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2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Operations & Transition Facilities Projects	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: 03-F-031	6. Cog. Engr.: DR Shank	7. Purchase Order No.: N/A
8. Originator Remarks: Approve and release the attached Project Quality Assurance Plan for Project F-031.		9. Equip./Component No.: N/A
11. Receiver Remarks:		10. System/Bldg./Facility: FFTF 491-W, 4717, 403
		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date:

15. DATA TRANSMITTED									
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition	
1	WHC-SD-F031-QAPP-001	-	0	Project Quality Assurance Plan, Sodium Storage Facility, Project F-031	SQD	1,2			

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Receipt	2. Approved w/comment	5. Reviewed w/comment
		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

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**Document Number:** WHC-SD-F031-QAPP-001, REV 0

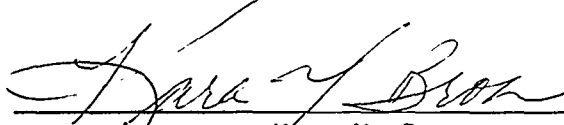
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1. Total Pages 17

2. Title

**Project Quality Assurance Plan, Sodium Storage Facility, Project F-031**

3. Number

**WHC-SD-F031-QAPP-001**

4. Rev No.

**0**

5. Key Words

Project Quality Assurance Plan  
Sodium Storage Facility  
QAPP  
SSF  
FFTF

**APPROVED FOR  
PUBLIC RELEASE**

*KMB 12/29/94*

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Organization/Charge Code 7F160/B194P

7. Abstract

The Sodium Storage Facility Project Quality Assurance Plan delineates the quality assurance requirements for construction of a new facility, modifications to the sodium storage tanks, and tie-ins to the FFTF Plant.

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PROJECT QUALITY ASSURANCE PLAN

SODIUM STORAGE FACILITY  
PROJECT F-031

Issued by:

WESTINGHOUSE HANFORD COMPANY

NOVEMBER 1994

for the

U.S. DEPARTMENT OF ENERGY  
RICHLAND OPERATIONS OFFICE  
RICHLAND, WASHINGTON

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## 1.0 SCOPE

- 1.1 This Quality Assurance Plan (QAP) identifies the Westinghouse Hanford Co. (WHC) Quality Assurance (QA) program requirements for all contractors involved in the planning and execution of the design, procurement, construction, testing and inspection of the Sodium Storage Facility, Project F-031. This plan provides direction for the types of verifications necessary to satisfy the functional requirements within the project scope and applicable regulatory requirements determined in the Project Functional Design Criteria (FDC), WHC-SD-FF-FDC-009.
- 1.2 The extent of this project Quality Assurance Plan will be for activities including the Sodium Storage structure, piping, HVAC, electrical, fire protection, transfer piping to/from FFTF, and the installation and tie-in of Sodium Storage tanks in the new facility. All modifications to the tanks will be completed by the Construction Contractor (CC) under the control of the Operating Contractor. Procurement of other components to be identified as Government Furnished Equipment will not be a part of this QAP.

## 2.0 RESPONSIBILITIES

- 2.1 The Department of Energy (DOE) has the responsibility to determine the requirements for assuring quality, and the contractors are responsible for installing and implementing Quality Assurance (QA) in accordance with their contractual requirements, as stated in DOE 4700.1, Section III, Part D.
- 2.2 The Operating Contractor (OC) is responsible for the overview of all quality related documentation for the project design, procurement, fabrication, and construction. This overview is to ensure conformance with the requirements of the Functional Design Criteria and based upon the OC approved procedures.
- 2.3 The responsibility for the project design, procurement, fabrication, construction, and acceptance inspection shall be identified within the confines of the Work Breakdown Structure (WBS) located in the Project Management Plan, as prepared by the Project Engineer. If the responsibilities are changed during the course of the project, these changes shall be made per OC approved procedures.
- 2.4 The Construction Contractor (CC) is responsible and held accountable for all aspects of project quality. The CC shall perform, or have performed, the quality verification activities as specified in the contract and identified in the drawings, specifications and other approved project documents.



### 3.0 QUALITY ASSURANCE PROGRAM REQUIREMENTS

- 3.1 The design, procurement, fabrication and construction activities shall conform to the quality assurance/quality control provisions of the codes and standards specified in the approved project documents. Codes and standards shall have the edition, addenda, year, or revision identified in the Definitive Design documents (e.g. Construction Specifications and/or Drawings). These issue dates shall be based upon the start of the Definitive Design process.
- 3.2 The safety classification shall be determined by analysis in accordance with WHC-CM-4-46, 9.0 and WHC-CM-1-3, MRP 5.46. These procedures shall be used as a method in determining the risk involved which shall be applied to items and processes. Currently, there are safety class 2, safety class 3 systems, and non-safety class 4 components, and structures identified in this project. A Preliminary Safety Evaluation (PSE), WHC-SD-FF-PSE-002, has been prepared to document safety analysis information on the project.
- 3.3 The QA Requirements for WHC safety classes (Attachment 1) of systems, components, and structures is the basis for the requirements of this plan. They shall be used in design and construction as the basis for determining WHC quality assurance program requirements. The Project Functional Design Criteria further imposes DOE Order 5700.6C, "Quality Assurance". The rigor with which the Quality Assurance requirements will be applied shall be based upon the a "graded approach". The identification of the safety class will assist in the application of this "graded approach" to quality.
- 3.4 The Project Critical Characteristics (Attachment 2) denotes the safety class and types of inspections required for typical systems, components, or structures being designed or constructed within the scope of this project. The Comments section provides minimal references to suggested codes or standards to be used for direction to determine the types of inspections required to be performed. This does not relieve the Designer of the responsibility to ensure applicable requirements have been identified. The systems, components, or structures identified by Safety Classification on the Project Critical Characteristics Sheet are based upon the information supplied within the Preliminary Safety Evaluation, WHC-SD-FF-PSE-002, Appendix B.
- 3.5 The Description of Types of Inspection (Attachment 3) is a detailed description of the types of inspections to be performed during the execution of construction. This description for inspection is reproduced from DOE Order 4700.1, Chapter V, Part C, Paragraph 3.c.(3)(c).
- 3.6 Contractors performing work on this project shall maintain a management system which addresses the applicable Quality Assurance Programmatic requirements as determined by the Safety Class of the systems affected.

It shall be the responsibility of each contractor to ensure that their sub-tier contractor complies with the applicable quality requirements as delineated herein.

- 3.6.1 The Architect-Engineer (A-E) who performs design activities on Safety Class 2 systems, components, or structures shall maintain a management system which addresses Quality Assurance Programmatic requirements of National Consensus Standard ASME NQA-1 and DOE Order 5700.6C, "Quality Assurance." The program shall meet the following basic requirements of NQA-1, and the additional criterion identified from DOE Order 5700.6C, as a minimum:

NQA-1 Basic Requirements:

- 1 - Organization
- 2 - Quality Assurance Program
- 3 - Design Control
- 4 - Procurement Document Control
- 5 - Instructions, Procedures, and Drawings
- 6 - Document Control
- 7 - Control of Purchased Items and Services
- 16 - Corrective Action
- 17 - Quality Assurance Records
- 18 - Audits

DOE Order 5700.6C Criterion:

- 3 - Quality Improvement
- 9 - Management Assessment

- 3.6.2 The A-E who performs design activities on Safety Class 3 or non-safety class 4 systems, components, or structures shall have a management system in place. This does not require the A-E to have a formal ASME NQA-1 program, however, the A-E must have procedures and/or instructions which, as a minimum, address the following requirements:

- a) ORGANIZATION - The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented.
- b) DESIGN CONTROL - Design interfaces shall be identifiable and controlled. Design adequacy shall be verified by persons other than those who designed the item. Design changes, including field changes shall be defined and governed by control measures commensurate with original design.
- c) DOCUMENT CONTROL - The preparation, issue, and change of documents that specify quality requirements or prescribe activities affecting quality shall be controlled to assure that correct documents are being employed.

d) INSTRUCTIONS, PROCEDURES, AND DRAWINGS - Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, specifications, procedures, or drawings of a type appropriate to the circumstances.

e) QUALITY ASSURANCE RECORDS - Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.

f) QUALITY IMPROVEMENT - The organization shall establish and implement processes to detect and prevent quality problems and to ensure quality improvement. Items and processes that do not meet established requirements shall be identified, controlled, and corrected. Correction shall include identifying the causes of problems and preventing recurrence. Item reliability, process implementation, and other quality-related information shall be reviewed and the data analyzed to identify items and processes needing improvement.

g) MANAGEMENT ASSESSMENT - Management at all levels shall periodically assess the integrated quality assurance program and its performance. Problems that hinder the organization from achieving its objectives shall be identified and corrected.

NOTE: For guidance as to what the procedures or instructions should address, ASME NQA-1 Basic Requirements and DOE Order 5700.6C concerning the above requirements should be reviewed.

3.6.3 For procurement, fabrication, construction, and inspection of Safety Class 2 items, the performing organization shall have a management system which addresses Quality Assurance Programmatic requirements of National Consensus Standard ASME NQA-1 and DOE Order 5700.6C, "Quality Assurance." The program shall meet the following basic requirements of NQA-1, and the additional criterion identified from DOE Order 5700.6C, as a minimum:

NQA-1 Basic Requirements:

- 1 - Organization
- 2 - Quality Assurance Program
- 4 - Procurement Document Control
- 5 - Instructions, Procedures, and Drawings
- 6 - Document Control
- 7 - Control of Purchased Items and Services
- 8 - Identification and Control of Items
- 9 - Control of Processes
- 10 - Inspection
- 11 - Test Control
- 12 - Control of Measuring and Test Equipment

- 13 - Handling, Storage, and Shipping
- 14 - Inspection, Test, and Operating Status
- 15 - Control of Nonconforming Items
- 16 - Corrective Action
- 17 - Quality Assurance Records
- 18 - Audits

DOE Order 5700.6C Criterion:

- 3 - Quality Improvement
- 9 - Management Assessment

3.6.4 Those organizations performing procurement, fabrication, construction, and inspection activities on Safety Class 3 or non-safety class 4 systems, components, and structures shall have a management system in place. This does not require the organization to have a formal quality assurance program, however, they must have procedures and/or instructions which, as a minimum, address the following requirements:

- a) **PROCUREMENT DOCUMENT CONTROL** - Applicable design bases and other requirements necessary to assure adequate quality shall be included or referenced in documents for procurement of items or services.
- b) **DOCUMENT CONTROL** - The preparation, issue, and change of documents that specify quality requirements or prescribe activities affecting quality shall be controlled to assure that correct documents are being employed.
- c) **INSPECTION** - Inspections shall be planned. Characteristics to be inspected and inspection methods shall be specified. Inspections shall be documented. Inspection for acceptance shall be performed by persons other than those who performed or directly supervised the work being inspected.
- d) **TEST CONTROL** - Tests required to verify conformance or demonstrate performance shall be planned and executed. Test results shall be documented and their conformance with acceptance criteria evaluated.
- e) **INSTRUCTIONS, PROCEDURES, AND DRAWINGS** - Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.
- f) **CONTROL OF MEASURING AND TEST EQUIPMENT** - Measuring and test equipment used for activities affecting quality shall be controlled and calibrated.
- g) **CONTROL OF NONCONFORMING ITEMS** - Controls shall provide for identification, documentation, evaluation, segregation when practical, dispositioning of nonconforming items, and for notification to affected organizations.

h) **QUALITY ASSURANCE RECORDS** - Records that furnish documentary evidence of quality shall be specified, prepared, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.

i) **QUALITY IMPROVEMENT** - The organization shall establish and implement processes to detect and prevent quality problems and to ensure quality improvement. Items and processes that do not meet established requirements shall be identified, controlled, and corrected. Correction shall include identifying the causes of problems and preventing recurrence. Item reliability, process implementation, and other quality-related information shall be reviewed and the data analyzed to identify items and processes needing improvement.

j) **MANAGEMENT ASSESSMENT** - Management at all levels shall periodically assess the integrated quality assurance program and its performance. Problems that hinder the organization from achieving its objectives shall be identified and corrected.

NOTE: For guidance as to what the procedures or instructions should address, ASME NQA-1 Basic Requirements and DOE Order 5700.6C concerning the above requirements should be reviewed.

3.6.5 Construction specifications and drawings shall specify specific code required inspection activities to be performed and to identify the responsible contractor(s) which will perform such activities.

#### 4.0 **QUALITY INDEX OF IMPLEMENTING PROCEDURES**

4.1 An Operating Contractor Quality Assurance Program Index (QAPI), Attachment 4, is supplied. The QAPI is a listing in Chart Format of Manuals, which contain general procedures, and some specific procedures to be utilized on the Project. The procedures from the WHC Projects Department Manuals are identified and will be applied based on the scope of the procedure. It must be noted that use of each and every procedure identified is not required for the complete project, rather, the use shall be determined by the applicable Project Engineer and the activity involved.

4.2 The engineering contractor(s) and acceptance inspection organization engaged in the activities of design verification, inspection and acceptance of project systems, components and structures shall provide an index or description of the implementing procedures to show compliance with quality programmatic requirements.

4.3 The CC shall prepare and provide applicable specific procedures where required within the Definitive Design documents. All other Procedures or Methods employed shall comply with the Codes and/or Standards identified within the Definitive Design documents.

- 4.4 The OC reviews these indexes and implementing procedures for conformance and adequacy. These documents will provide the basis for technical reviews, surveillances, and audits of project activities to assure compliance to project requirements.

## 5.0 REFERENCES

The preparation of this QAPP is based upon the following references:

1. DOE Project Management System (DOE Order 4700.1 & RLIP 4700.1A)
2. DOE Quality Assurance Order (DOE Order 5700.6C)
3. Quality Assurance Program Requirements for Nuclear Facilities (ASME NQA-1)
4. WHC Quality Assurance Manual (WHC-CM-4-2)
5. WHC Management Requirements & Procedure Manual (WHC-CM-1-3)
6. WHC Safety Analysis Manual (WHC-CM-4-46)
7. WHC Functional Design Criteria (WHC-SD-FF-FDC-009)
8. Conceptual Design Report (WHC-SD-FF-CDR-006)
9. WHC Project Management Plan (WHC-SD-F031-PMP-001)
10. WHC Preliminary Safety Evaluation (WHC-SD-FF-PSE-002)
11. Hanford Site Hoisting and Rigging Manual (DOE RL 92-36)

Attachment 1

QA Requirements for WHC safety classes

WHC SAFETY CLASSIFICATION*	DEFINITIONS*	QUALITY ASSURANCE REQUIREMENTS*
safety class 1	Safety class 1 addresses the offsite environment and the health and safety of the public.	A comprehensive QA program that meets all applicable provisions of the "Quality Assurance Program Requirements for Nuclear Facilities (ASME NQA-1)" shall be used to control all WHC safety class 1 items.
safety class 2	Safety class 2 addresses onsite worker health and safety and the onsite environment.	A graded approach shall be used to apply QA program requirements.
safety class 3	Safety class 3 addresses the health and safety of facility workers and releases of radioactive or toxic material to the environment.	As a minimum, conventional industrial standards (National Electrical Code, National Fire Protection Association codes, military standards, etc.) shall be applied to WHC safety class 3 items.
nonsafety class 4	Nonsafety class 4 has no significant importance to health, safety, or environmental protection.	No defined QA program requirements apply to nonsafety class 4 items.
* Information as compiled from WHC-CM-1-3, MRP-5.46, Revision 4.		

Attachment 2

PROJECT CRITICAL CHARACTERISTICS

ITEM	DESCRIPTION OF ACTIVITY/SYSTEM	SAFETY CLASS	TYPE OF INSP.			COMMENTS
			F=FUNCTIONAL	G=GENERAL	D=DETAIL	
<b>I</b>	<b>SITWORK</b>	- - -				
	▪ Excavation/Removal of Existing Heat Exchanger Concrete	4		X		
	▪ Removal of Existing Underground Utilities	4	X			
	▪ Backfill/Compaction	4		X		
	▪ Stormwater Drainage	4		X		
<b>II</b>	<b>CONCRETE</b>	- - -				
	▪ Sodium Storage Facility (SSF) Footings/Foundation	3		X		Design for Seismic/Wind per Safety Class 2 Criteria
	▪ SSF Structural/Shielding Walls	3		X		Design for Seismic/Wind per Safety Class 2 Criteria
	▪ SSF Mezzanine Shielding Floor & Walls	3		X		Design for Seismic per Safety Class 2 Criteria
	▪ Tanks - Foundation/Anchor Bolts	2			X	
	▪ Roof Support Beam, Precast	3		X		Design for Seismic/Wind per Safety Class 2 Criteria
	▪ Roof Panels, Precast	3		X		Design for Seismic/Wind per Safety Class 2 Criteria
<b>III</b>	<b>METALS</b>	- - -				
	▪ Mezzanine Support Steel	3		X		Design for Seismic per Safety Class 2 Criteria



Attachment 2

PROJECT CRITICAL CHARACTERISTICS

ITEM	DESCRIPTION OF ACTIVITY/SYSTEM	SAFETY CLASS	TYPE OF INSP.			COMMENTS
			F=FUNCTIONAL	G=GENERAL	D=DETAIL	
	▪ Mezzanine Tank Access Plates	3		X		Design for Seismic/Wind per Safety Class 2 Criteria
	▪ Containment Sump (Drip Pan)	3		X		
	▪ Sump Cover, Support Steel	3		X		
	▪ Sump Cover, Perforated Areas	3		X		
	▪ Sump Cover, Steel Plate	3		X		
	▪ Piping Supports	3		X		
	▪ Interior Stairwells	3		X		
	▪ Ladder	3		X		
<b>IV</b>	<b>INSULATION</b>	---				
	▪ Tank(s) Insulation	4		X		
	▪ Sodium Piping Insulation	4		X		
<b>V</b>	<b>Doors</b>	---				
	▪ Access Doors	3	X			
<b>VI</b>	<b>SPECIAL CONSTRUCTION</b>	---				
	▪ Pre-Engineered Structures ▪ Exterior Stairwells	3		X		
	▪ Jib Hoist	3			X	Load Test Required

Attachment 2

PROJECT CRITICAL CHARACTERISTICS

ITEM	DESCRIPTION OF ACTIVITY/SYSTEM	SAFETY CLASS	TYPE OF INSP.			COMMENTS
			F=FUNCTIONAL	G=GENERAL	D=DETAIL	
<b>VII</b>	<b>MECHANICAL</b>	- - -				
	▪ Tank Internal Modifications	3			X	
	▪ Piping	- - -				
	▪ Sodium Piping and Components	3		X		
	▪ Inert Gas Piping and Components	3		X		
	▪ Tank Relief Components	3		X		
	▪ HEPA Filter	3			X	ASME N509/N510
	▪ Ventilation Relief Damper	3	X			
	▪ Mezzanine Heating & Venting	- - -				
	▪ Furnaces	4	X			
	▪ Dampers-Ventilation Supply	4	X			
	▪ Ventilation Ductwork	4	X			
	▪ Vacuum Pump	4	X			
<b>VIII</b>	<b>FIRE PROTECTION</b>	- - -				
	▪ Sodium Smoke Detector/Alarm	3	X			*Coordinate with FFTF OPS before Testing
	▪ Fire Alarm Panel	3	X			*
	▪ Fire Alarm Relay Panel	3	X			*
	▪ Emergency Fire Alarm Pull Stations	3	X			*

Attachment 2

PROJECT CRITICAL CHARACTERISTICS

ITEM	DESCRIPTION OF ACTIVITY/SYSTEM	SAFETY CLASS	TYPE OF INSP.			COMMENTS
			F=FUNCTIONAL	G=GENERAL	D=DETAIL	
<b>IX</b>	<b>ELECTRICAL</b>	- - -				
	▪ Trace Heat	- - -				
	▪ Tanks	4	X			
	▪ Sodium Piping	4	X			
	▪ Lighting	- - -				
	▪ General Lighting	4	X			
	▪ Emergency Lighting	3	X			
	▪ Exit Lights	3	X			
	▪ Oxygen Monitors	3	X			
	▪ Transformer	4	X			

NOTE: All other items not identified above, listed in WHC-SD-FF-PSE-002, Appendix B (Preliminary Safety Equipment List), are to be classified as non-safety class 4 and do not have any QA Programmatic requirements applied to them. Acceptance Inspection activities involving non-safety class 4 systems, components, or structures shall be limited to overview to ensure installation per design.

### Attachment 3

## Description of Types of Inspection

**Types of Inspection.** Due to the variety and types of contracts and subcontracts, and the degree of responsibility assigned to the operating contractors, the architect-engineer, the construction contractors, and the individual vendors; specific rules covering all phases of inspection cannot be prescribed. In general, inspection activities are divided into three types: functional, general, and detailed.

1. **Functional Inspection.** Performed to determine overall compliance with contract drawings and specifications. Functional Inspection may vary from inspection of minor items to extensive testing of operating equipment (which must be provided for in the contract). It may also serve in making initial determination of the adequacy of the design effort. The field element and the operating contractor participate in functional inspections from the viewpoints of owner and user.
2. **General Inspection.** The fundamental and comprehensive inspection to ascertain that workmanship and kind and quality of materials conform to the contract specifications.
3. **Detailed Inspection.** Includes, but is not limited to, verification of details, such as checking location and size of reinforcing bars, maintaining records of concrete batching plant operations, verifying the use of proper welding rods, checking riveting and welding, and performing other inspection for quality assurance purposes. It starts with initial construction operations and extends through all construction stages.

# Attachment 4 Quality Assurance Program Index

