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**SANDIA NATIONAL LABORATORIES**  
**CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM**  
**QUALITY ASSURANCE IMPLEMENTING PROCEDURE (QAIP)**

**QAIP 20-3**

**SAMPLE CONTROL**

**Revision 07**

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Author: Original Signed by Jose A. Archuleta Date: 02/09/2004

Concurrence: Original Signed by James F. Graff Date 02/09/2004  
QA Reviewer

Approval: Original Signed by Peter N. Swift for Date: 02/12/2004  
S. Andrew Orrell  
SNL CRWM Lab Lead

## REVISION HISTORY

Revision	Summary
00	The initial issue of this procedure replaced QAP 8-1 and incorporated new QARD requirements, was simplified and written in QAIP 5-1 format.
01	Revised in response to SNL Corrective Action Request 94-95 by adding a requirement that "use-as-is" dispositions for sample Nonconformance Reports be supported by a written technical justification. References were also updated.
02	Revised to replace reference to QAIP 16-1 with reference to YMSCO YAP 15.1Q. Editorial changes to Section 5.0, "Records," were made.
03	Complete revision to incorporate editorial and terminology corrections, revised QARD requirements, update records section, in response to YM-96-D004, and to incorporate an expedited change approved 8/21/97 to delete an unused form.
04	Revised to implement Process Validation and Re-engineering procedure changes.
05	Revised to update titles of Civilian Radioactive Waste Management (CRWM) QA Procedures and to change the reference from YAP-15.1Q to AP-15.2Q "Control of Nonconformances".
06	Revision to change references from YAP-SII.1Q to AP-SII.2Q, YAP-SII.2Q to AP-SII.1Q and YAP-SII.4Q to AP-SII.3Q. Changed to meet format criteria of QAIP 5-1.
07	Revision to change reference from AP-15.2Q Control of NonConformances to AP-16.1Q Condition Reporting and Resolution and to meet the criteria of QAIP 5-1, Rev.13.

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## 1.0 PURPOSE AND SCOPE

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This procedure defines the handling and control of samples used for Sandia National Laboratories (SNL) Civilian Radioactive Waste Management (CRWM) activities. Samples are required to be identified and controlled in a manner consistent with their intended use. Sample controls are required to identify responsibilities, including interfaces between organizations, and for documenting and tracking sample possession from sample collection and identification through handling, preservation, cleaning, shipment, transfer, analysis, storage, and final use.

This procedure applies to the identification and control of natural, manmade, and calibration samples collected, controlled, or used by SNL personnel. Samples identified prior to October 31, 1986 may be used for SNL activities. These samples may retain their original identification or may be re-identified using this procedure as long as traceability between the old and new identification is maintained.

The following Project procedures apply to YMP site samples and samples maintained by the Sample Management Facility (SMF):

- AP-SII.1Q “Authorization for Sample Examination at the Yucca Mountain Site Characterization Project Sample Management Facility”
- AP-SII.2Q “Requesting, Transferring and Returning Yucca Mountain Project Geologic Borehole Specimens”
- AP-SII.3Q “Collection, Submission, and Documentation of Non-core and Non-cuttings Samples to the Sample Management Facility for Site Characterization”

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## 2.0 DEFINITIONS

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**Calibration Samples:** Material used for calibration or calibration checks of testing and experiment equipment.

**Custodian:** The individual responsible for maintaining custody of a sample (i.e., a person who collects and/or submits samples under the sample management system).

**Manmade Sample:** Engineered materials (e.g., concrete, grout, etc.).

**Natural Samples:** Rocks, minerals, soil, etc.

**Remnant:** A portion of a specimen that is returned to the Sample Management Facility (SMF) after analysis and testing have been performed on that sample.

**Sample:** A physical part of a whole whose properties are studied to gain information about the whole.

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## 3.0 PROCEDURE

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### 3.1 Establishing and Maintaining Sample Chain of Custody

**The Custodian shall:**

1. ensure that custody of a sample by SNL is documented on a Chain-of-Custody form (see Appendix B) when a sample is collected by SNL or when a sample becomes SNL's responsibility, which includes establishing traceability to the implementing documents (Technical Procedures or Scientific Notebooks) associated with sample processing.
2. assure that sample transfers are documented each time a sample changes custody. This is documented by the dated signatures of the person relinquishing custody and the person taking custody. If an organization rather than an individual is assuming custody, each signature should be followed by "for" and the organization name (e.g., John Doe for XYZ, Inc.)
3. retain the Chain-of-Custody form(s) until the sample is subdivided (See Section 3.4) or until final disposition of the sample occurs. Completed Chain-of-Custody form(s) and any accompanying documentation (e.g., sample collection reports, shipping/ receiving documents, etc.) shall be submitted as Project records.
4. consider applying a method to track the use of manmade and calibration samples, although Chain-of-Custody for manmade or calibration samples is not mandatory.
5. terminate custody of a sample when the sample is dispositioned.

### 3.2 Acquiring Samples

This section describes steps taken whenever a sample comes into the custody of SNL, either by having been collected by SNL, obtained or made for SNL, or supplied for use by SNL.

**The Custodian shall:**

1. collects samples in accordance with controlling documents (i.e., Technical Procedures or Scientific Notebooks) to assure that collection methods, techniques, and related equipment are adequate for the intended use of the samples. These controls shall implement any specific identification or traceability requirements specified in requirements documents.
2. determines a unique identification number for each sample per Appendix A.
3. labels each sample with its identification number using physical markings, if appropriate. The markings shall:
  - a. be made with materials and methods that provide a clear, indelible, and legible identification,
  - b. not detrimentally affect the sample content or form,
  - c. be transferred to each identified sample part when the sample is subdivided,
  - d. not be obliterated or hidden by surface treatments or sample preparations unless other means of identification are substituted.

4. initiates a Chain-of-Custody form (Appendix B) for each new sample collected or created that contains the following information (purchased standard reference materials are excluded from this step):
  - a. unique sample identification number (Appendix A);
  - b. name, signature, and organization of initial custodian.
  - c. brief sample description, e.g. including as appropriate the type of sample (rock, soil, liquid, aluminum, concrete, etc.); source of sample (i.e., for natural samples: specific sampling location and orientation, with reference to relevant maps, photographs, or logs; for calibration or manmade samples: sample composition and/or purity may be pertinent); approximate weight, volume, and dimensions of sample; sampling date and time; and any unique storage requirements.
5. physically separates and identifies the samples with tags or labeled containers to provide traceability between the sample and its associated identification number, if physical markings are impractical or insufficient.
6. assures that sample identification is maintained throughout the time that the sample is in the custody of SNL or SNL subcontractors.

**Note:** Samples originating as a result of activities of organizations other than SNL should arrive at SNL with an identification already assigned. Either assign an SNL number and note the original number on the Chain-of-Custody form or maintain the original identification throughout the subsequent sample history up to and including disposition.

### 3.3 Using Samples

Before using a sample, the **Custodian shall** verify that the sample is properly identified and that the identification is documented (Section 4.2) to ensure that chain of custody is maintained.

### 3.4 Subdividing Samples

**The Custodian shall:**

1. identify subdivided samples with the original identification along with an additional unique identifier as defined in Appendix A.
2. initiate a Chain-of-Custody form for each subdivided sample, noting the new sample identification numbers on the form used for the original, undivided sample. The Chain-of-Custody forms used to document custody of the original sample are to be retired and submitted as Project records.
3. initiate any other required documentation linked to the subsample(s) at the time of creation of the subsample(s).

### 3.5 Handling, Storing, and Shipping Samples

**The Custodian shall:**

1. assure that samples are protected during shipping and handling to prevent damage or deterioration.
2. handle, store, clean, package, ship, and preserve samples in accordance with implementing or other specified documents.
3. establish measures for marking and labeling samples for packaging, shipping, handling, and storage as necessary to adequately identify, maintain, and preserve the sample. These markings shall indicate the presence of special environments or the need for special controls.

**Note 1:** Samples collected by an organization other than SNL or its subcontractors are handled and shipped in accordance with requirements of that organization.

**Note 2:** When shipment of samples is by courier, mail, or commercial freight company (e.g., UPS or Federal Express), custody is relinquished by the sender upon shipping and is reinitiated by the addressee upon receipt. The carrier does not have custody and is not allowed to sign the Chain-of-Custody.

4. assure that liquid samples are stored in nonmetallic containers (for small quantities) or lined 55-gallon drums (for large quantities).
5. assure rock samples are contained in plastic jars, canvas or plastic bags, heavy cardboard boxes, or wooden crates.
6. assure soil samples are contained in glass or plastic containers.
7. specify and provide (if required for critical, sensitive, perishable, or high value samples), special equipment (e.g., containers) and protective environments (e.g, inert gas and moisture and temperature limits). If special handling equipment is necessary, implementing or other specified documents shall define adequate measures to maintain the equipment and to require that the operators of the equipment are experienced or receive appropriate training.
8. establish (if relatively long-term storage of samples is required) methods for the control (i.e., protection, maintenance, or replacement) of sample identification commensurate with the planned duration and conditions of storage.
9. if the need to archive representative samples is identified, specify this within implementing documents (e.g., Technical Procedures or Scientific Notebooks).

### 3.6 Processing Limited Lifetime Samples

**The Custodian shall:**

1. identify limited calendar or operating lifetimes of samples when required.
2. note the date that sample usability ends and the method of discard on the Chain-of-Custody form. When possible, the sample or its container is marked or tagged with the same information. As a minimum, the material shall be flagged as limited-life material.
3. upon expiration, ensure the sample is discarded or that samples that have not been discarded are segregated or suitably identified so that the sample is not used. The method of discard is noted on the original custody form.

### 3.7 Processing Nonconforming Samples

**The Custodian shall:**

1. processes a Condition Report (CR) in accordance with AP-16.1Q for any samples that are known or suspected of being of unacceptable or indeterminate quality.

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## 4.0 RECORDS

QA records generated by this procedure are listed below. The Custodian shall be responsible for submitting all records in accordance with AP-17.1Q Records Management.

- Chain-of-Custody forms (Appendix B)
- Any special shipping documentation

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## 5.0 REFERENCES

AP-17.1Q, Records Management

AP-16.1Q Condition Reporting and Resolution

AP-SII.1Q "Authorization for Sample Examination at the Yucca Mountain Site Characterization Project Sample Management Facility"

AP-SII.2Q "Requesting, Transferring, and Returning Yucca Mountain Project Geologic Borehole Specimens"

AP-SII.3Q "Collection, Submission and Documentation of Non-core and Non-cuttings Samples to the Sample Management Facility for Site Characterization"

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## 6.0 APPENDICES

Appendix A: Sample Identification Format

Appendix B: Chain-of-Custody Form

## SAMPLE IDENTIFICATION FORMAT

### APPENDIX A

1. **Natural Sample** identification shall be formatted as follows:

**k-m-n-SNL-q-r-s-t**

where

- k** = The collection locality, which can include drill holes, coreholes, shafts, ramps, drifts, outcrops, or surface locations;
- m** = The distance (in units consistent with the relevant sample collection report or with the records of the organization from which the sample was received) of the sample location from the zero-point of the collection locality (i.e., ground surface for surface-based drill holes, coreholes, and shafts; starting points for underground drifts or coreholes, etc.);
- n** = The number of the sample taken from location “**k-m**.” The sample may be an individual piece of arbitrary size or a collection of pieces within a single container, with the container bearing the “**n**” designator (non-core samples only);
- q-r-s-t** = Sequential designators to be used when subdividing samples, where:
  - q** = Capital letters in sequence A through Z (continuing as A through ZZ);
  - r** = Arabic numerals in sequence, beginning with 1;
  - s** = Lower case letters in sequence a through a (continuing as aa through zz);
  - t** = Arabic numerals in sequence beginning with 1.

Assignment of designators “**k-m-n**” shall be the combined responsibility of the sample collector and of the Sample Management Facility (SMF). The SMF shall ensure that all designators “**k**” are unique. Assignment of designators “**q**” and following is the responsibility of the SNL PI or representative.

2. **Calibration Sample** identification will be formatted as follows:

**C-SNL-xx**

where

- C** = Calibration-related sample;
- xx** = Type of test for which the sample will be used, for example.
  - MI = Mechanical, intact rock;
  - MF = Mechanical failure;
  - TC = Thermal conductivity;
  - TE = Thermal expansion;
  - HC = Heat capacity;
  - HI = Hydrologic, intact rock;
  - HF = Hydrologic, fracture.

If the calibration sample is subdivided, the designators “**q-r-s-t**” will be assigned as described above. The Custodian is responsible for assigning sample identification numbers.

3. **Manmade Samples** follow the format for Calibration Samples with the exception that the initial “**C**” is omitted. If necessary, the identifications for engineered samples may be expanded using suffixes to include additional information as defined above.

