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September 22, 1995

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7. Abstract

This document describes the Quality Assurance Program Plan (QAPP) for the Spent Nuclear Fuels (SNF) Canister Storage Building (CSB) Project. The purpose of this QAPP is to control project activities ensuring achievement of the project mission in a safe, consistent and reliable manner.

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Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

**Westinghouse
Hanford Company** Richland, Washington

Management and Operations Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

Approved for public release; distribution is unlimited

QUALITY ASSURANCE PROGRAM PLAN FOR PROJECT W-379,
SPENT NUCLEAR FUELS CANISTER STORAGE BUILDING PROJECT

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EXECUTIVE SUMMARY

This document describes the Quality Assurance Program Plan (QAPP) for the Spent Nuclear Fuels (SNF) Canister Storage Building (CSB) Project. The SNF CSB is a nonreactor nuclear facility intended to store multicanister overpacks containing SNF. The purpose of this QAPP is to control project activities in such a manner as to achieve the mission of the SNF CSB in a safe, consistent, and reliable manner. The QAPP is founded on 10 CFR 830.120, "Quality Assurance Requirements,"¹ and 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste,"² using ASME NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities*³ (ASME 1989 with addenda 12-1989, 1b-1991, and 1c-1992) as a guide. This document describes the QA program and planned actions that Westinghouse Hanford Company (WHC) will implement to demonstrate and ensure that the project meets the requirements of 10 CFR 830.120 and 10 CFR 72.

The WHC SNF CSB QAPP described herein shall provide a compliance basis for all CSB Project QAPPs. The WHC SNF CSB QAPP and implementing procedures shall form the WHC controls for the SNF CSB Project.

¹10 CFR 830.120, "Quality Assurance Requirements," *Code of Federal Regulations*, as amended.

²10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste," *Code of Federal Regulations*, as amended.

³ASME, 1989, *Quality Assurance Program Requirements for Nuclear Facilities*, ASME NQA-1-1989 with current addenda, American Society of Mechanical Engineers, New York, New York.

The SNF CSB organizational relationships are defined in Figure 1-1 in the main text. Each participating organization shown in Figure 1-1 has assigned responsibility for the quality of work described in its respective statement of work, letter of instruction, or work order.

Cognizant quality engineer(s) report to management within their respective organizations, ensuring independence from cost and schedule, and provide direct communications with appropriate levels of project management.

CONTENTS

1.0	INTRODUCTION	1-1
1.1	GENERAL	1-1
1.2	GENERAL ROLES AND RESPONSIBILITIES	1-2
1.3	DELEGATION OF WORK	1-4
1.4	STOP WORK AUTHORITY	1-4
1.5	MANAGEMENT PROCESSES	1-4
2.0	QA PROGRAM	2-1
2.1	GENERAL	2-1
2.2	QA PROGRAM	2-1
2.3	REPORTING INDEPENDENCE OF PERSONNEL	2-1
2.4	PLANNING	2-2
2.5	GRADED QA	2-2
2.6	QAPP MATRIX	2-3
2.7	PERSONNEL SELECTION, INDOCTRINATION, TRAINING, AND QUALIFICATION	2-3
2.8	MANAGEMENT ASSESSMENT	2-4
2.9	QA PROCEDURES	2-4
2.10	PROJECT PROCEDURES	2-4
3.0	DESIGN CONTROL	3-1
3.1	GENERAL	3-1
3.2	DESIGN INPUTS	3-1
3.3	DESIGN PROCESS	3-1
3.4	CHANGE CONTROL	3-1
3.5	INTERFACE CONTROL	3-2
3.6	DOCUMENTATION AND RECORDS	3-2
3.7	TECHNICAL REVIEWS	3-2
3.8	PEER REVIEWS	3-2
3.9	COMPUTER SOFTWARE CONTROL	3-2
4.0	PROCUREMENT DOCUMENT CONTROL	4-1
4.1	GENERAL	4-1
4.2	PROCUREMENT DOCUMENT PROCESS	4-1
4.3	DOCUMENT CONTENTS	4-1
4.4	PROCUREMENT DOCUMENT REVIEWS	4-2
4.5	PROCUREMENT DOCUMENT CHANGE CONTROL	4-2
4.6	QA OVERVIEW OF PROCUREMENT/CONTRACT ACTIVITIES	4-3
5.0	INSTRUCTIONS, PROCEDURES, AND DRAWINGS	5-1
5.1	GENERAL	5-1
5.2	RESPONSIBILITIES	5-1
5.3	REVIEWS	5-1
5.4	QA VERIFICATION	5-1
6.0	DOCUMENT CONTROL	6-1
6.1	GENERAL	6-1
6.2	DOCUMENT CONTROL SYSTEM	6-1
6.3	ISSUANCE, DISTRIBUTION, AND STORAGE	6-2
6.4	REVIEW AND APPROVAL	6-2

CONTENTS (cont)

6.5	DOCUMENT RETIREMENT, RECALL, OR TRANSFER	6-3
6.6	MAJOR AND MINOR CHANGES	6-3
7.0	CONTROL OF PURCHASED ITEMS AND SERVICES	7-1
7.1	GENERAL	7-1
7.2	RESPONSIBILITIES	7-1
7.3	CONTROL OF PURCHASED ITEMS AND SERVICES	7-1
8.0	IDENTIFICATION AND CONTROL OF ITEMS	8-1
8.1	GENERAL	8-1
8.2	IDENTIFICATION METHODS	8-1
8.3	TRACEABILITY	8-1
8.4	LIMITED LIFE OR SHELF LIFE ITEMS	8-2
8.5	MAINTENANCE OF IDENTIFICATION	8-2
9.0	CONTROL OF PROCESS	9-1
9.1	GENERAL	9-1
9.2	PROCESS CONTROL	9-1
9.3	SPECIAL PROCESSES	9-1
9.4	RESPONSIBILITY	9-2
9.5	RECORDS	9-2
10.0	INSPECTION	10-1
10.1	GENERAL	10-1
10.2	PERSONNEL	10-1
10.3	HOLD POINTS	10-1
10.4	INSPECTION PLANNING	10-1
10.5	IN-PROCESS INSPECTION	10-1
10.6	FINAL INSPECTIONS	10-2
10.7	RECORDS	10-2
11.0	TEST CONTROL	11-1
11.1	GENERAL	11-1
11.2	TEST REQUIREMENTS	11-1
11.3	TEST PROCEDURES	11-1
11.4	TEST RESULTS	11-2
11.5	TEST RECORDS	11-2
12.0	CONTROL OF M&TE	12-1
12.1	GENERAL	12-1
12.2	SELECTION	12-1
12.3	CALIBRATION	12-1
12.4	CONTROL	12-1
12.5	RECORDS	12-2
13.0	HANDLING, STORAGE, AND SHIPPING	13-1
13.1	GENERAL	13-1
13.2	INSTRUCTIONS/PROCEDURES	13-1
13.3	TOOLS AND EQUIPMENT	13-1
13.4	OPERATORS	13-1

CONTENTS (cont)

13.5	MARKING	13-1
13.6	QA/INSPECTION	13-1
14.0	INSPECTION, TEST, AND OPERATING STATUS	14-1
14.1	GENERAL	14-1
14.2	RESPONSIBILITIES AND INTERFACES	14-1
14.3	VERIFICATION	14-1
15.0	CONTROL OF NONCONFORMING ITEMS	15-1
15.1	GENERAL	15-1
15.2	IDENTIFICATION	15-1
15.3	SEGREGATION	15-1
15.4	DISPOSITION	15-1
16.0	CORRECTIVE ACTION	16-1
16.1	GENERAL	16-1
16.2	TREND ANALYSIS	16-1
16.3	CORRECTIVE ACTION CRITERIA	16-2
16.4	TRACKING	16-2
16.5	REMEDIAL ACTION	16-2
17.0	QA RECORDS	17-1
17.1	GENERAL	17-1
17.2	RECORDS SYSTEM	17-1
17.3	RECORD ADMINISTRATION	17-1
17.4	RECORD VALIDATION	17-1
17.5	INDEX	17-2
17.6	DISTRIBUTION	17-2
17.7	IDENTIFICATION	17-2
17.8	CLASSIFICATION	17-2
17.9	RETENTION OF RECORDS	17-3
17.10	CORRECTIVE INFORMATION IN RECORDS	17-3
17.11	RECORD RECEIPT	17-3
17.12	STORAGE, PRESERVATION, AND SAFEKEEPING	17-4
17.13	INTERFACES	17-5
18.0	INDEPENDENT ASSESSMENTS	18-1
18.1	GENERAL	18-1
18.2	AUDITS	18-1
18.3	AUDIT PROCESS	18-1
18.4	AUDIT SCHEDULING	18-1
18.5	AUDIT TEAMS	18-2
18.6	AUDIT PREPARATION	18-2
18.7	AUDIT PERFORMANCE	18-3
18.8	AUDIT REPORTING	18-3
18.9	POST-REPORT ACTION	18-4
18.10	AUDIT RECORDS	18-4
18.11	SURVEILLANCE	18-5

CONTENTS (cont)

19.0	COMPUTER SOFTWARE	19-1
19.1	GENERAL	19-1
19.2	REQUIREMENTS	19-1
19.3	SQA	19-1
19.4	SOFTWARE DEVELOPMENT	19-2
19.5	COMPUTER SOFTWARE VERIFICATION AND VALIDATION	19-3
19.6	VERIFICATION	19-4
19.7	CONFIGURATION MANAGEMENT	19-4
19.8	QUALIFICATION OF EXISTING SOFTWARE	19-4
19.9	DOCUMENTATION	19-5
19.10	DISCREPANCY REPORTING AND CORRECTIVE ACTION	19-5
19.11	MEDIA CONTROL AND PHYSICAL SECURITY	19-5
19.12	ACQUIRED COMPUTER SOFTWARE	19-6
19.13	COMPUTER SOFTWARE APPLICATION	19-6
20.0	REFERENCES	20-1
21.0	BIBLIOGRAPHY	21-1
22.0	GLOSSARY	22-1
APPENDIX:	QUALITY ASSURANCE PROGRAM PLAN MATRIX FOR THE SPENT NUCLEAR FUELS CANISTER STORAGE BUILDING PROJECT	A-1

LIST OF FIGURES

1-1	Spent Nuclear Fuels Canister Storage Building Project Organization	1-2
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QUALITY ASSURANCE PROGRAM PLAN FOR PROJECT W-379,
SPENT NUCLEAR FUELS CANISTER STORAGE BUILDING PROJECT

1.0 INTRODUCTION

1.1 GENERAL

This section describes the organizational responsibilities and authorities for the Spent Nuclear Fuels (SNF) Canister Storage Building (CSB) Project. The assignment of responsibilities is based on the policy that line organizations achieve quality and the quality organization provides overview to verify achievement of quality.

Several organizations contribute to the SNF CSB. The design and construction of the project represents an integrated effort by the U.S. Department of Energy (DOE), the Owner; Westinghouse Hanford Company (WHC), the Design Authority and Maintenance and Operations Contractor; the Architect-Engineer (A-E), serving as the Design Agent; and the Construction Manager (CM). The potential involvement of numerous participants underscores the need to effectively integrate activities to reduce or eliminate redundancies. The potential problem of overlap in responsibilities has been addressed by adopting an integrated management team approach. An organization chart depicting the interfaces of the participants is shown in Figure 1-1.

Each affected organization is required to identify the quality assurance (QA) position within its organization responsible for the establishment and implementation of its Quality Assurance Program Plan (QAPP). The following characteristics are required of this position:

- An organizational position at the same or higher organizational level as the highest line manager responsible for performing activities affecting quality
- Knowledge and experience in the areas of QA and management
- The authority and responsibility to verify the adequacy and implementation effectiveness of the QAPP and subtier QAPPs
- No other duties or responsibilities unrelated to QA that could prevent full attention to QA program matters
- Sufficient freedom from cost and schedule considerations when such considerations could impact quality or safety
- Access to senior management and management at the next higher organizational level to identify and obtain resolution of quality concerns
- Review and approval recommendations authority for QAPPs, revision, and interpretation.

Figure 1-1. Spent Nuclear Fuels Canister Storage
Building Project Organization.

1.2 GENERAL ROLES AND RESPONSIBILITIES

1.2.1 U.S. Department of Energy-Headquarters (DOE-HQ)

The DOE-HQ is responsible for establishing national program and policy for SNF projects.

1.2.2 U.S. Department of Energy, Richland Operations Office (RL)

The RL, as the Owner, is responsible for establishing site and program policy and defining the Hanford Site Mission and programmatic requirements and objectives in accordance with DOE Orders. The RL monitors and provides oversight of the Design Authority (WHC) and evaluates and approves the project configurations and changes thereto.

1.2.3 WHC

The RL has delegated the responsibility for project management and QA to WHC. Westinghouse Hanford Company is the Design Authority (refer to WHC-SD-W379-PMP-001 [Foley 1995]) and Maintenance and Operations Contractor and has the primary responsibility for executing the project mission. This includes defining systems through systems engineering, managing the SNF CSB Project and program, providing technical direction to the Design Agent (A-E) and the CM, reviewing and approving products and activities, and ensuring that requirements are met.

1.2.4 A-E (To be Determined [TBD])

The A-E is the Design Agent (refer to WHC-SD-W379-PMP-001 [Foley 1995]) and shall be responsible for the overall design, engineering, preparation of definitive design documents, design control, and internal technical design verification. The A-E's QA program shall address the requirements of Section 2.2 and this QAPP and implement the controls necessary to ensure compliance. The A-E shall respond to provisions of the statement of work, including configuration control, quality of drawings, specifications, and other supporting documents. The design shall specify specific criteria identified in this plan during development of specifications and drawings which are a means of forwarding quality requirements to contractors. The A-E shall provide a list of "Critical Items" to be verified during Title III inspection. The A-E shall provide timely response to surveillances, audits, or assessments performed by RL and/or WHC.

1.2.5 CM

The Construction Manager (CM) (ICF KH) shall be responsible for meeting the contract obligations as identified in the contract specifications, drawings, and documents. The CM also will serve as the contract coordinator for quality activities during construction. The CM will, when required, review design packages and provide constructability reviews. In addition, the CM shall participate in the development of inspection planning, submittal scheduling, transmittal control, as-built verification, and document turnover upon project completion. The CM will procure the services of qualified subcontractors to ensure timely completion and execution of the contract specification and drawings. The CM shall provide timely response to surveillances, audits, or assessments conducted by RL and/or WHC.

1.2.5.1 Construction Subcontractors. Construction subcontractors are responsible for the overall quality of their work and shall perform inspection and provide acceptable documentation of their activities as described in the contract specifications and drawings. Construction contractors shall ensure that materials, equipment, components, and workmanship supplied under the terms of their contracts conform to the contracts. Construction subcontractors shall provide timely response to surveillances, audits, or assessments conducted by the CM, RL, and/or WHC.

1.2.6 Title III Contractor (TBD)

The Title III Contractor (TBD) shall (1) review construction quality activities and other functions denoted in DOE Order 4700.1 (DOE 1987); (2) inspect construction work, including procurement and installation of associated equipment as prescribed in the contract specifications and drawings; and (3) identify hold or witness points, as appropriate, based on design documents. These hold or witness points should take into consideration, as a minimum, activities that cannot be inspected at a later date. The Title III Contractor shall have a QA program that addresses the applicable requirements of this QAPP. The Title III Contractor shall provide timely response to surveillances or audits conducted by RL and/or WHC.

1.3 DELEGATION OF WORK

The RL is responsible for the overall execution of the SNF CSB but has delegated Design Authority to WHC. Westinghouse Hanford Company also assumes direct responsibility for regulatory compliance and project integration. Responsibility for design, acting as the Design Agent, has been assigned by WHC to the A-E. The delegating organization, however, remains accountable for work that is delegated. Delegation of work has been assigned by contract, statement of work, work order, or letter of instruction, as applicable, to the respective participant.

1.4 STOP WORK AUTHORITY

Line managers shall ensure that project activities are performed in a safe, environmentally sound manner and in compliance with quality, safety, and environmental requirements. The performing organization's responsibilities shall include the authority to stop and/or correct work whenever continuation could result in unsafe acts or danger to the environment or violate approved work requirements. When unsafe or incorrect work is observed by WHC representatives during monitoring, surveillance, or audit of participant's work activities, the WHC representative has the authority and responsibility to stop work. Stop work actions shall be reported immediately to project management.

Before work can resume, the stop work action must be dispositioned. The disposition must identify the condition or occurrence that caused the work to be stopped, corrective action to be implemented, and actions taken to release the stop work. Verifications of the actions to release must be documented and approved, with concurrence from the respective QA manager.

Each participant shall have a procedure that defines and implements the requirements for stop work actions.

1.5 MANAGEMENT PROCESSES

Planning, scheduling, and resource considerations are described in a project management plan (PMP). The PMP defines the responsibility of the project management team, and includes QA input regarding the QA program.

2.0 QA PROGRAM

2.1 GENERAL

The SNF CSB QAPP, as defined herein, covers activities necessary for design, procurement, and construction. This project QAPP does not address plant operation. Specific requirements affecting plant operation are deferred until the appropriate time.

This QAPP will be revised to address revisions to QA requirements documents as directed by RL and reviewed at least annually to ensure continued compatibility to project policy and schedule.

2.2 QA PROGRAM

Westinghouse Hanford Company has an established QA program that is based on 10 CFR 830.120, "Quality Assurance Requirements." The WHC QA program for this project is derived from the applicable sections of 10 CFR 830.120 and 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste," using ASME NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities*, including the supplements as a guide. In response to the *Price-Anderson Amendments Act of 1988* and the QA Rule (10 CFR 830.120), WHC has issued WHC-SP-1131, *The Westinghouse Hanford Company Quality Assurance Program and Implementation Plan* (Moss 1995). That document serves as the basis for WHC implementation of 10 CFR 830.120 and is the foundation for extending implementation requirements to contractors and subcontractors.

Participants shall have a QA plan that addresses 10 CFR 830.120 and 10 CFR 72 requirements applicable to their assigned task and for work performed by others in support of those tasks. Other nationally recognized standards may be used as guidance in lieu of NQA-1 though no single standard fully meets all the requirements of 10 CFR 830.120 and 10 CFR 72.

This QAPP has not invoked QA requirements from the Office of Civilian Radioactive Waste Management.

2.3 REPORTING INDEPENDENCE OF PERSONNEL

The line organization is accountable for achieving quality, while the QA organization is accountable for ensuring that quality has been achieved. Because of this distinction in functional accountability between QA and the line organization, and because cost and/or schedule pressures may tempt the line organization to influence the QA organization to accept unsatisfactory work, the QA organization reports independent of the line organization. The requirements for QA reporting independence are described as follows.

- Identify deficiencies and quality problems.
- Initiate, recommend, or provide solutions to conditions adverse to quality.

- Verify implementation of solutions.
- Ensure that further processing or use is controlled until proper disposition of the problem is complete.

Participating organizations shall provide QA verification as called for in the design documents and this QAPP. The WHC Projects QA group provides overview surveillance, audit, and/or review.

2.4 PLANNING

Quality assurance programs shall include QA program planning to be integrated and coordinated among participating organizations. The integration and coordination effort is performed to provide consistency and completeness and to avoid duplication of effort.

Quality assurance organizations review implementing procedures to verify that quality requirements have been adequately defined and can be effectively implemented. Implementation of the QA program is verified by reviews, surveillance, audits, and assessments conducted in accordance with approved procedures using approved plans, checklists, or documents, and reported to appropriate management. Any deficiencies identified will be processed in accordance with the requirements of this QAPP, Sections 16.0 and 18.0.

Activities shall be planned so that activities affecting quality are accomplished under suitably controlled conditions.

Quality assurance program planning includes the integration and coordination of the individual participants' QA programs by WHC. The following elements shall be considered when planning QA programs:

- Definition of activities
- Selective application of appropriate QA program requirements and procedural controls to items and activities
- Assignment of responsibilities for QA program control and verification activities
- Identification of applicable technical and QA program management control and verification activities
- Provisions for the identification of required QA records.

2.5 GRADED QA

Quality assurance requirements are to be judiciously applied by a graded approach. The graded approach to QA is founded on the concept of judicious application of specific QA requirements to particular activities, items, components, systems, or structures in accordance with the importance of the activity item or structures. The SNF CSB QA program describes the QA

requirements that are active during the various phases of the project. In addition, the program provides for those active requirements to be applied selectively to achieve a graded approach. The methodology used to determine the QA requirements and procedural controls selected for specific activities is as follows.

- Identify items, components, systems, and structures that are candidates for procedural control by the QA program.
- Select the QA requirements (and their degree of application) that are appropriate for each candidate item, component, system, structure, and activity based on the following considerations:
 - Importance to safety, health, and environmental protection
 - Complexity
 - Reliability of process
 - Reproducibility of results
 - Uniqueness of product
 - Degree of functional product demonstration
 - Degree of standardization
 - Impact on cost and schedule to replace in the event of failure
 - Environmental impacts due to failure
 - Necessity of special controls or processes
 - Significance to any applicable licensing process.

2.6 QAPP MATRIX

A QAPP Matrix (see the Appendix) is a listing, in table format, of manuals that contain general procedures to be used by WHC. Note that use of each and every procedure identified is not required for the complete project; rather, the use shall be determined by the applicable cognizant engineer and the complexity of the activity involved.

The QAPP Matrix has been developed to demonstrate that each of the applicable requirements of 10 CFR 830.120 and 10 CFR 72 have been addressed by this QAPP. Participants shall develop a QAPP Matrix of implementing procedures or instructions covering the quality requirements applicable to their assigned tasks. The QAPP Matrix shall be controlled and updated annually, as required.

2.7 PERSONNEL SELECTION, INDOCTRINATION, TRAINING, AND QUALIFICATION

Project personnel who will perform activities affecting quality must be qualified and receive appropriate indoctrination and training. This training includes personnel who conduct inspections and testing activities to verify conformance of items to specified requirements for the purpose of acceptance and to demonstrate that items will perform satisfactorily in service. Indoctrination and training ensure that personnel achieve and maintain suitable proficiency. Indoctrination and training will be verified by audit or surveillance.

Documentation for training and qualification programs includes the objective, content of program, attendees, and date of attendance. Records of personnel qualification shall be maintained by the employer.

2.8 MANAGEMENT ASSESSMENT

A management assessment is an evaluation conducted by management of its own performance in implementing the integrated QA program. This evaluation is performed in a planned and controlled manner to provide management personnel with insight as to the effectiveness of the QA program; the adequacy of procedural control; the effectiveness of the Corrective Action System; and the adequacy of the project organization, resources, and training.

The need for management assessments of the SNF CSB QA program will be assessed at least annually. As a minimum, management assessments will be conducted every 2 years by management or by designees who are independent of the participant's QA organization.

Results of the assessment will be documented, and those deficiencies that are identified will be processed in accordance with the requirements of Section 16.0 of this QAPP.

2.9 QA PROCEDURES

Each participant's QA program addresses the QA/quality control activities that comprise policy, procedures, and instructions implemented by each participant. Quality assurance administrative procedures may be developed, implemented, and maintained by the QA organization within each participating company.

The QA program directs specific activities to control the quality of the work for which each participant is responsible. Technical procedures are developed, implemented, and maintained by those responsible for the specific activities assigned to a participant and delivered as a product (e.g., design, documents, development data, a facility, etc.).

2.10 PROJECT PROCEDURES

Unique project procedures addressing controls specific to the project staff may be required and, if so, are documented in project-specific procedures. Westinghouse Hanford Company develops, assigns implementation, and maintains these procedures which govern activities that are unique to the project.

3.0 DESIGN CONTROL

3.1 GENERAL

The design of the SNF CSB shall be defined, controlled, and verified. Applicable design inputs are specified on a timely basis and correctly translated into design documents. Design interfaces are identified and controlled. Design adequacy is verified by persons other than those who designed the item. Design changes, including field changes, are governed by control measures commensurate with those applied to the original design. Design information will be provided to RL as requested.

3.2 DESIGN INPUTS

Design inputs consist of applicable DOE Orders and Standards, functional and operational requirements for the SNF CSB, conceptual design criteria, national standards, specifications, and drawings. Changes to the design inputs shall be formally controlled by a change control process.

3.3 DESIGN PROCESS

The design process is carried out in accordance with A-E plans and procedures. Adequacy of the documents is ensured by A-E and WHC reviews. The applicable quality standards are specified as design input, and their adequate application verified through reviews. Changes that are made from the quality standards are reviewed and approved before affecting the change documentation. Control of the changes is accomplished through the change control system. The suitability of application of materials and components is ensured during A-E and WHC reviews. Information derived from experience, as set forth in reports or other documentation, is available to cognizant design personnel. The final design is related to design input to allow documentation of verification, and to ensure that it identifies the assemblies or components that are part of the design. Commercially available items should be used whenever practical. Commercial-grade items used in safety class systems (Safety Class 1), structures, components, or equipment require identification and additional documented inspection, testing, or verification to ensure they are suitable for their intended use. The design is sufficiently documented such that design verification can be accomplished by a technically qualified person without recourse to the originator.

3.4 CHANGE CONTROL

Change to final designs, changes resulting from disposition of nonconformance reports (NCR), and field changes shall be controlled and subject to verification measures commensurate with the original design. These change control measures also apply to nonconformance dispositions of "use-as-is" and "repair." These dispositions shall be approved by the A-E and are controlled through the review and approval process.

3.5 INTERFACE CONTROL

Design interfaces within the project will be limited. The A-E is responsible for performing and managing all direct project plant designs and reviews. Internal (interdisciplinary) controls are accomplished in accordance with A-E procedures. Designs provided by suppliers will be evaluated by the A-E during the submittal review process. This single point control provides assurance that interfaces are controlled within one organizational management system.

Transmittal of information across organizational interfaces is documented and controlled. Transmittals identify status of information, action required, or approval. Informal transmittal of design information is followed by controlled documentation.

3.6 DOCUMENTATION AND RECORDS

Design documentation and records, which provide evidence that the design and the verification process were accomplished in accordance with the requirements, are collected, maintained, and stored in accordance with A-E procedures. The A-E is responsible for maintaining control of QA records until the records are formally dispositioned and requested by WHC.

3.7 TECHNICAL REVIEWS

Technical reviews are performed when the information or document under review is within the state-of-the-art and is based on accepted standards, criteria, principles, and practices. These reviews are used when documents, activities, material, or data require technical evaluation for applicability, correctness, adequacy, completeness, and assurance that established requirements are satisfied. Such reviews are performed by individuals with sufficient technical knowledge of the area under review, and results shall be documented.

Technical reviews of major activities, such as seismic design reviews, are based on predetermined requirements, industry standards, or common scientific, engineering, and industry practice. Reviews are performed by a qualified, independent organization to ensure that the design approach complies with DOE Orders and applicable code requirements.

3.8 PEER REVIEWS

Peer reviews will be conducted for designs based on unproven assumptions or new technologies developed for the processes and products that have not been demonstrated as effective.

3.9 COMPUTER SOFTWARE CONTROL

Computer software shall comply with Section 19.0 of this QAPP.

4.0 PROCUREMENT DOCUMENT CONTROL

4.1 GENERAL

The provisions by which WHC QA will provide overview of participant procurement activities are discussed in this section. Each participant will have a procurement document control system.

4.2 PROCUREMENT DOCUMENT PROCESS

The project QA program controls the process of developing and using procurement documents to ensure that requirements for quality are formally communicated to vendors of items and services. The CM is given responsibility for management and administration of construction subcontracts. The applicable technical requirements will be included in the procurement documents. The CM reviews the procurement document to ensure that all appropriate requirements are addressed. The procurement document is then controlled so that subsequent changes to the document are subjected to the same level of review as the original. After review, the procurement document is approved and released to the vendors. Any changes to the procurement documents after release shall be approved in the same manner as the original design approval and procurement requirements.

Suppliers/subcontractors shall have QA programs consistent with the requirements contained in the procurement documents. Suppliers of materials shall meet the quality requirements of the specified codes.

4.3 DOCUMENT CONTENTS

Procurement documents contain the following requirements necessary to ensure quality of the procured items and services (as appropriate).

- A statement of work that details the scope of activities to be performed shall be included.
- Technical requirements shall include necessary references to specific drawings, specifications, codes, standards, regulations, procedures, or instructions, including revisions. Appropriate test, inspection, and acceptance requirements are provided for evaluation of the supplier's performance.
- The supplier is required to have a documented QA program that implements the applicable requirements for its activity. In addition, the supplier is required to invoke the appropriate requirements on any supplier that supports this project. When deemed appropriate, the supplier may work under the umbrella of the purchaser's QA program provided the scope of the activity is sufficiently addressed. When this condition exists, the procurement documents will specify which portion of the purchaser's QA program apply.

- Suppliers are required to provide access to their facilities and records for inspection/audits by the purchaser, WHC, and DOE.
- The contents shall include documentation of suppliers' submittal requirements to be submitted for information, review, or approval, and when they are to be submitted. Supplier retention time and disposition requirements shall be included for any quality records that must be retained.
- A system shall be established to identify, report, and control any nonconformance.
- Spares and replacement parts shall be identified, and necessary support documentation shall be included.

Procurement documents require that departure from specified requirements be documented and submitted to the procuring organization for evaluation and disposition.

4.4 PROCUREMENT DOCUMENT REVIEWS

Procurement documents are reviewed by technical personnel and QA to ensure that all applicable technical and QA program requirements are incorporated. These reviews are documented to provide objective evidence of satisfactory reviews before award of a contract, purchase order, or other work-authorizing document. Changes recommended as a result of bid evaluation or precontract negotiation are reviewed and approved in the same manner as the original procurement document and are incorporated before award. The review of changes includes criteria in Section 4.2, as well as any additional or modified design criteria, and analysis of exceptions by the vendor. Reviews are performed by personnel who have access to relevant information and who adequately understand the intent and requirements of the procurement document.

4.5 PROCUREMENT DOCUMENT CHANGE CONTROL

The project QA program provides for the control of procurement documents by procedures written specifically for procurement document control. The procedure identifies the responsibilities of individuals and addresses the controls applied through the various phases of the procurement document's life. A procurement document comes under control when it is initially released for review. Every change to the procurement document after initial release for review is subjected to the review and approval process commensurate with the original document. The performance of the review and approval process is documented for each change. These changes shall be reviewed by QA and technical personnel.

4.6 QA OVERVIEW OF PROCUREMENT/CONTRACT ACTIVITIES

Westinghouse Hanford Company will verify by surveillance, audits, and/or reviews that procurement document control processes are performed in accordance with approved procedures. Participants are responsible for appropriate procurement control of their subcontractors.

Westinghouse Hanford Company QA will perform periodic audits/surveillances of the participants involved in programmatic procurement activities to assess the following.

- A system has been initiated to establish procedures that delineate the preparation, review, approval, and control of the procurement documents.
- Procedures have been established for review of procurement documents to determine that QA requirements are identified where appropriate.
- Organizational responsibilities, including involvement of QA, are described for the following:
 - Procurement planning
 - Preparation, review, and approval
 - Bid evaluation
 - Review and acceptance of supplier QA program.

Westinghouse Hanford Company QA will perform surveillances or reviews of selected procurement documents to ensure the following.

- Procuring documents specify QA program requirements for contractors, subcontractors, and consultants commensurate with their scope of work.
- The procurement document specifies the right of access at each procurement stage.
- Technical requirements design bases, codes, standards, and regulatory specifications have been addressed.
- Procurement documents adequately address the appropriate documentation submittal for approval by the purchaser.
- Procurement document changes have been subject to the same review requirements as required of the originals.

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5.0 INSTRUCTIONS, PROCEDURES, AND DRAWINGS

5.1 GENERAL

The project activities affecting quality are prescribed by, and performed in accordance with, plans, procedures, drawings, and instructions. The need for instructions and procedures defining work performed in support of the project is identified and selected from existing procedures, or prepared, approved, and issued.

5.2 RESPONSIBILITIES

Participant activities that affect quality are prescribed by, and performed in accordance with, documented instructions, procedures, plans, or drawings. Controlled procedures delineate documents to be generated as a result of implementation, which are to be designated as QA records. These procedures and instructions contain quantitative and qualitative acceptance criteria, as appropriate. Westinghouse Hanford Company shall ensure that all organizations have sufficient procedures to properly implement their respective QA plans.

5.3 REVIEWS

Independent reviews of instructions, procedures, and drawings are performed to ensure technical adequacy, regulatory compliance, and inclusion of quality requirements, and to verify correct translation of design requirements. Preparation, issuance, and change of these documents are reviewed and controlled to ensure that correct and approved documents are being used in the workplace.

5.4 QA VERIFICATION

Verification that current issues of documents are available in the workplace will be made through periodic surveillance, audits, and/or reviews. Verification also shall consist of independent reviews to ensure documents are technically adequate and include the appropriate quality requirements.

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6.0 DOCUMENT CONTROL

6.1 GENERAL

The SNF CSB participants will develop and implement procedures that ensure the program documents affecting quality shall be prepared, revised, reviewed, approved, and issued in a prescribed and controlled manner.

6.2 DOCUMENT CONTROL SYSTEM

An integrated document control system for design and construction phases of the project is in place. This system provides a single focus (i.e., SNF CSB management) for document control practices for all participants. The document control system provides for the following activities:

- Document control
- Identification of documents to be controlled
- Identification of distribution for specific documents
- Identification of the assignment of responsibility for preparing, reviewing, approving, and issuing documents
- Review of documents for adequacy, completeness, and correctness before their approval and issuance
- Resolution of mandatory comments before approval and issuance of document
- Documentation and maintenance of review comments and resolutions
- Timely replacement of obsolete or superseded documents at work areas
- Consistent means for identifying the revision status of controlled documents
- Special approval and issuance requirements for minor changes to documents (i.e., editorial changes, which do not change how work is done or results of work), including who can approve the changes.

Participant documents, which specify quality requirements or prescribe activities affecting quality, shall be controlled. This control applies during preparation, distribution, and modification to ensure that correct documents are available for use when and where needed.

6.3 ISSUANCE, DISTRIBUTION, AND STORAGE

Document issuance and distribution will be controlled to ensure that correct, applicable, and current documents are available to the personnel performing work activities. Approval procedures delineate the responsibility and authority for releases.

Procedures for issuance and distribution address the following:

- Identification and marking of documents, including documents released before completion of the approval process
- Use of receipt acknowledgment document transmittal forms or equivalent system
- Maintenance of controlled document distribution lists
- Marking, removal, or destruction of obsolete or superseded controlled documents
- Maintenance of an index that provides the revision status for controlled documents.

Controlled document recipients are responsible for acknowledging document receipt; ensuring that the latest authorized documents are in use; and marking, destroying, or returning obsolete or superseded documents.

The WHC Projects QA group will ensure adequate control of documents by periodic review, surveillance, and/or audit of participants' document control practices.

6.4 REVIEW AND APPROVAL

Documents requiring control will be reviewed for adequacy and approved by authorized personnel for release and use. Each participant who prepares controlled documents will have a procedure that interfaces with the project document control system and establishes the measures for review and approval of documents. These measures include identification of responsibility for review and approval documents. Quality assurance personnel will review documents that prescribe quality-affecting activities to confirm that appropriate QA requirements are included. The organization that prepares the document will determine the appropriate level of review and approval for the document. Evidence of approval (i.e., signatures) is required on the controlled documents. Changes to documents that affect how the work is done or results of the work will require review and approval by the originating organization in the same manner as the original documents. Reviewing organizations will have access to background information or data upon which to base the review and/or approval.

6.5 DOCUMENT RETIREMENT, RECALL, OR TRANSFER

The QA program shall provide for the retirement, recall, or transfer of controlled documents. After a quality-affecting activity has been satisfactorily completed, the requirements document for the activity may be retired or canceled to reduce the quantity of documents that are tracked for control. Documents describing activities that are temporarily suspended may be recalled to prevent inadvertent accomplishment of activities. When individuals change job functions or leave the project, the controlled documents issued to them are retired if appropriate, or transferred to other individuals. In the case of document retirement, recall, or transfer, the project QA program requires sufficient notice in writing to be given to controlled copy holders, and records are maintained for the change in distribution status. Specific requirements for document retirements, recall, or transfer shall be addressed in procedures.

6.6 MAJOR AND MINOR CHANGES

The QA program shall provide for an expedited means to release changes or revisions to documents when those changes are minor in character. Minor changes that are editorial in nature (i.e., those that do not alter work results or affect how work is accomplished) are not required to have the same level of review and approval as major changes. The definition for major and minor changes shall be provided in the QA program, and authorized personnel are designated to determine whether changes are minor. The procedure that governs issuance of controlled documents also shall describe the measures implemented to release minor changes.

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7.0 CONTROL OF PURCHASED ITEMS AND SERVICES

7.1 GENERAL

This section describes the controls applied to the purchase of items and services that affect quality. Implementation of these controls ensures conformance with specified requirements. As appropriate, these controls provide for source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services upon delivery or completion.

7.2 RESPONSIBILITIES

The responsibility for procurement of items and services for plant construction and equipment/systems has been delegated to the CM.

7.3 CONTROL OF PURCHASED ITEMS AND SERVICES

Procurement activities are to be performed in accordance with documented procedures to ensure a systematic approach is used in procurement processes. Precautions shall be taken to ensure controls are in place to prevent inadvertent use of counterfeit parts and software.

7.3.1 Procurement Planning

The SNF CSB QA program requires that procurement activities be planned and documented at the earliest practical time to provide appropriate interfaces ensuring compatibility and uniformity to the procurement process. Planning shall include, as a minimum, what is to be accomplished, how it will be accomplished, who will accomplish it, and when it is to be accomplished. Procedures that control the procurement process address the following:

- Procurement documents and their preparation, review, and release
- Selection of procurement sources
- Bid evaluation and award
- Supplier performance evaluation
- Control of supplier-generated documents
- Inspections, source, and/or receiving
- Control of changes to procurement documents for items and services
- Material identification and control
- Acceptance of items and services

- Corrective action
- Quality assurance records.

7.3.2 Proposal Evaluation

The selection of suppliers is based on evaluation of their capability to provide items and services in accordance with the requirements of the procurement documents before contract award. These evaluations will be documented and include one or more of the following:

- The supplier's history on past contracts for providing identical or like items that perform satisfactorily in service; the supplier's history must also reflect current capability
- Assessment of the supplier's current quality records supported by documented qualitative and quantitative information that can be objectively evaluated
- Assessment of the supplier's technical and quality capabilities by direct evaluation of the facilities, personnel, and implementation of the QA program.

7.3.3 Proposal Evaluation

Proposal evaluations will be performed by individuals or organizations that have the necessary expertise to make decisions for technical considerations, QA requirements, personnel, and supplier past performance. Evaluation will include a determination of the extent of conformance to procurement documents. All contract negotiations will be complete and documented, including resolution of unacceptable quality conditions before award of contract. Proposal evaluation considers the following:

- Technical considerations
- QA requirements
- Supplier's personnel
- Supplier's production capability
- Supplier's past performance
- Supplier's QA program
- Alternates
- Exceptions.

7.3.4 Supplier Performance Evaluation

Evaluation of supplier's performance throughout the life of the contract is planned and documented. These verifications are initiated as early as practical to establish compliance to program requirements.

Evaluation methods include review of supplier's plans and procedures, source surveillance inspections, audits, receipt inspections, nonconformances,

dispositions, waivers, and corrective actions. This documentation will be used to determine the effectiveness of the supplier's QA program.

Evaluation activities include the following:

- Establishing an understanding of the provisions and specifications of the procurement documents
- Requiring the supplier to identify methods used to meet procurement document requirements
- Reviewing supplier documentation generated or processed during activities, fulfilling procurement requirements
- Providing necessary change information
- Controlling information exchange between the purchaser and the supplier
- Establishing the extent of source surveillance and inspection activities.

Procurement documents require the supplier to accomplish the requirements stated and to verify that requirements have been met. Verification conducted by the purchaser does not relieve the supplier of responsibility for verification of quality achievement.

The extent of verification activities, including planning, is a function of the relative importance, complexity, and quantity of the items or services procured. The supplier's quality performance also affects the extent of verification activities. The safety classification of an item is the major influence on the extent of verification activities. Qualified personnel who are assigned to check, inspect, audit, or witness the activities of suppliers will accomplish verification activities.

The performance of verification activities is recorded. Source surveillances and inspections, audits, receiving inspections, nonconformances, dispositions, waivers, and corrective actions are documented. This documentation is evaluated to determine the effectiveness of the supplier's QA program. The manner of documentation is described in procedures.

7.3.5 Control of Supplier-Generated Documents

Supplier-generated documents are controlled, handled, and approved in accordance with the methods established in the procurement document and the purchaser's program requirements. Document submittal requirements are delineated in the procurement specifications. The WHC QA audits these documents as necessary to provide assurance of procurement requirement compliance. Document verification provides for evaluation of technical, inspection, and test data against acceptance criteria.

Changes to procurement documents of procured items and services are communicated to suppliers in the procurement specifications. These changes are evaluated in the same manner and with the same criteria as the original documents.

7.3.6 Acceptance of Items and Services

Suppliers' QA programs will ensure that before offering the item or service for acceptance, the supplier will verify compliance with procurement requirements. When required by code, regulation, or contract requirement, documentary evidence that items conform to procurement documents is required to be available at the project before installation or use.

Four methods for acceptance have been established and can be used either individually or in combination as follows.

1. Evaluation of suppliers' certificates of conformance for services or items to ensure validity and authenticity of documentation and results. The following criteria must be met.
 - a. The certificate must identify the purchased material or equipment, such as by purchase order number.
 - b. The certificate must identify the specific procurement requirements met by the purchased material or equipment, such as codes, standards, and other specifications, in a manner that clearly establishes conformance to procurement requirements.
 - c. The certificate must identify any procurement requirements that have not been met along with an explanation and the means for resolving the nonconformances.
 - d. The certificate is signed or otherwise authenticated by a person who is responsible for the supplier's QA function as described in the purchaser's or supplier's QA program.
 - e. The certification system is described in the supplier's QA program. The supplier has procedures to prepare certificates of conformance and review and approve the certificates for submittal to the purchaser. The purchaser has procedures for review of submitted certificates of conformance.
 - f. A means to verify the validity of supplier certificates is provided by the purchaser. The effectiveness of the certification system is verified by audits or by independent inspections or tests of items. Verification is conducted at intervals commensurate with the supplier's past quality performance.
2. Source inspection/surveillance. Source inspection is performed at intervals consistent with the importance and complexity of the item or service. It is implemented to monitor, witness, or observe activities in process. Source verification also is implemented in

accordance with purchaser plans for performance of inspections, examinations, or tests at predetermined points. The procurement document provides the purchaser with the ability to perform verifications in the supplier's facility.

Upon purchaser acceptance of an item or service by source verification, documented evidence of acceptance of the item or service is furnished to the receiving destination, as well as to the purchaser and supplier.

3. Receiving inspection. Purchased items are inspected upon receipt to verify conformance to specified requirements. The extent of the receiving inspection is influenced by the demonstrated quality performance of the supplier and by the source verification and audit activities that have been previously performed for the procurement. Procedures for the conduct of receiving inspection are established to ensure that objective evidence is available to verify such features as proper configuration; identification; dimensional, physical, and other characteristics; freedom from shipping damage; and cleanliness. Receiving inspection is coordinated with review of supplier-generated documentation when procurement documents require such documentation to be furnished before receiving inspection. Detailed requirements for receiving inspection include inspection planning, inspection performance, and records of receiving inspection. Receipt inspection records identify characteristics inspected and objective evidence of the results, inspection criteria, identification of applicable drawings, specifications or procedures, and identification of material and test equipment used during the receipt.
4. Post-installation testing. When post-installation testing is used, requirements and acceptance documentation are mutually established by the purchaser and supplier. The requirements and acceptance documentation are specified in the procurement document.

In the case of procurement services, the purchaser may accept the service by any or all of the following methods:

- o Technical verification of data produced
- o Surveillance and/or audit of the activity
- o Review of objective evidence for conformance to the procurement document requirements, such as certifications and stress reports.

7.3.7 Control of Nonconformances

The SNF CSB QA Program requires that procedures be developed for the disposition of items and services that do not meet procurement requirements. The requirements are to be delineated in a procedure.

The procedure shall provide for the following:

- Evaluation of nonconforming items and services
- Submittal of nonconformances by supplier to purchaser as directed in procurement documents. These submittals are required to identify the supplier-recommended disposition and technical justification. Deviations from requirements of the procurement document or from purchaser-approved supplier documents are to be documented and submitted to the purchaser for approval of the recommended disposition for the following conditions:
 - Technical or material requirement violations
 - Violations of requirements in supplier documents
 - Nonconformances that cannot be corrected by original work process or by rework
 - Items that do not conform to the original requirement even though the item can be restored to a condition such that the capability of the item to function is unimpaired
- Purchaser disposition of supplier recommendations and corrective action
- Verification of disposition implementation
- Records maintenance of nonconformances.

8.0 IDENTIFICATION AND CONTROL OF ITEMS

8.1 GENERAL

This section describes the controls necessary to ensure that only correct and accepted items are used and installed. As appropriate, these controls provide the necessary identification on items or in documents to ensure traceability and that identification is established and maintained.

Participants and subcontractors/suppliers will be responsible for implementing appropriate portions of the SNF CSB system for identification and control of items.

8.2 IDENTIFICATION METHODS

8.2.1 Item Identification

Items of production (i.e., batch, lot, component, or part) are identified from the initial receipt and fabrication of the item through installation and use. This identification relates an item to an applicable design or other pertinent specifying document.

8.2.2 Physical Identification

Physical identification is used to the maximum extent. If physical identification is impractical or is insufficient, measures will be established to control the item by physical separation, procedural control, or other approved appropriate means.

8.2.3 Markings

Markings, when used, are applied using materials and methods that provide a clear and legible identification and will not affect the function or service life of the item. Markings are transferred to each part of the item before subdivision. Caution will be observed to prevent the obliteration by any surface treatment or coatings.

8.3 TRACEABILITY

The SNF CSB QA program provides identification and traceability control. Specific identification traceability requirements that originate from codes, standards, or other specifications are observed. Examples of such requirements include markings to indicate the following: (1) the heat, batch, lot, part, or serial number; (2) the specified inspection, test, or other records; and (3) the identification or traceability of the item to an applicable specification and/or grade of material.

8.4 LIMITED LIFE OR SHELF LIFE ITEMS

Items that have a limited calendar or operating life, cycles, or shelf life are controlled to preclude the use of such items after these dates have expired.

8.5 MAINTENANCE OF IDENTIFICATION

The SNF CSB QA program provides for the control of item identification during storage. These controls are consistent with the planned duration and conditions of storage. The controls include the following:

- Provisions for maintenance or replacement of markings and identification records damaged during handling or due to aging
- Protection of identification on items subject to excessive deterioration resulting from environmental exposure
- Provisions for updating existing plant records.

9.0 CONTROL OF PROCESS

9.1 GENERAL

This section describes the measures established to control special processes, and to ensure that they are accomplished by qualified personnel using written procedures qualified in accordance with applicable codes, standards, specifications, or other special requirements. Also described are those measures that ensure qualifications of special processes, personnel performing special processes, and equipment are kept current, and that the associated records are maintained.

9.2 PROCESS CONTROL

The term "process" is defined here as "a method of accomplishing a number of operations or steps that produce a result or product that conforms to an established specification."

Processes will be controlled by approved instructions, procedures, drawings, checklists, travelers, or other appropriate means. These means ensure that process parameters will be controlled, documented, and verified to provide a record of process compliance.

9.3 SPECIAL PROCESSES

Special processes require qualification of personnel, equipment, and/or procedures. Each special process will be performed in accordance with instructions or procedures that include or reference qualification requirements. The qualified procedures or instructions identify the information and conditions necessary to accomplish the process. These include proper equipment, controlled parameters, proper environmental conditions, calibration requirements, personnel qualifications, and acceptance criteria. In cases where existing codes and standards do not cover a special process, or where quality requirements specified for an item exceed those of existing codes or standards, the requirements for qualification of personnel, equipment, or procedures will be specified or referenced in the qualified procedures/instructions. The qualification and performance of special processes shall be controlled, documented, and verified to provide a record of process compliance. Each participant's QA personnel will monitor the development and implementation of special process qualification activities through inspections, reviews, audits, or surveillances, as appropriate to its work scope.

The process is designated as a special process when any of the following criteria are met:

- If the results of the process are highly dependent on precise control of the process
- If the results of the process are highly dependent on the skill of the operator

- If the specific quality for the end-product of the process cannot be readily determined by inspection or test.

The following special process activities are to be controlled:

- Nondestructive examination processes (radiographic testing, penetrant testing, magnetic particle testing, ultrasonic testing, and visual testing)
- Soil tests
- Concrete tests
- Welding
- Heat treating.

9.4 RESPONSIBILITY

It is the responsibility of the CM to include in its QA program documents a list of special processes that will be performed by it or for which it is responsible. Criteria will be established and documented for determining which processes are to be controlled as "special processes."

The CM is responsible for the following:

- Adherence to approved procedures and processes
- Compliance with specified requirements for qualification of personnel, procedures, and equipment
- Development of documentation in accordance with this QAPP and other applicable requirements
- Sample collection and analytical laboratory analysis, which are needed to ensure regulatory compliance.

9.5 RECORDS

Records relating to the qualification of special processes, qualification of personnel, and equipment, and to the performance of the process/special process are in accordance with Section 17.0 of this QAPP.

10.0 INSPECTION

10.1 GENERAL

This section describes the controls for inspections required of the SNF CSB to verify conformance of items or activities to specified requirements.

Construction inspections, control practices, characteristics to be inspected, and methods to be employed are described in the work procedures and inspection planning documents. Inspection activities and results are documented. The WHC Projects QA group is responsible for monitoring construction inspection activities by surveillance.

Title III inspection requirements will be identified and included commensurate with the appropriate time and project schedule.

10.2 PERSONNEL

Inspection of completed work is performed by persons other than those responsible for accomplishing or supervising the work being inspected.

Only qualified inspection personnel are used for inspection assignments. Activities performed by personnel unqualified and fully engaged in on-the-job training are verified by qualified inspectors.

10.3 HOLD POINTS

Mandatory inspection hold points beyond which work cannot proceed are specified in work procedures or in final inspection planning documents.

Hold points may be waived only with prior approval by the management of the organization imposing the hold point. Waiver approval will be recorded by the approval authority before work continues.

10.4 INSPECTION PLANNING

Inspection plans include provisions for hold points and descriptions of methods, characteristics, and acceptance criteria. Inspection results will be recorded by the inspection personnel.

Recognized approved sampling practices will be used to prepare sampling inspections for acceptance.

10.5 IN-PROCESS INSPECTION

In-process inspection of construction is used to the maximum extent possible and for monitoring activities where proper verification of product quality is required.

Monitoring of process methods, equipment, and personnel will be used when advantageous or direct inspection is impossible. Inspection and process monitoring are provided when control is inadequate without both.

When a combination of process control and inspection are used to verify quality, they are performed in a manner to ensure control of the process and quality of the item for the duration of the process.

Controls are established and documented to establish inspection points during the process or construction.

10.6 FINAL INSPECTIONS

Final inspections to accept work shall be accomplished in accordance with DOE Order 4700.1 (DOE 1987) and shall include a records review of inspection results and the resolution of nonconformances identified in previous inspections.

Final inspections provide documented conclusions regarding acceptability of the item to requirements, including completeness, markings, calibration, adjustments, protection, or other applicable characteristics.

Quality records are reviewed for adequacy and completeness if not previously examined.

Final acceptance is documented in inspection records and approved by authorized personnel. Modifications, repairs, or replacements accomplished after final inspection are reinspected or tested as required.

10.7 RECORDS

Records will identify, as a minimum, the following:

- Item inspected
- Date of inspection
- Identity of the inspector
- Type of observation
- Results or acceptability
- Reference to action taken for nonconformances
- Identification of inspection procedure.

11.0 TEST CONTROL

11.1 GENERAL

This section provides a description of the activities and controls for test control at the project. Test requirements and acceptance criteria for inclusion in the procurement and construction specifications are prepared by the A-E. These tests are executed to provide verification of conformance to requirements. Final detailed test plans and/or acceptance test procedures are prepared by the CM and vendors/subcontractors in accordance with the requirements of the procurement and construction specifications and vendor data.

Test plans and procedures identify characteristics to be tested and methods to be used. These detailed test plans and/or acceptance test procedures will be reviewed and approved by the A-E, CM, and/or WHC as defined in the design media.

All tests shall be conducted using approved procedures and/or detailed test plans, checklists, and trained personnel. Data collected as a result of these tests are reviewed and evaluated for acceptability.

11.2 TEST REQUIREMENTS

Test requirements and acceptance criteria are provided or approved by the organization responsible for the design or use, unless otherwise designated. Required tests, including applicable verification tests, hardware integration tests, and in-use tests, are planned, controlled, and documented. The items to be inspected, the characteristics to be inspected, and the inspection methods to be employed for each item shall be specified in written inspection plan documents. The characteristics to be tested are determined from the design of the item. The test methods selected for a specific item are appropriate to the characteristics to be inspected. Tests are executed in accordance with the plans, and results shall be documented. Testing for the purpose of accepting an item or service is performed by personnel other than those who performed or directly supervised the work being tested. Westinghouse Hanford Company and/or RL may elect to witness test activities.

11.3 TEST PROCEDURES

The CM will be responsible for planning and control of construction testing activities. Test planning provides for when a test is to be performed and identifies the mandatory hold points associated with the test. Test procedures include or reference test objectives and provisions for ensuring that prerequisites for the given test have been met, adequate instrumentation (precision and accuracy) is available and used, necessary monitoring is performed, and suitable environmental conditions are maintained.

Test procedure prerequisites include applicable requirements for calibrated instrumentation, proper equipment, trained personnel, condition of

equipment and items tested, suitable environmental conditions, and provisions for data collection.

Potential sources of uncertainty or error will be identified in test plans and procedures, including affected parameters, which are controlled. Precision and accuracy requirements shall be identified in test procedures.

11.4 TEST RESULTS

Test results shall be documented by responsible participants and evaluated to ensure that test requirements have been satisfied.

11.5 TEST RECORDS

The test records include items tested, date of test, tester or data recorder, results and acceptability, type of observation, action taken for deviations, and person(s) evaluating the results.

12.0 CONTROL OF M&TE

12.1 GENERAL

This section describes the activities and controls of M&TE for the project.

Each organization responsible for using M&TE shall use controlled procedures for calibration and control of that equipment. Any M&TE used for acceptance testing, verification, or data collection is subject to these controls. These controls provide for calibration and adjustment at specified intervals to maintain accuracy within necessary limits.

12.2 SELECTION

Selection of M&TE is controlled to ensure proper types, range, accuracy, and tolerance to determine conformance to requirements. The basis for selection of appropriate M&TE is the design documents. The design specifies the attributes to be measured for conformance, and the M&TE is selected to accomplish the measurements of those attributes.

12.3 CALIBRATION

Calibration shall be performed using certified equipment of known relationship to a national accepted standard or to a documented calibration basis. Calibration, adjustment, and maintenance of M&TE shall be conducted at prescribed intervals or before use to ensure proper range, accuracy, and tolerance. Calibration is not required for devices such as rulers, tapes, measures, levels, and other devices if normal commercial equipment provides adequate accuracy. Calibration is not required for a device used to measure or test if the results of the measurement or test are not used to accept or reject the item or test. Equipment is marked to indicate calibration status such as calibration due date or traceability to calibration records.

Calibration standards should have greater accuracy than the equipment or standards that are being calibrated. Calibration standards of the same accuracy may be used if they can be shown to be adequate for the requirements, and the basis for acceptance is documented and authorized by responsible management. Calibration standards are cited in calibration procedures; approval of these procedures by management constitutes acceptance of the standards.

12.4 CONTROL

The method and frequency of M&TE calibration shall be based on the equipment or instrument type, stability characteristics, required accuracy, intended use, or other applicable conditions.

For M&TE found to be out of calibration, an evaluation of the validity of previous inspections and test results is made and documented as well as the acceptability of any items inspected or tested using the suspect M&TE.

Equipment that is out of calibration is tagged, segregated, and not used until recalibrated. Any M&TE consistently found out of calibration is either repaired or replaced. A calibration is performed if the accuracy of the equipment is suspect.

The M&TE is handled and stored to provide protection and maintain accuracy.

12.5 RECORDS

Records of calibration and repair, including "as found" conditions, shall be maintained. Equipment is tagged to indicate calibration status and provide traceability to calibration records. The WHC Projects QA group will ensure adequacy of M&TE through periodic surveillance and overview.

13.0 HANDLING, STORAGE, AND SHIPPING

13.1 GENERAL

Procedures and instructions for handling, storage, cleaning, shipping, and preservation will be developed. The need for special equipment (such as containers, shock absorbers, and accelerometers) and special protective environments (such as inert atmosphere, moisture content, and temperature levels) is considered and specified in the preparation of documents, and their existence is verified.

13.2 INSTRUCTIONS/PROCEDURES

The CM, its suppliers, and subcontractors will establish work, shipping, inspection instructions, drawings, and specifications as necessary to prevent damage and preserve items used the SNF CSB.

The tasks associated with handling, marking, and labeling of items are conducted in accordance with approved procedures, instructions, drawings, specifications, or other documents applicable to the activities being performed.

13.3 TOOLS AND EQUIPMENT

Special handling and lifting equipment and tools are used and controlled, as specified in approved documents, to ensure safe and adequate handling. Tools and equipment are inspected and tested at specified intervals in accordance with procedures to verify that the tools and equipment are adequately maintained.

13.4 OPERATORS

Operators of special handling and lifting equipment will be qualified, trained, and experienced in the use of that equipment.

13.5 MARKING

Instructions for marking and labeling as required to adequately identify, maintain, preserve, and indicate the presence of special environments or controls are addressed in instructions and/or procedures.

13.6 QA/INSPECTION

Each participant will conduct surveillances and audits of its handling, storage, and shipping activities to verify compliance.

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14.0 INSPECTION, TEST, AND OPERATING STATUS

14.1 GENERAL

Status indicators are used to segregate accepted items from those that are nonconforming or awaiting inspection or test. The status of inspection and test activities is identified either on the items or in documents traceable to the items. This status-indicator process ensures that items not passing the required inspections or tests are not inadvertently installed, used, or operated. Status indicators, such as physical location, tags, markings, shop travelers, stamps, inspection records, or other suitable means are used and maintained. This section describes the controls that are applied in the use of status indicators for inspection, test, and operations through the use of tags and stamp markings. The sequence of activities to perform required inspections and tests of components, systems, and structures is governed by procedure, and proposed deviations are required to be documented, reviewed, and approved in the same manner as the document that describes the original sequence of inspection or test. These indicators provide the necessary assurance that required inspections and tests have been performed.

14.2 RESPONSIBILITIES AND INTERFACES

Responsibility for control of inspection, test, and operating status before construction turnover (i.e., during plant construction, procurement of plant equipment, and acceptance testing) has been delegated to the CM. The CM is responsible for the application and removal of status indicators for construction activities. Following construction turnover, the WHC SNF CSB Startup and Operations group has responsibility for statusing until plant operations begin, at which time WHC SNF CSB Operations will assume this responsibility.

14.3 VERIFICATION

The WHC Projects QA group will overview the project inspection, test, and operating status through surveillances and audits, as applicable.

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15.0 CONTROL OF NONCONFORMING ITEMS

15.1 GENERAL

This section describes the activities and controls for reporting nonconforming material, parts, components, or conditions at the project.

Nonconformance report procedures are used to promote consistency, timeliness of problem resolution, and processing of the necessary documentation. Items or practices that do not conform to specified requirements, or whose conformance is indeterminate, shall be documented on an NCR and controlled to prevent inadvertent installation or use. Controls for nonconformances are provided for notification of affected organizations; for identification of affected organizations; and for identification, documentation, evaluation, segregation (when practical), and disposition. Nonconformances shall be tracked to closure to ensure that approved dispositions are properly implemented. All personnel associated with the project are responsible for documenting instances of nonconformances and for seeking resolution.

15.2 IDENTIFICATION

Nonconforming materials, parts, or components shall be identified by marking, tagging, or other methods that do not adversely affect the item. Identification is required to be legible and recognizable. When identification of nonconforming items is impractical, the container, package, or segregated storage, as appropriate, shall be identified.

15.3 SEGREGATION

When practical, nonconforming items are segregated by placing them in an identified and designated holding area until disposition is complete.

When segregation is impractical or impossible because of size, weight, or access limitations, other precautions shall be employed to preclude use of a nonconforming item (i.e., status-indicating system, with tags securely affixed to the item and displayed in a readily accessible area).

15.4 DISPOSITION

Documentation is required to adequately identify and describe the nonconformance. Nonconforming characteristics are reviewed and dispositions of items are proposed and approved in accordance with approved procedures. These procedures specify the responsibility and authority for evaluation and disposition of nonconformances. Personnel who perform evaluations to approve dispositions are required to be competent in the specific area they are evaluating, have adequate understanding of the requirements, and have access to pertinent background information.

Control of further processing, delivery, installation, or use of a nonconforming item is effected pending resolution of the NCRs.

Dispositions such as "accept-as-is," "reject," or "rework" are identified and documented by signature of the person authorized to accept the disposition.

Technical justification for the acceptability of a nonconformance dispositioned "repair" or "accept-as-is" is documented. Nonconformances to design requirements dispositioned "accept-as-is" or "repair" are subject to design controls commensurate with those applied to the original design or subsequent design changes.

Repaired or reworked items are reexamined to original requirements unless new requirements are established.

The disposition of "reject" shall mean that the nonconforming item is scrapped and shall be replaced with a conforming item. Scrapped items/materials shall be controlled or destroyed to prevent inadvertent installation or use in the project.

"As-built" records, where applicable, are changed to reflect the accepted deviation including identification of the NCR, and identification of the records in the NCR.

Recommended dispositions may allow for conditional release of nonconforming items for further processing or assembly. Conditional release of NCRs will be used only for unusual circumstances and must not create a situation that will obstruct or hinder the resolution of the nonconforming condition. Examples of unusual circumstances include, but are not limited to, the following conditions: (1) unacceptable consequences because of excessive schedule delays, (2) results in high cost of equipment (related or unrelated to nonconforming items), and (3) physical interferences resulting if installed at a later time.

In addition, the following criteria will be met.

- Those responsible for approval of the NCR agree with the conditional release.
- The nonconforming characteristic is not rendered inaccessible for reinspection.
- Control of the nonconforming item and its documentation is maintained until final acceptance of nonconformance.

Actions taken to correct nonconformances are required to be verified and documented.

16.0 CORRECTIVE ACTION

16.1 GENERAL

Each participant will implement a corrective action system which shall identify conditions adverse to quality. These conditions shall be promptly identified, documented, and corrected as soon as practical.

The organization that detects an adverse condition is responsible for initiating action to document the condition. If the adverse condition involves an item or construction practice that is described by released design documents, an NCR is initiated and processed in accordance with approved procedures. If the adverse condition is discovered as a result of an audit or surveillance, an audit finding/observation or Inspection/Surveillance Report is initiated and processed. If the condition is significantly adverse to quality, a Corrective Action Request or Stop Work Order is initiated and processed.

The criteria for a significant condition adverse to quality are defined as a condition that imperils the uninterrupted progress of the project, which relates effectively to an imminent health or safety concern for personnel or the public, or a serious or repeated breach of requirements. In the case of a significant condition adverse to quality, the cause of the condition is determined and corrective action is taken to remedy the immediate problem and preclude recurrence. The identification, cause, and proposed corrective action for significant conditions adverse to quality are concurred with by WHC QA and reported to the highest levels of management. Followup action is taken by the QA personnel to verify satisfactory implementation of the approved corrective action within prescribed time limits for all types of adverse conditions.

16.2 TREND ANALYSIS

A trend analysis system and procedures will be developed and implemented to analyze quality information such as audit reports, surveillance reports, NCRs, Corrective Action Requests, and other deficiency documents for possible adverse quality trends. Westinghouse Hanford Company will summarize and maintain an overall project assessment and reporting of quality trends. Trend analysis will adhere to the following criteria.

- Be performed in a manner and at a frequency that provides for prompt identification of adverse quality trends.
- Be reported to affected organizations and participants' project management.
- Be performed by the QA organization.

16.3 CORRECTIVE ACTION CRITERIA

Criteria for determining the existence of significant conditions adverse to quality are included in the procedures developed by each participant. Procedures specify the QA organizations' responsibility to concur with proposed corrective action, verify corrective action implementation, and prescribe time limits for closeout of corrective action implementation.

16.4 TRACKING

A tracking system for all deficiencies is presented within the WHC system to ensure that the deficiencies are appropriately addressed, prioritized, trended, and closed.

16.5 REMEDIAL ACTION

Remedial action is documented and initiated after a deficiency is reported. The following actions shall be carried out by the responsible organization:

- Concurrence with the remedial action to ensure quality requirements are satisfied
- Followup to verify proper implementation of remedial action
- Closeout of the remedial action in a timely manner.

17.0 QA RECORDS

17.1 GENERAL

This section describes the activities and controls for control of records for the project.

The term "records," used throughout this section, is to be interpreted as QA records as defined in ASME NQA-1.

17.2 RECORDS SYSTEM

A records system, consistent with the schedule for accomplishing work activities, will be established. The records system, as defined and implemented, is enforced in accordance with written procedures and instructions.

Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Measures are established to ensure that records are legible, identifiable, traceable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record generation, transmittal, evaluation, distribution, retention, maintenance, and disposition are established and documented in procedures. Each participant organization is responsible for generating records that furnish documentary evidence of quality according to requirements appearing in work-authorizing documents. The description of controls for records only applies to QA records that have been completed. Documentary evidence of quality that is incomplete is not subject to the controls described.

17.3 RECORD ADMINISTRATION

The design specifications, procurement documents, test procedures, safety procedures, quality procedures, environmental procedures, contractor operating procedures, or other documents specify the records to be generated, supplied, or maintained by or for the owner.

Documents that become records are reviewed for legibility, accuracy, traceability, and completeness appropriate to the work accomplished.

17.4 RECORD VALIDATION

Documents are considered valid records only if stamped, initialed, or signed and dated by authorized personnel or otherwise authenticated. This authentication may take the form of a statement by the responsible individual or organization. Handwritten signatures are not required if the document is

clearly identified as a statement by the reporting individual or organization. Authentication or validation involves reviewing the document to ensure that the information appearing on the document is accurate and complete, and that the document will receive no more entries unless subjected to a formal change control process. Following validation, the initiator shall maintain control of the QA records until the records are formally dispositioned and transferred to or requested for retention. These records may be originals or legible reproductions.

17.5 INDEX

The records shall be indexed in accordance with an indexing system that includes record retention time and location of the record within the record system.

17.6 DISTRIBUTION

The procedures developed and used to process QA records shall specify the distribution, handling, and control appropriate for each record. Standard distribution lists are augmented by designation of specific personnel affected by the document.

17.7 IDENTIFICATION

Records and indexing systems provide sufficient information to permit identification between the record and the item or activity to which it applies.

17.8 CLASSIFICATION

Records are classified as "lifetime" or "nonpermanent" in accordance with the following criteria.

- Lifetime records are those that meet one or more of the following criteria:
 - Those which would be of significant value in demonstrating capability for safe operation/shutdown
 - Those which would be of significant value in maintaining, reworking, repairing, replacing, or modifying an item
 - Those which would be of significant value in determining the cause of an accident or malfunction of an item
 - Those which provide required baseline data for in-service inspections
 - Those which substantiate development or major decisions involving safety, health, the environment, etc.

- Those which provide evidence of conformance to codes standards, specifications, DOE Orders, and other mandatory requirements.
- ~ Lifetime records are required to be maintained by or for the plant owner for the life of the particular item while it is installed in the plant.
- ~ Nonpermanent records are those required to show evidence that an activity was performed in accordance with the applicable requirements but need not be retained for the life of the item because the records do not meet the criteria for lifetime records.

17.9 RETENTION OF RECORDS

Records shall be retained in accordance with the previously discussed classifications. The retention period for nonpermanent records is established in controlling procedures or in code requirements, as applicable.

17.10 CORRECTIVE INFORMATION IN RECORDS

Records shall be corrected in accordance with procedures that provide for appropriate review or approval by the originating organization or equivalent. The correction includes the date and identification of the person or organization authorized to make such corrections, and a single line drawn through the deleted text.

17.11 RECORD RECEIPT

Each organization responsible for receipt of records designates a person or organization responsible for receiving the records. The designee is responsible for organizing and implementing a system of receipt control of records for permanent and temporary storage.

Westinghouse Hanford Company provides protection from damage or loss during and after receipt. A system for receipt control is established to ensure adequate permanent and temporary storage. Incoming documents are logged, and their processing is tracked to permit a current and accurate assessment of the status of records during the receiving process.

As a minimum, a receipt control system shall include the following:

- A method for designating the required records
- A method for identifying records received
- Procedures for receipt and inspection of incoming records
- A method for submittal of completed records to the storage facility without unnecessary delay.

Each control system is structured to permit a current and accurate assessment of the status of records during the receiving process.

17.12 STORAGE, PRESERVATION, AND SAFEKEEPING

Records shall be stored in predetermined locations that meet the requirements of applicable standards, codes, and regulatory agencies. A written storage procedure shall be prepared and responsibility assigned for enforcing the requirements of the procedure. The procedure shall include the following, as a minimum:

- A description of the storage facility
- The filing system to be used
- A method for verifying that the received records are in agreement with the transmittal document and the records are legible and reproducible
- A method for verifying the records are those designated
- The rules governing access to and control of the files
- A method for maintaining control of, and accountability for, records removed from the storage facility
- A method for filling supplement information and disposing of superseded records.

To preclude deterioration of records, the following requirements apply.

- Provisions are made in the storage arrangement to prevent damage from moisture, temperature, and pressure.
- Records are firmly attached in binders, or placed in folders/envelopes, for storage in steel file cabinets, or in containers on shelving.
- Provisions are made for special processed records (such as radiographs, photographs, negatives, microfilm, and magnetic media) to prevent damage from excessive lights, stacking, electromagnetic fields, temperature, and humidity.

Measures have been established to preclude the entry of unauthorized personnel into the storage area. These measures guard against larceny and vandalism. Measures also have been taken to provide for replacement, restoration, or substitution of lost or damaged records.

Records shall be stored in facilities maintained in a manner that minimizes the risk of damage or destruction from the following:

- Natural disasters such as winds, floods, or fires

- ~ Environmental conditions such as high and low temperatures and humidity
- ~ Infestation of insects, mold, or rodents.

Storage methods shall provide retrieval of information in accordance with planned retrieval times based on the record type. A list is maintained that designates personnel with access to the files.

Records maintained by a supplier at the supplier's facility or other location shall be accessible by project personnel. Records accumulated at various locations before transfer shall be accessible to the project directly or through the procuring organization.

Suppliers' nonpermanent records are disposed of only after the applicable following conditions are satisfied.

- ~ A Code Data Report is signed or a Code Symbol Stamp is affixed for items released for shipment.
- ~ Regulatory requirements are satisfied.
- ~ Operational status permits are satisfied.
- ~ Warranty considerations are satisfied.
- ~ Purchase requirements are satisfied.

Each participant will develop a quality records program appropriate for its scope of work.

The WHC Document Processing Center uses 1-hour, fire-rated, Underwriters Laboratory-approved containers for storage of records during processing. Procedures specify the maximum allowable period before records can be turned over to the RL Records Holding Area.

17.13 INTERFACES

Each participant is responsible for implementing portions of the WHC QA Records System as it applies to the participant's work assignment. Specific responsibilities for identifying, preparing, validating, authenticating, logging, indexing, reviewing, classifying, correcting, safekeeping, storing, protecting, transmitting, distributing, retaining, dispositioning, and tracking when not in storage shall be described in controlled procedures. Westinghouse Hanford Company, with the assistance of the CM, coordinates activity between organizations to effect consistent processing of QA records.

Westinghouse Hanford Company is responsible for the final identification, logging, indexing, review, classification, safekeeping, storage, protection, transmittal, distribution, retention, retrieval maintenance, and tracking of QA records.

Quality assurance records will be generated by all participants and their subcontractors/suppliers. Personnel in each organization that generates records will prepare, validate, authenticate, and correct the records. Records generated by the project subcontract/suppliers are transmitted to WHC through the responsible participant. Other generated records shall be transmitted directly to WHC. Submittal of records is made by formal transmittal.

Westinghouse Hanford Company processes records according to written procedure(s) that address each of the responsibilities previously identified. In addition, the procedure(s) require incoming records to be reviewed for legibility and traceability to the item or work to which the record applies.

Disposition of non-lifetime records shall be in accordance with applicable orders, regulations, contract requirements, and participants' organizational policies and procedures.

18.0 INDEPENDENT ASSESSMENTS

18.1 GENERAL

Westinghouse Hanford Company shall establish requirements for independent assessments to provide independent verification of status, compliance, and implementation effectiveness of this QA program and its elements. This section describes provisions for implementing independent assessments.

18.2 AUDITS

Planned and scheduled audits are performed to verify compliance with selected aspects of the QA program and to determine its effectiveness. These audits are performed in accordance with written procedures or checklists by personnel who have no direct responsibility for performing the activities being audited. Audit results shall be documented, reported to, and reviewed by responsible management. Followup action shall be taken where indicated.

18.3 AUDIT PROCESS

Procedures for audit activities shall address the accomplishment of the planning and scheduling of audit activities to ensure that program-deliverable products and processes are evaluated commensurate with importance to achieving mission objectives or scheduled completion dates assigned to the products or processes. Audits of participating contractors' quality program are performed once each year (not to exceed 12 months during design and construction).

18.4 AUDIT SCHEDULING

The WHC Projects QA group develops, maintains, and implements an audit schedule that covers applicable program elements. Audit/overview shall begin early in the life of the project and continue at intervals consistent with the schedule for accomplishing the activities. Participants shall conduct audits/overviews of their suppliers.

Project supplier QA programs are evaluated for audit annually. Supplier audits are performed on a triennial basis, unless an annual evaluation indicates the need for an audit before the end of the triennial period. The need to audit a supplier also is evaluated when major changes in contract scope or work methodology occur. Pre-award surveys may serve as the first audit if the scope and conduct of the pre-award survey addresses contract requirements.

The annual evaluation is documented and addresses review of supplier-provided documents and records; result of previous source verifications, surveillances, audits, management assessments, and receiving inspections; operating experience with identical or similar products from the supplier; and results of audits from other sources.

Westinghouse Hanford Company audits implementation of participants' QA programs at least annually. Audit schedules are prepared annually and adjusted in the event of significant changes in personnel, organization, or QA program.

18.5 AUDIT TEAMS

Audit team leaders are selected before the start of each audit and they are required to be certified lead auditors. Qualifications of lead auditors comply with the requirements of ASME NQA-1, Supplement 2S-3 and Appendix 2A-3. The lead auditor is responsible for organizing and directing the audit, coordinating the preparation and issuance of the report, evaluating the responses, and ensuring that the audit team is prepared before the audit.

Members of the audit team shall be independent with respect to activities they audit (i.e., audit team members do not audit an activity for which they were directly responsible). Management personnel of audited activities are prohibited from participating in the selection of the audit team members who will audit their activities.

Collectively, audit team members will have the necessary programmatic and technical expertise in the work being audited by virtue of education and/or experience and/or specific, documented orientation or training.

Integrated audit teams may include members from appropriate technical and other disciplines who will verify adequacy of the technical processes employed to ensure correctness of technical work and regulatory compliance.

The WHC auditor training and qualification programs are administered by the Audit Program Administration section. Participants' programs will be endorsed by WHC through audits and surveillances. Lead auditors will be certified under the appropriate QA program. Auditor and lead auditor formal training is provided by the RL-sponsored Quality Training Resources Center.

18.6 AUDIT PREPARATION

As a minimum, preparation for individual audits includes the following: preparation of an audit plan and an audit checklist or procedure; study of the procedures applicable to the activities to be audited; evaluation of relevant surveillance results; results of previous audits of the same activities; relevant corrective action history; review of trend data; and review of current status of work.

The audit plan identifies the scope, requirements, audit personnel, activities to be audited, organizations to be notified, applicable documents, schedule, and written procedures or checklists.

The scope of each audit is based on an evaluation of the activities to be audited. The evaluation considers the following:

- Results of previous internal audits

- Results of previous external audits
- Impact of significant changes in personnel, organization, or QA program.

The scope of an audit may include verification of product quality and technical adequacy of the work being done as well as programmatic compliance and implementation effectiveness. If personnel with appropriate technical knowledge are assigned as audit team members, they shall evaluate technical aspects of the processes and acceptability of the quality of the products resulting from the process. Technical requirements are selected from governing technical requirements documents for audit verification and are included in audit checklists.

18.7 AUDIT PERFORMANCE

Audit team members perform document reviews, interviews, and other activities described in the audit checklist or procedure under the direction of the audit team leader. Objective evidence is examined as necessary to determine if the checklist items are being implemented effectively. Audit team members regularly communicate the status of assigned activities, as well as problems and potential problems, to the audit team leader. The audit team leader ensures problems that require immediate attention are relayed to the audited organization's representatives in a timely manner. Regular discussions with the audited organization's representatives are held to communicate the status of the audit activities and promote effective communication between the auditor and the auditee. Management of the audited organization is actively drawn into the audit process. Audit performance includes documentation of the evidence examined and conditions observed so that a sound basis exists for the reported conclusions.

Results of the audit are presented to the audited organization's representatives by the audit team leader (and team members) in a post-audit conference to complete the audit performance phase.

The audit team assesses the adequacy and effectiveness of the program and reports the results to responsible management for appropriate action.

18.8 AUDIT REPORTING

The audit report contains the following information, as appropriate:

- A description of the audit scope
- Identification of audit team members
- Identification of personnel contacted during the audit
- A summary of the audit results, including a statement describing the effectiveness of the quality elements audited

- A clear description of each Audit Finding that will allow the audited organization to understand the finding and take corrective action.

The audit report will be signed by the audit team leader and approved by the QA manager of the organization leading the audit before transmittal and distribution. The audit is issued to the audited organization for review, assessment, and appropriate action. Copies of the audit report also are distributed to other affected organizations as well as to upper management of the audited organization.

Audit findings require responses from the affected organization, including specified action dates.

18.9 POST-REPORT ACTION

Management of the affected organization investigates audit findings and determines the root cause(s), schedules corrective actions, and notifies the auditing organization of corrective actions planned or taken. In most cases, the affected organization will examine other areas of similar activity for related deficiencies. Past work shall be evaluated to determine if remedial corrections are required. Audit findings will be tracked to ensure that actions are taken to address, prioritize, and close each finding.

Management of the auditing organization shall evaluate the responses to determine the following:

- Adequacy of cause determinations
- Acceptability of commitments for correcting the deficient (and similar) conditions (past and present)
- Acceptability of committed actions to preclude recurrence of the deficient conditions and of the schedule for completing such actions
- Adequacy of the impact evaluation of the deficient work performed and the generic implications to the program
- Appropriateness of corrective action responsibility assignments.

Followup action shall be performed by the auditing organization to verify satisfactory implementation of corrective and preventive actions taken to resolve audit findings. Verification of corrective and preventive action implementation shall be documented to support closeout of findings.

18.10 AUDIT RECORDS

Audit records include audit plans, audit reports, written replies, and the record of completion of corrective action.

18.11 SURVEILLANCE

Surveillance of work in progress is a means to verify correct performance of quality-affecting activities or correct use of items and informational inputs. The term "surveillance" pertains to the oversight activity performed by an oversight group, such as QA, while the term "technical surveillance" refers to the monitoring performed by WHC SNF CSB Project Engineering on released design media to verify that the design output addresses the design input. Other verifications, such as audits, inspections, and reviews, are discussed elsewhere in this QAPP. The remainder of this section is devoted to describing the requirements that pertain to surveillance performance by oversight groups.

Surveillance activities affecting quality are planned, performed, documented, and reported to the management of the organization responsible for the performance of the activity under surveillance. Surveillances are conducted to accomplish the following objectives.

- Verify the quality of work in progress.
- Identify and document actual potential deficiencies and deviations and promote prompt corrective action by cognizant management responsible for performing the work.
- Verify timely implementation of corrective action associated with surveillances.
- Identify and document quality practices resulting in consistently superior results.

Personnel selected to perform surveillances are required to be knowledgeable of the surveillance topic and independent of direct responsibility for performance of the activity to be surveilled. All surveilled activities shall be accomplished in accordance with prescribed procedures. Surveillance personnel shall be qualified and trained for their assignments. Surveillance results shall be documented in a report that includes the following, at a minimum:

- A discrete surveillance tracking number
- Date of the surveillance
- Description of the activity or item under surveillance
- Persons conducting the surveillance
- Persons contacted during the surveillance
- Requirements for the item or activity upon which the surveillance is based
- Results of the surveillance
- Deficiencies identified during the surveillance

- Identification of M&TE used to perform the surveillance
- Summary of actions taken during the surveillance to correct deficiencies immediately.

Deficiencies noted during the surveillances are tracked to ensure timely completion of corrective action and closure. Data relating to deficiencies are input into a quality tracking and trending system to aid in identifying recurrent or common problems.

The WHC Projects QA group is responsible for overview of project activities through the surveillance process. The results of these surveillances will be documented and reported to the respective organization and to project management. Any deficiencies noted will be corrected by the responsible organization and the deficiency tracked to verify the adequacy of the corrective action.

19.0 COMPUTER SOFTWARE

19.1 GENERAL

The SNF CSB participants developing or using computer software programs that affect the project activities will have approved procedures defining how work will be performed to comply with the requirements as indicated in this section of this QAPP.

19.2 REQUIREMENTS

Affected organizations that use or develop computer software in support of this project shall have in place a program that implements software quality assurance (SQA) requirements appropriate for their scope of work. Their SQA program shall be prescribed and shall identify applicable internal policies and procedures as well as additional program elements necessary to comprise the SQA program. Precautions shall be taken to ensure controls are in place to prevent inadvertent use of counterfeit software.

19.3 SQA

Participants using or developing computer software shall describe their computer software development, test, and configuration management system.

The description shall, as a minimum, contain the following.

- Indicate the methods used to develop computer program requirements, to translate those requirements into a detailed design, and to implement that design in executable code.
- Identify the types of documentation to be prepared, reviewed, and maintained during computer software requirements analysis, design, code implementation, test, and use.
- Describe the methods for managing interfaces involving computer software documentation.
- Identify the methodology for establishing computer software and documentation baselines and baseline changes and tracking changes throughout the life of the computer software.
- Specify the process used for verification of computer software and validation of models developed or applied to analyses.
- Identify the procedures for reporting and documenting computer software discrepancies (including sources), evaluating impacts of discrepancies on previous calculations, and determining appropriate corrective action.

19.4 SOFTWARE DEVELOPMENT

The development activities of applicable software shall be identified and documented to ensure that the project proceeds in an orderly and traceable manner. Sufficient information shall be provided to clearly indicate necessary tasks, the deliverables and baselines of each project life-cycle phase, required reviews, milestones, and responsibilities associated with each task.

19.4.1 Software Project Management Plan

Each development or application effort at the start of the computer software life cycle shall identify the following:

- Computer software products to which it applies
- Organizations responsible for computer software quality and their tasks and responsibilities
- Required documentation
- Required computer software and documentation reviews
- Standards, conventions, techniques, or methodologies that guide software development.

The typical software life-cycle phases to be used for development are as follows:

- Concept Exploration Phase--Includes the initial feasibility study and the statement of need associated with the project. The overall system requirements are determined during this phase.
- Requirements Phase--The period in the software life cycle during which the software development is planned and the requirements for a software product, such as the functional and performance capabilities, are defined and documented. This phase results in the issuance of the software requirements specification planning for software development, software configuration control, and software testing. The software requirements review evaluates and documents the completion of items produced during this phase. The satisfactory completion of the software requirements review shall be identified as the primary project milestone for this phase.
- Design Phase--A period in the software life cycle during which the designs for architecture, software components, interfaces, and data are created, documented, and verified to satisfy requirements. During the design phase, the software design description and test case specifications are produced. The software design review evaluates and documents the completion of the item produced during this phase. The satisfactory completion of the software design review shall be identified.

- o Implementation Phase--The period in the software life cycle during which a software product is created from design documentation and debugged. During this phase, the code listings, user documentation, and test procedure specifications are produced. The modules are tested and consolidated in preparation for formal testing. The test readiness review determines the completion of all development activities up to the formal testing of the completed software. The test readiness review shall be identified in a plan as the primary project milestone indicating the completion of this phase and indicating the software is ready for formal testing.
- o Test Phase--A period in the software life cycle during which the software product is evaluated to determine whether requirements have been satisfied. During this phase, the tests are performed and monitored and the results are recorded and reviewed for acceptance. The milestone indicating the completion of the test phase shall be the successful completion of the verification and validation review.
- o Installation and Checkout Phase--The period in the software life cycle during which a software product is integrated into its operational environment and tested in this environment to ensure that it performs as required. The milestone indicating the completion of this phase is the successful performance of the software development documentation review.
- o Operation and Maintenance Phase--The period in the software life cycle during which a software product is employed in its operational environment, monitored for satisfactory performance, and modified as necessary to correct problems or to respond to changing requirements. The software items shall be controlled during the operation and maintenance phase according to formally documented plans and procedures.
- o Retirement Phase--The period in the software life cycle during which support for a software product is terminated. During this phase, the records and media archival requirements shall be specified and carried out according to those requirements.

19.5 COMPUTER SOFTWARE VERIFICATION AND VALIDATION

Verification of computer software and model validation shall be planned and performed before the use of such computer software to perform technical calculations.

The responsible participant develops verification and validation plans that employ methods such as inspection, analysis, demonstration, and test to ensure that the software adequately and correctly performs all intended functions. These plans also ensure that the software does not perform any function that, either by itself or in combination with other functions, can degrade the entire system.

19.6 VERIFICATION

Verification activities shall be integrated into the software life cycle and verification performed to ensure software requirements are correctly specified and adequately implemented in the design and that the design is correctly implemented in code.

19.7 CONFIGURATION MANAGEMENT

A computer software configuration management system shall be established to ensure positive identification of computer software and control of software baselines and changes. This system includes the following:

- Configuration identification
 - Uniquely identifies each configuration item or version including identification of software version in the output, when feasible
 - Identifies changes to configuration items by revision
 - Places the configuration item in a relationship with other configuration items
 - Directly relates each code version with its associated documentation.
- Configuration change control
 - This documentation contains a description of the change(s) as follows:
 - The identification of originating organization
 - The rationale for the change
 - The identification of the affected baselines and computer software configuration items
 - Evidence of evaluation, coordination, and approval.

Changes to computer software shall be subject to the same level of approval, verification, and validation as original computer software.

19.8 QUALIFICATION OF EXISTING SOFTWARE

Existing software can be accepted for use if the following conditions are met.

- Software is verified and validated in accordance with Section 19.5.
- A computer software baseline is established before its use.

19.9 DOCUMENTATION

Life-cycle documentation of software includes, as a minimum, the following:

- Software requirements specification
- Software design description
- Verification and model validation documentation
- User documentation
- Description of mathematical models and numerical methods
- Code assessment and support (verification and validation records)
- Continuing documentation and code listings (problem reports and change notifications).

19.10 DISCREPANCY REPORTING AND CORRECTIVE ACTION

A formal computer software discrepancy reporting and corrective action system shall be established. The reporting system will be integrated with the configuration management system to provide current correct information to software developers and users. Discrepancy reporting and corrective action systems will ensure, as a minimum, the following.

- Defects are documented and corrected.
- Defects are assessed for criticality and impact on previous applications.
- Corrections are reviewed and approved before changes to the software configuration are made.
- Preventive actions provide for appropriate notification of affected organizations.
- Deficiencies are analyzed for impacts on previous work.
- Deficiencies are documented and controlled in accordance with Section 16.0 of this QAPP.

19.11 MEDIA CONTROL AND PHYSICAL SECURITY

Procedures that specify measures to physically protect media containing the images of computer software and preventing inadvertent damage or degradation shall be prepared.

Special software developed by the participants shall be properly protected such that any required change is incorporated by authorized personnel only. The program output should be a "read only" file.

19.12 ACQUIRED COMPUTER SOFTWARE

Participants' procedures shall control the transfer of computer software, as applicable.

19.13 COMPUTER SOFTWARE APPLICATION

Technical calculations using computer software shall be performed with computer codes and software operating procedures defined sufficiently to allow independent repetition of entire computation. Model validation is performed for specific application of software.

Procedures shall provide for the following:

- Controlling application of verified software and/or validated models to technical calculations
- Determining which technical calculations are subject to controls
- Documenting and reviewing software applications and analyses
- Ensuring that results are accurate and reproducible
- Identifying or marking record copies of analyses and supporting documentation
- Generating and documenting software used to perform technical calculations
- Conducting independent review and approval to ensure that software is applicable to the problem being solved and that input and assumptions are valid and traceable.

Software application outputs shall be traceable to the software and hardware configuration status used to produce those outputs. Output documents, including designs, reports, spreadsheets, charts, etc., shall be traceable to the software and its revision identification, the hardware configuration, date, user identification, and input data source, as a minimum. This information shall be maintained in logs or by other methods of traceability for each application run that is used to support a formally released output (e.g., design, design analysis, environmental report, etc.).

20.0 REFERENCES

- 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste," *Code of Federal Regulations*, as amended.
- 10 CFR 830.120, "Quality Assurance Requirements," *Code of Federal Regulations*, as amended.
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- WHC-CM-3-5, *Document Control and Records Management Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-2, *Quality Assurance Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-3, *Industrial Safety Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-5, *Quality Assurance Qualifications and Instructions*, Westinghouse Hanford Company, Richland, Washington.
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- WHC-CM-6-2, *Project Management*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-6-10, *Welding Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-7-5, *Environmental Compliance*, Westinghouse Hanford Company, Richland, Washington.

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22.0 GLOSSARY

ABBREVIATIONS AND ACRONYMS

A-E	Architect-Engineer
CM	Construction Manager
CSB	Canister Storage Building
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy-Headquarters
ICF KH	ICF Kaiser Hanford Company
M&TE	measuring and test equipment
NCR	Nonconformance Report
participant	project participant (WHC, A-E, CM, or subcontractors)
QA	quality assurance
QAPP	Quality Assurance Program Plan
RL	U.S. Department of Energy, Richland Operations Office
SNF	Spent Nuclear Fuels
SQA	software quality assurance
TBD	to be determined
WHC	Westinghouse Hanford Company

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APPENDIX

QUALITY ASSURANCE PROGRAM PLAN MATRIX FOR THE
SPENT NUCLEAR FUELS CANISTER STORAGE BUILDING PROJECT

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10 CFR 830.120 criteria/title	10 CFR 72 criteria	SNF CSB QAPP Section	WHC implementing manuals
1. Program	72.142 72.144	1.0 2.0	CM-1-3 CM-4-46 CM-1-5 CM-6-2 CM-4-2
2. Training and Qualification	72.144	2.0 9.0	CM-4-2 CM-6-2 CM-4-39 CM-6-12
3. Quality Improvement	72.170 72.172	7.0 15.0 16.0 18.0 19.0	CM-1-3 CM-1-4 CM-4-2 CM-6-3
4. Documents and Records	72.152 72.174	3.0 4.0 5.0 6.0 17.0	CM-3-5 CM-4-2 CM-6-2 CM-7-5
5. Work Processes	72.150 72.156 72.158 72.166 72.168	2.0 13.0 5.0 19.0 8.0 9.0 12.0	CM-1-3 CM-4-2 CM-6-1 CM-6-2
6. Design	72.146	4.0 19.0	CM-1-3 CM-4-46 CM-4-2 CM-6-1
7. Procurement	72.148 72.154	4.0 7.0	CM-1-3 CM-4-2 CM-2-1 CM-6-1 CM-2-2 CM-6-2
8. Inspection of Acceptance Testing	72.160 72.162 72.164	10.0 11.0 14.0 19.0	CM-1-3 CM-4-2 CM-6-2
9. Management Assessment	72.144	2.0 16.0	CM-4-2
10. Independent Assessments	72.176	18.0	CM-4-2

CSB = Canister Storage Building
QAPP = Quality assurance program plan
SNF = Spent nuclear fuel
WHC = Westinghouse Hanford Company

A1.0 REFERENCES

- 10 CFR 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High Level Radioactive Waste," *Code of Federal Regulations*, as amended.
- 10 CFR 830.120, "Quality Assurance Requirements," *Code of Federal Regulations*, as amended.
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WHC-SD-W379-QAPP-001
Revision 0

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