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Revision Status

Revision	Effective Date	Description
8	12/04/2009	<p>This change completes the periodic review. Changes made per ATS-310, Section 1.1, Administrative Procedure Control Process, are: a revision status page was added and Section 6, References, section title was changed to "Sources."</p> <p>Justification for continued use of this 222-S Laboratory procedure and not using a Tank Operations Contractor numbered procedure:</p> <p>The TFC suite of procedures do not cover the topic of Laboratory Archive of Samples. This procedure is specific to the 222-S Laboratory and needs to be kept in use.</p>
9	11/08/2010	<p>This editorial (inconsequential) change is to replace the Records table format with a list. Reference: WRPS-PER-2010-0884.2. Added TFC-BSM-IRM_DC-C-02 as a Source Requirement.</p>
10	05/10/2011	<p>Added Project Coordinator direction to reserve sample in the archive database for future project work. Changes were made to Sections 3.2.9, 3.4.6, 3.5.3, 4.1.1, 4.1.2, and 4.3.4. Changed 222-S Analytical and Testing Services Project Control to 222-S Laboratory Analytical Services and Testing Project Coordination.</p> <p>Reference: WRPS-PER-2011-0409.</p>
D-1	08/15/2013	<p>Minor changes were made to complete a periodic review.</p>

***NOTE** – This revision status section was added to this procedure effective 12/04/2009. The procedure revision as of that date and subsequent revisions will be reflected in this section.*

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1.0 PURPOSE

This procedure addresses the long-term storage of sample material at the 222-S Laboratory after the completion of initial analytical work under the provisions found in Washington Administrative Code (WAC) 173-303, "Dangerous Waste Regulations." This procedure is not applicable to the storage of sample material actively being analyzed, or to material being retained while analytical data is being confirmed. Room 2E, 2B, and the hot cells (1A, 1E-1, 1E-2, 1F, and 11A) in the 222-S Laboratory have been designated as archive areas.

1.1 Scope

This procedure addresses the management of laboratory samples stored in the archive area described above. Some samples in archive are highly radioactive and present a hazard for resampling. However, not all samples are highly radioactive (e.g., Hanford Fire samples).

This procedure does not cover treatability study samples.

2.0 REQUIREMENTS

WAC 173-303 contains specific requirements that regulate the handling, storage, and treatment of waste. WAC 173-303-071 provides exemption for samples that meet specific criteria outlined in this section. Specifically, WAC 173-303-071(3)(1)(i)(C) states "The sample is being stored temporarily in the laboratory after testing for a specific purpose." WAC 173-303-071 further defines criteria that the sample must meet to qualify under this exclusion from the requirements of WAC 173-303. If the specified criteria for exemption are not met, the provisions of WAC 173-303 apply to the samples, and the sample material must be handled as waste when there is no identified further need for the material. This situation makes it incumbent upon the laboratory customers to identify a specific purpose for storing samples, for which all requested analyses have been completed.

Samples being held in archive must be covered under at least one of the following general purposes:

- To provide material for re-analysis should an unexpected problem arise during laboratory analysis of a sample
- To provide material for re-analysis should sampling conducted in accordance with the data quality objectives or other customer-defined structured planning process and analysis plans prove inadequate to address an issue associated with safe storage and handling of the sampled waste stream
- To provide material that can be used to address future programmatic needs.

A primary consideration is that samples are obtained at a cost of time, money, and personnel radiation exposure. In addition, it may not be possible to obtain additional samples from some locations due to access limitations or other issues. Keeping samples in archive, in accordance with reasonable criteria, is prudent.

The general purposes of sample retention are outlined above in this section. Specific purposes of sample retention shall be determined and documented following completion of the administrative process outlined in section 4.2 of this procedure.

3.0 RESPONSIBILITIES

3.1 Project Responsibilities

Ownership of material being archived remains with the program where the sample originated. The program remains responsible for:

- 3.1.1 All storage and sample maintenance costs.
- 3.1.2 Final disposition of the sample material.
- 3.1.3 Providing direction for sample material archive retention at the customers' request and/or removal from archive at their discretion.

3.2 Laboratory Hot Cell Operations

The Advanced Technologies and Laboratories International, Inc. (ATL) Hot Cell Operations Manager is responsible for the operations of the archive storage including:

- 3.2.1 Physical management of sample material.
- 3.2.2 Repackaging samples when required.
- 3.2.3 Disposal of unneeded archive samples (in accordance with section 4.2).
- 3.2.4 Transfer of material in and out of archive storage.
- 3.2.5 Conducting a yearly inventory of the samples being stored.
- 3.2.6 Maintenance of actual and up-to-date records of samples being stored.
- 3.2.7 Maintenance of this procedure.
- 3.2.8 Submittal of a letter to each affected program concerning disposition of sample inventory.

3.2.9 Enter all comments provided from the project coordinator/project manager into the archive database.

3.3 Process Chemistry (WRPS)

3.3.1 Physical management for sample material in the 1E-1, 1E-2, 1A, and 1F hot cells.

3.3.2 Disposal of unneeded archive samples in the 1E-1, 1E-2, 1A, and 1F hot cells (in accordance with section 4.2 of this procedure).

3.3.3 Transfer of material in and out of archive storage in the 1E-1, 1E-2, 1A, and 1F hot cells.

3.3.4 Conducting a yearly inventory of the samples being stored in the 1E-1, 1E-2, 1A, and 1F hot cells.

3.3.5 Submittal of the results of the yearly inventory to the Hot Cell Operations Manager.

3.4 Sample Management Office (SMO) (WRPS)

3.4.1 Physical management for sample material in the rooms 2B and 2E archive storage areas.

3.4.2 Disposal of unneeded archive samples in the rooms 2B and 2E archive storage areas.

3.4.3 Transfer of material in and out of archive storage in the rooms 2B and 2E archive storage areas.

3.4.4 Conducting a yearly inventory of the samples being stored in the rooms 2B and 2E archive storage areas.

3.4.5 Submittal of the results of the yearly inventory to the Hot Cell Operations Manager.

3.4.6 Provide any samples reservation comments for future projects required in the sampling and analysis plan to hotcell personnel for entry into the archive database.

3.5 222-S Laboratory Analytical Services and Testing Project Coordination

3.5.1 222-S Laboratory Analytical Services and Testing Project Coordination will assist hot cell operations in communicating with laboratory customers to ensure all requirements in this procedure are met.

- 3.5.2 The 222-S Laboratory SMO will be the key point of contact for Washington River Protection Solutions to resolve archive questions.
- 3.5.3 Provide any samples reservation comments for future projects required in the sampling and analysis plan to hotcell personnel for entry into the archive database.

4.0 PROCEDURE

4.1 Criteria for Archiving New Samples

Laboratory analysis is performed according to the requirements outlined by the customers. All sample material (parent, daughter, and analytical preparations) is maintained until the final analytical report is issued. After the final report is issued, the laboratory aliquots and analytical preparations are scheduled for disposal. Normally, this occurs 90 days after the final analytical report is issued.

The remaining unused or chemically unaltered sample material may be transferred to the laboratory sample archive areas in accordance with established procedures and customer direction. No samples are placed in archive storage without the customer's directions to do so.

4.1.1 Information Needed for Hot Cell Storage

Samples that are archived in the various hot cells will be placed into numbered storage boxes (if available) or shelves for ease of tracking and retrieval. The sample jars will then be entered into the Hot Cell sample database with the following information:

Jar tracking number	Core number (if available)
Jar/Vial size	Segment number (if available)
Jar tare weight (if available)	Auger number (if available)
Net grams of sample material archived	Storage box/shelf number (if available)
Customer sample identification	Matrix
Laboratory sample number (if available)	Location (cell number)
Sample point/tank number	Memo comments
Sample reservation comments (if applicable)	

4.1.2 Information Needed for Storage in Rooms 2B and 2E

Samples stored in archive in rooms 2B and 2E will have the samples stored in holding cells or on shelving. The sample data provided in the archive database will consist of the following:

Laboratory Customer Number	Location (cell number, shelf location)
Customer sample identification	Matrix
Sample jar size (if available)	Memo comments
Sample reservation comments (if applicable)	

4.1.3 Long-Term Effects of Prolonged Storage

Samples that have a demonstrated programmatic need, as determined by exercise of the administrative process described in section 4.2, will be kept until the need is fulfilled. The customer should be aware that prolonged sample storage may have the following effect:

- a. **Sample Stability.** During storage, sample composition may change, causing the representativeness of the sample to decrease and rendering the sample less valuable for further analysis. Sample composition changes may occur as a result of:
 - Deterioration of the silica (Si) matrix of the sample container (glass jar), which increases the Si content of the sample and renders it less representative for Si and some trace elements found in glass. Trace quantities of some heavy metals that are soluble in glass may also be affected by prolonged storage in glass jars.
 - Container leakage that causes sample integrity to be compromised before or during opening of the container.
 - Gas buildup in the sample container as a result of chemical and radiolytic changes. (Samples are not vented because of high cost and low-risk consequence of venting.)
 - Drying of the sample caused by diffusion of moisture from sample material and container. (Rewetting of the sample will not ensure representativeness due to crystallization during the drying process.) Not all sample material is alike. Differences in matrix and sample type (large crystals, small crystals, salt cake, sludge, etc.) make rewetting an inappropriate method of rehydrating dried material.

Even though composition changes may occur, the samples are expected to retain most of their chemical characteristics (such as radionuclide content and heavy metal concentration) and some physical properties.

All material that has undergone physical or chemical change as a result of the analysis methods (e.g., digestion or chemical/physical separation), daughter samples, samples from nonstatic locations, and sample vials containing less than five grams of material are to be disposed of at completion of the analytical process. These types of sample material should not be archived as their retention is of little value to future programmatic needs.

- b. Rationale for Disposal of Archived Sample Material. The technical rationale for disposal of material in archive includes:
- Material that has been substantially altered chemically or physically (used) by the analytical process is no longer representative of the material at the sampling location.
 - Quantities less than five grams are marginal for subsequent analysis for physical properties and application of multiple analytical techniques. (For example, a 1-gram inductively coupled plasma analysis requires an additional one gram for the duplicate and one gram for the spike. In addition, not all of the sample material is recoverable from the sample vial).
 - Daughter samples (e.g., sample split from the parent jar) are represented adequately by the parent sample.
 - Analytical preparations degrade substantially soon after preparations and are better if redigested from fresh material, rather than stored for any period of time. Hot cell space is at a premium. The continued disposal of unneeded material keeps this space open for analytical processes and storage of those materials with a programmatic need.

4.2 Archiving Administrative Process

To implement disposal of samples as described in section 4.1, an administrative process is required so that U.S. Department of Energy-sponsored programs are given ample notification and opportunity to define program needs and to request retention of samples beyond one year. A three-step administrative process has been developed to ensure that adequate communication takes place with programs and projects that have an interest in archived materials. The three steps are:

- 4.2.1 Inventory of Archived Material. Samples currently in archive will undergo a physical inventory at least once a year. The timing of the inventory will be such

that final disposition (i.e., transfer to the 219-S Tank System, return to customer, or transfer from the sample archive area for disposal) will occur before December 31 of each year. In the 11A hot cell, the weight of each container will be confirmed, the integrity of the sample container checked, and any defects in the container or lid will be corrected by replacement and may necessitate repackaging of the sample material. The sample information will be updated (if necessary) in the hot cell sample database to reflect the current status of each sample. Any material that cannot be reconciled or positively identified will be reclassified and disposed of as waste. Custodians for all other archive areas will perform an annual inspection of the archived containers. Defects will be corrected as stated above. The container information will be transferred to the 11A techs for updating the database.

- 4.2.2 Notification to the Customer of Inventory Results and Request for Justification for Continued Storage. A letter from the ATL Hot Cell Operations Manager will be issued 30 days following inventory completion to each program identified during the archive inventory. This letter will identify each sample being stored for each program and require confirmation from the customer justifying continued archival or disposal of each sample. The letter should list action due dates negotiated with the client. See section 4.3 for additional information regarding justification for archiving samples.
- 4.2.3 Notification to the Customer of Intent to Dispose of Material. In the absence of a response, before disposal of any sample material, the 222-S Laboratory will issue a letter of intent to dispose of any material not meeting the criteria for continued archiving. The Laboratory, 30 days after the issuance of "the letter of intent to dispose," may dispose of samples listed in the letter that have been in archive in excess of one year.
- 4.2.4 Samples selected for disposal may be disposed on a continuous (first in, first out) basis, or the samples may be staged for batch disposal at the discretion of the Laboratory.

4.3 Technical Justification for Archiving

Programs shall file requests for retention for samples that have been in archived storage longer than one year. The request for retention requires that programmatic needs be justified and documented. This justification is necessary from a regulatory point of view, as stated in section 2.0. The criteria and guidelines listed below are recommended to the programs for use in preparation of requests for disposal. Other rationale for retention may also be provided.

Unanswered questions regarding the safe handling and/or disposal of the material represented by the retained sample(s) may require additional analysis.

- 4.3.1 Material should be saved when it is needed to address unresolved issues.

- 4.3.2 Matrices that represent unresolved issues should be saved for potential additional testing.
- 4.3.3 Additional analysis of samples may be required to enable transfer and disposal of waste represented by the samples.
- 4.3.4 Additional analysis required to support future project work as identified in the sampling analysis plan.
- 4.3.5 Sample material should be retained if safe retrieval of waste represented by the sample is likely to require definition of additional properties beyond those requested in the original analysis request.
- 4.3.6 If the material represented by the samples will not remain static (chemically and physically unchanged) until the waste is scheduled for retrieval or transfer, samples should not be retained unless justified for other reasons.
- 4.3.7 Samples representing a sample type that is likely to require collection of additional information to support process design, or to address safe storage issues in the interim, should be retained.
- 4.3.8 Samples that represent boundary conditions (extremes), both chemical and physical, for a process should be retained.
- 4.3.9 The volume of material requested for retention shall not exceed the amount of material likely to be needed to resolve the design or safe storage issue.
- 4.3.10 Design issues for which samples are being retained should be identified and the samples "released" via revision of the request for retention once the design issues are resolved.
- 4.3.11 To complete a justification, programs should make a technical argument that the sample material requested for retention represents a boundary condition, the volume requested for retention is reasonable given the amount likely to be needed to address a design or safety issue, and the sample shall remain representative of the condition.

The request for retention should be revised to release samples once the issues are resolved.

4.4 Disposal of Archive Samples

- 4.4.1 Once permission to dispose of material is received, the sample containers will be located and disposed of in accordance with ATS-LO-100-107, *222-S Laboratory Hot Cell Cubicle Housekeeping and Waste Management*, for hot cell locations, or ATS-LO-100-171, *222-S Laboratory Waste Transfer at Hood 16 in Room 2B to*

the 219-S Tank System, for areas not located in a hot cell. Transfer to the 219-S Tank System is accomplished using the following procedures:

- ATS-LO-100-151, *Laboratory Waste Generation* – for samples that are to be labpacked out.
- ATS-LO-100-171 – for 2B transfer of archive samples from 2B/2E.
- Transfer to 219-S is approved only for unused or unaltered SST, DST, and 219-S tank samples, which have been pre-approved for transfer to 219-S and are considered to be sample return.
- All other samples that are suitable for transfer to the tank will undergo a review designation by Waste Services, and be approved (in writing) by 222-S Environmental.

4.4.2 Whenever a sample container is disposed of, notification shall be made to the inventory control custodian. Information will include the jar number, tank information (i.e., tank number, core number, segment number), net weight of the material disposed of, or customer and laboratory identification for non-tank samples. This will meet the facility's responsibility for tracking the laboratory's nuclear inventory.

4.4.3 Following sample disposal activities, provide verification of sample disposal to the applicable customer(s).

5.0 RECORDS

The following records are generated during the performance of this procedure:

- Letter of inventory results and justification for storage
- Letter of intent to dispose of samples
- Letters of continued storage/disposal from the customer (inventory response letter)

The record custodian identified in the Company Level Records Inventory and Disposition Schedule (RIDS), is responsible for record retention in accordance with [TFC-BSM-IRM DC-C-02](#).

6.0 SOURCES

6.1 Requirements

ATS-310, *222-S Laboratory Administration*, Section 6.4, “222-S Laboratory Complex Waste Management Program”

Brown, T. M., 1996, *Tank Waste Characterization Basis*, WHC-SD-WM-TA-164, Rev. 2

Lin, Li-Yin, 1997, “Inventory Study of Tank Waste Samples at 11A Hot Cells,” (email to M. R. Adams, Lockheed Martin Hanford Corporation, February 26), Rust Federal Services of Hanford, Inc., Richland, Washington. Spreadsheets included with message.

Narquis, C. T., 1997, “White Page on Storage of Excess TWRS Characterization Samples,” Internal memo #31100-CTN97-001, Rust Federal Services of Hanford, Richland, Washington.

Powell, Roger, 1997, “Samples in 325 Building,” (email to M. A. Payne, Lockheed Martin Hanford Corporation, and Distribution, February 11), Lockheed Martin Hanford Corporation, Richland, Washington.

TFC-BSM-IRM_DC-C-02, *Records Management*

WAC 173-303, "Dangerous Waste Regulations," *Washington Administrative Code*, as amended.

6.2 References

ATS-LO-100-107, *222-S Laboratory Hot Cell Cubicle Housekeeping and Waste Management*

ATS-LO-100-151, *Laboratory Waste Generation*

ATS-LO-100-171, *222-S Laboratory Waste Transfer at Hood 16 in Room 2B to the 219-S Tanks System*