Figure 1 - BTP-SMF-008 Flowchart (continued)

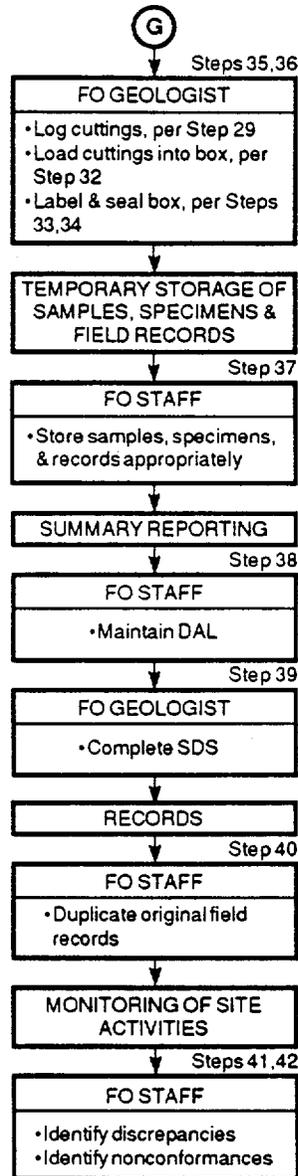


Figure 1 - BTP-SMF-008 Flowchart (continued)

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Name		Organization	Purpose of Visit
Print	-----		
Sign	-----		
Print	-----		
Sign	-----		
Print	-----		
Sign	-----		
Print	-----		
Sign	-----		
Print	-----		
Sign	-----		
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Sign	-----		

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Attachment 1 - Field Facility Access Log

**INSTRUCTIONS FOR PREPARATION OF
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
SAMPLE MANAGEMENT FACILITY
FIELD FACILITY ACCESS LOG
YMP-013**

HEADER INFORMATION

Borehole ID # Unique alphanumeric designation assigned to borehole

Pagination Numbers sequentially assigned to sheets; first blank contains number of that particular sheet; second blank contains total number of sheets completed for the shift

Shift Start Date Date shift starts

Shift Time From / to; using a 24-hour timeclock (0000 - 2400 hrs)

COLUMN INFORMATION

Name Name and signature of individual entering the facility; not applicable to FO Staff

Organization Organization of individual

Purpose of Visit Brief description of purpose of visit

NOTE: Individuals only need to sign in the first time they enter the facility during the shift.

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INSTRUCTIONS FOR PREPARATION OF YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SAMPLE MANAGEMENT FACILITY FIELD PHOTOGRAPHIC LOG YMP-014

HEADER INFORMATION

Borehole ID # Unique alphanumeric designation for borehole

Cassette # Number sequentially assigned to each cassette; begin new log when starting new cassette

Pagination Numbers sequentially assigned to sheets; first blank contains number of that particular sheet; second blank contains total number of sheets completed for the cassette

Checked by/Date FO Staff's signature and date verifying that information on record is correct; cannot have taken videotape if signing here

COLUMN INFORMATION

Run Number Number of run being videotaped

Run Interval Interval of run being videotaped

Counter Interval Counter interval (from/to) on video camera

Remarks Documentation of any other feature being videotaped, including interesting item in core, drilling activity, etc.

Photographer Photographer's initials and date

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YMP-012-R0 4/17/91 WBS: _____ QA: _____	YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SAMPLE MANAGEMENT FACILITY SHIFT DRILLING SUMMARY																																																																																																
Borehole ID _____ Drilled Interval _____ Page _____ of _____ Shift Start Date _____ Shift Time _____ (0000 - 2400 clock) Completed By _____ Date _____ Checked By _____ Date _____																																																																																																	
SUMMARY OF ACTIVITIES _____ _____ _____ _____ _____ _____ _____ _____ _____																																																																																																	
GEOLOGIC INFORMATION _____ _____ _____ _____ _____ _____ _____																																																																																																	
RUN INFORMATION <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>#</th> <th>INTVL</th> <th>CUT</th> <th>RCVRD</th> <th>UNRCVRD</th> <th>UNRCVD INT</th> <th>% REC</th> <th>VERIFIED BY</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr> <td colspan="2">TOTAL</td> <td> </td> <td> </td> <td> </td> <td style="background-color: #cccccc;"> </td> <td> </td> <td> </td> </tr> </tbody> </table>		#	INTVL	CUT	RCVRD	UNRCVRD	UNRCVD INT	% REC	VERIFIED BY																																																																																	TOTAL							
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INSTRUCTIONS ATTACHED BTP-SMF-008

Attachment 3 - Shift Drilling Summary

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INSTRUCTIONS FOR PREPARATION OF YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SAMPLE MANAGEMENT FACILITY SHIFT DRILLING SUMMARY YMP-012

HEADER INFORMATION

Borehole ID # Unique alphanumeric designation assigned to each borehole

Drilled Interval Total interval drilled during shift

Pagination Number sequentially assigned to sheets; first blank contains number of that particular sheet; second blank contains total number of sheets for the shift

Shift Start Date Date of beginning of shift

Shift Time Expressed in 24-hour timeclock (0000 - 2400 hrs)

Completed by/Date FO Geologist's signature and date

Checked by/Date FO Staff not directly responsible for completion of form

SUMMARY OF ACTIVITIES

Summary of shift activities may include: drilling, testing, logging, or standby activities; equipment breakdown; unusual features or occurrences encountered; rig changeouts; inspections.

GEOLOGIC INFORMATION

Provide gross lithologic description and structural information.

RUN INFORMATION (Note: Record all amounts to nearest 0.1 ft)

Run number

Interval Depth interval of run

Cut Amount of footage cut during run, as reported by driller

Recovered Amount of core recovered from run

Unrecovered Amount of core unrecovered from run

Unrecovered Interval Depth interval(s) of each unrecovered interval of core from run (if applicable)

% Recovered Total percent of core unrecovered from run

Verified By FO Staff not directly responsible for completion of this form; verify for each run; verify "Totals" in lower right-hand block

Total Totals of "cut", "recovered", and "unrecovered" columns; calculate % recovery

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YMP-010-R0 4/17/91 WBS: _____ QA: _____		YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SAMPLE MANAGEMENT FACILITY FIELD SPECIMEN REMOVAL CHECKLIST AND CONTRACT			
Recipient _____ Address _____ Organization _____ Telephone () _____ (FTS) _____ Courier _____					
By _____ Date _____ Borehole ID _____ RSED Director Authorization _____ Page ____ of ____					
SPECIMEN INFORMATION		CHECKLIST			
Specimen Number	Affixed?	Interval Removed	Foam Mkr?	Mkd/ Tag?	Pkgd? Desc.
		Date Created			
SPECIMEN TRANSFER					
Person Releasing Custody: _____			Person Accepting Custody: _____		
Date/Time _____			Date/Time _____		
SMF Use Only	Checked By _____ Date _____				

INSTRUCTIONS ATTACHED

BTP-SMF-008

**INSTRUCTIONS FOR PREPARATION OF
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
SAMPLE MANAGEMENT FACILITY
FIELD SPECIMEN REMOVAL CHECKLIST AND CONTRACT
YMP-010**

HEADER INFORMATION

<u>Recipient</u>	Person accepting final custody of field specimens
<u>Address</u>	Recipient's address
<u>Organization</u>	Recipient's organization
<u>Telephone</u>	Recipient's telephone number; also FTS
<u>Courier</u>	Person accepting specimen in field or transporting specimen
<u>By/Date</u>	FO Staff determining authorization for removing specimens
<u>Borehole ID</u>	Unique alphanumeric designation assigned to borehole
<u>RSED Director Authorization</u>	Describe briefly
<u>Pagination</u>	Numbers sequentially assigned to sheets; first blank contains number of that sheet; second blank contains total number of sheets in that set of contracts

SPECIMEN/CHECKLIST INFORMATION:

<u>Specimen Number</u>	Write number in space; check "Affixed?" column when label with duplicate number affixed to specimen and/or container
<u>Interval Removed/ Date Created</u>	Record interval removed and date created
<u>Foam Marker?</u>	Check when a labeled Field Specimen Removed marker has been placed in inner sleeve
<u>Marked/Tag?</u>	Check when specimen has been properly identified
<u>Packaged? Description</u>	Place orientation stripes and footages on packaging; include description of packaging material

SPECIMEN TRANSFER

<u>Person Releasing Custody</u>	FO Staff's signature/date/time of release of specimens
<u>Person Accepting Custody</u>	Person's signature/date/time of receipt of specimens

**YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
PROCEDURE**

Procedure No.: BTP-SMF-008
FIELD LOGGING, HANDLING AND DOCUMENTING BOREHOLE
SAMPLES

Revision:
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**INSTRUCTIONS FOR PREPARATION OF
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
SAMPLE MANAGEMENT FACILITY
STRUCTURAL LOG**

HEADER INFORMATION

- Borehole ID Unique alphanumeric designation given to borehole
- From/To First and last core depths from Columns 3-7
- Core Diameter Diameter of core; begin new sheet with new diameter
- Inclination/Bearing Inclination: degrees from vertical; bearing: 360° azimuthal bearing; does not relate to natural drift of hole; enter "NA" if vertical hole
- Pagination Numbers sequentially assigned to sheets; first blank contains number of individual sheet; second blank contains total number of sheets, filled in upon completion of borehole
- Geologist(s)/Date(s) Signature(s)/date(s) of Geologist(s) completing form
- Checked by/Date Signed/dated by FO Staff not directly responsible for completion of form

COLUMN INFORMATION [Note: Column number in ()]

Nonorientation marks (1)

Bracket / X (2) Enter "I" and "X" to delineate run depths, zones of similar fracturing or breakage, core losses, intervals of rubble, significant void intervals, fracture lengths > 0.5 ft, and intervals of removed specimens. Enter "I" beside top depth of zone and "X" on next row beside bottom depth of zone. Leave blank for single features that occur at a particular depth. Always enter "I" and "X" of individual bracket on same page.

Depth (3-7) Enter to nearest 0.1 ft; locate fractures at mid-point

Frac. Origin (8) Use following codes for origin of break or feature:
 N: Natural; best recognized by mineralization
 C: Coring-induced; fresh, clean, tightly fitting
 H: Handling-induced; further description not necessary
 I: Indeterminate; cannot determine origin

Bracket Code (9-10) Identifies features bracketed in Column 2:
 UC: Unrecovered core
 WC: Whole core removed
 RZ: Rubble zone
 VI: Void interval
 FZ: Fracture zone
 FL: Fracture length - frags w/ length ≥ 0.5 ft

**INSTRUCTIONS FOR PREPARATION OF
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
SAMPLE MANAGEMENT FACILITY
STRUCTURAL LOG
(continued)**

- Numeric Value (11-14)** Each bracket code has a numeric value:
 for UC, WC: Length of interval to nearest 0.1 ft
 for RZ: Average maximum length of rubble pieces to nearest 0.01 ft
 for FZ: Average spacing between breaks to nearest 0.01 ft
 for FL: Measured length of fracture to nearest 0.01 ft
 for VI: Estimated volume percent of voids in that interval
- Orientation (15-18)** Relation of fracture to orientation stripes; A1, A2; B1, B2; C1, C2; D1, D2; if fracture has 0° or 90° dip or does not transect core, slash Columns 14-17
- Dip (19-20)** Angle between plane normal to axis of core and plane of feature, expressed in (°)
- Fracture Description (21-22)** Alphanumeric code to describe fracture; use a letter (Column 21) and a number (Column 22):
 A - continuous 1 - open 3 - partly open/partly healed
 B - discontinuous 2 - healed 4 - hairline
- Fracture line (23)** Enter following codes:
 1 - planar 2 - irregular 3 - curved 4 - undulatory
- Surface Characteristics (24)** Enter following codes:
 1 - smooth/polished 2 - irregular 3 - curved 4 - undulatory
- Tectonic features (25-26)** Enter following codes; slash if no tectonic features noted:
 SR: Solution removal of matrix ON: Offset normal CO: Offset oblique
 SS: Slickensides OP: Offset parallel
- Secondary Mineralization (27-36)** Enter "X" in appropriate column; describe "Other" in Remarks
- Weathered (37)** Enter "X" if condition noted
- Piece Length (38-41)** Enter length of core ≥ 0.35 ft between natural and/or indeterminate breaks, in same row as lowermost break. Piece lengths are measured between midpoints of fractures
- Remarks** Enter core conditions, mineralization, etc.

Attachment 5 - Structural Log (continued)

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT PROCEDURE

Procedure No.: BTP-SMF-008
FIELD LOGGING, HANDLING AND DOCUMENTING BOREHOLE
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INSTRUCTIONS FOR PREPARATION OF YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT SAMPLE MANAGEMENT FACILITY LITHOLOGIC LOG YMP-009

HEADER INFORMATION

Borehole ID # Unique alphanumeric designation assigned to borehole

Type Indicate core or cuttings

From/To Represents the interval documented on individual sheet

Pagination Numbers sequentially assigned to sheets; first blank contains number of individual sheet; second blank contains total number of sheets, filled in after completion of borehole

By/Date(s) FO Geologist's signature and date

Checked by/Date FO Staff not responsible for completion of this form

DESCRIPTION INFORMATION

Record lithologic description of rock, as well as accepted geologic formation and/or member names, if known. Record depths in feet to nearest 0.1 ft. Use charts, tables, and other references to describe features in consistent manner, as described below:

Primary Descriptive Terms Note for lithologic units, in following order:

Unit
Type
Color
Welding
Vitrification

General Features Characteristics of entire unit interval; estimate % volumes (volumetric proportions), when applicable; describe general features in following order, when present:

Pumice
Lithic fragments
Phenocrysts
Lithophysae
Unit contact

Specific Features Characteristics of zone within unit interval; isolated, localized features not common throughout unit; locate by depth