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NUCLEAR WASTE MANAGEMENT PROGRAM PROCEDURE

SP 13-2
CORE SAMPLE LOGGING AND MANAGEMENT
Revision 3

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(printed name) (signature) date

1.0 Purpose and Scope

This procedure prescribes the Sandia National Laboratories (SNL) Nuclear Waste Management Program (NWMP) process for ensuring that core sample logging, storage, requisition, recoring, sawing and shipping of core samples at the Waste Isolation Pilot Plant (WIPP) site or other WIPP-related locations are performed in such a manner as to prevent damage, reduction in scientific value, or loss of identity and/or traceability during these activities. The objectives of this procedure are to maintain the integrity of core during logging, storage, recoring and sawing, and to maintain a formal record of each core sample requested and shipped for traceability and quality assurance. Basic requirements for the identification and control of samples from the time of collection through ultimate disposition are contained in NP 13-1 *Sample Control*.

This procedure controls core logging, storage, requisition, recoring, sawing and shipping. These activities are to be performed by personnel with appropriate technical and Quality Assurance (QA) training. When the WIPP Management and Operating Contractor (MOC) drills core samples, this work will be requested through the WIPP Work Control process, which is governed by WIPP Procedure WP 10-2 *WIPP Maintenance Operations Instruction Manual*. In this case, the WIPP Qualification Card process governs the training and qualifications of the WIPP Drill Crew. For the drilling of other core samples, work will be requested through the facility work control process or by the SNL work control document, such as the governing SNL-developed test plan.

Acronyms and definitions for terms used in this procedure may be found in the NWMP Glossary located at the SNL NWMP On-line Documents web site.

2.0 Implementation Actions

2.1 Core Section Definition

A. For the purposes of this procedure, the word "*section*" means the following:

1. Any piece of core large enough to apply the identification directly on the core.

2. A collection of core pieces that is too small to apply the identification directly on to the core. This collection of core will be placed in plastic bags and labeled as a single unit.

2.2 Core Logging

A. Core samples should be collected, handled, or disposed in accordance with appropriate work controlling documents, such as the governing SNL-developed test plan, SNL NWMP Activity/Project Specific Procedures (SPs), or other implementing procedures. Core samples shall be labeled, inventoried, and stored in such a way that they are easily retrievable. Care is to be taken at all times while handling core to prevent damage.

B. During the coring operation, each collected core section is to be removed from the barrel of the coring machine (drill) and temporarily placed in a core tray and/or storage location, until each section is labeled and logged. Each core section is to be placed in a core tray and/or storage location in the same sequence as it is removed from the barrel or hole. Core section place markers (e.g., wood blocks, bags of rubble, etc.) should be used as place markers for unrecovered core.

C. Each core section is to be labeled with:
- An orientation mark (e.g., up, north)
- A unique core identification number
- The depth of each section
- Any expiration date

An expiration date is not required if the core has an unlimited shelf life. The identification number is to include the borehole identification number, and the core section number. Borehole identification numbers, for boreholes drilled by the WIPP MOC, are obtained from the Managing and Operating Contractor (MOC) by submitting the latest revision of Attachment 1 of WIPP Procedure WP 07-EU1003 *Location of Underground Drilling Holes*.

Appendix A of SP 13-2 describes the Core Identification Numbering System. An example of a core section identification number is P5X21-3, where P5 is the borehole location, X21 the borehole designation number and –3 the core section number.

D. Complete the top four sections of the current version of Form SP 13-2-1 *Core Log* (Core Log form). Complete as many forms as required and (page) number sequentially. Obtain drilling specifications from the cognizant drilling supervisor and the borehole coordinates from the cognizant surveyor (if applicable). The hole number on the form is the same as the borehole identification number labeled on the core.

E. Record any unusual events and/or pertinent information occurring during the drilling in the Comments section of the Core Log form.

F. Beginning with the shallowest core section removed, and working toward the deepest core section removed, complete the bottom section of the Core Log form. The depth of each core section should be accurate to within +/- 0.05 feet. The Profile section of the Core Log form should describe the rock type (e.g., halite, clay seam). A separate Profile and Description Report (or equivalent) may be generated and referenced in lieu of completing the Profile

Section. Two copies of these documents are to be submitted to the SNL Carlsbad Programs Group (SNL/CB) Records Center (Records Center).

G. Record any unusual and/or distinct features observed in the core in the Description section of the Core Log form. A separate Profile and Description Report (or equivalent) may be generated and referenced in lieu of completing the Profile Section. Two copies of these documents are to be submitted to the Records Center.

H. The Remarks section of the Core Log form may be used to sketch core sections and/or record the disposal of core samples.

I. The % Run Recovery, Run Rock Quality Designation (RQD), and Core RQD may be calculated with the following formulas and recorded in the Comments section of the Core Log form:

- % Run Recovery = (Length of Core Recovered ÷ Run Advance) x 100
- Run RQD = (Sum of Run Sample Lengths ≥ 4 in. (10.2 cm.) ÷ Run Advance) x 100
- Core RQD = (Sum of All Sample Lengths ≥ 4 in. (10.2 cm.) ÷ Total Core Length) x 100

J. After identifying and logging the core, either package/preserve or dispose of the core as directed by the Sandia Principal Investigator (PI) or their delegate. In the remainder of this document, the use of "PI" includes their delegate.

K. Maintain core identification records in a safe and readily retrievable manner. Records will be given to the PI. After review by the PI, two copies of all records are submitted to the Records Center upon completion of the activity, or periodically for longer activities.

2.3 Core Storage

A. Core sections 6 inches or less in diameter are stored in core boxes, core sleeves PVC piping, or similar storage containers to prevent damage. Larger cores may be stored in PVC piping or wooden crates. The PI will make this determination. Core section place markers (e.g., wood blocks, bags of rubble, etc.) should be used as place markers for unrecovered core. Note: The use of PVC piping in the WIPP Underground is not recommended. PVC piping may be used for surface storage and shipping.

B. All cores are sealed in airtight material when moisture loss or contamination is to be prevented. Suggested airtight material includes coating materials, stretch-wrap, heat-sealed plastic bags, sealed containers, and/or sealed PVC piping (not recommended for use in the WIPP Underground). The PI will make this determination.

C. Core destined for storage should be placed in a dry controlled storage area in the WIPP Underground or in an environmentally controlled surface building at least 3 inches above concrete floors and at room temperature (e.g., about 25^{O} C). The core storage area shall provide easy access to and identification of core samples stored there.

D. If core is removed from the core storage location, the current version of Form SP 13-1-1 *Chain of Custody* (COC) shall be completed and accompany the core until final disposition.

Submit 2 copies of the completed COC form to the Records Center. Return the original COC form, along with a copy, to the Records Center upon final disposition of the core.

E. Core identification numbers are marked on all core and containers, or should be visible through the containers. The core expiration date (if applicable) should be marked on the containers. Examples from the Core Identification Numbering System are given in Appendix A of this procedure.

2.4 Core Requisition

A. A request for core samples may be initiated by a memo, E-mail, or verbal request to a PI or Department Manager. The PI or manager is to notify the requestor of the approval/disapproval of the request. If it is determined that the transfer of core samples is appropriate, a COC is initiated to document the transfer of the core samples. The COC or the attached documentation is to include:

- The requestor's name and organization
- The identification of the core sections
- A brief description of the core (e.g., halite with polyhalite from Room P)
- The reason for the core (e.g., lab analysis)
- Shipping instructions
- Any special requirements (e.g., sealing, preservation instructions)
- Any other special provisions

B. The requestor completes a COC form for the requisitioned core samples. The form accompanies the core until final disposition. Submit 2 copies of the completed COC form to the Records Center. Return the original COC form, along with a copy, to the Records Center upon final disposition of the core.

C. Place a copy of the completed COC form in the original storage container(s) as future reference for the disposition of the core samples.

2.5 Recoring and Sawing

A. A request to recore and/or saw existing core samples in storage may be initiated by a memo, E-mail, or verbal request to a PI or Department Manager. The PI or manager is to notify the requestor of the approval/disapproval of the request. The request should include the same requisition information required in Section 2.4 (*Core Requisition)*, Subsection A of this procedure. Additional information required in the request is the diameter/dimensions and number of recored core and/or the length/dimensions of the sawed core.

B. All special requirements, such as sealing, preservation and processing instructions, as well as any special provisions, should be explained in detail on the memo or E-mail request.

C. Recoring or sawing may be accomplished at the WIPP site or other facility designated by the PI.

D. Core identification numbers are marked on all recored and/or sawed core and containers or should be visible through the containers. The expiration date (if applicable) should be marked on the recored/sawed core. Examples from the Core Sample Identification Numbering System are given in Appendix A of this procedure.

E. The requestor completes a new COC form to include the recored and/or sawed core samples. The form accompanies the new core until final disposition. Submit 2 copies of the completed COC form to the Records Center. Return the original COC form, along with a copy, to the Records Center upon final disposition of the core.

2.6 Shipping

A. Insure the requestor has met the core samples requisition requirements of Section 2.4 (*Core Requisition)*, Subsection A of this procedure before packaging and shipping core samples.

B. All core samples are shipped in sealed airtight containers when moisture loss or contamination is to be prevented. Suggested airtight containers include coating materials, stretch-wrap, heat-sealed plastic bags, sealed containers, and/or sealed PVC piping (not recommended for use in the WIPP Underground). The PI and/or requestor will make this determination.

C. Placing core samples 6 inches or less in diameter in core boxes, PVC piping or similar storage containers may provide additional protection. Larger cores may be stored in PVC piping or wooden crates. The PI and/or requestor will make this determination.
Note: The use of PVC piping in the WIPP Underground is not recommended. PVC piping may be used for surface storage and shipping.

D. Pack the sealed core in crates or boxes that contain sufficient padding to protect core from damage. Use crates or pallets bound with plastic or steel banding for shipping weights over 50 lbs. For shipping weights under 50 lbs., use shipping boxes sealed with high strength nylon tape and rated for burst loads of 200 psi or more.

E. Core shipments should not be permitted to freeze. Write freeze warnings on boxes during winter months.

F. Use the COC form to document the transfer of core.

G. Keep the original COC form with the core, and submit 2 copies to the SNL Records Center. Return the original COC form, along with a copy, to the Records Center upon final disposition of the core.

2.7 Core Retention and Transfer

A. SNL must track core retained (inventory) by SNL, and core samples transferred to other facilities (e.g., for laboratory analyses). A core database and/or submittal of Core Log forms to the Record Center are acceptable processes for tracking core inventory. The completion and submittal of a COC form(s) to the Records Center is an acceptable process to document core samples transferred to other facilities.

B. A periodic review is to be performed to inventory core retained by SNL. At a minimum, the review is to be completed within six months following the renewal of the WIPP RCRA Hazardous Waste Facilities Permit (HWFP). Appropriate documentation (i.e., memorandum) shall be written and distributed to cognizant SNL and DOE personnel and the Records Center documenting the retention, disposal and/or transfer of core.

2.8 Work Control Documents

A. Tests requiring the extraction of core will outline the logging and management requirements in the work control documents (i.e., test plan, work package). The work control documents should reference this procedure for specific QA requirements.

2.9 Training

A. All personnel who use this procedure will have current training in the SNL QA program.

B. All personnel assigned to log and manage core retained by SNL will read the latest revision of this procedure (SP 13-2), NP 13-1 *Sample Contro*l, and SP 13-1 *Chain of Custody*.

C. The PI will complete and submit Form NP 2-1-2 *Training Roster* (as required) to the SNL Training Coordinator to document the reading of the required NPs and SPs.

2.10 Safety

A. Core sample logging, storage, requisition, recoring, sawing and shipping activities performed at the WIPP site shall conform to Environment, Safety, and Health (ES&H) requirements governed by the latest revision of WIPP Procedure 12-IH.01 *WIPP Chemical Hygiene Plan,* WIPP Procedure WP 12-IH.02 *WIPP Industrial Hygiene Program,* and WIPP Procedure WP 12-IS.01 *WIPP Industrial Safety Program.*

B. Core sample activities performed at other facilities shall conform to the facility ES&H requirements and as a minimum to the requirements of the *SNL ES&H Manual.*

C. Personnel should be aware of pinching hazards, and lifting precautions associated with the handling of larger core. Refer to the *WIPP Industrial Safety Program* or *SNL ES&H Manual* for safety recommendations.

3.0 Records

The following QA records, generated through implementation of this procedure, shall be prepared and submitted to the Records Center in accordance with NP 17-1 (Records):

QA Record	Preparer	Records Submitter
• Core Log forms (Form SP 13-2-1)	PI	PI
• Memos/E-mails of Request (for core sample requisition, shipping, recoring, &/or sawing)	Requestor	PI
• Chain of Custody forms (Form SP 13-1-1)	PI/Requestor	PI
• Profile and Description Reports	PI/Contractor	PI
• Training Forms	PI	Training Coordinator

4.0 Appendices

Appendix A: Core Identification Numbering System

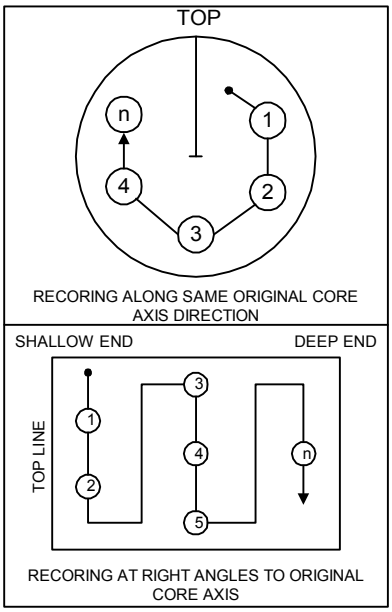
Appendix B: Core Log (Form SP 13-2-1)

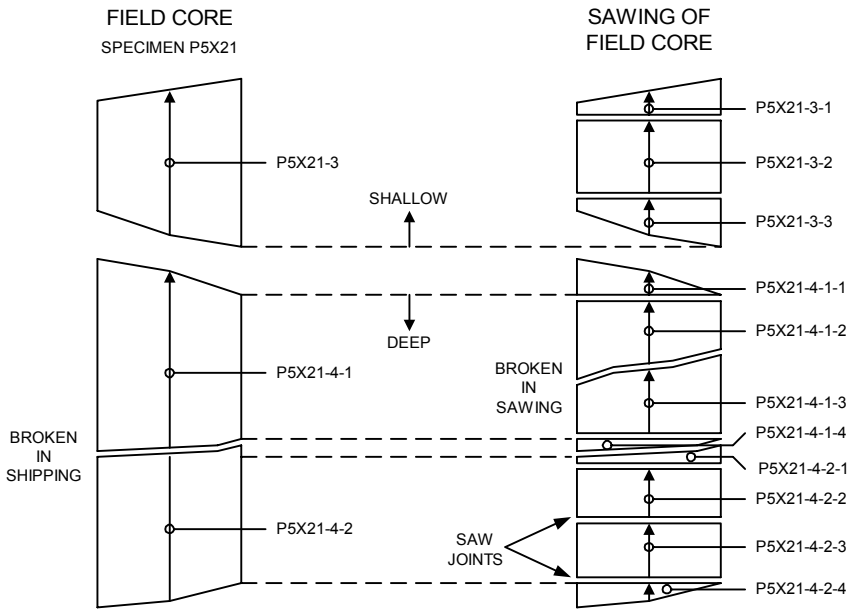
Appendix A

CORE IDENTIFICATION NUMBERING SYSTEM

NOTES:

1. HOLE DIRECTION NOTED EITHER PARALLEL OR PERPENDICULAR TO ORIG. CORE AXIS.
2. RECORING NUMBERING CONVENTION WITH RESPECT TO ORIGINAL BLOCK AS SHOWN:





3. NUMBERS CONVENTION:

P5 X21 -3 /2 -4 -8 ...-1/3

- SUCCESSIVE SAWINGS AND SUBCORING OPERATIONS. (A slash followed by a figure, i.e. /3, indicates recoring; a dash followed by a figure, i.e. -1, indicates a sawing operation.)
- RELATIVE DEPTH OF PIECES AFTER SAWING.
- RECORE SEGMENT NUMBER
  - 1 = SHALLOWEST PIECE OF RECORE.
  - 2 = SECOND SHALLOWEST PIECE OF RECORE.
  - :
  - n = DEEPEST PIECE OF RECORE.
- RECORE LOCATION NUMBER
  - 1 = CORE ADJACENT TO DIRECTIONAL ARROW.
  - 2 = CORE ADJ. TO POSITION 1 IN CLOCKWISE DIRECTION.
  - :
  - n = etc.
- BARREL OR SEGMENT NUMBER
  - 1 = SHALLOWEST PIECE OF FIELD CORE.
  - 2 = SECOND SHALLOWEST PIECE OF FIELD CORE.
  - :
  - n = DEEPEST PIECE OF FIELD CORE.
- HOLE DESIGNATOR (i.e., X21 IS EXTRA HOLE 21.)
- LOCATION IDENTIFIER (i.e., P5 IS PRELIMINARY DESIGN VALIDATION ROOM 5.)

Appendix B

NUCLEAR WASTE MANAGEMENT PROGRAM Sandia National Laboratories	**Core Log**				**Form Number:** **SP 13-2-1** **Page _____ of _____** Attach more forms as needed	
Date: _____ **Room:** _____ **Location:** _____	**Hole No:** _____ **Hole Diameter:** _____ **Hole Depth:** _____ **Hole Orient:** _____ **Run Advance:** _____		**Drill Specs:** _____ **Barrel Specs:** _____ **Barrel Length:** _____ **Drilling Fluid:** _____ **Core Preserv:** _____		**Team:** _____	
	$X_1(R_1)$	**$X_2(R_2)$**	**$Y_1(\theta_1)$**	**$Y_2(\theta_2)$**	**Z_1**	**Z_2**
Hole Coordinates: (Ft)						
Comments:						

Section	Depth (Ft)	% Recovered	Profile (Rock Type)	Description	Remarks