ENGINEERING CHANGE NOTICE

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1. ECN 655884

Proj.
ECN

2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐	3. Originator's Name, Organization, MSIN, and Telephone No. Joseph R. Buchanan/COGEMA/S7-70/376-7263		4. USQ Required? ☐ Yes ☒ No	5. Date 9/21/99
	6. Project Title/No./Work Order No. 241-SY-101 RAPID Mitigation		7. Bldg./Sys./Fac. No. 241-SY-101	8. Approval Designator E, S. Q
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) RPP-4993, Rev. 0		10. Related ECN No(s). n/a	11. Related PO No. n/a
	12a. Modification Work ☐ Yes (fill out Blk. 12b) ☒ No (NA Blks. 12b, 12c, 12d)		12b. Work Package No. n/a	12c. Modification Work Completed n/a Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? ☒ Yes ☐ No

Complete rewrite of subject document - 6430.1A Compliance Matrix for 241-SY-101 Surface Level Rise Remediation Project - see attached continuation sheets.

14a. Justification (mark one) Criteria Change ☐ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐ As-Found ☐ Facilitate Const. ☒ Const. Error/Omission ☐ Design Error/Omission ☐	14b. Justification Details Information updated and added to in order to demonstrate compliance of the entire RAPID Mitigation System with DOE Order 6430.1A. No USQ screening is necessary for this change per HNF-IP-9842, Vol. IV, Sec. 5.4, Rev. 11b. The design will not result in an exposure change >1 person-REM (whole body) or >10 person-REM (extremities) for the installation, maintenance, and operation of the life of the modification. Design verification is informal review per IP-0842, Vol. IV, Sec. 4.24.
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15. Distribution (include name, MSIN, and no. of copies)

W.J. Powell/S7-70/1	M.H. Brown/T4-07/1
M.F. Erhart/S7-70/1	V.K. Izaguirre/S7-70/5
R.W. Reed/T4-07/1	G.A. Leshikar/S0-08/1
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DATE:		ID:
STA: A		2
OCT 08 1999		

ENGINEERING CHANGE NOTICE

Page 2 of 2

1. ECN (use no. from pg. 1)

655884

16. Design Verification Required

☐ Yes
☒ No

17. Cost Impact

ENGINEERING

Additional ☐ \$ n/a
Savings ☐ \$

CONSTRUCTION

Additional ☐ \$ n/a
Savings ☐ \$

18. Schedule Impact (days)

Improvement ☐ n/a
Delay ☐

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	☐	Seismic/Stress Analysis	☐	Tank Calibration Manual	☐
Functional Design Criteria	☐	Stress/Design Report	☐	Health Physics Procedure	☐
Operating Specification	☐	Interface Control Drawing	☐	Spares Multiple Unit Listing	☐
Criticality Specification	☐	Calibration Procedure	☐	Test Procedures/Specification	☐
Conceptual Design Report	☐	Installation Procedure	☐	Component Index	☐
Equipment Spec.	☐	Maintenance Procedure	☐	ASME Coded Item	☐
Const. Spec.	☐	Engineering Procedure	☐	Human Factor Consideration	☐
Procurement Spec.	☐	Operating Instruction	☐	Computer Software	☐
Vendor Information	☐	Operating Procedure	☐	Electric Circuit Schedule	☐
OM Manual	☐	Operational Safety Requirement	☐	ICRS Procedure	☐
FSAR/SAR	☐	IEFD Drawing	☐	Process Control Manual/Plan	☐
Safety Equipment List	☐	Cell Arrangement Drawing	☐	Process Flow Chart	☐
Radiation Work Permit	☐	Essential Material Specification	☐	Purchase Requisition	☐
Environmental Impact Statement	☐	Fac. Proc. Samp. Schedule	☐	Tickler File	☐
Environmental Report	☐	Inspection Plan	☐	<u>n/a</u>	☒
Environmental Permit	☐	Inventory Adjustment Request	☐	<u> </u>	☐

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
<u>n/a</u>	<u>n/a</u>	<u>n/a</u>

21. Approvals

Signature	Date
Design Authority <u>W.J. Powell</u>	<u>10/6/99</u>
Cog. Eng. <u>M.F. Erhart</u>	<u>9/24/99</u>
Cog. Mgr. <u>R.W. Reed</u>	<u>24 Sep 99</u>
QA <u>M.L. McElroy</u>	<u>9/24/99</u>
Safety <u>C.D. Jackson</u>	<u>9/30/99</u>
Environ. <u>D.L. Dyekman</u>	<u>9/24/99</u>
Other <u> </u>	<u> </u>
Des Eng Mgr <u>C.E. Hanson</u>	<u>9/24/99</u>
Inf review <u>R.L. Schlosser</u>	<u>9/24/99</u>
Proj Mgr <u>R.E. Raymond</u>	<u>10/8/99</u>

Signature	Date
Design Agent <u>J.R. Buchanan</u>	<u>9/24/99</u>
PE	<u> </u>
QA	<u> </u>
Safety	<u> </u>
Design	<u> </u>
Environ.	<u> </u>
Other	<u> </u>

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

6430.1A Compliance Matrix for 241-SY-101 Surface Level Rise Remediation Project

M. F. Erhart

Lockheed Martin Hanford Company

Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 627412

UC: 2030

Org Code: 79000

Charge Code: HN920201

B&R Code: EW3120071

Total Pages: 40 42 44 45
JES 320
10/6/99 10/6/99

Key Words:

RAPID, transfer; SY Farm, 241-SY-101, SY-101 pump pit, PPP

Abstract:

This document shows compliance with DOE order 6430.1A of the 241-SY-101 RAPID Mitigation system.

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L. Jof
Release Approval

OCT 08 1999
Date

Release Stamp

Approved For Public Release

[illegible]

1.0 BACKGROUND

Tank 241-SY-101 (SY-101) has recently exhibited a steady waste surface level growth. A path forward to mitigate the SY-101 surface level growth issue has been developed. The project has been directed to install the necessary equipment to transfer 380-570 m³ (100,000-150,000 gallons) of waste from SY-101 to SY-102 before the waste elevation reaches the region of the tank where the transition from a double to a single shell tank occurs.

2.0 PURPOSE

The purpose of this document is to record the design attributes of the RAPID Mitigation System which fulfill the pertinent requirements specified in DOE Order 6430.1A – General Design Criteria. Those pertinent Order requirements which are not met by the project at the time of the release of this document are recorded and noted as open items in Section 4.0 – Conclusions.

3.0 ANALYSIS

An initial review of DOE Order 6430.1A was performed and selected sections of the specified design criteria were identified as pertaining to the SY-101 RAPID Mitigation System project. General design criteria which are crucial to the safe and effective operation of the RAPID System were selected for demonstration of compliance and are derived from the following sections of the Order:

Division 1 – General Requirements

- Section 0109 – Reference Standards and Guides*
- Section 0110 – Architectural and Special Design Requirements*
- Section 0111 – Structural Design Requirements*
- Section 0140 – Quality Assurance*

Division 2 – Site and Civil Engineering

- Section 0200 – Site Development*
- Section 0201 – Subsurface Investigations*
- Section 0203 – Utilities Within Easements or Corridors*
- Section 0205 – Demolition, Decontamination, and Decommissioning*
- Section 0220 – Earthwork*
- Section 0235 – Building Foundations*

Division 3 – Concrete

- Section 0301 – General Requirements*
- Section 0320 – Concrete Reinforcement*
- Section 0340 – Precast Concrete*

3.0 ANALYSIS (cont'd)

Division 5 – Metals

Section 0512 – Structural Steel

Section 0532 – Metal Fastening

Division 9 – Finishes

Section 0900 – General

Division 11 – Equipment

Section 1161 – Enclosures

Division 13 – Special Facilities

Section 1300 – General Requirements

Section 1323 – Radioactive Liquid Waste Facilities

Division 15 – Mechanical

Section 1525 – Mechanical Insulation

Section 1530 – Fire Protection

Division 16 – Electrical

Section 1605 – Basic Electrical Material and Methods

Section 1630 – Exterior Electrical Utility Service

Section 1639 – Grounding

Section 1640 – Interior Electrical Systems

Section 1660 – Special Systems

Section 1671 – Interior Communications and Alarm Systems

The matrix contained on the following pages records specific requirements contained in these sections which are pertinent to the SY-101 RAPID Mitigation System. A citation is provided which specifies the design document and attribute which fulfills each criterion's requirement.

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
1	The latest edition of standards and guides shall be used.	Order 6430.1A, Section 0109	The Functional Requirements and Technical Criteria for the 241-SY-101 RAPID Mitigation System, the Structural Design Criteria, and the specifications for individual SSCs comply with this criterion, EXCEPT that the 1994 edition of UBC is used for seismic criteria, in accordance with LMH-PRO-097.	HNF-3885 HNF-4169 HNF-4170 HNF-4216 HNF-4043 HNF-4407 HNF-4235 LMH-PRO-097	HNF-3885 Section 3.0 HNF-4169 Section 2.0 HNF-4170 Section 2.0 HNF-4216 Section 2.0 HNF-4407 Section 3.75(GAB) HNF-4043 Section 2.0 HNF-4235 Section 2.0
2	Designs shall produce facilities that are straightforward and businesslike.	Order 6430.1A, Section 0110-1.1.1	Compliance with this criterion results from the formal and documented design review process. Due to the urgent nature of this project, cost was not the driving factor.	LMH-PRO-1819 HNF-4519	
3	Designs shall be defensible in terms of scope, cost, and appearance.	Order 6430.1A, Section 0110-1.1.1	Compliance with this criterion results from the formal and documented design review process.	LMH-PRO-1819	
4	Appropriate design shall meet and not exceed users' needs.	Order 6430.1A, Section 0110-1.1.1	Compliance with this criterion results from the formal and documented design review process.	LMH-PRO-1819 HNF-4519	
5	Programmatic studies shall include a detailed consideration of the functional requirements of ... the facility.	Order 6430.1A, Section 0110-1.1.2	HNF-3824, Tank 241 SY-101 Surface Level Rise Remediation Project Plan constitutes the programmatic study that includes consideration of the functional requirements of the facility. HNF-3885, Functional and Technical Criteria for the 241-SY-101 RAPID Mitigation System enumerates explicit functional requirements. As per the requirements specified in DOE 4700.1, the project's Functional Requirements and Technical Criteria specification clearly state the programmatic and operational requirements expected of the RAPID system.	HNF-3824 HNF-3885	HNF-3885 Section 4.0
6	The design criteria document shall make programmatic and operating requirements explicit in compliance with DOE 4700.1, Project Management System.	Order 6430.1A, Section 0110-1.1.2	Guidance from the cognizant DOE authority is based on FY-89 PA 6.1.5, incorporated into HNF-3824, Tank 241 SY-101 Surface Level Rise Remediation Project Plan.	HNF-3885	HNF-3885, Section 1.1
7	The designer shall consider the program and resolve perceived deficiencies with the user and cognizant DOE authority.	Order 6430.1A, Section 0110-1.1.2	Compliance with this criterion results from the formal and documented design review process, which includes participation by the user (Tank Farm Facility Operations) and an RL representative.	LMH-PRO-1819 HNF-4519	
8	The designer shall question apparently excessive scope demands when they occur.	Order 6430.1A, Section 0110-1.1.2	Compliance with this criterion results from the formal and documented design review process.	LMH-PRO-1819 HNF-4519	
9	When two or more services or systems ... are to be incorporated into a facility or a facility complex, these systems shall be considered to determine if they can be integrated...	Order 6430.1A, Section 0110-1.2	Consideration has been given to incorporating the requirements for back dilution of tank 241-SY-101 into the scope of the transfer system designed and developed for the RAPID Mitigation project.	HNF-3824, Project Plan	
10	Emergency planning requirements ... shall be considered ... in the conceptual design phase to ensure that facility features provide for evacuation and other emergency requirements and that facility emergency plans are coordinated with the overall plant-complex emergency plan.	Order 6430.1A, Section 0110-1.3	Emergency planning requirements are bounded by existing emergency response procedures.	HNF-4519, Design Review Report	
11	During the ... conceptual design, alternative designs shall be developed.	Order 6430.1A, Section 0110-2	Alternatives were identified and evaluated in Alternative Generation and Analysis for 241-SY-101 Expedited Waste Transfer to 241-SY-102. HNF-3832	HNF-3832	
12	... the design shall ... provide sufficient flexibility to accommodate for programmatic changes or operational modifications.	Order 6430.1A, Section 0110-3	The system has adequate flexibility for the planned transfer(s) which are short term in duration and intermittent in occurrence.	HNF-3824	
13	The layouts ... shall address anticipated future needs.	Order 6430.1A, Section 0110-3	The system layout considered future needs as appropriate for the planned transfer, which are short term in duration and intermittent in occurrence.	HNF-3824	
14	Design solutions shall demonstrate methods for modification and expansion including ... additional capacities...	Order 6430.1A, Section 0110-3	Additional capacity results from the requirement for temporary and intermittent transfers with the ability to perform additional transfers	HNF-3824	
15	Organizational, functional, spatial, and adjacency aspects of design shall promote operational efficiency in a workable and logical manner.	Order 6430.1A, Section 0110-4	Tank Farm Facilities Operation personnel have participated in all project design reviews. This participation assures that organizational, functional, and spatial aspects of design promote operational efficiency in a workable and logical manner. Adjacency aspects, specifically any potential impacts on the tank mixer pump operations, are addressed through the appropriate design review process.	HNF-4519	
16	Health and safety performance objectives ... include: Protection of the public and personnel from injury and from exposure to toxic materials, radiation, and other hazards in accordance with DOE requirements and allowable limits.	Order 6430.1A, Section 0110-5.1	The required objectives are established in the BIO, the Tank Farm Health and Safety Plan (HASP), RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, TWR-4177 RAPID Project Dose Rate Calculations, HNF-3645 Hazard Evaluation for SY-101 Waste Surface Level Growth, HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102, and HNF-3737 Safety Basis for Remediation Activities.	HNF-SD-WM-BIO-001 HNF-SD-WM-HSP-002, Rev. 3, Tank Farms Health and Safety Plan TWR-4176 HNF-4177 HNF-3645 HNF-3966 HNF-3737	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
17	Health and safety performance objectives ... include: Protection of private and public property against damage resulting from DOE operations.	Order 6430.1A, Section 0110-5.1	The required objectives are established in the BIO, the Tank Farm Health and Safety Plan (HASP), RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, TWR-4177 RAPID Project Dose Rate Calculations, HNF-3645 Hazard Evaluation for SY-101 Waste Surface Level Growth, HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102, and HNF-3737 Safety Basis for Remediation Activities.	HNF-SD-WM-BIO-001 HNF-SD-WM-HSP-002, Rev. 3 TWR-4176 HNF-4177 HNF-3645 HNF-3966 HNF-3737	
18	Health and safety performance objectives ... include: Continuation of operations by minimizing accident potential.	Order 6430.1A, Section 0110-5.1	The required objectives are established in the BIO, the Tank Farm Health and Safety Plan (HASP), RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, TWR-4177 RAPID Project Dose Rate Calculations, HNF-3645 Hazard Evaluation for SY-101 Waste Surface Level Growth, HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102, and HNF-3737 Safety Basis for Remediation Activities.	HNF-SD-WM-BIO-001 HNF-SD-WM-HSP-002, Rev. 3 TWR-4176 HNF-4177 HNF-3645 HNF-3966 HNF-3737	
19	Health and safety performance objectives ... include: Limitation of loss or damage to Federal property, including losses associated with the inability to readily decontaminate or decommission facilities for other subsequent uses.	Order 6430.1A, Section 0110-5.1	The required objectives are established in the BIO, the Tank Farm Health and Safety Plan (HASP), RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, TWR-4177 RAPID Project Dose Rate Calculations, HNF-3645 Hazard Evaluation for SY-101 Waste Surface Level Growth, HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102. The "in-tank equipment" (ie, transfer pump & drop leg) were designed to be easy to decontaminate while being removed. Also, a spray wash system was built into the design.	HNF-SD-WM-BIO-001 HNF-SD-WM-HSP-002, Rev. 3 TWR-4176 HNF-4177 HNF-3645 HNF-3966 HNF-3737	
20	Specific project design criteria in the areas of emergency preparedness and emergency management shall be developed with the advice and assistance of DOE organizations responsible for DOE emergency management/emergency preparedness programs. Such criteria shall comply with: DOE 5500.1A and DOE 5500.3.	Order 6430.1A, Section 0110-5.1	The system design is bounded by existing emergency management and preparedness procedures which were developed in the requisite fashion and comply with the noted orders. No unique requirements are included in the SY-101 RAPID system design.	HNF-4519, Design Review Report	
21	All DOE facilities shall be evaluated for potential risks to the operators, the public, and the environment. DOE 5481.1B contains criteria for determining the level of reporting required based on facility functions and potential accident risks. Safety analysis report timing, content, and format criteria and approval provisions are contained in DOE 5481.1B.	Order 6430.1A, Section 0110-5.2	The required evaluations are documented in the BIO. The BIO is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project.	HNF-SD-WM-BIO-001 HNF-3737	
22	The preliminary safety analysis shall be initiated during the conceptual design phase of the project and further developed during preliminary (Title I) design and detailed (Title II) design phases.	Order 6430.1A, Section 0110-5.2	The safety analysis for this project was developed in parallel with the design of the project. This project is an expense project and is not required to include a preliminary SAR for Title I or Title II items.	HNF-SD-WM-BIO-001 HNF-3737	
23	Facility design and construction features identified as a result of the PSAR shall be factored into the conceptual design before establishing the project cost estimate and requesting Congressional authorization for design and construction.	Order 6430.1A, Section 0110-5.2	The BIO is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project. Design and construction features resultant from the analyses in the BIO have been incorporated into the design as appropriate. This project is not a budget line item, and Congressional authorization is not applicable.	HNF-SD-WM-BIO-001 HNF-3737	
24	The PSAR shall be completed and approved prior to the start of construction (including site preparation), consistent with DOE 4700.1.	Order 6430.1A, Section 0110-5.2	The BIO is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project and was completed prior to initiation of construction.	HNF-SD-WM-BIO-001 HNF-3737	
25	The Final Safety Analysis Report (FSAR) shall be developed during the construction phase of the project and shall be completed and approved prior to the initiation of facility operations.	Order 6430.1A, Section 0110-5.2	The BIO is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project. The RPP will be transitioning to the FSAR on October 4, 1999.	HNF-SD-WM-BIO-001 HNF-3737	
26	Each facility that has potential on-site or off-site effects during normal or abnormal operations shall have an Emergency Plan prepared which shall be incorporated with the Site Emergency Preparedness Plan.	Order 6430.1A, Section 0110-5.3	The normal Tank farms operations emergency plan is adequate for this transfer. During readiness, drills will be performed to assure Operations can/will be able to respond appropriately to operating & "off-normal" situations.		
27	Facilities shall comply with DOE 5480.4 Attachment 2, Section 2 C. (DOE 5480.4, Environmental Protection, Safety, and Health Protection Standards)	Order 6430.1A, Section 0110-6.1	Environmental Protection permits and analyses required for the project are identified in HNF-3824, Tank 241 SY-101 Surface Level Rise Remediation Project Plan. Compliances with the permitting and analytical requirements are scheduled project activities. The project is enveloped by the Tank Farm Health and Safety Plan, which is in compliance with the specified DOE requirement.	HNF-3824 HNF-SD-WM-HSP-002, Rev. 3	
28	Facilities shall comply with DOE 5480.7, Fire Protection.	Order 6430.1A, Section 0110-6.1	The SY-101 RAPID mitigation system is enveloped by the Tank Farm standards and requirements for fire protection included in the Standards and Requirements Identification Document, Chapter 12, which is in compliance with the specified order.	HNF-SD-MP-SRID-001, Rev. 2	HNF-SD-MP-SRID-001, Rev. 2, Chapter 12
29	Facilities shall comply with Section 1530, Fire Protection	Order 6430.1A, Section 0110-6.1	The SY-101 RAPID mitigation system is enveloped by the Tank Farm standards and requirements for fire protection included in the Standards and Requirements Identification Document, Chapter 12, which is in compliance with the specified order.	HNF-SD-MP-SRID-001, Rev. 2	HNF-SD-MP-SRID-001, Rev. 2, Chapter 12

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS				
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
30	Facilities shall also comply with 29 CFR 1926 and 29 CFR 1910. (29 CFR 1926, Safety and Health Regulations for Construction; 29 CFR 1910, Occupational Safety and Health Standards.)	Order 6430.1A, Section 0110-6.1	Construction and operations activities associated with the project are governed by the Tank Farm Health and Safety Plan, which is in compliance with the specified requirements.	HNF-SD-WM-HSP-002, Rev. 3
31	Except as required by other sections of these criteria, NFPA 101 shall apply where 29 CFR 1926 and 29 CFR 1910 does not apply or where NFPA 101 exceeds the requirements of 29 CFR 1926 and 29 CFR 1910.	Order 6430.1A, Section 0110-6.1	Construction and operations activities associated with the project are governed by the Tank Farm Health and Safety Plan, which is in compliance with the specified requirements.	HNF-SD-WM-HSP-002, Rev. 3
32	Definitions, fire resistance ratings, and types of construction shall be as contained in the UBC.	Order 6430.1A, Section 0110-6.1	The existing Tank Farm Fire Protection program complies with this criterion. Fire-resistant materials were used in the design of this system.	HNF-3885
33	Any materials with unusual fire characteristics, such as urethane foams, and any materials that develop significant quantities of toxic or other harmful products of combustion, shall not be used as interior finishes or other interior applications without the approval of the cognizant DOE fire protection authority.	Order 6430.1A, Section 0110-6.1	This design does not employ any materials with unusual fire characteristics or that develop significant quantities of toxic or other harmful products of combustion in any interior application.	HNF-3885
34	The use of foamed plastics in construction shall be prohibited unless it fully complies with FM 1-57.	Order 6430.1A, Section 0110-6.1	No materials within the scope of this criterion have been specified. Insulation utilized in the Water Skid and transfer line are subject to the criteria contained in Division 15 of DOE order 6430.1A. See items 411 through 417 below.	HNF-3885
35	A special fire protection design analysis shall be made of each facility vital to DOE mission accomplishment.	Order 6430.1A, Section 0110-6.2	To the extent that the Mitigation System relates to "a public health and safety function," the system is covered by the BIO analyses (including fire protection) for an above ground transfer. No additional "special" analysis is appropriate.	HNF-SD-WM-BIO-001 HNF-3737
36	All facilities shall be divided into areas in which the total potential fire loss to each area and its equipment does not exceed \$75 million as described in DOE 5480.7.	Order 6430.1A, Section 0110-6.3	RAPID Mitigation Project potential loss (equipment, installation and construction) is less than \$75 million (HNF-3824, Tank 241 SY-101 Surface Level Rise Remediation Project Plan)	HNF-3824
37	When exemptions are granted to specific DOE fire protection standards for reasons unique to DOE facilities, as in the case of some containment structures, fire protection shall be provided so as to assure the life safety of facility occupants as required by the cognizant DOE fire protection authority.	Order 6430.1A, Section 0110-6.4	The required fire protection and life safety assurance are provided by existing equipment/programs/procedures of the Tank Farm. Facility occupants, as used in this criteria, do not apply to the RAPID Mitigation System; the system creates no new or additional fire or life safety hazards.	
38	Hazardous areas, such as radioactive spaces or spaces with inert atmospheres, shall have sufficient alarms and interlocks to assure that access by emergency personnel will not endanger such personnel or result in a public hazard.	Order 6430.1A, Section 0110-6.4	Routine or emergency access will be in accord with existing procedures, including appropriate PPE. Any SSCs within the scope of this project that could potentially contain an inert atmosphere are too small to allow personnel access.	
39	The design of hazardous areas shall facilitate access by emergency personnel from the exterior and, at the same time, shall maintain any required confinement or containment using air locks or other features.	Order 6430.1A, Section 0110-6.4	All of the "hazardous areas" within the scope of this project are exterior. Personnel access to the interior of the confinement or containment boundaries is not physically possible because of the limited size of the SSCs. (NA... Applies to a building)	
40	The design of the exteriors of facilities shall follow the recommendations of NFPA 80A.	Order 6430.1A, Section 0110-6.4	There are no "exteriors of facilities". (NA... Applies to a building)	
41	Facilities that are not separated as recommended by NFPA 80A shall have fire protection systems such as exterior sprinklers or barrier walls.	Order 6430.1A, Section 0110-6.4	Project SSCs are separated from other Tank Farm SSCs. (NA... Applies to a building)	
42	The construction of all DOE facilities shall comply with the environmental protection and pollution control portions of DOE 4700.1, Chapter V.	Order 6430.1A, Section 0110-7	DOE 4700.1 is no longer a valid document, and has been replaced with DOE 430.1 Environmental protection and pollution control planning contained within the project plan, are in conformance with this requirement, as verified by LMHC Environmental Engineering.	HNF-3824
43	The construction of all DOE facilities shall comply with the environmental protection and pollution control portions of DOE 5480.4.	Order 6430.1A, Section 0110-7	This is a construction phase requirement not applicable to this stage of project design. All Environmental permitting requirements for this project have been met through consultation w/ LMHC & FDH Environmental group(s).	
44	The construction of all DOE facilities shall comply with the environmental protection and pollution control portions of DOE 5480.1B.	Order 6430.1A, Section 0110-7	This is a construction phase requirement not applicable to this stage of project design. All Environmental permitting requirements for this project have been met through consultation w/ LMHC & FDH Environmental group(s).	
45	The construction of all DOE facilities shall comply with the environmental protection and pollution control portions of DOE 5440.1C.	Order 6430.1A, Section 0110-7	This is a construction phase requirement not applicable to this stage of project design. All Environmental permitting requirements for this project have been met through consultation w/ LMHC & FDH Environmental group(s).	
46	For more specific criteria, see Section 0273, Water Pollution Control; Section 0275, Industrial Wastewater Treatment; Section 0285, Solid Waste System; and Section 1589, Air Pollution Control.	Order 6430.1A, Section 0110-7	None of the specific criteria in DOE Order 6430.1A Sections 0273, 0275, 0285, or 1589 is applicable to Mitigation System design.	
47	Planning and design of structures, including operating components and systems, shall take into account all aspects of operation and maintenance including: Equipment accessibility.	Order 6430.1A, Section 0110-8	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for the required equipment accessibility.	HNF-4169, H-14-103571 HNF-4170, H-14-103618, H-14-103619 HNF-4216, H-14-103592 HNF-4235, H-14-103551, H-14-103552, H-14-103553 HNF-4407, H-14-103595 HNF-4043, H-14-103605

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ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference Citation
48	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: Dismantling	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for the required component dismantling.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
49	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: replacement and repair	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for the required component replacement and repair.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
50	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: frequency of preventive maintenance	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of the design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for preventive maintenance.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
51	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: inspection requirements	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of the design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for inspection requirements.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
52	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: personnel safety	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of the design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for personnel safety.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
53	Planning and design of ... structures, including ... operating components and systems, shall take into account all aspects of operation and maintenance including: day-to-day operations	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation and Maintenance personnel have participated in all project design reviews. This participation assures that organizational, functional, maintenance, and spatial aspects of the design promote operational efficiency in a workable and logical manner. Procurement specifications and released drawings for individual SSC's define and show the arrangement of components to the extent necessary for day to day operations.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
54	Design decisions for all projects shall be based on considerations of LCC as well as all other programmatic requirements affecting the facility.	Order 6430.1A, Section 0110-9	Alternative Generation and Analysis for 241-SY-101 Expedited Waste Transfer to 241-SY-102, COGEMA Engineering Corp., January, 1999, includes consideration of initial and decommissioning costs in design decisions.	HNF-4168; H-14-103571 HNF-4170; H-14-103618, H-14-103619 HNF-4216; H-14-103592 HNF-4235; H-14-103551, H-14-103552, H-14-103553 HNF-4407; H-14-103595 HNF-4043; H-14-103605
55	Studies shall be made that balance initial construction cost with the operating and maintenance costs over the anticipated life of the facility.	Order 6430.1A, Section 0110-9	Alternative Generation and Analysis for 241-SY-101 Expedited Waste Transfer to 241-SY-102, COGEMA Engineering Corp., January, 1999, includes consideration of initial and decommissioning costs in design decisions.	HNF-3832
56	LCC analyses used to select materials and equipment shall include the cost and availability of materials, parts, and labor required for operation, maintenance, repair, and replacement.	Order 6430.1A, Section 0110-9	Alternative Generation and Analysis for 241-SY-101 Expedited Waste Transfer to 241-SY-102, COGEMA Engineering Corp., January, 1999, was prepared to assess the best alternative for this application. Due to the urgent nature of the task, a high priority was set for a system that could complete the transfer quickly.	HNF-3832
57	Space for the operation, maintenance, repair, and replacement of materials and equipment shall be provided and shall be included in LCC analyses used to select materials and equipment.	Order 6430.1A, Section 0110-9	Tank Farm Facilities Operation personnel have identified space requirements for the operation, maintenance, repair, and replacement of materials and equipment; incremental costs of materials and equipment are insignificant in relationship to operability and delivery concerns and were weighted appropriately.	HNF-4519

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ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
58	LCC analyses shall be appendices in a project's design criteria document or other such project file...	Order 6430.1A, Section 0110-9	Alternative Generation and Analysis for 241-SY-101 Expedited Waste Transfer to 241-SY-102, COGEMA Engineering Corp., January, 1999, includes consideration of initial and decommissioning costs in design decisions.	HNF-3832	
59	...[S]pecial facilities shall be planned and layout developed on the basis of repetitive or discrete processing steps, grouped according to facilities services ...	Order 6430.1A, Section 0110-99.0.1	Layout of SSCs is based on specific functional requirements and existing configuration of tanks SY-101 and SY-102. This is a specialized system, designed for a single, or at most 2 or 4 transfers. As such, repetition was not a paramount consideration.	HNF-4519	
60	[Special facilities] shall be contained in individual process rooms or cells to the extent practical.	Order 6430.1A, Section 0110-99.0.1	The transfer pump is contained within existing tank SY-101, transfer valves and other appurtenances are contained within the Prefabricated Pump Pit, the transfer line is contained within the transfer encasement, and the drop leg is contained within existing tank SY-102. The individual processes are divided to the extent practical.		
61	The design professional shall consider the need for safe normal and emergency access, egress, and internal traffic flow.	Order 6430.1A, Section 0110-99.0.1	Existing structures, programs, and procedures in place at the Tank Farm provide for safe normal and emergency access, egress, and traffic flow. No additional needs result from the mitigation project.	HNF-4519	
62	The type and level of hazard shall be determined for each functional area of the special facility, the attendant degree of risk established, and the possibility of cross-contamination considered.	Order 6430.1A, Section 0110-99.0.1	The hazards are identified and analyzed in the BIO, RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, TWR-4177 RAPID Project Dose Rate Calculations, HNF-3845 Hazard Evaluation for SY-101 Waste Surface Level Growth, and HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102.	HNF-SD-WM-BIO-001 TWR-4176 TWR-4177 HNF-3845 HNF-3966	
63	Radioactive and hazardous materials shall be segregated from each other to minimize the generation of mixed waste.	Order 6430.1A, Section 0110-99.0.1	Lead used as shielding is covered with protective to prevent radioactive contamination of the lead (as well as to prevent release of lead to the environment). No other new radioactive or hazardous materials (i.e., materials not already present as part of the waste in SY-101) are specified for use in the project.		
64	Wherever possible, areas for work with radioactive or other hazardous contaminants shall be located together to simplify solutions to problems of air supply and exhaust, waste disposal, decontamination, and cross contamination.	Order 6430.1A, Section 0110-99.0.1	Work areas for this project are fixed by location of SY-101 and existing installed SSC's.	HNF-4519	
65	[A]reas where radioactive materials are used shall be designed for ease of decontamination during ... usage and ... decommissioning.	Order 6430.1A, Section 0110-99.0.1	The material of construction and the finish specified for the SSC's were selected for ease of decontamination. The Prefabricated Pump Pit, Drop Leg spray ring, and the Water Support Skid flush water capability are additional design elements included for ease of decontamination.	HNF-4519 HNF-4216 Drop Leg (ASSD) HNF-4169 PPP HNF-4043	
66	Energy conservation shall be given particular attention in the planning and design of special facilities.	Order 6430.1A, Section 0110-99.0.1	This criterion is not applicable due to it limited energy consumption rate.	HNF-3824 Project Plan	
67	A special facilities utilization schedule shall be developed to show the intended schedule of operations of energy-using systems and equipment.	Order 6430.1A, Section 0110-99.0.3	N/A... This criterion is not applicable due to it limited energy consumption rate.	HNF-3824 Project Plan	
68	These [utilization] schedules shall be used in performing computerized or other energy-use analyses to develop energy-efficient special facility design.	Order 6430.1A, Section 0110-99.0.3	N/A... This criterion is not applicable due to it limited energy consumption rate.	HNF-3824 Project Plan	
69	The design of the facility shall include controlled access to areas of potential hazards.	Order 6430.1A, Section 0110-99.0.4	Compliance with this criterion is achieved by implementation of existing Tank Farm programs, plans, and procedures.		
70	The facility layout shall provide for the segregation of administrative and other support personnel from operations and process activities and areas.	Order 6430.1A, Section 0110-99.0.4	Compliance with this criterion is achieved by implementation of existing Tank Farm programs, plans, and procedures.		
71	The arrangement and location of process equipment and maintenance provisions shall ensure that exposure to radiation and other hazardous materials is within the requirements of DOE 5480.11 and DOE 5480.10, respectively.	Order 6430.1A, Section 0110-99.0.4	The RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, documents that exposure to radiation is within the requirements of DOE 5480.11. HNF-3845 Hazard Evaluation for SY-101 Waste Surface Level Growth, and HNF-3966 Hazard Evaluation for Transferring Waste from SY-101 to SY-102 ensure the resulting design prevents exposure to hazardous materials beyond that allowed under DOE 5480.10.	TWR-4176 HNF-3845 HNF-3966	
72	[E]xposures shall be maintained ALARA.	Order 6430.1A, Section 0110-99.0.4	The RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, documents that exposure to radiation is maintained ALARA.	TWR-4176	
73	The design shall protect workers sufficiently from hazards to ensure that workers can perform actions required during normal operations, anticipated operational occurrences, and postulated DBAs.	Order 6430.1A, Section 0110-99.0.4	The design protects workers from radiological hazards by maintaining exposures ALARA (TWR-4176). Protection from other hazards results from existing safety program and procedures and administrative controls. This project is not required to operate during or following DBA's.	TWR-4176 HNF-SD-WM-BIO-001	

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ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
74	The design shall ensure prompt, safe shutdown in emergencies, and allow ready access to areas where manual corrective actions are required and to areas that contain radiation monitoring equipment.	Order 6430.1A, Section 0110-99.0.4	The Operating Procedure, TO-430-100, requires any transfer operation to be terminated, & the system be put in a safe condition during emergencies. The design includes the following SSCs to ensure prompt, safe shutdown: Tank Farm O&M participation in design reviews has ensured the required ready access. The design of the prefabricated pump pit does not impede the required access. The design of the Rapid Mitigation System has incorporated emergency stop push buttons on the waste transfer control panels (CP-350A and 350B).	HNF-4169 HNF-4235 TO-430-100 HNF-4519	
75	The facility design shall provide space to accommodate all planned activities, operations, and maintenance.	Order 6430.1A, Section 0110-99.0.4	Tank Farm O&M personnel have identified space requirements for the operation, maintenance, repair, and replacement of materials and equipment through the design review process.	HNF-4519	
76	Layout of the facility shall provide specific control and isolation, if possible, of quantities of flammable, toxic, and explosive gases, chemicals, and other hazardous materials admitted to the facility.	Order 6430.1A, Section 0110-99.0.4	The Mitigation System design includes a safety class seal loop to isolate the Prefabricated Pump Pit and other SSCs from the potentially flammable head space gases in SY-101. Quantities of flammable, toxic, and explosive gases, chemicals, and other hazardous materials were minimized to the extent possible.	HNF-4169	H-14-103572, item #23
77	The provision of additional space or temporary shielding shall be considered in the event radiation levels are higher than anticipated.	Order 6430.1A, Section 0110-99.0.4	Since the Mitigation System is outdoors, additional space is essentially unlimited. Additional shielding is limited only by tank dome bearing capacity, a case-specific analysis would be required in the event higher than expected radiation levels require additional temporary shielding.	N/A	
78	Development of the DBF shall include consideration of conditions that may exist during normal operations and special situations (e.g., during periods of decontamination, renovation, modification, repair, and maintenance).	Order 6430.1A, Section 0110-99.0.6	The BIO defines the DBF, as well as prevention and mitigation SSCs, for Tank Farm operations, including above-ground transfers. The BIO and the project's safety analysis analyzes the consequences of normal operations and accident conditions. This RAPID Mitigation project is within the analytical scope of the BIO; no additional fire hazards result.	HNF-SD-WM-BIO-001 HNF-3737	
79	The structural shell surrounding the critical areas and their supporting members shall remain standing and continue to act as a confinement structure during the DBF under conditions of failure of any fire suppression system not designed as a safety class item.	Order 6430.1A, Section 0110-99.0.6	As the RAPID system is installed outdoors and not within a confining structure as defined in this criteria, this criteria is not applicable.	N/A	
80	Fire resistance of this shell shall be attained by an integral part of the structure (concrete slabs, walls, beams, and columns) and not by a composite assembly (membrane fireproofing).	Order 6430.1A, Section 0110-99.0.6	As the RAPID system is installed outdoors and not within a confining structure as defined in this criteria, this criteria is not applicable.	N/A	
81	In no event shall the fire resistance rating be less than two hours under conditions of failure of any fire suppression system not designed as a safety class item.	Order 6430.1A, Section 0110-99.0.6	As the RAPID system is installed outdoors and not within a confining structure as defined in this criteria, this criteria is not applicable.	N/A	
82	Penetrations in this shell shall incorporate, as a minimum, protection against DBF exposures unless greater protection is required by other sections of these criteria.	Order 6430.1A, Section 0110-99.0.6	As the RAPID system is installed outdoors and not within a confining structure as defined in this criteria, this criteria is not applicable.	N/A	
83	The design of special facilities shall reduce the consequences of normal and DBA events by incorporating ALARA design concepts.	Order 6430.1A, Section 0110-99.0.8	Mitigating design features are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176	
84	Occupancy time, spacing, remote handling equipment, and shielding shall be considered.	Order 6430.1A, Section 0110-99.0.8	Occupancy time, spacing, and shielding were considered, as documented in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176. Shielding of the transfer line, Prefabricated Pump Pit and Anti-Siphoning Slurry Distributor are included in the design.	TWR-4176 HNF-4519 HNF-4216 ASSD HNF-4169 PPP	
85	Automatic monitoring and alarm devices shall be provided (where required by the form and potential hazard of the material being handled or stored) to detect the presence of significant levels or increases of radioactivity and, if feasible, any other hazardous materials, either released in the special facility or escaping from it.	Order 6430.1A, Section 0110-99.0.8	Safety class leak detectors will detect and annunciate release of radioactive materials within the confinement system of the Mitigation System. Material balance calculations will identify potential leaks within the transfer line. Pressure switches are provided to indicate proper flow path of hazardous materials.	Process Control Plan - HNF-4264 HNF-4216 ASSD HNF-4169 PPP HNF-4170 Piping Manifolds	
86	Where monitoring devices are not available for specific contaminants, sampling devices shall be substituted and be evaluated on a frequency sufficient to detect release levels of interest.	Order 6430.1A, Section 0110-99.0.8	The required component(s) are provided in the design as identified on the SEL. Substitute sampling devices are not required for compliance with this criterion.	HNF-4513 (SEL)	
87	Cautionary systems or interlocks shall prevent inadvertent entry into hazardous areas.	Order 6430.1A, Section 0110-99.0.8	Compliance with this criterion results from implementation of existing Tank Farm radiological controls supplemented as appropriate by additional radiological area posting requirements established in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.		
88	All safety alarm systems shall annunciate inside of the special facility so as to identify hazardous areas.	Order 6430.1A, Section 0110-99.0.8	The required component(s) are provided in the design as identified on the SEL. The alarm functions and locations determined during the formal Design Review Process and incorporated accordingly in the Functional Requirements and Technical Criteria (HNF-3885), and in the design. Safety class alarms annunciate alarm conditions both within the SY farm fenced enclosure and the nearby DACS trailer.	HNF-4513 HNF-3885 HNF-4235	

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Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					Design Attribute	Configuration Control Reference	Citation
Item #	Criteria	Source	ORDER 6430.1A REQUIREMENTS				
89	The need for visual alarm devices within the special facility, in addition to audible alarm devices, shall be considered.	Order 6430.1A, Section 0110-99.0.8			The required component(s) are provided in the design as identified on the SEL. The alarm functions and locations were determined during the formal Design Review Process and incorporated accordingly in the Functional Requirements and Technical Criteria (HNF-3885), and in the design.	HNF-4513 HNF-3885	
90	Where alarms can preclude or minimize exposures outside of the facility, they shall be provided (such as criticality alarms or evacuation alarms).	Order 6430.1A, Section 0110-99.0.8			Criticality and evacuation alarms existant in the facility adequately fulfill the requirements of this criterion.		
91	DOE 5480.5 contains requirements for safety of nuclear facilities. In addition to its requirements, personnel exposure levels shall comply with Section 1300-6.2, Shielding Design.	Order 6430.1A, Section 0110-99.0.8			Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176 HNF-SD-WM-BIO-001	
92	Exposure of the public shall comply with Section 1300-1.4, Guidance on Limiting Exposure of the Public.	Order 6430.1A, Section 0110-99.0.8			Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176 HNF-SD-WM-BIO-001	
93	Proper consideration shall also be given to chemical toxicity protection, as well as radiation protection.	Order 6430.1A, Section 0110-99.0.8			No new or additional toxic chemicals are specified for the Mitigation System. Consideration of chemical protection for accident scenarios is provided in the BIO and the project's safety analysis; protection measures, if required, are specified in existing TWO procedures.	HNF-SD-WM-BIO-001 HNF-3737	
94	Local availability of construction materials and labor force shall be considered in the selection of the structural system.	Order 6430.1A, Section 0111-1			Multiple qualified suppliers are locally available. This was taken into account when determining where/how to build components.		
95	The structural design drawings shall indicate the design criteria, the structural materials and their strengths with applicable materials standards, the design loads including loads that can occur during construction, and the allowable foundation loads that were used in the design.	Order 6430.1A, Section 0111-1			Specifications for individual SSCs and the Structural Design Criteria document (SDC) define the applicable design criteria, the structural materials and their strengths with applicable materials standards, the design loads including loads that can occur during construction, and the allowable foundation loads that are to be used in the design. All appropriate drawings reference the structural analysis and provide appropriate standards and loads.	HNF-4252, HNF-4169, HNF-4170, HNF-4043, HNF-4216, HNF-4407.	
96	Where earthquake resistance is required, the cognizant DOE authority should consult LBL-9143 for practical guidelines for engineering earthquake safety and management planning and technical procedures for design of new facilities.	Order 6430.1A, Section 0111-1			Seismic planning and design procedures are based on site specific hazards analyses and DBE definition in the BIO, which provides equivalent compliance. Specific seismic requirements are contained in LMH-PRO-097, which is reflected in the structural design criteria (SDC) document (HNF-4252).	HNF-4252	
97	Structures and their elements shall be designed for the loads prescribed in these criteria.	Order 6430.1A, Section 0111-2.1			Structural analyses for the SSCs meet the requirements specified in the Structural Design Criteria Document, as documented in HNF-4359.	HNF-4359	
98	Dead loads ... shall include the weights of all permanent materials and equipment, including the structure's own weight, supported in, or on, a structure.	Order 6430.1A, Section 0111-2.2			The analysis took dead loads into account.	HNF-4252	
99	Load calculations shall include an allowance for any loadings anticipated to be added at a later date.	Order 6430.1A, Section 0111-2.2			The required loads are established in the Structural Design Criteria.	HNF-4252	
100	Initially assumed loads shall be revised so that the final design reflects the configuration shown on the drawings.	Order 6430.1A, Section 0111-2.2			Initially assumed loads were revised as necessary through the design review process. Structural analyses for all major structures were reconciled with the final as built configuration.	HNF-4359	Sections 1, 2, and 3
101	The unit weights of materials ... for ... structures shall be those given in ANSI A58.1. Where unit weights are neither established in that standard nor determined by test or analysis, the weights shall be determined from data in manufacturers' drawings or catalogs.	Order 6430.1A, Section 0111-2.2			ANSI B58.1 establishes load requirements for occupied buildings and was replaced in 1988 by ANSI/ASCE 7. The current version of this standard is ANSI/ASCE 7-95 (1995 issue). Since the project is not related to the design and construction of occupied buildings, this criteria is not applicable.	N/A	
102	Design dead loads shall include the weight of all permanent service equipment.	Order 6430.1A, Section 0111-2.2			The required dead loads are established in the Structural Design Criteria.	HNF-4252	
103	Live loads shall include all loads resulting from the occupancy and use of the structure, whether acting vertically down, vertically up, or laterally.	Order 6430.1A, Section 0111-2.3			The required live loads are established in the Structural Design Criteria.	HNF-4252	
104	Operating, moving, stopping, and impact forces shall be considered part of the live loads.	Order 6430.1A, Section 0111-2.3			Operational loads are included with the live loads established in the Structural Design Criteria.	HNF-4252	
105	Live loads shall include neither dead loads nor loads from the environment, such as wind, tornado, earthquake, thermal forces, earth pressure, and fluid pressure.	Order 6430.1A, Section 0111-2.3			The required live loads are established in the Structural Design Criteria. Dead loads and natural phenomenon hazard loads are established as separate loads in the SDC.	HNF-4252	
106	Live loads for buildings and other structures shall be those produced by the intended use or occupancy. In no case shall they be less than the minimum uniform load or concentrated load stipulated in ANSI A58.1.	Order 6430.1A, Section 0111-2.3			The required live loads are established in the Structural Design Criteria. Uniform and concentrated live loads are established for this non-occupied equipment based on anticipated use. ANSI B58.1 establishes load requirements for occupied buildings and was replaced in 1988 by ANSI/ASCE 7. The current version of this standard is ANSI/ASCE 7-95 (1995 issue). Since the project is not related to the design and construction of occupied buildings, the reference to ANSI A58.1 is not applicable.	HNF-4252	
107	The structural ... components of ... exposed structures shall be designed to resist pressures due to wind assumed to act from any direction.	Order 6430.1A, Section 0111-2.4			Analysis of wind loads address worst case conditions as applicable.	HNF-4359	

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ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
108	Partial wind loading shall be considered if it produces a more severe effect.	Order 6430.1A, Section 0111-2.4	Analysis of wind loads address worst case conditions as applicable.	HNH-4359
109	Wind load design for ... structures shall be determined in accordance with procedures in ANSI A58.1 with the basic wind speed being obtained from UCRL 15910.	Order 6430.1A, Section 0111-2.4	The required wind loads are established in the Structural Design Criteria. Site-specific wind speed design bases obtained in accordance with UCRL 15910 are specified in LMH-PRO-097, which is reflected in the SDC. ANSI B58.1 establishes load requirements for occupied buildings and was replaced in 1988 by ANSI/ASCE 7. The current version of this standard is ANSI/ASCE 7-95 (1995 issue). Since the project is not related to the design and construction of occupied buildings, the reference to ANSI A58.1 is not applicable.	HNH-4252
110	The basic wind speed shall be derived from DOE site-specific hazard model studies summarized in UCRL 53526, Rev. 1.	Order 6430.1A, Section 0111-2.4	Design wind speed was derived from site-specific requirements of DOE-STD-1020-94, which incorporates UCRL 53526 by reference. These site-specific requirements appear in LMH-PRO-097, which is reflected in the Structural Design Criteria.	HNH-4252
111	To determine the design wind loads, all factors and coefficients stipulated in ANSI A58.1 shall be applied to the site-specific basic wind speeds.	Order 6430.1A, Section 0111-2.4	The methodology for determining wind loads is established in the Structural Design Criteria, which specifies the use of ASCE 7-95 as required by LMH-PRO-097. The requirements in ANSI A58.1 and ASCE 7-95 are essentially equivalent.	HNH-4252
112	The basic wind speed and missile parameters shall be derived from DOE site-specific hazard model studies summarized in UCRL 53526, Rev. 1. If site-specific hazard model studies are not available, a hazard model shall be developed consistent with the approach used in UCRL 53526, Rev. 1.	Order 6430.1A, Section 0111-2.5	Design wind speed was derived from site-specific requirements of DOE-STD-1020-94, which incorporates UCRL 53526 by reference. These site-specific requirements appear in LMH-PRO-097, which is reflected in the Structural Design Criteria. The project's safety evaluation and LMHC chief engineer's waiver or interpretation of LMH-PRO-097 will envelope the missile parameters.	HNH-4252 HNH-3737
113	Facilities for radioactive material handling, processing, or storage, and other facilities having high value or vital importance to DOE programs that are classified as critical facilities, shall require special tornado loading criteria as stipulated in Section 0111-99.0, Nonreactor Nuclear Facilities-General.	Order 6430.1A, Section 0111-2.5	Design for tornadoes is not a site-specific requirement in LMH-PRO-097.	N/A
114	The basic seismic parameters shall be derived from DOE site-specific hazard model studies summarized in UCRL 53582. If site-specific hazard model studies are not available, a hazard model shall be developed that is consistent with the approach used in UCRL 53582.	Order 6430.1A, Section 0111-2.6	The site-specific seismic hazard model used is derived from the requirements of DOE-STD-1020-94, which incorporates UCRL 53526 by reference. These site-specific seismic requirements appear in LMH-PRO-097, which is reflected in the Structural Design Criteria.	HNH-4252
115	In applying UCRL 53582, specific guidance on relating frequency of occurrence to facility hazard levels shall be obtained from UCRL 15910.	Order 6430.1A, Section 0111-2.6	The site-specific seismic hazard model used is derived from DOE-STD-1020-94. The site-specific seismic requirements appear in LMH-PRO-097, which is reflected in the Structural Design Criteria.	HNH-4252
116	Earthquake load design for buildings and other structures shall be determined in accordance with the procedures contained in the UBC and UCRL 15910.	Order 6430.1A, Section 0111-2.6	Seismic load requirements are as specified in LMH-PRO-097, which complies with UCRL 15910 and specifies UBC requirements for the design of applicable structures. These requirements are established as design bases in the Structural Design Criteria.	HNH-4252
117	For critical facilities, the provisions and design procedures of TM 5-809-10.1 shall be used.	Order 6430.1A, Section 0111-2.6	The design procedures of DOE-STD-1020-94 have been applied, providing equivalent compliance.	
118	Facilities for radioactive material handling, processing, or storage, and other facilities having high value or vital importance to DOE programs that are classified as critical facilities, shall require application of dynamic analysis in determining structural requirements for earthquake loading as stipulated in Section 0111-99.0, Nonreactor Nuclear Facilities-General.	Order 6430.1A, Section 0111-2.6	For performance category PC-1 and PC-2 SSCs LMH-PRO-097 specifies an equivalent static analysis in accordance with the UBC, which is reflected in the Structural Design Criteria. For performance category PC-3 safety class SSCs LMH-PRO-097 specifies a dynamic seismic analysis. However, per the BIO, a performance category PC-3 seismic analysis is not required for transfer system safety class SSC's (Timmins 1998).	HNH-4252 HNH-SD-WM-BIO-001
119	An independent review of the seismic design shall be made for facilities and buildings where a seismic event can have a potential risk to operator lives, to public safety, or of large economic loss. The review shall be made in two stages: the first at the end of preliminary design and the second before final design is complete. For additional guidance on independent reviews, see LBL 9143 and UCRL 15910.	Order 6430.1A, Section 0111-2.6	Seismic design requirements are addressed in HNF-3885, the functions and requirements document, HNF-4252, the Structural Design Criteria document, and HNF-4359, the design calculations. All of these documents were reviewed by Hassan Zia, an independent and qualified reviewer.	HNH-3885, HNF-4252, HNF-4359
120	Equipment supports shall be designed to avoid resonance resulting from the harmony between the natural frequency of the structure and the operating frequency of reciprocating or rotating equipment supported on the structure.	Order 6430.1A, Section 0111-2.8.1	The potential effect of resonance between rotating equipment and the support structure for the equipment is addressed in the structural analysis of the PPP, as required by the Structural Design Criteria.	HNH-4252 and HNF-4359
121	The operating frequency of supported equipment shall be determined from manufacturer's data prior to completion of structural design.	Order 6430.1A, Section 0111-2.8.1	The vibration frequency and loads for the transfer pump are determined from the pump manufacturer, as specified in the Structural Design Criteria.	HNH-4252 and WEEMD 1997
122	Resonance shall be prevented by designing equipment isolation supports to reduce the dynamic transmission of the applied load to as low a level as can be economically achieved in the design.	Order 6430.1A, Section 0111-2.8.1	Structural analysis of the PPP, the support structure for the transfer pump, concluded that the vibration loads from the transfer pump are negligible. As such there is not need for vibration isolation.	HNH-4359
123	The provisions of the UBC shall be the minimum requirements for foundations design.	Order 6430.1A, Section 0111-3.4	Provisions of the UBC are established as requirements by the Structural Design Criteria.	HNH-4252
124	The potential adverse effects of frost heave and movements due to expansive soils shall also be considered in the design.	Order 6430.1A, Section 0111-3.4	Footings were installed below the frost line in accordance with UBC requirements, as specified in the Structural Design Criteria. There is no adverse effect.	HNH-4252

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
125	For all structures, Section 0201, Subsurface Investigations, shall be complied with to determine subsurface conditions, recommended foundation type, allowable design soil bearing pressure, seismic potential, and differential settlement.	Order 6430.1A, Section 0111-3.4	Subsurface investigations were not deemed necessary. The concrete support piers for the PPP meet the requirements contained in the UBC, as specified in the Structural Design Criteria, and the project drawings. Allowable soil bearing pressures specified in the UBC were used, as required by the SDC. The potential for differential settlement is addressed by periodic surveys of the PPP support frame elevation.	HNF-4252
126	Analysis of foundation vibrations, design to avoid resonance, and vibration and shock isolation, where required, shall be in accordance with Chapter 1 of DM-7 03, (U.S. Naval Facilities Engineering Command - DM-7 03, Soil Dynamics, Deep Stabilization, and Special Geotechnical Construction)	Order 6430.1A, Section 0111-3.4	The mitigation system does not have "foundations" as defined by Order references. Although the effect of vibration from the transfer pump on the PPP support structure and concrete piers is addressed in the structural analysis of the PPP, as required by the Structural Design Criteria.	HNF-4252 and HNF-4359
127	Special facility structures that need not be designed to withstand severe natural phenomena or man-made events shall be designed to the requirements in Section 0111-2, Loads.	Order 6430.1A, Section 0111-99.0.1	The Structural Design Criteria document specifies natural phenomena and other design loads in accordance with LMH-PRO-097, which implements the requirements of Section 0111-2.	HNF-4252
128	A case-by-case written evaluation shall be performed to determine which structures or components may be excluded from these criteria.	Order 6430.1A, Section 0111-99.0.1	The SEL constitutes the written evaluation required.	HNF-4531
129	Safety class items required to function during or following severe natural phenomena shall not be prevented from performing their required safety functions by the failure of components, systems, or structures that are not designed to the severe natural phenomena criteria.	Order 6430.1A, Section 0111-99.0.1	This requirement is satisfied via HNF-3885, the functions and requirements document, HNF-4252, the design requirements document, and HNF-4359, the design calculation. All of these documents were reviewed by Hassan Ziada, an independent and qualified reviewer. According to the BIO, no equipment is required to function during or after a severe natural phenomena hazard.	HNF-3885 HNF-4252 HNF-4359
130	Safety class structures shall be protected against dynamic effects ... that may result from natural phenomena, accidents at nearby facilities, ... transportation facilities, equipment failure, and similar events and conditions inside and outside the facility.	Order 6430.1A, Section 0111-99.0.1	This requirement is satisfied via HNF-3885, the functions and requirements document, HNF-4252, the design requirements document, and HNF-4359, the design calculation. All of these documents were reviewed by Hassan Ziada, an independent and qualified reviewer.	HNF-3885 HNF-4252 HNF-4359
131	The design bases for such events shall take into account their historic frequency and severity in the region of the site and the potential risk to the environment or the health and safety of the public. The type of severe events to be considered will vary among sites. However, earthquakes, tornados, straight winds and floods shall be addressed.	Order 6430.1A, Section 0111-99.0.1	Site specific design bases from DOE-STD-1020-94, Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities, were applied for earthquakes, tornados, winds, and floods. The results were included in the SDC.	HNF-4252
132	Facilities containing ... radioactive material ... shall be evaluated as to the degree of risk, and more stringent criteria applied in structural design, as necessary. Design criteria for enclosures of radioactive and other hazardous materials are provided in Section 1161, Enclosures.	Order 6430.1A, Section 0111-99.0.1	The evaluations of above-ground waste transfers in the BIO are commensurate with the degree of risk. More stringent criteria have been applied (e.g., addition of SSCs to the SEL) as a result of the BIO analyses or the design review process.	HNF-SD-WM-BIO-001
133	The design of structures, including their supports, that are confinement system barriers shall ensure satisfaction of the functional requirements for the specific confinement system they are part of.	Order 6430.1A, Section 0111-99.0.1	This criterion is applicable to the PPP, the PPP supports, the transfer encasement, and the drop leg, which collectively comprise the safety class confinement system. The design of those SSCs satisfies the functional requirements of the confinement system established in HNF-3885, Functional and Technical Criteria for the 241 SY-101 RAPID Mitigation System.	HNF-3885 HNF-4252 HNF-4359
134	In addition, safety class confinement barriers (barriers whose continued integrity is shown by a safety analysis to be required following severe natural phenomena, including the DBE, and man-made events) shall be designed to withstand secondary events as well as primary events. Potential secondary events might be fire, explosion, or nuclear criticality caused by the DBE.	Order 6430.1A, Section 0111-99.0.1	The BIO, HNF-SD-WM-BIO-001, assumes that all SSCs fail and that procedurally, the site will defer to the Hanford Alarm and Emergency Response Plan.	HNF-SD-WM-BIO-001
135	In no case shall the total combustible loading located in a fire area exceed the fire resistance rating of the area enclosure. This shall be documented in a fire risk analysis.	Order 6430.1A, Section 0111-99.0.1	Any additions to the combustible loading in the Tank Farm resultant from the RAPID Mitigation Project are extremely minor; the materials of construction of the SSCs are noncombustible. The Fire Risk Analysis incorporated by reference to the BIO is applicable.	
136	DOE site-specific hazard model studies summarized in UCRL 53526, Rev. 1 ... shall be used to select the DBT and extreme wind characteristics for the design of structures; if site-specific hazard model studies are not available, a hazard model shall be developed consistent with the approach used in UCRL 15910.	Order 6430.1A, Section 0111-99.0.2	DBT and extreme wind design bases are established in the BIO and the project's safety analysis, and are compliant with site-specific values tabulated in DOE-STD-1020 and LMH-PRO-097.	HNF-SD-WM-BIO-001 HNF-3737
137	In applying UCRL 53526, Rev. 1, specific guidance on relating frequency of occurrence to facility hazard levels shall be obtained from UCRL 15910.	Order 6430.1A, Section 0111-99.0.2	Specific guidance on relating frequency of occurrence to facility hazard levels was obtained from LMH-PRO-097, the project's safety analysis, and the BIO, which provides equivalent compliance.	HNF-SD-WM-BIO-001 HNF-3737
138	In designing for tornado or extreme wind resistance, the tornado rotational speed shall be appropriately combined with the translational speed.	Order 6430.1A, Section 0111-99.0.2	DBT and extreme wind design bases are established in the BIO, compliant with site-specific values tabulated in DOE-STD-1020, the project's safety analysis, and LMH-PRO-097.	HNF-SD-WM-BIO-001 HNF-3737
139	Resulting loads from the rate of pressure drop, taking into consideration any pressure equalization due to permissible venting, shall be combined with velocity-induced pressure loads as stipulated in UCRL 15910.	Order 6430.1A, Section 0111-99.0.2	NA as both SY-101 & SY-102 are ventilated.	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
140	UCRL 53526, Rev. 1, provides the characteristics of typical potential tornado-generated missiles. Additional missiles may be identified from review of on-site sources and possible missiles that could be borne to the site by a tornado. Both small high-velocity missiles and massive low-velocity missiles shall be considered separately in terms of penetration, perforation, or crushing effects	Order 6430.1A, Section 0111-99.0.2	DBT and extreme wind design bases are established in the BIO, compliant with site-specific values tabulated in DOE-STD-1020, the project's safety analysis, and LMH-PRO-097.	HNF-SD-WM-BIO-001 HNF-3737	
141	The horizontal and vertical velocities of the missiles shall be combined in the design.	Order 6430.1A, Section 0111-99.0.2	DBT and extreme wind design bases compliant with the subject requirement are established in the BIO, are compliant with site-specific values tabulated in DOE-STD-1020, the project's safety analysis, and LMH-PRO-097.	HNF-SD-WM-BIO-001 HNF-3737	
142	The minimum wind speed used shall be 70 mph.	Order 6430.1A, Section 0111-99.0.2	Wind speed utilized in analyses is 70 MPH as established in the project's structural design criteria.	HNF-4252 (SDC)	
143	The systems, components, and structures that shall be designed to meet these special facility criteria shall be identified through a written evaluation (see Section 0111-99.0.1, General). Such systems, components, and structures shall be designed to provide their passive or active functions as required by the SAR in accord with their designated safety classes.	Order 6430.1A, Section 0111-99.0.4	The project SEL identifies the SSCs for which this criterion is applicable. The SEL also identifies the safety class and safety functions for each SSC.	HNF-4531 (SEL)	
144	Site-specific seismic parameters shall be determined for a DBE. The SSE shall be equivalent to the DBE.	Order 6430.1A, Section 0111-99.0.4	The site-specific parameters from the BIO and from LMH-PRO-097 were applied and are incorporated by reference into the Structural Design Criteria. No separate and less restrictive seismic parameters were developed for the SSE; DBE parameters govern.	HNF-4252	
145	New seismic design, including additions or modifications to existing structures, shall be reviewed by a qualified, independent organization. This review must include evaluation of the design approach, the lateral force resisting system, and the design detailing, per UCRL-15910, TM-S-809-10 can be used for design detail guidance.	Order 6430.1A, Section 0111-99.0.4	This requirement is satisfied via the design requirements document, HNF-4252, the design calculations, HNF-4359, and meeting the requirements of the BIO, HNF-SD-WM-BIO-001. The design requirements document and the design calculations have been reviewed by Hassan Ziada, an independent and qualified reviewer.	HNF-4252	
146	Generally, a DBE shall have a ground acceleration of 0.1g or greater. To determine the DBE, site-specific earthquake hazard models and response spectra given in UCRL 53582, Rev. 1, shall be used to select the appropriate seismic ground acceleration. Design guidance in UCRL 15910 shall be used in applying UCRL 53582, Rev. 1.	Order 6430.1A, Section 0111-99.0.4	Structural Design Criteria incorporates the site-specific models and response spectra of DOE-STD-1020-94 by reference.	HNF-4252	
147	Site-specific studies can be substituted for the UCRL 53582, Rev. 1, data where no data exist or where a higher level of detail is required.	Order 6430.1A, Section 0111-99.0.4	Structural Design Criteria incorporates the site-specific models and response spectra established in LMH-PRO-097.	HNF-4252	
148	The DBE shall be defined by design response spectra, appropriate for the site, or by acceleration time histories, representative of the anticipated ground motions.	Order 6430.1A, Section 0111-99.0.4	Structural Design Criteria incorporates the site-specific models and response spectra of DOE-STD-1020-94 and implemented by LMH-PRO-097 by reference.	HNF-4252	
149	The adequacy of systems, components, and structures to withstand a seismic event shall be verified by a dynamic analysis, except where it can be demonstrated that the use of a simplified approach, such as a static load method, component testing, or a combination of testing and analysis provides assurance of adequate seismic design.	Order 6430.1A, Section 0111-99.0.4	This requirement is satisfied via HNF-3885, the functions and requirements document, HNF-4252, the design requirements document, and HNF-4359, the design calculation. All of these documents were reviewed by Hassan Ziada, an independent and qualified reviewer.	HNF-3885 HNF-4252 HNF-4359	
150	The ratio of vertical-to-horizontal acceleration shall be two-thirds, unless site-specific data justify the use of a different ratio.	Order 6430.1A, Section 0111-99.0.4	Structural Design Criteria incorporates the site-specific models and response spectra of DOE-STD-1020-94 and LMH-PRO-097 by reference. Said references incorporate the requisite ratio.	HNF-4252	
151	The use of earthquake experience data is an acceptable approach to the seismic qualification of safety class items. If experience data are used for seismic qualification, the following shall be considered: Safety class equipment shall be essentially identical to the equipment that has data in the experience data base (i.e., this comparison should take into account the manufacturer, vintage, and general configuration of such equipment); Equipment shall be mounted and anchored in essentially an identical fashion as that for the experience data base equipment, and consideration of the above and an independent review of this consideration must be adequately documented.	Order 6430.1A, Section 0111-99.0.4	Structural Design Criteria incorporates the site-specific models and response spectra of DOE-STD-1020-94 by reference. The STD-1020 data are not experience based. The remainder to this criterion is not applicable.	HNF-4252	
152	The potential effects of a major explosion at a nearby facility or transportation route shall be considered among the spectrum of external blast effects and missiles that confinement structures shall be designed to withstand or against which they shall be protected.	Order 6430.1A, Section 0111-99.0.6	The hazards for this project were evaluated at a HAZ OPS session and documented in HNF-3966.	HNF-3966	
153	The probable consequence of DBAs involving internally generated missiles or blast effects shall be considered. Such DBAs typically involve failure of high-speed rotating machinery, cranes, experimental facilities, high-energy fluid system components, or explosives.	Order 6430.1A, Section 0111-99.0.7	No credible DBAs involving internally generated missiles or blast effects are identified in the BIO or HAZ OPS.	HNF-SD-WM-BIO-001 HNF-3966	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
154	Structures required to function following such accidents shall be designed to withstand these DBAs.	Order 6430.1A, Section 0111-99.0.7	There are no SSCs within the scope of this criterion.	N/A	
155	Safety class structures and structural members shall be designed to resist the appropriate load combinations provided in UCRL 15910.	Order 6430.1A, Section 0111-99.0.8	Equivalent appropriate load combinations are specified in SDC. All safety class equipment is in compliance, as demonstrated in analyses contained in the project's calculations, save for the effects of wind-driven missiles acting on instrument enclosures. The effects of wind-driven missiles on instrument enclosures is not applicable to this project, as interpretation is to be issued by the LMHC chief engineer.	HNF-4252	
156	Concrete structures and structural members for safety class concrete structures shall meet the design and construction requirements of ACI 349 for new construction or original (or equivalent) codes for existing construction providing the margin of safety of the overall facility is maintained.	Order 6430.1A, Section 0111-99.0.8	There are no safety class concrete structures within the scope of the project.	N/A	
157	Safety class steel structures shall meet the design, fabrication, and erection requirements of AISC N690 for new construction or original (or equivalent) codes for existing construction providing the margin of safety of the overall facility is maintained.	Order 6430.1A, Section 0111-99.0.8	The ASME B31.3 Process Piping code with additional inspection requirements will be used to ensure that safety class steel structures are suitable for safety class functions. This is an appropriate equivalent compliance with the criterion.		
158	Facility design shall be conducted under QA requirements to ensure that the established program and project quality objectives are satisfied.	Order 6430.1A, Section 0140	The existing TWRS Quality Assurance Program Plan, HNF-IP-0842, Volume XI, Sec. 1.1, is implemented for this project.	HNF-IP-0842, Volume XI, Sec. 1.1.	
159	A QA program shall be developed and implemented in compliance with DOE 5700.6B and using the elements of DOE 4700.1 and ANS/ASME NQA-1.	Order 6430.1A, Section 0140	The existing TWRS Quality Assurance Program Plan, HNF-IP-0842, Volume XI, Sec. 1.1, is implemented for this project.	HNF-IP-0842, Volume XI, Sec. 1.1.	
160	not used	N/A	N/A	N/A	
161	not used	N/A	N/A	N/A	
162	The selection of sites for new facilities shall comply with DOE 4300.1B.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
163	Site development and facility utilization planning shall comply with DOE 4300.1B.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
164	Site development planning for energy management shall comply with DOE/MA 0129.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
165	A site development plan shall be used to locate new facilities on existing or new sites to assure effective site utilization and to preclude future conflicts between existing and new facilities.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
166	During site selection for new facilities the following conditions and requirements shall be considered: Programmatic and operating efficiency; Natural topographic and geologic conditions; Endemic plant and animal species; Existence of known RCRA and/or CERCLA sites; Special siting requirements for facilities containing, using, or processing hazardous materials; Health, safety and environmental protection requirements; Indoor air quality impacts (e.g., presence of radon in foundation soils, building materials that off-gas irritating-chemical vapors and the need to "bake out" new buildings prior to occupancy); Hazardous operations and consequences of potential accidents in adjacent facilities; Natural hazards including seismic activity, wind, hurricane, tornado, flood, hail, volcanic; Physical protection requirements; Security and safeguard requirements; Adequacy of existing or planned support and service facilities, including utilities, roads, and parking areas; Interrelationships between facilities and aesthetic compatibility; Energy conservation requirements.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
167	Location analyses performed during the preparation of CDRs shall consider but not be limited to these same criteria	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102		
168	The NEPA/DOE 5440.1C require the preparation of an environmental assessment prior to the initiation of a government action that may significantly affect the environment. These requirements shall be considered during facility siting.	Order 6430.1A, Section 0200-1	HNF-3824, Tank 241 SY-101 Surface Level Rise Remediation Project Plan, identifies the appropriate level of NEPA consideration. Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102		
169	To the extent possible, facility siting shall preclude the use of floodplains or areas subject to flash floods and shall minimize destruction, loss, or degradation of wetlands.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	
170	Radiological siting requirements shall be considered during site selection and facility planning efforts.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102	N/A	

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
171	For those facilities in which radioactive materials are processed, used, or stored, or those facilities that incorporate radiation-producing machines, the acceptability of the site shall be evaluated in terms of potential radiological consequences.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102. Potential radiological consequences are evaluated in the BIO and RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, DRAFT.	N/A
172	Radiation dose to an off-site individual receiving maximum exposure shall be evaluated. For both on-site and off-site individuals, emergency response planning shall be an important criterion in determining the acceptability of a site.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102. Radiation dose to the maximally exposed off site individual is evaluated in the BIO and RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, Emergency response planning for the transfer operations phase will be within the scope of the existing TFFO Emergency Response Plan.	TWR-4176 HNF-3737 HNF-SD-WM-BIO-001
173	Dose shall be calculated and compared to the dose guidelines established below. Comparisons shall be based on a 50-year committed effective dose equivalent.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176
174	The off-site individual receiving the maximum dose shall be assumed to be located at the point of highest concentration (or highest exposure rate) outside the boundary controlled by the site.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis document, HNF-3737.	TWR-4176 HNF-3737
175	Meteorological conditions used in dose calculations shall be representative of unfavorable dispersion, determined by comparing the 0.5 percent dispersion factors (X/Q) for each sector to the 5-percent overall site X/Q and selecting the highest value.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis document, HNF-3737.	TWR-4176 HNF-3737
176	The dose assessment shall consider both the duration of the event and, consistent with emergency response capability to control or evacuate individuals, the duration of exposure.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis document, HNF-3737.	TWR-4176 HNF-3737
177	The duration of exposure should not exceed two hours.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis document, HNF-3737.	TWR-4176 HNF-3737
178	The dose calculated shall be compared to the numerical guidelines within 0200-1.2, Radiological Siting Guidelines.	Order 6430.1A, Section 0200-1	Requirements of this criterion are met by RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis document, HNF-3737.	TWR-4176 HNF-3737
179	Consideration shall be given to on-site individuals.	Order 6430.1A, Section 0200-1	The BIO, the project's safety analysis (HNF-3737), and RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, present radiological evaluations applicable to on-site individuals.	TWR-4176 HNF-3737 HNF-SD-WM-BIO-001
180	Prudent measures associated with the radiological protection of on-site personnel and in conjunction with the on-site emergency response planning, as required through implementation of DOE 5500.3, Planning and Preparedness for Operational Emergencies, shall be incorporated into the design and siting of a new facility.	Order 6430.1A, Section 0200-1	Compliance with this criterion is/will be achieved by implementation of an existing Tank Farm program, plan, or procedure.	TWR-4176
181	Information on the siting evaluation, including the models, parameters, and assumptions used in the dose calculations shall be documented for use in the facility's SAR and emergency response plans. See DOE 5440.1C and DOE 5481.1B.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102.	N/A
182	The following siting guidelines apply to off-site individuals receiving maximum dose from exposure to internally-deposited radioactive materials and/or to radiation from external sources. Guidelines are based on a 50-year committed dose equivalent. The maximum calculated dose shall not exceed 25 rem to the whole body, 300 rem to the thyroid, 300 rem to the bone surface, 75 rem to the lung, or 150 rem to any other organ. If multiple organs receive doses from the same exposure, the effective dose equivalent from all sources shall not exceed 25 rem when calculated by using the ICRP Report No. 26 weighting factors.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102. Compliance with the radiological requirements of this criterion for the project site are documented in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and the project's safety analysis (HNF-3737).	TWR-4176 HNF-3737
183	These siting guidelines (from above) apply to nonreactor nuclear facilities. When calculating these doses, degraded performance of ESF and administrative controls shall be assumed unless they can be clearly shown to be unaffected by the accident (capable of performing their safety function) by proper design, installation, testing, and maintenance according to prescribed standards.	Order 6430.1A, Section 0200-1	Application of site selection criteria from this Order is not appropriate, since the project site is fixed by the location of SY-101 and SY-102. Compliance with the radiological requirements of this criterion for the project site are documented in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	N/A
184	For permanent structures, subsurface conditions shall be determined by means of borings or other methods that adequately disclose soil and groundwater conditions.	Order 6430.1A, Section 0201	There are no "permanent structures" within the scope of the project. Subsurface conditions are determined from existing Tank Farm data.	N/A
185	Data and other information obtained from prior subsurface investigations shall be used, supplemented by additional investigations at the specific location as deemed necessary by the design professional.	Order 6430.1A, Section 0201	Existing data were used. Additional investigations were not deemed necessary (SDC).	N/A

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-01 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
186	Subsurface investigations shall be made for critical facilities.	Order 6430.1A, Section 0201	Exploratory "digs" were conducted to adequately site the P3. The transfer line design eliminated the need for "sub-surface" exports when the O/G Hose-In-Hose concept was adopted.	HNF-4359
187	Subsurface investigations shall be performed under the direction of a qualified soils engineer.	Order 6430.1A, Section 0201	Exploratory "digs" were conducted to adequately site the P3. The transfer line design eliminated the need for "sub-surface" exports when the O/G Hose-In-Hose concept was adopted.	HNF-4359
188	In earthquake-prone areas, appropriate geological investigations shall be made to determine the contribution of the foundation (subsurface) to the earthquake loads imposed on the structure and shall include, but not be limited to, a recommendation of foundation type, determinations of allowable soil bearing design capacity, and the possible effects of seismic activity on the soil mass.	Order 6430.1A, Section 0201	Existing data were used. Support types are as specified in the SDC and project drawings.	
189	A settlement analysis under differential design loads shall be performed where differential settlement may cause structural or architectural damage.	Order 6430.1A, Section 0201	Existing data were used. Additional analyses were not deemed necessary (SDC).	HNF-4359
190	The soils engineer shall analyze the information developed by investigation or otherwise available, including any aspect of the soil conditions that might affect design and construction of proposed structures, and shall consult with the engineer on the design requirements of the project.	Order 6430.1A, Section 0201.4	Existing data were used. Additional analyses related to the PPP and transfer line are in progress.	HNF-4359
191	The soils engineer shall submit a professional evaluation, recommended construction specifications, and recommendations including the following where applicable: Foundation support of the structure and slabs, including soil bearing pressures, bearing elevations, foundation design recommendations and anticipated settlement. ... Soil material and compaction requirements for site fill, construction backfill, and for the support of structures and pavement. ... Seismic activity. Frost penetration depth and effect. Analysis of the effect of weather and construction equipment on soil during construction. Analysis of soils to ascertain presence of dispersive potentially expansive, deleterious, chemically active or corrosive materials or conditions, or presence of gas. Recommendation of the most proper foundation system and other alternative workable systems, ...	Order 6430.1A, Section 0201.4	The required evaluations, recommended construction specifications, and recommendations are incorporated in HNF-4349, Transfer System Calculations.	HNF-4359
192	Construction, control, property and topographic surveys shall be coordinated with the cognizant DOE authority.	Order 6430.1A, Section 0202	No construction, control, property, or topographic surveys are required for the project.	N/A
193	Where feasible, surveying support available from DOE contractors shall be used.	Order 6430.1A, Section 0202	Survey support required to identify as-built elevation of the floor of the PPP is by FDNW, a recognized DOE contractor.	N/A
194	Survey field notes shall be legibly recorded on standardized (8-1/2 inch x 11 inch) field note forms.	Order 6430.1A, Section 0202	Survey field notes are or will be recorded on standardized field note forms which measure 8 1/2" x 11".	N/A
195	Field notes and final plots of surveys shall be furnished to the cognizant DOE authority.	Order 6430.1A, Section 0202	Field notes resulting from survey of the as-built elevation of the floor of the PPP shall be furnished to the cognizant DOE authority.	N/A
196	Any boundary surveys and recorded maps shall be forwarded to the DOE Operations Office.	Order 6430.1A, Section 0202	No boundary surveys or recorded maps are to be prepared to support construction or operation of the project.	N/A
197	The degree of accuracy for construction, control, property, and topographic surveys shall be consistent with the nature and importance of each survey.	Order 6430.1A, Section 0202	No construction, control, property, or topographic surveys are required for the project.	N/A
198	Each DOE Facilities Engineering Group shall be responsible for establishing, recording, and perpetuating primary on-site horizontal and vertical control monumentation.	Order 6430.1A, Section 0202	No monumentation additions or changes are required for the project.	N/A
199	Temporary on-site horizontal and vertical control monumentation shall comply with ACSM NGS 3.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A
200	The location and description of all temporary control monuments in the immediate vicinity of new construction shall be provided on construction drawings.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A
201	Temporary control monuments shall be 5/8-inch diameter mild steel bars or 3/4-inch diameter iron pipe with a minimum length of 2 feet.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A
202	In loose sand or unstable soil, such temporary control monuments shall have a minimum length of 3 feet.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A
203	With written approval from the cognizant DOE Facilities Engineering Group, manhole rims, markings chiselled in concrete, PK nails in asphalt, and lead and tack in bedrock or concrete shall be suitable alternative temporary control monuments.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
204	Three guard posts with reflective paint striping shall be installed adjacent to temporary control monuments in high traffic areas to preclude vehicular damage.	Order 6430.1A, Section 0202	No temporary monumentation is required for the project.	N/A
205	Utility locations shall take into consideration the following: Location, size, and elevation of sanitary sewers, storm drains or open drainage channels, drain inlets and manholes; Location, size, and elevation of water, gas, heat transmission mains and underground electrical service; Location and size of overhead electric service, street lighting, and telephone lines, including pole and manhole locations; Location of fire alarm call boxes.	Order 6430.1A, Section 0203	Applicable configurations of existing utilities were considered during the design review process.	HNF-4519, Design Review Report
206	Above-ground utility features shall not be located in front of, or in such a manner as to detract from the facility. They shall not make landscaping more difficult or restrict or negate close-in recreational areas.	Order 6430.1A, Section 0203	Utilities associated with the project are temporary. No landscaping or recreational areas are impacted.	N/A
207	Separation of utilities from security-related equipment must be considered when planning utility installations. A special emphasis should be given to maintaining clear ground around security fences and in security areas. Utilities that penetrate or pass under a security barrier through an opening of more than 96 square inches in smallest dimension shall provide the same degree of penetration delay as is required for the security barrier.	Order 6430.1A, Section 0203	No interfaces with existing security barriers are within project scope	N/A
208	Facilities where radioactive or other hazardous contaminating materials will be used or will result from facility operation shall be designed to limit dispersion and simplify periodic decontamination and ultimate facility decommissioning and disposal or reuse. Requirements are provided in Section 1300-11, Decontamination and Decommissioning.	Order 6430.1A, Section 0205	Design elements that limit dispersion of radioactive materials include: the safety class confinement system (PPP, transfer encasement, and drop leg), which prevents release of materials for dispersal; and the PPP cover, which mitigates the spread of material and generation of aerosols in the event of a spray leak.	HNF-4531
209	Prior to earthwork design, the design engineer shall confer with the soils engineer to define subsurface investigation recommendations required in accordance with Section 0201, Subsurface Investigations.	Order 6430.1A, Section 0220	Design elements that simplify periodic and ultimate decontamination include the PPP spray ring and the transfer line flush capability of the water support skid	LMH-PRO-097
210	The earthwork design and specification shall comply with the recommendations in the project subsurface investigation.	Order 6430.1A, Section 0220	No site-specific subsurface investigations are needed as the design meets requirements as specified in LMH-PRO-097	N/A
211	Building foundations shall be designed in accordance with the requirements of the UBC and ACI 318.	Order 6430.1A, Section 0235-1	No earthwork design is within project scope	HNF-4252
212	Based on preliminary information concerning the purpose of the structure, foundation loads, and subsurface soil conditions, the design professional shall consider alternative types of foundations.	Order 6430.1A, Section 0235-2	Requirements applicable to system supports are incorporated in SDC. Piers intended to support the PPP meet the applicable requirements of the UBC and ACI 318 for soil bearing, stability, and concrete design.	HNF-4519
213	Where reasonable alternative design foundation types are possible, preliminary designs shall be prepared for the purpose of detailed cost comparisons.	Order 6430.1A, Section 0235-2	Alternatives were informally considered by design engineers and reviewers (HNF-4519, Design Review Document for SY-101 RAPID project). Cost, purpose, and timeliness support the current design of piers for the prefabricated pump pit.	HNF-4519
214	Final foundation design shall not be initiated until the evaluation and cost comparison of the proposed alternatives have been completed.	Order 6430.1A, Section 0235-2	Alternatives were informally considered by design engineers and reviewers (HNF-4519, Design Review Document for SY-101 RAPID project). Design of supports is based on functional requirements. Cost differences between alternatives are not of significant amount to impact selection.	HNF-4519
215	Concrete for building foundations shall be designed in accordance with Section 0330, Cast-in-Place Concrete.	Order 6430.1A, Section 0235-3	Cast-in-place concrete utilized for this project is in accordance with the applicable requirements of Section 0330. Dwg H-14-103668 requires cast-in-place concrete comply with HNF-4169, Appendix C which invokes ACI 301. ACI 301 incorporates the requirements of ACI 211 and ACI 304. Said drawing also invokes the requirements of ACI 305R for hot weather concreting. Standards included in Section 0330 include ACI 318, but this specification is not appropriate for the subject concrete, as the application is specifically outside the scope of ACI 318, per the provisions of ACI 318 Paragraph 1.1.5.	HNF-4169
216	Heavy, vibration-producing equipment, such as high-pressure air compressors, chillers, fire pumps and engine/generator sets, shall have separate, isolated foundations.	Order 6430.1A, Section 0235-8	This criterion was considered for applicability to the NGTF. The manufacturer's design report includes a dynamic analysis, which does not require separate or isolated support. Reference Model 2A-513-A1 Lead Unit Final Design Report Addendum, S.O. V001, Engineering Memorandum 6673, Revision 3, Westinghouse Electric Corporation, April 30, 1997, Chapter 10, "Dynamic Analysis."	HNF-4169, Appendix C H-14-103668

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
217	A structural vibration analysis and design shall be provided for vibration equipment, where appropriate.	Order 6430.1A, Section 0235-8	This criterion was considered for applicability to the NGTP. The manufacturer's design report includes a dynamic analysis, which does not require separate or isolated support. Reference Model 2A-513-A1 Lead Unit Final Design Report Addendum, S.O. V001, Engineering Memorandum 6873, Revision 3, Westinghouse Electric Corporation, April 30, 1997, Chapter 10, "Dynamic Analysis."		
218	Concrete materials, design, and construction for ... structures shall comply with ACI 318 and 40 CFR 249.	Order 6430.1A, Section 0301	The SDC imposes ACI compliance on suppliers for design and construction. Concrete piers fabricated to support the PPP in service are outside the scope of ACI Standard 318, per the provisions of ACI 318, Paragraph 1.1.5. 40 CFR 249, a federal regulation regarding the use of solid waste in concrete fabrication, is no longer in force and therefore not applicable to the project.	HNF-4252	
219	Reinforcement materials for ... structures shall comply with ACI 318	Order 6430.1A, Section 0320	The SDC imposes ACI compliance on suppliers for design and construction. Concrete piers fabricated to support the PPP in service are outside the scope of ACI Standard 318, per the provisions of ACI 318, Paragraph 1.1.5.	HNF-4252	
220	Reinforcement details shall comply with ACI 352R and ACI SP-66 in addition to ACI 318 for ... structures	Order 6430.1A, Section 0320	Concrete piers fabricated to support the PPP in service are outside the scope of ACI Standard 352R and ACI SP-66. Piers are also outside the scope of ACI 318, per the provisions of ACI 318, Paragraph 1.1.5.		
221	... [P]recast concrete shall comply with the PCI MNL-116, Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.	Order 6430.1A, Section 0340	Per HNF-4169, RAPID Mitigation Prefabricated Pump Pit (PPP), Section 3.4 and Appendix C, piers comply with ACI Standards 117 and 301, and ASTM Standards A615, C31, C33, C94, C143, C173, C280, and C494, as required by Divisions III through VI of PCI MNL-116. Quality Control requirements in force for the design and fabrication of the piers is in compliance with NQA-1, which meets or exceeds the requirements of PCI MNL-116, Division I.		
222	Structural steel for ... structures shall comply with the UBC.	Order 6430.1A, Section 0512	The Structural Design Criteria, as well as HNF-4043, Specification for SY-101 RAPID Mitigation Mobile Water Support Skid, HNF-4169, Specification for SY-101 RAPID Mitigation Prefabricated Pump Pit, HNF-4170, Specification for SY-101 RAPID Mitigation Transfer Pump Piping and HNF-4216, Specification for SY-101 RAPID Mitigation System Anti-Siphoning Slurry Distributor Assembly incorporate the requirements of UBC by reference.	N/A	
223	Structural steel for ... structures shall comply with AISC S326, Specification for the Design, Fabrication and Erection of Structural Steel for Buildings (included in AISC Manual of Steel Construction).	Order 6430.1A, Section 0512	AISC S326 is related to buildings designed for human occupancy. No such structures are incorporated in the project's design.		
224	Structural steel for ... structures shall comply with AISC M011, Manual of Steel Construction	Order 6430.1A, Section 0512	Structural steel utilized in the construction of project components is per ASTM A36, as required by the AISC Manual of Steel Construction.	HNF-4169	
225	Structural connections for ... structures shall comply with the requirements of the UBC	Order 6430.1A, Section 0532	The Structural Design Criteria, as well as HNF-4043, Specification for SY-101 RAPID Mitigation Mobile Water Support Skid, HNF-4169, Specification for SY-101 RAPID Mitigation Prefabricated Pump Pit, HNF-4170, Specification for SY-101 RAPID Mitigation Transfer Pump Piping and HNF-4216, Specification for SY-101 RAPID Mitigation System Anti-Siphoning Slurry Distributor Assembly incorporate the requirements of UBC by reference, and/or by analysis contained in the project's supporting calculations.	HNF-4252 HNF-4169 HNF-4170 HNF-4043 HNF-4216 HNF-4359	
226	Structural connections for ... structures shall comply with the requirements of AISC M011, Manual of Steel Construction.	Order 6430.1A, Section 0532	The Structural Design Criteria, as well as HNF-4043, Specification for SY-101 RAPID Mitigation Mobile Water Support Skid, HNF-4169, Specification for SY-101 RAPID Mitigation Prefabricated Pump Pit, HNF-4170, Specification for SY-101 RAPID Mitigation Transfer Pump Piping and HNF-4216, Specification for SY-101 RAPID Mitigation System Anti-Siphoning Slurry Distributor Assembly incorporate appropriate codes and standards to ensure structural connections conform to the AISC Manual of Steel Construction. Basis of analysis of these connections included in the project's supporting calculations demonstrate compliance with the imposed standards.	HNF-4252 HNF-4169 HNF-4170 HNF-4043 HNF-4216 HNF-4359	
227	Welding of structures shall comply with AWS D1.1, Structural Welding Code - Steel	Order 6430.1A, Section 0532	The Structural Design Criteria, as well as HNF-4043, Specification for SY-101 RAPID Mitigation Mobile Water Support Skid, HNF-4169, Specification for SY-101 RAPID Mitigation Prefabricated Pump Pit, HNF-4170, Specification for SY-101 RAPID Mitigation Transfer Pump Piping and HNF-4216, Specification for SY-101 RAPID Mitigation System Anti-Siphoning Slurry Distributor Assembly incorporate the requirements of AWS D1.1 by reference. Specifically, each Specification invokes FDNW-WS-7, Welding of Stainless Steel and Nickel Alloy Structural and Other Components, which includes applicable requirements of the AWS standard.		
228	Welding of structures shall comply with AWS D1.2, Structural Welding Code - Aluminum	Order 6430.1A, Section 0532	There are no SSCs within the scope of this criterion.		
229	Welding of structures shall comply with AWS D1.3, Structural Welding Code - Sheet Steel	Order 6430.1A, Section 0532	There are no SSCs within the scope of this criterion.		

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
230	Welding of structures shall comply with AWS D5.2, Standard for Welded Steel, Elevated Tanks, Standpipes and Reservoirs for Water Storage.	Order 6430.1A, Section 0532	There are no SSC's within the scope of this criteria. The Water Skid Storage tank is fiberglass.	HNF-4043 H-14-103805.
231	In the planning and design of new facilities, economy in finishes shall be considered in terms of the character of the facility.	Order 6430.1A, Section 0900-1	This criterion is not appropriate to the system, as "character" is not a meaningful attribute.	
232	In the planning and design of new facilities, economy in finishes shall be considered in terms of functional requirements of the facility.	Order 6430.1A, Section 0900-1	Surface finish SSC's are defined by procurement specification and are based on the functional requirements of service life, maintenance, and decontamination.	HNF-4169 HNF-4216
233	In the planning and design of new facilities, economy in finishes shall be considered in terms of LCC.	Order 6430.1A, Section 0900-1	Process control, maintenance, and decontamination requirements provide override surface finish requirement for the SY-101 RAPID irrigation system. Considering of finish in terms of LCC is not warranted for this system.	
234	In the planning and design of new facilities, economy in finishes shall be considered in terms of functional requirements of the facility.	Order 6430.1A, Section 0900-1	Surface finish SSC's are defined by procurement specification and are based on the functional requirements of service life, maintenance, and decontamination.	HNF-4169 HNF-4216
235	Where radiological contamination can occur, paint finishes shall comply with ANSI N512.	Order 6430.1A, Section 0900-3	SSC's where radioactive materials are processed or handled, and contamination can occur, have washable, not painted, finishes (SS, rms124).	
236	This item number is not used.	n/a	n/a	n/a
237	[The] DOE project manager shall provide the design professional criteria on the location, size, fume imposition, and operating schedule for enclosures.	Order 6430.1A, Section 1161-1	The applicable elements of this criterion were provided in FY 99 PA 6.1.5, incorporated into HNF 3824, Tank 241 SY-101 Surface Level Rise Redemption Project Plan.	HNF-3824
238	The design objective shall be to prevent exposure of the plant personnel to airborne contamination and shall implement ALARA concepts as practical to minimize operator exposures.	Order 6430.1A, Section 1161-1	The design objective is established in Functional Requirements and Technical Criteria for the 241 SY-101 RAPID Mitigation System and RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering report.	HNF-3885 TWR-4176
239	The enclosure system, including its internal and external support structures, shall be designed to withstand the effects of normal operating conditions and the environment.	Order 6430.1A, Section 1161-1	Normal operating conditions and environment are defined and established as design bases in Functional Requirements and Technical Criteria for the 241 SY-101 RAPID Mitigation System and SDC.	HNF-3885 HNF-4252
240	DBAs such as fire, explosion, ... and natural phenomena shall be considered in the design of the enclosure.	Order 6430.1A, Section 1161-1	DBAs are defined and analyzed in the BIO and are established as design bases in Functional Requirements and Technical Criteria for the 241 SY-101 RAPID Mitigation System. Natural phenomena hazards are mitigated within structural design criteria document HNF-4252.	HNF-3885 HNF-4252
241	Enclosure stability during a seismic event shall be based on the seismic parameters described in Section 0111-99.0.4, Earthquakes.	Order 6430.1A, Section 1161-1	Seismic parameters are defined in the BIO and are established as design bases in Functional Requirements and Technical Criteria for the 241 SY-101 RAPID Mitigation System. Seismic parameters conforming to the specified requirement are implemented within structural design criteria. HNF-4252.	HNF-3885 HNF-4252
242	Where practical and without penetrating the enclosure, all equipment components not functionally required to operate directly in the presence of radioactive materials shall be located outside the enclosure.	Order 6430.1A, Section 1161-1	Equipment not functionally required to operate directly in the presence of radioactive materials is located outside the enclosure. Other SSCs comprise parts of the "enclosure".	HNF-4519, Design Review Report
243	All equipment that must be located within the enclosure shall be designed to allow for in-place maintenance and/or replacement.	Order 6430.1A, Section 1161-1	All equipment within project enclosures (PPP, drop leg) is capable of being removed and replaced. And allowance for in place maintenance exists for equipment that require it.	HNF-4170 HNF-4216 HNF-4235
244	The design ... of support and protection systems ... shall not promote the failure of the enclosure system integrity or the loss of confinement.	Order 6430.1A, Section 1161-1	Design requirements included the maintenance of the enclosure system integrity. The enclosure system was designed to require minimal maintenance and be robust.	HNF-4169 HNF-4216 HNF-4407
245	Noncombustible or fire-resistant and corrosion-resistant materials shall be used for enclosures.	Order 6430.1A, Section 1161-2	PPP, drop leg enclosure SSCs are Stainless Steel. Transfer line encasement is non-combustible. And fire resistant within the range of operation temperatures specified by the Functional Requirements and technical criteria for the 241 SY-101 RAPID mitigation system.	HNF-4169 HNF-4216 HNF-3885
246	Noncombustible or fire-resistant and corrosion-resistant materials shall be used, to the maximum extent practicable, for any required radiation shielding.	Order 6430.1A, Section 1161-2	Specified radiation shielding materials for the Mitigation System are limited to concrete, SS, and lead. Lead blankets outer and inner cover are made from fire resistant, nuclear grade material (LANCS Industries, Section 200)	HNF-3868, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102
247	In no case shall the total combustible loading located in a fire area exceed the fire resistance rating of the structural envelope (see Section 0110-99.0.6, Fire Resistance). This shall be documented in a fire risk analysis performed according to a methodology approved by the DOE Fire Protection Authority.	Order 6430.1A, Section 1161-2	The SSCs of the mitigation system are not located in a fire area.	N/A
248	Enclosures ... shall be designed with the objective of being leak-tight.	Order 6430.1A, Section 1161-2	All SSCs of the enclosure are designed to be leak tight to the level appropriate to their release prevention or mitigation functions. The Prefabricated Pump Pit cover is intended to allow sufficient inleakage of ambient air so that the active ventilation system of SY-102 can maintain the interior of the Pit at a negative pressure.	HNF-4169 HNF-4216 HNF-4407
249	In conjunction with their ventilation systems, all enclosures shall be capable of maintaining confinement (i.e., negative pressure with respect to the surrounding operating area).	Order 6430.1A, Section 1161-2	The SSCs of the enclosure are safety class and maintain confinement in conjunction with the ventilation system of SY-102	HNF-4169 HNF-4216 HNF-4407

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
250	Without their associated ventilation systems enclosures shall be designed with appropriate physical features to provide an essentially leak-tight confinement ... for the contaminants they handle.	Order 6430.1A, Section 1161-2	Physical features of enclosures utilized to confine and contain contaminants associated with the project's waste transfer function have been demonstrated to be leak tight, with or without associated ventilation, for containment volumes up to and including that defined by the BIO, by means of acceptance testing and performance of the project's operational test procedure.	HNF-4360 RPP-4892 HNF-SD-WM-BIO-001 OTP-440-003	
251	Enclosure specifications should include the following standardized features, where applicable: Ease of cleaning (radius corners, smooth interior and exterior surfaces, minimal protruberances, and accessibility of all parts) Adequate interior illumination (from fixtures mounted on the exterior where feasible) Connections for services lines, conduits, instrument leads and ductwork Fire barriers and filter installation. Sample removal ports Pressure differential readouts.	Order 6430.1A, Section 1161-2	Applicable features are included in individual SSC specifications	HNF-4169 HNF-4216 HNF-4407	
252	... closure devices or permanent seals shall be provided on entrances and exits of piping, ducts, or conduits penetrating confinement barriers. Such closures or seals shall have an integrity equal to or greater than the barrier itself.	Order 6430.1A, Section 1161-2	No piping, ducts, or conduits penetrate confinement barriers established to confine and contain contaminants in the project's design, except for the conduit passage for the leak detector cabling servicing the ASSD. While the barriers associated with this conduit passage do not have an integrity greater than or equal to the solid steel barrier of the ASSD confinement itself, it provides an adequate barrier for the intended application.	HNF-4169 HNF-4216 HNF-4407	
253	Where pertinent to safety, the enclosure design shall consider the heat generation in the enclosure.	Order 6430.1A, Section 1161-2	Heat generation within the enclosure is not pertinent to safety, the criterion is not applicable.	N/A	
254	Consideration shall be given to modular construction, versatility, relocation, and incorporation of shielding.	Order 6430.1A, Section 1161-2	Modular construction is incorporated into the system design in the case of the water support skid, which is separated from radioactive materials and could conceptually be relocated for another use. Other SSCs are custom designed for unique locations and configurations. Structural strength and mounting apertures for shielding are incorporated into the PPP and riser extension design.	HNF-4043 HNF-4169 HNF-4216	
255	Structural support shall be provided to accommodate any anticipated loading resulting from shielding.	Order 6430.1A, Section 1161-2	Structural strength and mounting apertures for shielding are incorporated into the PPP design, ASSD design, and transfer line support design analyses.	HNF-4359	
256	Discrete work stations or process areas shall be separated from each other by a barrier designed to prevent the spread of fire based on safety analysis review.	Order 6430.1A, Section 1161-2	Safety analysis (BIO) does not identify any appropriate applications of this criterion to the Mitigation System design.	N/A	
257	[Fire detection shall be installed.	Order 6430.1A, Section 1161-3	Summary of Tank 241 SY-101 Waste Transfer Hazard and Accident Analyses, Safety, Structures, Systems, and Components, and Technical Safety Requirements does not establish any requirement for new fire detection instrumentation.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102.	
258	Provisions shall also be made for manual fire suppression where deemed necessary.	Order 6430.1A, Section 1161-3	Summary of Tank 241 SY-101 Waste Transfer Hazard and Accident Analyses, Safety, Structures, Systems, and Components, and Technical Safety Requirements does not establish any requirement for new manual fire suppression equipment.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102.	
259	Fire detection systems shall be integrated with any central alarm location and any associated automatic fire suppression systems.	Order 6430.1A, Section 1161-3	There are no applicable fire detection systems	N/A	
260	A ventilation system shall be installed on all enclosure systems to maintain a minimum negative pressure differential of 0.3 in. of water inside the enclosure with respect to the operating area.	Order 6430.1A, Section 1161-4	All enclosures as defined in the order are ventilated as required by the SY-102 tank ventilation system, via the siphon break in the drop leg assembly	HNF-4170 HNF-4407 HNF-4216	
261	Safety class items of the ventilation system shall be supplied with emergency power.	Order 6430.1A, Section 1161-4	The TWRS Safety Equipment List states that the SY-101 ventilation system has safety class power.	HNF-SD-WM-SEL-040	
262	[For safety class items,] [failure of any single component or control function shall not compromise minimum adequate ventilation.	Order 6430.1A, Section 1161-4	The TWRS Safety Equipment List states that the SY-101 ventilation system has safety class power.	HNF-SD-WM-SEL-040	
263	The design professional shall consider the possible necessity to remove moisture, heat, and explosive and corrosive gases, as well as other contaminants.	Order 6430.1A, Section 1161-4	This requirement was considered in the design by connection to the ventilation system through SY-102.	HNF-3824	
264	HEPA filters shall be provided at the interface of the enclosure outlet and the ventilation system to minimize the contamination of ductwork and at the enclosure inlet to prevent movement of contamination within the enclosure to the operating area in the event of a flow reversal. A roughing filter should be installed to reduce HEPA filter loading.	Order 6430.1A, Section 1161-4	The RAPID Mitigation System is integrated with and relies on the SY tank farm ventilation system, which incorporates the requisite filters.	H-2-37745, 241-SY Ventilation Plan	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
265	The system shall be designed to automatically ensure adequate inflow of air through a credible breach in the enclosure system. Minimum inward air velocity shall be 125 plus or minus 25 linear fpm or as determined from guidance provided in the ACGIH Industrial Ventilation Manual.	Order 6430.1A, Section 1161.4	The RAPID Mitigation System is integrated with and relies on the SY tank farm ventilation system, which incorporates adequate capacity to provide the required inflow rate. Should a breach of the ventilation system's enclosed volume sufficient to reduce inflow below mandated rates occur, alarm systems and operational responses are in place to mitigate or prevent unwanted release of contamination.	H-2-37745, 241-SY Ventilation Plan	
266	The design of the enclosure ventilation flow pattern shall minimize the spread of fire, and fire screens shall be provided where necessary.	Order 6430.1A, Section 1161.4	The RAPID Mitigation System is integrated with and relies on the SY tank farm ventilation system, which incorporates the requisite flow patterns.	H-2-37745, 241-SY Ventilation Plan	
267	For enclosures where overpressurization is possible, a system shall be provided to ensure that confinement is not breached.	Order 6430.1A, Section 1161.4	Design of PPP cover ensures overpressurization is not possible.	HNF-4169	H-14-103571
268	Shielding, shape, size, and any other pertinent design criteria for all enclosures ... and process equipment should be coordinated with operations requirements to ensure continuity and performance of operations.	Order 6430.1A, Section 1161.5	The required coordination results from Tank Waste Operations personnel participation in the design review process.	HNF-4519, Design Review Report	
269	The design of special facilities shall: Protect the public and facility personnel from hazards associated with the use of radioactive and other hazardous materials as a result of normal operations, anticipated operational occurrences, and DBA conditions, including the effects of natural phenomena pertinent to the site, and maintain these effects ALARA.	Order 6430.1A, Section 1300-1.3	The BIO analyses, the project's safety analysis, and amended AB document demonstrate compliance with this criterion	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 HNF-3737	
270	The design of special facilities shall: Ensure compliance with DOE policies regarding nuclear safety, ... radiation safety, ... industrial safety, fire protection, environmental protection...	Order 6430.1A, Section 1300-1.3	The BIO and project safety analyses and amended AB, as well as this compliance matrix, document compliance with this criterion	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 HNF-3737	
271	The design of special facilities shall: Protect government property and essential operations from the effects of potential accidents	Order 6430.1A, Section 1300-1.3	The BIO and project safety analyses and amended AB document compliance with this criterion	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 HNF-3737	
272	Minimize exposures of personnel and the general public to hazardous materials by emphasizing ALARA concerns during all design, construction, and operational phases of special facilities	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 HNF-3737	
273	The design of new or modification of existing special facilities shall address the health hazards represented by all hazardous materials in enclosures, general work areas, and noncontaminated areas.	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4176	
274	The release of hazardous materials under normal operating conditions and anticipated operational upset occurrences shall be designed to be less than release guideline limits contained in applicable orders, regulations, and requirements. In addition, to the extent practical, such releases shall be maintained ALARA	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4176	
275	Consideration shall be given to the frequency of occurrence and the effects of DBAs in the design features of special facilities. The depth of the risk analysis involved in this consideration should be in some measure proportional to the level of risk at the facility under consideration.	Order 6430.1A, Section 1300-1.3	The depth of the risk analysis appropriate for this project is the level of analysis contained in the BIO for RAPID mitigation system. The BIO analysis considers frequency and effects of DBAs. The project's safety analysis contained in HNF-3737 is the contractor Authorization Basis for the RAPID Mitigation System project.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4176	
276	Protection of employees within the facility and at nearby facilities shall be a requirement in all aspects of the design.	Order 6430.1A, Section 1300-1.3	Maintenance of system integrity is the means of ensuring personnel and facility protection. This was met by meeting the design requirements.	HNF-4519, Design Review Report HNF-3885	

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
277	Protection shall be provided for normal operation and for those accidents that can be anticipated as occurring during the facility lifetime such as radioactive material spills and small fires controlled by the facility fire suppression system.	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4176
278	Occupational exposure to radiation shall be limited according to DOE 5480.11.	Order 6430.1A, Section 1300-1.3	The RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, documents that exposure to radiation is within the requirements of DOE 5480.11.	TWR-4176
279	Design goals shall be established to maintain radiation exposure of employees ALARA.	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
280	The nature of the hazardous materials in the facility, including radionuclides, shall be considered in the assessment of potential employee exposure.	Order 6430.1A, Section 1300-1.3	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
281	The confinement of hazardous materials produced, processed, or stored in special facilities shall be designed to minimize dose to a maximally exposed member of the public.	Order 6430.1A, Section 1300-1.4.1	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
282	Releases of hazardous materials postulated to occur as a result of DBAs shall be limited by designing facilities such that at least one confinement system remains fully functional following any credible DBA.	Order 6430.1A, Section 1300-1.4.2	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4176
283	Facility design shall provide attenuation features for postulated accidents (up to and including DBAs) that preclude offsite releases that would cause doses in excess of the DOE 5400 series limits for public exposure.	Order 6430.1A, Section 1300-1.4.2	The BIO documents that the appropriate DBA relative to this criterion is a pool leak from the above ground waste transfer system. The combination of the PPP with cover assembly, transfer line, and SY-102 riser extension provide mitigation of this DBA to the extent that dose limits are met.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
284	To the extent practical, ALARA concepts shall be applied when designing special facilities to mitigate post-DBA releases of hazardous materials.	Order 6430.1A, Section 1300-1.4.2	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
285	The annual dose resulting from postulated, planned, or expected releases from the proposed facility shall be considered in combination with the annual doses resulting from planned or expected releases from other facilities at the same site.	Order 6430.1A, Section 1300-1.4.3	Potential exposures from the RAPID system are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176. No planned or expected releases are anticipated from facilities within the same site.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
286	The sum of the doses from the site shall be limited according to DOE Radiation Standards of Protection of the Public in the Vicinity of DOE Facilities or subsequent guidance included in the directive on Radiation Protection of the Public and the Environment in the DOE 5400 series.	Order 6430.1A, Section 1300-1.4.3	Site dose limitations are in accordance with the specified criteria.	HNF-3968, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102. HNF-SD-WM-BIO-001 TWR-4177
287	Releases shall be monitored in accordance with the directive on Radiological Effluent Monitoring and Environmental Surveillance in the DOE 5400 series.	Order 6430.1A, Section 1300-1.4.4	Mitigation System operations will be monitored in accordance with existing Tank Farm programs and procedures	IP-0842
288	Safety analysis shall comply with DOE 5481.1B. See also Section 0110-5.2, Safety Analysis.	Order 6430.1A, Section 1300-2	The BIO, along with the project's safety analysis, is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project.	HNF-SD-WM-BIO-001 HNF-3737

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Citation
289	Special facility components, systems, and structures shall be designed, fabricated, erected, and tested to standards and quality commensurate with the hazards and potential consequences associated with both the facility and the role of each component, system, and structure in mitigating the consequences of DBAs.	Order 6430.1A, Section 1300-3.1	The BIO, along with the project's safety analysis, is the functional equivalent to a DOE 5481.1B-compliant safety analysis for this project	HNF-SD-WM-BIO-001 HNF-3737
290	Safety class items shall be subject to appropriately higher-quality design, fabrication, and industrial test standards and codes ... to increase the reliability of the item and allow credit to be taken for its capabilities in a safety analysis.	Order 6430.1A, Section 1300-3.2	Safety Class items (per SEL) are subject to appropriately higher-quality design, fabrication, and industrial test standards and codes ... to increase the reliability of the item and allow credit to be taken for its capabilities in a safety analysis. Safety Class items are procured only from qualified suppliers, who have demonstrated compliance with the codes, standards, and QA programs required for safety class items or by purchasing items and dedicating them to Safety Class service via CGI procedures. CGI procedures include requirements for testing and Quality Assurance.	HNF-4531, SEL
291	Safety class items shall be designed to the ASME Boiler and Pressure Vessel Code (Section III, Class II) or to other comparable safety-related codes and standards that are appropriate for the system being designed.	Order 6430.1A, Section 1300-3.2	Appropriate design review performed to verify compliance with safety-related codes and standards.	HNF-4519, Design Review Report
292	Safety class and non-safety class items shall comply with Section 0140, Quality Assurance.	Order 6430.1A, Section 1300-3.2	All safety and non-safety class items were reviewed by QA and determined to be in compliance with QA requirements. Specifications for safety class and non-safety class SSCs require design/build vendors have QA/QC systems demonstrated as in compliance with NQA-1.	HNF-4519, Design Review Report HNF-4216 HNF-4169 HNF-4170 HNF-4407 HNF-4235
293	The design of systems, components and structures that are not safety class items shall, as a minimum, be subject to conventional industrial design standards, codes, and quality standards.	Order 6430.1A, Section 1300-3.2	SSCs that are not safety class are required to comply with appropriate and applicable industrial design standard, codes, and quality standards, as called out in the Functional Requirements and Technical Criteria specification and specifications for individual SSCs.	HNF-3885
294	Failure of these items [i.e., non-safety class items] shall not adversely affect the environment or the safety and health of the public.	Order 6430.1A, Section 1300-3.2	Analyses performed per the BIO, the project's safety analysis, and hazard evaluation show that non-safety class items in the SY-101 RAPID mitigation system do not adversely affect the environment or safety and health of the public.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-3737
295	[T]heir [i.e., non-safety class items] failure shall not prevent safety class items from performing their required functions.	Order 6430.1A, Section 1300-3.2	Safety analyses in the BIO and the project's hazard evaluation show that non-safety class items in the SY-101 RAPID Mitigation System do not prevent safety class items from performing their intended function.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001
296	The design shall ensure that a single failure does not result in the loss of capability of a safety class system to accomplish its required safety functions.	Order 6430.1A, Section 1300-3.3	Safety analyses in the BIO, the project's Safety Equipment List, and hazard evaluation demonstrate that a single failure does not result in loss of safety class system functionality.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001
297	To protect against single failures, the design shall include appropriate redundancy and shall consider diversity to minimize the possibility of concurrent common-mode failures of redundant items.	Order 6430.1A, Section 1300-3.3	Compliance with the project's Functional Requirements and Technical Criteria specification and Safety Equipment List demonstrates that adequate redundancy was included in design.	HNF-3885 HNF-4531 (SEL)
298	Safety class items shall be designed to withstand the effects of, and be compatible with, the environmental conditions associated with operation, maintenance, shutdown, testing, and accidents.	Order 6430.1A, Section 1300-3.4	The Functional Requirements and Technical Criteria specification and specifications for individual SSCs identify applicable environmental conditions with which safety class items, as identified on the SEL, must be compatible. Implementation of the design standards and codes applicable to safety class items, as noted elsewhere in this compliance matrix, provide assurance that the safety class items will withstand the effects conditions enumerated in this criterion.	HNF-3885 HNF-4531 (SEL)
299	The environmental capability of equipment shall be demonstrated by appropriate testing, analysis, and operating experience, or other methods that can be supported by auditable documentation, or a combination of these methods.	Order 6430.1A, Section 1300-3.4	The Functional Requirements and Technical Criteria specification and specifications for individual SSCs identify applicable environmental conditions and capabilities required. The Functional Requirements and Technical Criteria specification and specifications for individual SSCs also require appropriate testing, analysis, and/or operating experience, supported by documentation, from SSC designers, fabricators, and suppliers. All acceptance testing of individuals SSCs was satisfactorily completed and documented in HNF-4360 (System Test Report) and RPP-4892 (HAHA Test Report) and will be demonstrated by the performance of the project's Operational Test Procedure and testing related to the CGI process.	HNF-3885, Sec 3.1.9 HNF-3885, Section 3

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
300	Equipment qualification shall provide assurance that safety class items will be capable of performing required safety functions under DBA conditions. The qualification shall demonstrate that the equipment can at least perform for the period of time that its safety functions are required.	Order 6430.1A, Section 1300-3.4	Equipment qualification is met by fulfilling the structural design requirements of HNF-4252, the analysis in HNF-4359 and the acceptance testing documented in HNF-4360 and RPP-4892, and will be demonstrated by the performance of the project's Operational Test Procedure and testing related to the CGI process.	HNF-4252 HNF-4359 HNF-4360 RPP-4892 OTP-440-003 HNF-3885	
301	Temperature, pressure, and humidity environments shall be based on the most severe postulated accident affecting the particular item. The postulated environment shall reflect an environment that considers both radiological composition (e.g., elements, isotopes, total radioactivity) and chemical composition (e.g., abrasives, acids, smoke, caustic vapors) of all material physical forms likely to affect the equipment.	Order 6430.1A, Section 1300-3.4	Environmental conditions were defined in the Functions and Requirements document, HNF-3885 based on the severe SY-101 environment.		
302	Testing or a combination of testing and analysis shall be the preferred method of demonstrating the operability of fluid system components, mechanical equipment, instrumentation, and electrical equipment that are required to operate during and following a DBE.	Order 6430.1A, Section 1300-3.4	None of the RAPID System equipment is required to operate during or following a DBE. All SSC structures were designed to withstand at least a USC earthquake.	HNF-3866, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-4519, Design Review Report HNF-3885	4.1
303	The design shall consider the maintainability factors peculiar to the specific equipment to be used in the facility.	Order 6430.1A, Section 1300-3.5	Tank Farms Facilities Operations participation in the design review process constitutes consideration of maintainability.	HNF-4519, Design Review Report HNF-3885	4.1
304	Facility design shall provide for routine maintenance, repair, or replacement of equipment subject to failure.	Order 6430.1A, Section 1300-3.5	Tank Farms Facilities Operations participation in the design review process constitutes consideration of maintainability.	HNF-4519, Design Review Report HNF-3885	4.1
305	Safety class items shall be designed to allow inspection, maintenance, and testing to ensure their continued functioning, readiness for operation, and accuracy.	Order 6430.1A, Section 1300-3.5	Safety Class confinement and containment structures (PPP and ASSD) are configured to allow regular inspection, maintenance, and test of their confinement function. The transfer line outer encasement hose is readily accessible for inspection. No maintenance is required for continued functioning and operational readiness of this component. The transfer line encasement is a temporary component which may be tested by detachment from the PPP and ASSD and installation of hose end test fittings supplied with each hose assembly. The hose lifetime is one year. It is not easily testable after the primary hose is contaminated. The flowmeter in the waste transfer line allows inspection, maintenance, and testing to ensure continued functioning and readiness for operation. However, the ability to test this device for accuracy after initial use is restricted by its exposure to contamination.	HNF-4235 HNF-4169 HNF-4216 HNF-4407 OTP-440-003	
			(Design attribute for Item 305 continues) Once contaminated by waste transfer, the device will not be capable of being tested for accuracy to the level provided during manufacture (i.e. installation in a primary flow loop with instrumentation traceable to NIST standards). It will, though, be capable of being tested for accuracy within the capabilities of other instantaneous and totalized flow measurement appliances incorporated in the project (i.e. comparison to the dilution flow meter for instantaneous rate of flow, comparison to tank level instrumentation for totalized flow). All other safety class instrumentation utilized in the project's design is capable of the requisite inspection, maintenance, and testing.		
306	Auxiliary equipment, such as pumps, blowers, motors, compressors, gear trains, and controls, shall be located in an area least likely to be contaminated.	Order 6430.1A, Section 1300-3.5	Readiness for operation is confirmed by performance of the project's operational test procedure.	H-14-103610 HNF-3885	4.9
307	The design of equipment that must be located within confinement systems shall allow for in-place maintenance or replacement.	Order 6430.1A, Section 1300-3.5	The Water Support Skid is located at a distance from the PPP and other users of SY-101 and SY-102, in an area least likely to be contaminated. Locations of other SSCs are determined by function.		
308	The capability shall be provided for the maintenance of contaminated equipment that cannot be repaired in place. This capability shall include the necessary provisions for confinement, ventilation, and waste control.	Order 6430.1A, Section 1300-3.5	Readiness for operation is confirmed by performance of the project's operational test procedure.	H-14-103616 HNF-3885	4.1
309	The design of all process equipment shall include features to minimize self-contamination of the equipment, piping, and confinement areas.	Order 6430.1A, Section 1300-3.5	Maintenance of contaminated equipment that cannot be repaired in-place will be accomplished with existing facilities and handling procedures of TWO. Based on analysis in the AGA, in the event of failure the NGTP will be replaced rather than repaired.	HNF-3885	4.1
310	The design of process equipment shall also include features to minimize the spread of contamination out of local areas.	Order 6430.1A, Section 1300-3.5	Self contamination minimization is addressed by the individual SSC specifications.	HNF-4169 HNF-4216 HNF-4407 HNF-4169 HNF-4216 HNF-4407	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
311	The design shall include provisions for periodic testing of monitoring, surveillance, and alarm systems.	Order 6430.1A, Section 1300-3.6	Periodic testing of monitoring, surveillance, and alarm systems is required by Functional Requirements and Technical Criteria specification and is included in the System design.	HNF-3885 HNF-4235	
312	The design shall provide the capability to test periodically, under simulated emergency conditions, safety class items that are required to function under emergency conditions	Order 6430.1A, Section 1300-3.6	There are no SSCs that must function under emergency conditions.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-3737	
313	All systems for which credit is taken to meet the criteria of Section 1300-1.4.2, Accidental Releases, shall be in-place testable in terms of pressure, filtration or removal efficiency, alarm capability, leak resistance, and the like.	Order 6430.1A, Section 1300-3.6	Ventilation and ammonia monitoring systems are testable	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-3737 HNF-4531 (SEL)	
314	Safety class items shall be designed to be testable on a regular schedule.	Order 6430.1A, Section 1300-3.6	Safety class items are testable on a regular basis except for the temporary transfer line hose encasement.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-3737 HNF-4531 (SEL)	
315	The facility design shall allow for routine in-place testing of HEPA filtration systems as outlined by ASME N510.	Order 6430.1A, Section 1300-3.6	The RAPID Mitigation System does not include any HEPA filtration.	N/A	
316	Special facilities shall be designed to minimize personnel exposures to external and internal radiological hazards, provide adequate radiation monitoring and alarm systems, and provide adequate space for health physics activities.	Order 6430.1A, Section 1300-5	The mitigation system has been designed to keep exposures ALARA (RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176). Existing Tank Farm radiation monitoring and alarm systems, plus Mitigation System leak detectors, are provided. Existing Tank Farm space for health physics activities is adequate.	TWR-4176	
317	Primary radiation protection shall be provided by the use of engineered controls (e.g., confinement, ventilation, remote handling, equipment layout, and shielding).	Order 6430.1A, Section 1300-6	Engineered controls that provide radiation protection include the safety class enclosure, remote decontamination of the PPP, shielding of the PPP and the transfer line, negative pressure within transfer equipment provided by SY-Farm ventilation system.	TWR-4176	
318	Secondary radiation protection shall be provided by administrative control.	Order 6430.1A, Section 1300-6	Administrative controls that provide radiation protection include provisions for maximum operator distance during transfers, plus the existing administrative radiological controls of tank waste operations.	TWR-4176	
319	ALARA concepts shall be applied to minimize exposures where cost-effective.	Order 6430.1A, Section 1300-6	ALARA concepts that will be applied are identified and analyzed in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176	
320	The shielding design basis shall be to limit the maximum exposure to an individual worker to one-fifth of the annual occupational external exposure limits specified in DOE 5480.11. Within this design basis, personnel exposures shall be maintained ALARA.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176 TWR-4177	
321	Shielding shall be designed with the objective of limiting the total EDE to less than 1 rem per year to workers, based on their predicted exposure time in the normally occupied area.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176 TWR-4177	
322	Appropriate shielding shall be installed, if necessary, to minimize nonpenetrating external radiation exposures to the skin and lens of the eye of the worker.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176 TWR-4177	
323	Shielding and other radiation protection measures shall be provided for areas requiring intermittent access, such as for preventive maintenance, component changes, adjustment of systems and equipment, and so forth.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	TWR-4176	
324	The projected dose rates based on occupancy time, and frequency of exposure shall not exceed 1 rem/yr.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, and are demonstrated as not to exceed the specific rate.	TWR-4177	
325	Straightline penetration of shield walls shall be avoided to prevent radiation streaming.	Order 6430.1A, Section 1300-6	Penetrations in the PPP shield are drilled at an angle. Penetrations in drop leg are also on at an angle.	HNF-4169 HNF-4216	H-14-103571 Item 14 & H-14-103592
326	Remote shielded operation (i.e., with remote handling equipment such as remote manipulators) shall be considered where it is anticipated that exposures to hands and forearms would otherwise approach the dose guidance in 5480.11 or where contaminated puncture wounds could occur.	Order 6430.1A, Section 1300-6	Design of the PPP includes provision for using long-reach valve operators through holes in the shielded pit cover; exposures are thereby reduced.	HNF-4169H-14-103571 Item 4	

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
327	The design shall ensure that occupied operating areas do not exceed the airborne concentration limits of the DOE 5480 Series for normal operating conditions.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176, and Dose Rate Calculations, TWR-4177.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102, HNF-SD-WM-BIO-001 TWR-4176
328	To the extent practical, the concept of ALARA shall be used when designing confinement and ventilation systems to limit airborne contamination levels.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176.	HNF-3966, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102, HNF-SD-WM-BIO-001 TWR-4176
329	The design shall ensure that respirators are not required to meet the dose limits for normal operations.	Order 6430.1A, Section 1300-6	Normal operation of the Mitigation System is not planned to require additional personnel protective equipment beyond that already required for operations in the SY Tank Farm.	Health and Safety Plan (HASP)
330	Engineered controls and features shall also be provided to minimize potential inhalation of radioactive and other hazardous materials under all conditions.	Order 6430.1A, Section 1300-6	Potential exposures are identified and analyzed in the BIO, the project's safety analysis, and in RAPID SY-101 Surface Level Rise Mitigation Project Radiological Design Engineering, TWR-4176. Existing tank ventilation and access controls meet the requisite criteria.	TWR-4176 HNF-SD-WM-BIO-001 HNF-3737
331	All monitoring systems shall be calibrated annually with appropriate national standards to ensure validity of reported values.	Order 6430.1A, Section 1300-6	Monitoring instruments included in the project design are covered by the existing calibration and maintenance program and procedures of the Tank Farm. No new radiation monitoring equipment is added by this project.	N/A
332	All radiation monitoring, alarm, and warning systems that are required to function during a loss of normal power shall be provided with an emergency UPS (internal or external on-line) unless it is demonstrated that they can tolerate a temporary loss of function without losing needed data and they are provided with standby or emergency (switched) power.	Order 6430.1A, Section 1300-6	Equipment is fail safe on loss of power or recirculant and loss of power is obvious to the operators at DACS or in the field.	H-14-103655, Electrical Elementary Diagram
333	Determination of the power supply type and quality shall be based on the safety classification of the monitoring system or device. The sampling motivation (vacuum) shall be installed to the same requirement.	Order 6430.1A, Section 1300-6	There is no standby power, emergency power, safety class power, or uninterrupted power available, except at the Water Skid. However, the demonstrated reliability of Hanford site power meets the power requirements of this criterion. Equipment is fail safe on loss of power or recirculant and loss of power is obvious to the operators at DACS or in the field.	System Electrical Interconnection Diagram, H-14-103641
334	Air monitoring and warning systems shall be installed in work areas where hazardous materials are stored or handled and where hazardous airborne particles or vapors may be present.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
335	Air sampling heads shall be located to provide a representative sample of potential airborne radioactive materials being breathed.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
336	Air monitoring systems shall comply with ANSI N13.1.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
337	Use of devices to warn personnel of possible contamination or other hazardous materials shall be evaluated and such devices shall be provided in accordance with this evaluation.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
338	Provisions shall be made for personnel monitoring devices, such as hand and foot counters, in the vicinity of work stations.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
339	Installed monitors (supplemented with personal monitoring methods if necessary) shall be used to monitor personnel exiting an operating area through access ways.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
340	CAMSs shall be provided to detect and to alarm at prescribed airborne radioactivity levels.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
341	Where ionizing radiation is present (due to process material, equipment, or operations), an area radiation monitoring and alarm system shall be provided to alert personnel of unexpected increases in ionizing radiation levels.	Order 6430.1A, Section 1300-6	Existing Area Radiation Monitors are present in suitable locations within the SY Tank Farm and are designed in a manner so as to fulfill this criteria.	N/A
342	Warning and alarm systems shall be designed, installed, and tested to ensure that they can be heard in the ambient conditions of the area they are intended to cover.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
343	Evacuation alarm systems shall comply with ANSI N2.3.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
344	In addition to a local station alarm, radiation monitoring systems (criticality alarms, CAMSs, alarms associated with stack monitoring systems, and so on) shall have central (i.e., control room or radiation monitoring office) readout and alarm panels that are accessible after a DBA to evaluate internal conditions.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion. No New radiation monitoring and warning systems are added by this project.	N/A
345	Design shall provide for personnel decontamination facilities close to areas that represent sources of potential contamination.	Order 6430.1A, Section 1300-6	Existing TWO programs, systems, equipment, and procedures meet the requirements of this criterion.	N/A
346	Meteorological equipment shall be provided to measure and record wind speed and direction.	Order 6430.1A, Section 1300-6	Data from existing Tank Farm and Hanford equipment is sufficient for compliance.	N/A
347	Consideration shall be given to the need for additional equipment to provide meteorological parameters such as humidity data and wind direction frequencies for heights related to the estimated heights at which stack effluents and cooling tower moisture will be dispersed.	Order 6430.1A, Section 1300-6	Data from existing Tank Farm and Hanford equipment is sufficient for compliance. No stacks or cooling towers are within the scope of this project.	N/A
348	As necessary, special equipment for stack effluent dispersal and tracking shall be considered for installation.	Order 6430.1A, Section 1300-6	Data from existing Tank Farm and Hanford equipment is sufficient for compliance. No stacks are within the scope of this project.	N/A
349	Central site meteorological monitoring capability shall be considered as a substitute for individual facility monitoring.	Order 6430.1A, Section 1300-6	Available meteorological monitoring is used in lieu of new monitoring capability.	N/A
350	Confinement systems shall minimize the spread of radioactive and other hazardous materials within the unoccupied process areas.	Order 6430.1A, Section 1300-7.1	The design of the confinement system, comprised of the Prefabricated Pump Pit, the transfer encasement, and the SY-102 riser extension (an element of the drop leg) prevent the spread of waste into unoccupied process areas. The system air flow minimizes the spread of airborne contamination from the PPP, transfer line, and ASSD.	HNF-4169 HNF-4216 HNF-4407
351	Confinement systems shall prevent, if possible, or else minimize the spread of radioactive and other hazardous materials to occupied areas.	Order 6430.1A, Section 1300-7.1	The design of the confinement system, comprised of the Prefabricated Pump Pit, the transfer encasement, and the SY-102 riser extension (an element of the drop leg) prevent the spread of waste into occupied areas.	HNF-4169 HNF-4216 HNF-4407
352	Confinement systems shall minimize the release of radioactive and other hazardous materials in facility effluents during normal operation and anticipated operational occurrences.	Order 6430.1A, Section 1300-7.1	No normal operation or anticipated operational occurrences result in release to facility effluents.	TWR-4176
353	Confinement systems shall limit the release of radioactive and other hazardous materials resulting from DBAs including severe natural phenomena and man-made events in compliance with the guidelines contained in Section 1300-1.4.2. Accidental Releases.	Order 6430.1A, Section 1300-7.1	The design of the confinement system, comprised of the Prefabricated Pump Pit, the transfer line encasement, and the SY-102 riser extension (an element of the drop leg) has been analyzed to withstand natural phenomena and man-made events, and meets the requirements of the specified section as documented in items 282 through 284 above.	HNF-4359, Transfer System Calculations
354	Confinement capabilities, including confinement barriers and associated ventilation systems, shall maintain a controlled, continuous airflow pattern from the environment into the confinement building, and then from the noncontaminated areas of the building to potentially contaminated areas, and then to normally contaminated areas.	Order 6430.1A, Section 1300-7.2	While the RAPID system is installed outdoors, thus obtaining the specific requirements of this criterion, the intent of this criterion is met by virtue of the system's design attribute which ensures airflow pattern is from the outdoor environment into the potentially contaminated PPP, encasement line, and riser extension, and thence to the contaminated enclosure of the SY-102 tank dome space. This airflow pattern is maintained by the operation of the SY-102 tank dome space ventilation system, which is in hydraulic continuity with the space enclosed by the riser extension, encasement line, and PPP.	HNF-4216 HNF-4407 HNF-4169 H-2-37745, 241-SY Ventilation Plan
355	not used	N/A	N/A	N/A
356	not used	N/A	N/A	N/A
357	not used	N/A	N/A	N/A
358	For a specific nuclear facility, the number and arrangement of confinement barriers and their required design features and characteristics shall be determined on a case-by-case basis. Engineering evaluations, trade-offs, and experience shall be used to develop a practical design that achieves confinement system objectives.	Order 6430.1A, Section 1300-7.2	Specifically, the primary confinement boundary is the pump column, the distribution and valving appurtenances in the PPP, the transfer line and the drop leg. The secondary confinement boundary is comprised of the SY-101 riser extension, the Prefabricated Pump Pit, the transfer encasement, and the SY-102 riser extension. The tertiary confinement is the soil surrounding the SY Tank Farm. Based on engineering evaluations, the secondary confinement barrier is classified as safety class.	HNF-4169 HNF-4216 HNF-4407 HNF-4170
359	Although individual confinement systems are not required to withstand the effects of every accident, they shall effectively perform their required functions for the DBAs they are required to withstand.	Order 6430.1A, Section 1300-7.2	The confinement system is required to perform its safety class function in Bio-defined accidents. Individual SSCs of the confinement system are classified as safety class (PPP, transfer line encasement hose, ASSD) and are required to perform their confinement function to prevent or mitigate accidents.	HNF-4359, Transfer System Calculations HNF-SD-WM-BIO-001 HNF-3737 HNF-IP-0842-1266
360	Sufficient redundancy shall be provided in the unlikely event of a confinement system failure.	Order 6430.1A, Section 1300-7.2	The safety class confinement system is actually the secondary confinement boundary. Redundancy is provided by the primary confinement boundary (PPP Piping, Transfer Line, Drop Leg).	HNF-4170 HNF-4216 HNF-4407

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
361	At least one of the confinement systems shall be designed to ensure that it can withstand the effects of severe natural phenomena and man-made events, including the postulated DBAs and DBF initiated by these events, and remain functional to the extent that the guidelines of Section 1300.1.4.2 Accidental Releases, are not violated.	Order 6430.1A, Section 1300.7.2	The secondary confinement system is designated safety class and is designed to remain functional following the required natural phenomena hazards and design basis accidents.	HNF-4531, SEL HNF-SD-WM-BIO-001 HNF-3737 HNF-IP-0842-1266	
362	The adequacy of the design of these confinement systems to effectively perform their required functions shall be demonstrated by the safety analysis.	Order 6430.1A, Section 1300.7.2	The secondary confinement system is designated safety class. The adequacy of the safety class system to perform the required function is demonstrated by analysis in the BIO and the project's safety analysis and hazard evaluation.	HNF-3986, Hazard Evaluation for Transfer of Waste from Tank 241-SY-101 to 241-SY-102 HNF-SD-WM-BIO-001 HNF-3737	
363	To the extent practical, the ALARA concept shall be applied to the design of all confinement systems to minimize exposures to hazardous materials.	Order 6430.1A, Section 1300.7.2	The ALARA concept is fully applied to all of the Mitigation System, as documented in TWR-4176.	TWR-4176	
364	Design of confinement areas shall provide adequate means for decontamination of the areas prior to entry or breaching for maintenance and repair purposes.	Order 6430.1A, Section 1300.7.2	The system is designed so that decontamination can be performed prior to entry.	HNF-4169 HNF-4216 HNF-4407	
365	Double-walled pipes or pipes within a secondary confinement structure encasement shall be used in all areas where the primary pipe leaves the facility.	Order 6430.1A, Section 1300.7.4	The transfer pipe is confined within a safety class encasement	H-14-103595	
366	In areas within the facility, the use of double-walled pipe shall be considered.	Order 6430.1A, Section 1300.7.4	The transfer pipe is confined within a safety class encasement	H-14-103595	
367	Leakage monitoring shall be provided to detect leakage into the space between the primary pipe and the secondary confinement barrier.	Order 6430.1A, Section 1300.7.4	Safety class leak detectors are incorporated into the design	HNF-4531, SEL H-14-103616 H-14-103592	Item 15 Item 95
368	[P]rocess systems shall minimize the production of wastes at the sources and minimize the mixing of radioactive and nonradioactive hazardous wastes.	Order 6430.1A, Section 1300.8	The RAPID system produces no new waste. No non-radioactive hazardous waste is utilized or generated by the system, thus precluding the potential for mixing non-radioactive hazardous waste with radioactive waste.	N/A	
369	The waste management systems shall provide facilities and equipment (or incorporate existing facilities and equipment) to handle ... wastes safely and effectively.	Order 6430.1A, Section 1300.8	Radioactive Waste Management is conducted within the existing Tank Farm compliant with this section of the order.	IP-0842	
370	Volume reduction equipment for both liquid and solid wastes shall be required where feasible and shall be designed for process capability and capacity commensurate with the types and quantities of wastes expected.	Order 6430.1A, Section 1300.8	This criteria is not within the scope of the RAPID Mitigation System project goals	HNF-3824, Project Plan	
371	Waste handling areas shall comply with the standards of confinement and ventilation requirements commensurate with the potential for spreading contamination by the waste packages/forms handled.	Order 6430.1A, Section 1300.8	Confinement requirements are fulfilled by the safety class SSCs which comprise the system's secondary confinement structure. Ventilation requirements are fulfilled by the existing SY farm tank ventilation system.	HNF-4169 HNF-4216 HNF-4407	
372	Design of the areas in a facility that may become contaminated with radioactive or other hazardous materials under normal or abnormal operating conditions shall incorporate measures to simplify future decontamination.	Order 6430.1A, Section 1300.11	The system is designed so that decontamination can be performed prior to entry.	HNF-4169 HNF-4216 HNF-4407	
373	Such items as service piping, conduits, and ductwork shall be kept to a minimum in these areas and shall be arranged to facilitate decontamination.	Order 6430.1A, Section 1300.11	Service piping and conduits in potentially contaminated areas are minimized to the extent compatible with the system function by use of the water support skid.	HNF-4170 HNF-4169 HNF-4043	
374	Filters shall be positioned in ventilation systems in locations that minimize contamination of ductwork.	Order 6430.1A, Section 1300.11	Appurtenances within the PPP are arranged to facilitate decontamination by the spray ring or a decontamination spray wand inserted in an access port in the PPP.	N/A	
375	Walls, ceilings, and floors shall be finished with washable or strippable coverings.	Order 6430.1A, Section 1300.11	Filtration of the SY farm ventilation system is adequate for the system and is an existing design feature.	HNF-4169 HNF-4216 HNF-4407	
376	In some areas, metal liners shall be required.	Order 6430.1A, Section 1300.11	Chosen material of construction for potentially contaminated surfaces is stainless steel and washable EPDM (Ethylene Propylene Diamine Monomer) rubber.	N/A	
377	If necessary all cracks, crevices, and joints shall be caulked or sealed and finished smooth to prevent contaminated material accumulation in inaccessible areas.	Order 6430.1A, Section 1300.11	Metal lines are not required to meet system design requirements, as the PPP and ASSD are fabricated from stainless steel.	HNF-4169 HNF-4216	
378	Finishes shall comply with Section 0900-99, Special Facilities.	Order 6430.1A, Section 1300.11	All joints are made with full penetration seal welds.	HNF-4169 HNF-4216	
379	Designs consistent with the program requirements of DOE 5620.2A (Radioactive Waste Management) shall be developed during the planning and design phases based on a proposed decommissioning method or a conversion method leading to other uses.	Order 6430.1A, Section 1300.11	Specified finishes for SSCs meet the applicable requirements of this criterion.	HNF-4169 HNF-4216 IP-0842	

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
380	The facility design shall include features that will facilitate decontamination for future decommissioning. Increase the potential for other uses, or both.	Order 6430.1A, Section 1300-11	The design incorporates features that facilitate decontamination and decommissioning. These features include the PPP and ASSD decontamination spray rings, a provision for transfer line flush, and a provision for transfer pump internal flush.	HNF-4168 HNF-4170 HNF-4043 HNF-4407 HNF-4216
381	(1) The following design principles shall be considered for facilities handling radioactive and other hazardous materials: Use of modular, separable confinements for radioactive and other hazardous materials ... use of localized liquid transfer systems that avoid long runs of buried contaminated piping ... equipment, including effluent decontamination equipment, that precludes the accumulation of radioactive or other hazardous materials in relatively inaccessible areas; accessible, removable inspection covers are encouraged to allow visual inspection; materials that ... are easily decontaminated. Designs that ease cut-up, dismantlement, removal and packaging of contaminated equipment from the facility; use of modular radiation shielding. Use of lifting lugs on large tanks and equipment; Fully drainable piping systems that carry contaminated or potentially contaminated liquids.	Order 6430.1A, Section 1300-11	Each of the design principles listed has been incorporated into appropriate sections of the system design. Appropriate RADCON design review incorporated during design phase.	HNF-4518, Design Review Report TWR-4176
382	It is DOE policy to ensure that appropriate human factors technology is considered in the design, operation, and maintenance of Departmental nonreactor nuclear facilities.	Order 6430.1A, Section 1300-12	Compliance with the DOE policy results from: (1) Design/build SSC contractors are required to meet requirements of the Functions and Requirements Document, including layout of displays, labeling of components, and control orientation should be readable and adhere to the guidelines of MIL-STD-1472C, "Human Engineering Design Criteria for Military Systems, Equipment, and Facilities", EPRC NP-3659, "Human Factors Guide for Nuclear Power Plant Control Room," to the extent practical. The requirements of HNF-IP-0842, Volume IV, Section 4.14, "Tank Farm Operations Equipment Labeling and Master Equipment List Control" shall be met. The design of the RAPID system should follow the guidance of UCRL-15673, "Human Factors Design Guidelines for Maintainability of DOE Nuclear Facilities." (2) Appropriate operations and maintenance human factors issues are addressed by inclusion of Tank Farm O&M personnel in the design review process.	HNF-4518, Design Review Report TWR-4176
383	The design objective shall be to ensure that conservatively estimated consequences of normal operations and credible accidents are limited in accordance with the guidelines contained in Section 1300-1.4, Guidance on Limiting Exposure of the Public.	Order 6430.1A, Section 1323-2	The project is within the scope of the BIO, which, along with the project's safety analysis, document compliance with this criterion	HNF-SD-WM-BIO-001 HNF-3757
384	The use of multiple barriers shall be emphasized when necessary to restrict the movement of radioactive liquid waste that has the potential for human contact or for reducing groundwater quality below the requirements in DOE 5400.1.	Order 6430.1A, Section 1323-4.1	The system incorporates primary and secondary confinement barriers. Appropriate radiologized confinement review during design phase by RADCON personnel.	TWR-4176
385	Measurement capability shall be provided to determine the volume and radioactivity of wastes fed to collection tank(s).	Order 6430.1A, Section 1323-4.2	Flow meters, totalizers (water support skid and PPP), and liquid level sensing devices provide the required capability.	HNF-4043 HNF-4170 HNF-4235 HNF-3885
386	Individual lines shall be used for each waste stream fed to central collection tanks, where necessary, to prevent chemical reactions or introduction of contaminants such as complexing agents that could interfere with waste decontamination.	Order 6430.1A, Section 1323-4.2	Only one transfer line is within the scope of this project.	
387	The use of traps in radioactive liquid waste lines shall be avoided.	Order 6430.1A, Section 1323-4.2	Traps as defined in this criteria are avoided to the extent practicable. A trap exists in the prefabricated pump pit and is a seal loop provided as a path to return confined fluids to the SY-101 tank while preventing the release of gases from the tank. A second trap is the potential trap composed of the encasement hose in the transfer line assembly. The LMHC Chief Engineer issued a letter to RAPID System project management on this topic on July 2, 1999, stating that the trap formed by the transfer line hose is acceptable due to the urgency of the transfer.	HNF-4168 HNF-4407
388	(P)iping shall be designed to minimize entrapment and buildup of solids in the system.	Order 6430.1A, Section 1323-4.2	The transfer pipe has been designed with a minimum flow velocity of 6 ft/sec to ensure that solids in the waste remain suspended. Low points in the transfer line, P3, and drop leg have been minimized.	HNF-4284, Process Control Plan HNF-4407
389	Bypasses that would allow waste streams to be routed around collection tanks shall be avoided.	Order 6430.1A, Section 1323-4.2	No proscribed bypasses are included in the design	HNF-3885
390	Provisions shall be made so that liquids can be analyzed prior to transfer.	Order 6430.1A, Section 1323-4.3	Contents of SY-101 have been sampled and analyzed as appropriate to design and operations planning.	HNF-3824, SY-101 RAPID Mitigation Project Plan
391	All transfer lines shall have individual identification.	Order 6430.1A, Section 1323-4.3	Identification required per procurement specification for transfer line.	HNF-4407 Section 3.3.3

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
392	Provisions shall be made to adjust liquid waste characteristics prior to [transfer].	Order 6430.1A, Section 1323-4.3	Provisions have been made to add hot dilution water to the waste during transfer. This provision adjusts viscosity and chemistry. No other waste characteristics adjustment are deemed necessary.	HNF-4264, Process Control Plan	
393	There shall be no bypasses or drains in the radioactive liquid waste [transfer] system by which waste may inadvertently be released directly to the environment.	Order 6430.1A, Section 1323-4.3	All drainage from the system (primary or secondary confinement) directs waste back into SY-101 or SY-102.	HNF-4407 HNF-4170 HNF-4169 HNF-4216	
394	The actual confinement system requirements for a specific RLWF shall be determined on a case-by-case basis.	Order 6430.1A, Section 1323-5	The secondary confinement system, comprised of the SY-101 riser extension, the P3, the transfer enclosure, and the drop leg distribution enclosure, have been determined to be safety classes indicated in the Project's Safety Equipment List.	HNF-4531 (SEL)	
395	Systems, components, and structures that compose the transfer system shall be designed to ensure their integrity for all normal operations, anticipated operational occurrences, and DBAs they are required to withstand.	Order 6430.1A, Section 1323-5	Applicable SSCs are identified on the SEL. The SSCs are designed to maintain the safety function during normal operations and anticipated operational occurrences, but are not required to function during or following a DBE.	HNF-4531 HNF-SD-WM-BIO-001	
396	Unless it can be demonstrated that the risk is acceptable, the [transfer] system and/or associated supports shall be designed to remain functional following a DBE, and shall facilitate the maintenance of a safe shutdown condition.	Order 6430.1A, Section 1323-5	Applicable SSCs are identified on the Project's Safety Equipment List and are not required to function during or following a DBE.	HNF-4531 HNF-SD-WM-BIO-001	
397	[Portions of the (transfer system) whose failure would result in an unacceptable risk and whose functions are necessary to facilitate a safe shutdown condition shall be designed to remain functional following a DBE.	Order 6430.1A, Section 1323-5	Applicable SSCs are identified on the Project's Safety Equipment List and are not required to function during or following a DBE.	HNF-4531 HNF-SD-WM-BIO-001	
398	The primary confinement system consisting of the process [piping] shall be designed to operate under process conditions that prevent or minimize the probability of potential explosive chemical reactions.	Order 6430.1A, Section 1323-5	Process piping isolates waste from any other chemicals and subsequent chemical reactions. Piping and hose utilized in the project's design have conductive features with waste. Piping and hose utilized in the project's design have conductive features to minimize spark potential and the possibility of all types of explosion.	HNF-4407 HNF-4170 HNF-4264, Process Control Plan	
399	Spills, overflow, or leakage from ... primary confinement structures [e.g., the transfer pipe] shall be collected and retained within a suitable secondary confinement structure [e.g., the transfer enclosure].	Order 6430.1A, Section 1323-5	Leakage from the transfer pipe or from the appurtenances within the PPP or ASSD are collected and retained within the transfer enclosure, PPP, or ASSD respectively. Collected leakage is drained back into SY-101 or SY-102.	HNF-4169 HNF-4216 HNF-4407	
400	The secondary confinement structure shall be capable of retaining the maximum radioactive liquid ... inventory that may be released by a spill, overflow, or leak from the primary confinement structure.	Order 6430.1A, Section 1323-5	This design requirement is defined in the project's Functional Requirements and Technical Criteria for the 241 SY-101 RAPID Mitigation System.	HNF-3885	
401	For outdoor applications, the capacity must also include maximum predicted precipitation.	Order 6430.1A, Section 1323-5	By inspection, the capacity required to retain precipitation is negligible when compared to the volume required to contain a leak. Therefore additional volume is not required to retain precipitation.	HNF-4169	H-14-103571
402	The capability shall exist to transfer such collected liquid from the secondary confinement structure to a suitable storage location.	Order 6430.1A, Section 1323-5	Liquid collected in the secondary confinement structures is returned to tanks SY-101 and SY-102 via a seal loop installed in the PPP or drainage pots included in the ASSD.	HNF-4169 HNF-4216	H-14-103572, item 15 H-14-103542, item 61
403	At least one confinement system shall be designed to withstand the effects of man-made events and DBAs.	Order 6430.1A, Section 1323-5	The secondary confinement system (i.e., the transfer enclosure and the PPP) is categorized as safety class and is qualified to the DBE.	HNF-4531, SEL	
404	The ... secondary ... confinement [i.e., the transfer line enclosure and the Prefabricated Pump Pit] and associated ventilation systems shall be designed to remain functional during normal operations, anticipated operational occurrences and for the DBAs they are required to withstand.	Order 6430.1A, Section 1323-5	The transfer enclosure and the P3 are designed to maintain the confinement function following a DBE. The "associated ventilation system" is the SY farm tank ventilation system. Loss of operability or confinement integrity of the tank ventilation system is within the scope of the BIO and the project's safety analysis.	HNF-4169 HNF-4216 HNF-4407 HNF-SD-WM-BIO-001	
405	[Piping systems used for high-level liquid waste transfers] shall be of welded construction to the fullest extent practical. Materials of construction shall be selected to minimize all forms of corrosion.	Order 6430.1A, Section 1323-5	Transfer pump piping manifolds and the Drop leg assembly are of welded construction. Except for flanged interconnections required for field assembly, Materials of construction are 304L Stainless steel. The transfer line incorporates welded 304L stainless steel connections where feasible. The balance of transfer line material is Ethylene Propylene Diamine Monomer (EPDM) elastomer, which is resistant to the effects of corrosion.	HNF-4170 HNF-4216 HNF-4407	H-14-103618, H-14-103619, H-14-103542, H-14103596
406	Consideration shall be given to stress relieving, welding parameter controls, etc., depending on the materials used.	Order 6430.1A, Section 1323-5	Piping system materials of construction are 304L Stainless Steel and Ethylene Propylene Diamine Monomer (EPDM) elastomer. Neither material requires stress relieving. Welding parameter controls are required by the individual SSC procurement specifications.	HNF-4170 HNF-4216 HNF-4407	H-14-103618 H-14-103619 H-14-103592 H-14-103596
407	Provisions shall be made to detect leakage from the primary confinement [e.g., the transfer piping] to the interspace [between the transfer piping and the enclosure].	Order 6430.1A, Section 1323-5	Safety Class leak detectors are installed in the PPP and ASSD to detect primary containment leakage.	HNF-4531, SEL	HNF-4531, Section 6.1 H-14-103592, item 95 H-14-103616, item 17
408	Installation of spare pipe lines between transfer points shall be considered.	Order 6430.1A, Section 1323-5	Spare pipelines were deemed inappropriate during conceptual design review of the SY-101 RAPID mitigation system.	HNF-4519, Design Review Report	

DESIGN COMPLIANCE MATRIX					
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference	Citation
409	Process vessels shall be vented through appropriate treatment systems that control the release of radioactive material in gaseous effluents to the extent that the guidelines referenced in Section 1300.1.4.3, Routine Releases, are not exceeded and these releases are ALARA.	Order 6430.1A, Section 1323-5	The PPP, transfer line encasement hose, and Drop Leg assembly are ventilated and maintained at a negative pressure relative to ambient via the SY farm tank ventilation system which provides the required control function.	HNF-SD-WM-EO-001	
410	Integrity of the primary confinement boundary shall be determined by some or all of the following measures: ... inventory monitoring, on-line leakage monitoring for the intersperse, leakage monitoring outside confinement vessels, or capability for periodic visual surveillance, including remote visual surveillance with CCTV	Order 6430.1A, Section 1323-5	Integrity of the primary containment boundary is defined by safety class leak detectors installed in the PPP and ASSD.	HNF-4531	HNF-4531, Section 6.1 H-14-103616, Item 15 H-14-103592, Item 61
411	Insulation shall be considered for equipment, ductwork, piping, flue pipe, and breaching to minimize energy loss, to prevent condensation, and to provide safe surface temperatures.	Order 6430.1A, Section 1525	Insulation is incorporated in the system design where warranted	HNF-4170 HNF-4407 HNF-4216 HNF-4043	H-14-103616 Note 2 H-14-103596 Item 15 H-14-103605
412	All insulation material, media used to apply insulation, and jacketing material shall have a maximum flame spread of not more than 25 fuel-contributed and smoke-developed ratings of not over 50 when tested using UL 723 Test Methods.	Order 6430.1A, Section 1525	The SY-101 RAPID Mitigation System is outside the scope of this criterion as it is comprised of exterior above ground SSC's beyond 15 ft from buildings or building supports.	H-14-103559 civil site plan	
413	All insulation material, media used to apply insulation, and jacketing material shall have a maximum flame spread of not more than 25 fuel-contributed and smoke-developed ratings of not over 50 when tested using UL 723 Test Methods.	Order 6430.1A, Section 1525	The SY-101 RAPID Mitigation System is outside the scope of this criterion as it is comprised of exterior above ground SSC's beyond 15 ft from buildings or building supports.	H-14-103559 civil site plan	
414	Asbestos or asbestos-containing materials shall not be used.	Order 6430.1A, Section 1525	No asbestos or asbestos-containing materials have been specified.	HNF-4169 HNF-4170 HNF-4216 HNF-4407 HNF-4235 HNF-4043	
415	Insulation thickness for exterior and underground distribution systems and equipment shall be based on the TMA Economic Thickness Manual.	Order 6430.1A, Section 1525	The SY-101 RAPID Mitigation System is not intended as an energy distribution system. Thus the orders criteria is not directly applicable. Water skid requirements include documentation of heat loss calculations used to determine appropriate insulation thickness.	HNF-4043	HNF-4043, Section 6.2.1.4.3
416	Insulation material, thickness, and jacketing shall be designed to provide an exterior skin surface temperature greater than the minimum anticipated ambient dew point.	Order 6430.1A, Section 1525	The SY-101 RAPID Mitigation system include insulation as warranted to comply with process control requirements. Water skid requirements include documentation of heat loss calculations used to determine appropriate insulation thickness.	HNF-4043	HNF-4043, Section 6.2.1.4.3
417	Insulation shall be provided on hot and cold generation equipment, ductwork, piping, flues or breaching, using a material, thickness, and surface treatment that will maintain the surface temperature between 35°F and 125°F for conductive surfaces or between 32°F and 1500°F for nonconductive surfaces.	Order 6430.1A, Section 1525	The requirements of this criteria are involved by reference to OSHA requirements.	HNF-4043	HNF-4043, Section, 3.5.1
418	Fire protection systems shall comply with DOE 5480.7.	Order 6430.1A, Section 1530	The SY-101 RAPID mitigation system is outside the scope of DOE order 6480.7 as no fire protection systems are included in the project.	N/A	
419	All systems shall comply with NFPA 70 and ANSI C2.	Order 6430.1A, Section 1605	Equipment design and installation was specified and inspected to NFPA 70 (NEC). No applicable ANSI C2 (Elect Utility) equip.	NFPA 70, Nat'l Electric Code WP-99-00126 WP-99-00145 WP-99-00138	
420	Electrical systems shall be designed so that all components operate within their capacities for initial and projected loads.	Order 6430.1A, Section 1605	Equipment design and installation was specified and inspected to NFPA 70, National Electric Code, which requires that components operate within rated capacities.	NFPA 70, Nat'l Electric Code WP-99-00126 WP-99-00145 WP-99-00138	
421	Preferred standard voltages in conformance with ANSI C84.1 shall be used, with a single-voltage level characteristic in any classification, to minimize stocks of spare equipment and to standardize operating and maintenance practices and procedures.	Order 6430.1A, Section 1605	Standard voltages are used throughout 480V and 120 V.	HNF-4235 HNF-4043	
422	Electrical materials and equipment shall be UL- or FM-tested, with label attached, for the purpose intended, whenever such products are available. Where there are no UL- or FM-listed products of the type, testing and certification by another nationally recognized testing agency may be acceptable.	Order 6430.1A, Section 1605	Equipment design was specified and inspected to NFPA 70, National Electric Code, which requires the use of listed or labeled equipment.	NFPA 70, Nat'l Electric Code HNF-4235 HNF-4043	

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
423	Installation methods shall be in accordance with the manufacturer's instructions, with NFPA 70, and with other applicable requirements.	Order 6430.1A, Section 1605	Equipment installation was specified and inspected to NFPA 70, National Electric Code, and manufacturers instructions, as indicated in pertinent procurement specifications.	Electrical permits 99-0026 and 99-0027 HNF-4235 HNF-4043
424	On-site acceptance testing shall be required for each major electrical system.	Order 6430.1A, Section 1605	Work Packages require electrical inspection per the National Electric Code and pertinent procurement specifications. Said inspections verify the requisite testing has been performed.	Electrical permits 99-0026 and 99-0027 HNF-4235 HNF-4043
425	Tests shall be specified to demonstrate that each function and important parameter is implemented.	Order 6430.1A, Section 1605	The project's Operational Test Procedure includes the requisite tests.	OTP-440-003
426	Specific criteria shall be included to determine pass/fail acceptance.	Order 6430.1A, Section 1605	The project's Operational Test Procedure includes the requisite acceptance criteria.	OTP-440-003
427	Tests shall be performed in the presence of a government representative.	Order 6430.1A, Section 1605	The project's Operational Test Procedure includes the requisite tests and witnessing requirements.	OTP-440-003
428	Copies of all test results shall be submitted for approval.	Order 6430.1A, Section 1605	The project's Operational Test Procedure includes the requisite tests documentation approval. Vendor test result submittal for approval is required by pertinent procurement specifications.	HNF-4235 HNF-4043
429	Raceways that penetrate fire-rated assemblies shall be noncombustible.	Order 6430.1A, Section 1605	There are no combustible raceways in the design.	N/A
430	The complete installation shall be suitably sealed to maintain the established fire ratings as defined in UL Building Materials Directory and UL 1479, Fire Test of Through-Penetration Firestops.	Order 6430.1A, Section 1605	There are no firestops required in the design.	N/A
431	Raceways shall be 1/2-inch minimum in diameter.	Order 6430.1A, Section 1605	Minimum specified conduit size is 3/4 inch, per installation drawings.	ECN 652491
432	Raceways embedded in concrete or masonry shall be 3/4-inch minimum and shall be adequate in number and capacity for the initial and projected facility requirements.	Order 6430.1A, Section 1605	Minimum specified conduit size is 3/4 inch, per installation drawings and are adequate in number and capacity for the project's requirements.	ECN 652491
433	Electrical Metallic Tubing (EMT) shall be used to enclose circuit power conductors, alarm and signal circuits in nonhazardous and noncorrosive locations.	Order 6430.1A, Section 1605	No EMT was specified or utilized in the project's design and construction.	ECN 652491
434	[EMT] shall not be installed where subjected to physical damages during installation or while in service.	Order 6430.1A, Section 1605	No EMT was specified or utilized in the project's design and construction.	ECN 652491
435	EMT shall not be installed underground and shall not be encased in concrete.	Order 6430.1A, Section 1605	No EMT was specified or utilized in the project's design and construction.	ECN 652491
436	When EMT is used outdoors or in damp locations, compression type (rain tight) fittings must be used.	Order 6430.1A, Section 1605	No EMT was specified or utilized in the project's design and construction.	ECN 652491
437	Flexible steel conduit shall be used for connection to equipment subject to vibration and connection from junction boxes to recessed lighting fixtures.	Order 6430.1A, Section 1605	Equipment installation was specified and inspected to NFPA 70, National Electric Code, and manufacturers instructions, as indicated in pertinent procurement specifications.	NFPA 70 HNF-4235 HNF-4043
438	Rigid steel conduit or intermediate metal conduit shall be used in locations classified as hazardous by NFPA 70.	Order 6430.1A, Section 1605	Equipment installation was specified and inspected to NFPA 70, National Electric Code.	Art 348 Art 345 & 346
439	Only rigid steel conduit or intermediate metal conduit shall be used to route secure circuits through nonsecured areas.	Order 6430.1A, Section 1605	There are no secure circuits utilized in the project's design.	Art 348 Art 345 & 346
440	Such circuits shall be capable of detecting tamper with the line.	Order 6430.1A, Section 1605	There are no secure circuits utilized in the project's design.	Art 348 Art 345 & 346
441	Aluminum conduit shall be used for high-frequency circuits where steel will cause magnetic problems or in atmospheres where steel conduit is unsuitable.	Order 6430.1A, Section 1605	There are no high frequency circuits utilized in the project's design.	Art 348 Art 345 & 346
442	Aluminum conduit shall not be used to enclose secure conductors carrying classified information (as defined by the cognizant DOE authority).	Order 6430.1A, Section 1605	There are no secure circuits utilized in the project's design.	Art 348 Art 345 & 346
443	Aluminum conduit shall not be installed underground, encased in concrete, or where the atmosphere is corrosive to aluminum.	Order 6430.1A, Section 1605	No aluminum conduit was specified or utilized in the project's design and construction.	ECN 652491
444	Nonmetallic conduit shall be used only where allowed by NFPA 70.	Order 6430.1A, Section 1605	No non-metallic conduit was specified or utilized in the project's design and construction.	ECN 652491
445	Nonmetallic conduit shall not be used in electromagnetically sensitive areas or to enclose secure conductors, except when required in red/black design in accordance with NSA NACSIM 5203.1605-2.1.7.	Order 6430.1A, Section 1605	No non-metallic conduit was specified or utilized in the project's design and construction.	ECN 652491

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Citation
446	Except for vertical routings to source or termination points, surface-metal or nonmetallic raceways and multi-outlet assemblies shall be used only where allowed by NFPA 70.	Order 6430.1A, Section 1605	No surface raceways or multi-outlet assemblies were specified or utilized in the project's design and construction.	ECN 652491, Page 25 - Conduit Schedule
447	The use of cable trays shall be considered for large multiple-cable applications in both interior and exterior locations.	Order 6430.1A, Section 1605	No cable trays were specified or utilized in the project's design and construction.	ECN 652491, Page 25 - Conduit Schedule
448	Conductors for interior electrical systems shall be copper, except that aluminum conductors size No. 4 AWG and larger may be used.	Order 6430.1A, Section 1605	No aluminum conductors were specified or utilized in the project's design and construction.	ECN 652491, Page 25 - Conduit Schedule
449	Conductors for power and lighting branch circuits shall be not smaller than No. 12 AWG. No. 10 and No. 12 AWG conductors for power and lighting branch circuits shall be solid.	Order 6430.1A, Section 1605	No power and lighting conductors are smaller than No. 12 AWG.	ECN 652491, Page 25 - Conduit Schedule
450	No. 8 AWG conductors and larger shall be stranded.	Order 6430.1A, Section 1605	All No. 8 AWG conductors and larger are stranded.	ECN 652491, Page 25 - Conduit Schedule
451	Conductors for Class 1 remote-control and signal circuits shall be enclosed in cable and shall comply with NFPA 70.	Order 6430.1A, Section 1605	Class 1 circuits are in cable.	ECN 652491, Page 25 - Conduit Schedule
452	Conductors for Class 2 low-energy remote-control and signal circuits shall be not smaller than No. 18 AWG.	Order 6430.1A, Section 1605	Class 2 circuits are No. 18 AWG or larger.	ECN 652491, Page 25 - Conduit Schedule
453	Power and lighting conductors shall be 600-volt, Type THW, XHHW, or THWN. Conductors required to be rated 90 degrees C in accordance with NFPA 70 shall be Type RHH, THW, or THHN.	Order 6430.1A, Section 1605	All stranded conductors utilized in the project's design are THHN. Instrumentation conductors which must be shielded from external noise effects are co-axial cable and are not power or lighting conductors as defined in this criteria.	ECN 652491, Page 25 - Conduit Schedule
454	Conductors in high-temperature areas shall be NEC Type FEP or TFE as required.	Order 6430.1A, Section 1605	No conductor exists in high temperature areas.	ECN 652491, Page 25 - Conduit Schedule
455	Direct burial conductors shall be Type UF, UL 493.	Order 6430.1A, Section 1605	No direct burial conductors are installed.	ECN 652491, Page 25 - Conduit Schedule
456	Bonding and grounding conductors shall be ASTM B1 solid, bare copper for sizes No. 8 AWG and smaller and shall be ASTM B8 Class B stranded copper for wire sizes No. 6 AWG and larger.	Order 6430.1A, Section 1605	Ground conductors are 4/0 stranded copper.	ECN 652491, Page 9
457	Each set of contract documents shall indicate the basis for the size of the conductors shown on those plans when the option for aluminum conductors has been chosen.	Order 6430.1A, Section 1605	No aluminum conductors were specified or utilized in the project's design and construction.	ECN 652491, Page 3, Note 9
458	Demand and diversity factors shall comply with NFPA 70.	Order 6430.1A, Section 1630	Factors are as allowed by NFPA 70. See Electrical System Study	HNF-4947, Calculation E-1
459	Demand and diversity for feeder and substation load calculations shall be as stated in Fink and Beatty, Standard Handbook for Electrical Engineers.	Order 6430.1A, Section 1630	Load calculations are as allowed by ANSI C2, meeting the requirements of the specified document.	HNF-4947, Calculation E-1
460	Electric service quality and reliability shall be considered in conformance with IEEE 483 to ensure that they meet the load requirements.	Order 6430.1A, Section 1630	New services which meet the requirements of IEEE 483 were added or modified to serve Purge Tank Heater #1.	P1-28
461	Where loads require a high degree of voltage and frequency stability, the available short-circuit MVA at the service connection and the stability of the supplying utility system shall be considered to ensure adequate power quality.	Order 6430.1A, Section 1630	No electrical service changes are required by the project design.	P1-28
462	An overall power factor of not less than 85 percent shall be achieved.	Order 6430.1A, Section 1630	The required power factor limitation is complied with as indicated in the project's Electrical System Study.	HNF-4947, Calculation E-1
463	When power-factor correction is required, the amount of correction shall be coordinated with the billing tariff to prevent uneconomical overcorrection.	Order 6430.1A, Section 1630	No Power Factor correction is required.	HNF-4947, Calculation E-1
464	Switched capacitor banks shall be used only when necessary to prevent overvoltages during off-peak hours during low power consumption.	Order 6430.1A, Section 1630	No switched capacitors are utilized.	HNF-4947, Calculation E-1
465	Starting capacitors shall be located as near to the loads as practical.	Order 6430.1A, Section 1630	No starting capacitors are utilized.	HNF-4947, Calculation E-1
466	Starting capacitors shall be located as near to the loads as practical.	Order 6430.1A, Section 1630	No starting capacitors are utilized.	HNF-4947, Calculation E-1
467	Facilities designated by the cognizant DOE authority as critical shall be served by dedicated, redundant circuits.	Order 6430.1A, Section 1630	No critical facilities have been designated for the project.	N/A
468	The two services shall be separated by a 4-hour fire-rated barrier and shall be served from separate sources.	Order 6430.1A, Section 1630	No modifications to electric utility services are required for the project.	ECN 652491 P1-28
469	In lieu of providing two separate services, a single service supplied from a loop-type transmission or distribution system having sectionalizing features may be provided when the reliability of the single service proves adequate when considered in conformance with IEEE 399 and IEEE 483.	Order 6430.1A, Section 1630	No modifications to electric utility services are required for the project.	ECN 652491 P1-28
470	Electric circuits shall be located in utility corridors established on master utility plans.	Order 6430.1A, Section 1630	No modifications to electric utility services are required for the project.	ECN 652491 P1-28

DESIGN COMPLIANCE MATRIX					DESIGN COMPLIANCE CITATION		
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System					Design Attribute	Configuration Control Reference	Citation
Item #	Criteria	Source					
471	Grounding systems shall comply with NFPA 70 and IEEE 142.	Order 6430.1A, Section 1639			The project's ground system meets requirements established by NFPA 70 and IEEE 142.	ECN 652491	ECN 652491 P.9
472	A separate ground conductor shall be used.	Order 6430.1A, Section 1639			A separate ground conductor is used for each major project SSC, which is connected to the tank farm's grounding system.	ECN 652491	ECN 652491 P.26
473	Raceway systems shall not be used as ground path.	Order 6430.1A, Section 1639			A separate ground conductor is used for each major project SSC, which is connected to the tank farm's grounding system.	ECN 652491	ECN 652491 P.26
474	Substation and switching station grounding systems shall comply with IEEE 80.	Order 6430.1A, Section 1639			No substation or switching stations are impacted by the project.	ECN 652491	ECN 652491 P.26
475	Grounding connections shall comply with IEEE 837.	Order 6430.1A, Section 1639			All grounding conductors utilized in the system design comply with IEEE 837.	ECN 652491	ECN 652491 P.9
476	Isolated ground systems may be required to meet special instrumentation or other equipment needs. Such ground systems shall be clearly identified, protected against improper usage, and installed in conformance with NFPA 70.	Order 6430.1A, Section 1639			Isolated grounding is not required for instrumentation utilized on the project.	ECN 652491	ECN 652491 P.9
477	Demand and diversity factors shall comply with Section 1630-1.1, Load Requirements.	Order 6430.1A, Section 1640-1.1			Factors comply with the noted requirement as documented in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
478	Interior electrical system power factor shall comply with Section 1630-1.2, Power Factor.	Order 6430.1A, Section 1640-1.1			Factors comply with the noted requirements documented in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
479	Standard voltages shall comply with MIL-HDBK 1004/4 or shall continue the 240/120-volt single-phase service provided, as applicable.	Order 6430.1A, Section 1640-1.3			Industrial Voltage requirement is 480V as noted in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
480	Power system reliability consideration shall comply with IEEE 493 to ensure continual power supply to systems and equipment designated as critical by the cognizant DOE authority.	Order 6430.1A, Section 1640-1.4			Site utility power reliability is identified as high in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
481	The need for multiple transformer-switcher service equipment, to ensure power supply continuity within the facility during scheduled or emergency equipment outages, shall ... be considered.	Order 6430.1A, Section 1640-1.4			Substation 252-S is double ended as indicated in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
482	Adverse effects of voltage level variations, transients, and frequency variations on equipment operation shall be minimized.	Order 6430.1A, Section 1640-1.5			No adverse effects are anticipated for the operation of project equipment, as indicated in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-1
483	Sensitive electrical equipment, such as data processing equipment, shall be isolated as needed for protection. Uninterruptible power systems, motor-generator sets, or power conditioners may be used for isolation.	Order 6430.1A, Section 1640-1.5			Data logging equipment is isolated by optical isolation devices.	HNF-4235	
484	System protection shall comply with IEEE 242.	Order 6430.1A, Section 1640-1.6			System protection complies with IEEE 242 as documented in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-2
485	Ground-fault protection shall comply with NFPA 70.	Order 6430.1A, Section 1640-1.7			System ground fault protection complies with NFPA 70 as documented in the project's electrical system study.	HNF-4947	HNF-4947, Calculation E-2
486	The neutral conductor for electric discharge lighting and for data processing and other similar equipment shall be sized in accordance with NFPA 70.	Order 6430.1A, Section 1640-1.8			No neutral conductor loads are specified in the project.	ECN 652491	P.1-28
487	Calculations shall include harmonic current.	Order 6430.1A, Section 1640-1.8			All large loads have harmonic reduction filters.	CVI 50071 - Robicon VFD data	
488	Interior electrical systems shall comply with NFPA 70.	Order 6430.1A, Section 1640-2.1			Project systems and equipment meet NFPA 70, National Electric Code.	ECN 652491	P.3, Note 7
489	Switchgear criteria shall comply with IEEE C37 series.	Order 6430.1A, Section 1640-2.1			No switchgear within the scope of IEEE C37 is utilized in the project's design.	ECN 652491	P.3, Note 7
490	Energy metering requirements for new buildings and building additions shall comply with Section 1595-11, Energy Metering.	Order 6430.1A, Section 1640-2.2			No new metering within the scope of this criteria is included in the project's design.	ECN 652491	P.3, Note 7
491	Conventional kilowatt-hour meters shall be used for measuring and recording electric energy use at the incoming power service to the building and at the internal service points of significant process loads.	Order 6430.1A, Section 1640-2.2			Existing meters on utility service within the tank farm is adequate to fulfill this criterion. No new metering is incorporated in the project's design.	ECN 652491	P.3, Note 7
492	Where a facility load management program is used, individually for the facility or as a part of a site load management program, demand (kW) metering shall be used.	Order 6430.1A, Section 1640-2.2			No load management program is used on the project.	ECN 652491	P.3, Note 7
493	Metering devices shall be compatible with existing or projected EMs. See Section 1595-10, Energy Management Systems.	Order 6430.1A, Section 1640-2.2			No new metering requirements are established for the project.	ECN 652491	P.3, Note 7
494	Where a facility is to be served directly by a utility company, service metering requirements, equipment to be used, and service metering equipment locations shall be coordinated with the utility company.	Order 6430.1A, Section 1640-2.2			No new utility service is required by the project.	ECN 652491	P.3, Note 7
495	Interior service transformer installations shall comply with NFPA 70.	Order 6430.1A, Section 1640-2.3			No new interior service transformers are required by the project.	ECN 652491	P.3, Note 7
496	The minimum number of transformers necessary to satisfy initial and projected facility loads and operational continuity, safety, and security requirements shall be used.	Order 6430.1A, Section 1640-2.3			New transformers installed at the facility are adequate to fulfill the project's electrical power requirements.	ECN 652491	P.3, Note 7

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
497	Transformer protection and appurtenances shall comply with IEEE C37.91.	Order 6430.1A, Section 1640-2.3	New transformers with protection in conformance with the specified criteria are installed at the facility and are adequate to fulfill the project's electrical power requirements.	ECN 652491
498	Transformer installation shall comply with FM 5-4714-6.	Order 6430.1A, Section 1640-2.3	Transformer installation is in accordance with the specified requirement.	ECN 652491
499	Motors shall comply with NEMA MG-1, except that hermetic refrigerant motor compressors shall comply with UL 984.	Order 6430.1A, Section 1640-2.4	Motors supplied with the Water Support Skid and New Generation Transfer Pump comply with MG-1. No refrigerant compressors are included in the project design.	HNF-4043 HNF-3825 WHC-SD-WM-FDR-007
500	Motors shall have a sufficient rating for the duty they are to perform and shall not exceed their continuous horsepower rating, including service factor. When the driven equipment is operating at the greatest horsepower conditions it is likely to encounter.	Order 6430.1A, Section 1640-2.4	Motors utilized on the Water Support Skid were procured per NEC Article 430 and per NEMA specification MG-1 and are adequately sized to comply with the specified criteria. The motor for the New Generation Transfer pump is of adequate size and rating to comply with the noted criteria.	HNF-4043 WHC-SD-WM-FDR-007
501	Starting and running characteristics shall be coordinated with the driven machine and the motor control equipment.	Order 6430.1A, Section 1640-2.4	A electrical coordination study was completed and released.	HNF-4947
502	Motor enclosures shall be drip-proof for indoor dry locations and totally enclosed or totally enclosed fan-cooled for outdoor or other wet locations, except where special conditions require otherwise.	Order 6430.1A, Section 1640-2.4	All motors were procured for an outdoor environment.	HNF-4043 WHC-SD-WM-FDR-007, 3.2.2.2 and 3.3.3 and 6.0
503	Single-phase motors 1/8 hp and smaller shall be shaded-pole or permanent split capacitor; those larger than 1/8 hp shall be capacitor-start.	Order 6430.1A, Section 1640-2.4	No single phase motors are incorporated in the project's design.	HNF-4043 WHC-SD-WM-FDR-007, 3.2.2.2 and 3.3.3 and 6.0
504	Polyphase motors shall comply with NEMA Design B, unless other characteristics are required by the driven machine or the speed controller.	Order 6430.1A, Section 1640-2.4	All motors utilized in the project's design comply with the noted requirement, except where other characteristics are required by their associated variable frequency drives.	HNF-4043 WHC-SD-WM-FDR-007, 3.2.2.2 and 3.3.3 and 6.0
505	Motors shall be designed for continuous service at ambient temperature.	Order 6430.1A, Section 1640-2.4	All motors were procured to meet continuous use service	HNF-4043 Sec. 3.2.2.2 and 3.3.3 WHC-SD-WM-FDR-007
506	Motors shall operate at full capacity, with a voltage variation of plus or minus 10 percent of the nameplate voltage.	Order 6430.1A, Section 1640-2.4	Motors utilized in the project's design, when operated at full capacity, comply with the noted requirement for operation from 90 to 110 percent of nameplate voltage.	HNF-4043 WHC-SD-WM-FDR-007, 6.3.2
507	High-efficiency motors shall be considered where loading and nearly constant usage may result in significant energy savings.	Order 6430.1A, Section 1640-2.4	This criterion is not applicable as motor operation will be intermittent, and no significant energy savings may be achieved by alternate designs.	HNF-3885
508	Except where special conditions require otherwise, motors 1 hp and less shall be specified as single-phase, 115-volt motors, while those greater than 1 hp shall be specified as three-phase, 200- or 460-volt, motors.	Order 6430.1A, Section 1640-2.4	No motors under 1 hp are used on the project. All motors greater than 1 hp are 3 phase, 200V or 460 V	HNF-4043 3.2.2.1 WHC-SD-WM-FDR-007 6.0
509	Motor characteristics shall be selected to avoid excessive acceleration time for motors driving large masses and starting under load.	Order 6430.1A, Section 1640-2.4	All motors are VFD controlled and therefore no excessive acceleration time will be experienced.	HNF-4043 WHC-SD-WM-FDR-007
510	Variable-speed drives shall be considered where motor speed requirements vary widely during normal operation. Solid-state variable-frequency units are recommended for smaller horsepower motors.	Order 6430.1A, Section 1640-2.4	All motors used for the project pumps have VFD control.	6.3.2
511	[T]he driven motor shall be selected in accordance with the drive manufacturer's recommendations to ensure a coordinated system and to avoid overheating the motor.	1640-2.4	All pumps motors have been selected and procured by an ESL rated shop, and have been selected in accordance with motor manufacturer recommendations.	HNF-4043 WHC-SD-WM-FDR-007
512	Control equipment shall comply with the NEMA ICS standards and UL 508, Industrial Control Equipment.	Order 6430.1A, Section 1640-2.5	Control equipment was designed and built via a UL-508A qualified contractor.	HNF-4235 2.0 HNF-4043
513	All motors shall be provided with fully coordinated control equipment to perform the functions required.	Order 6430.1A, Section 1640-2.5	Pump motors for the water skid were provided by a ESSL/UL-508A qualified contractor and incorporate the requisite control equipment. The New Generation Transfer Pump is fitted with a variable frequency drive which meets the criterion's requirement.	HNF-4043 WHC-SD-WM-FDR-007
514	Overcurrent devices shall be provided in each ungrounded conductor	Order 6430.1A, Section 1640-2.5	All electrical design incorporated in the project complies with NFPA-70 1999, which requires overcurrent protection of ungrounded conductors.	ECN 652491 P. 3
515	[O]vercurrent devices located in the motor or controller shall be rated in accordance with the manufacturer's instructions.	Order 6430.1A, Section 1640-2.5	All electrical design incorporated in the project complies with NFPA-70 1999, which requires rating of overcurrent protection devices in accordance with manufacturer's instructions.	HNF-3885 ECN 652491 P. 3 HNF-3885
516	Single-phase motors may be controlled directly by automatic control devices of adequate rating.	Order 6430.1A, Section 1640-2.5	No single phase motors are utilized in the project's design.	N/A
517	Polyphase motors controlled automatically and all polyphase motors rated greater than 1 hp shall have magnetic starters.	Order 6430.1A, Section 1640-2.5	All motors are VFD controlled, obviating the requirement for magnetic starters.	HNF-4043 WHC-SD-WM-FDR-007
518	Control devices shall be of adequate voltage and current rating for the duty to be performed.	Order 6430.1A, Section 1640-2.5	All electrical design utilized on the project is per NFPA-70 1999, which requires electrical components to be of adequate rating for the intended service.	ECN 652491 P. 3 HNF-3885
519	Pilot control circuits shall operate with one side grounded, at no greater than 120 volts.	Order 6430.1A, Section 1640-2.5	Pilot control circuits are 120 VAC or less, one side grounded, as required per NFPA-70, 1999 and UL-508A.	ECN 652491 P. 3 HNF-3885

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
520	Where control power transformers are required, they shall be located inside the associated motor starter housing.	Order 6430.1A, Section 1640.2.5	All motors are VFD controlled, obviating the requirement for control power transformers.	HNF-4043
521	Where control power transformers are required, they shall be protected against faults and overload by properly sized overcurrent devices.	Order 6430.1A, Section 1640.2.5	All electrical controls are per NFPA-70 and UL-508A requirements, which invoke the required fault protection, and provide for appropriate sizing of overcurrent protection devices.	WHC-SD-WM-FDR-007 HNF-4235 HNF-4043
522	Where control power transformers are required, they shall be of sufficient capacity to serve all devices connected to them without overload.	Order 6430.1A, Section 1640.2.5	All electrical controls are per NFPA-70 and UL-508A requirements, which invoke the required capacity requirements.	HNF-4235 HNF-4043
523	Reduced-voltage starters shall be provided for larger motors where starting the motor may result in unacceptable voltage dip.	Order 6430.1A, Section 1640.2.5	As all pumps motors are controlled by a VFD, no reduced-voltage starters are required by the project's design.	HNF-4043
524	Electric power distribution systems shall be filtered to reduce emanation of detectable electromagnetic signals to acceptable levels as directed by the cognizant DOE telecommunications and security personnel.	Order 6430.1A, Section 1640.3.1	VFD controllers incorporate EMI filtering to eliminate electromagnetic signals which may interfere with telecommunications equipment.	WHC-SD-WM-FDR-007 HNF-4043
525	Installations shall comply with DOE 5300.2B, DOE 5300.3B, and DOE 5300.4B. Additional guidance shall be obtained from the Office of Computer Services and Telecommunications Management, DOE Headquarters, as directed by the cognizant DOE authority.	Order 6430.1A, Section 1640.3.1	No computers or telecommunications within the scope of this criterion are utilized in the project's design.	N/A
526	Normal primary power for protective alarm and communications systems shall come directly from the on-site power distribution system or, in the case of isolated facilities, shall come directly from the public utility.	Order 6430.1A, Section 1640.3.2	All primary power is provided by the onsite electrical distribution system.	HNF-3885
527	Where several primary power sources are available, the most reliable source shall be used.	Order 6430.1A, Section 1640.3.2	All primary power is provided by the onsite electrical distribution system which has been demonstrated to have high reliability, as documented in the project's electrical system study.	HNF-4947
528	Standby or emergency power supplies for security, communications, and alarm systems shall be provided in accordance with Section 1660, Special Systems.	Order 6430.1A, Section 1640.3.3	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
529	Standby and emergency systems shall serve loads set forth in NFPA 110.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
530	Additional standby or emergency systems shall be provided to support systems or equipment components whose operating continuity is determined to be vital by the cognizant DOE authorities for protection of health, life, property, and safeguards and security systems.	Order 6430.1A, Section 1660	No systems have been identified with the requirement to survive a loss of the electrical distribution system.	HNF-3885
531	Safety Class 1 items shall be provided with emergency power.	Order 6430.1A, Section 1660	Safety class items utilized in the project's design do not require emergency power to perform their safety function.	HNF-4947 HNF-4531
532	Optional standby systems shall be provided for production process operations in cases where the cognizant DOE authority determines that the process will become unstable on loss of power or that a severe monetary loss will result.	Order 6430.1A, Section 1660	No such determination has been made to include standby power systems.	N/A
533	Uninterruptible power shall be provided for equipment that cannot sustain functions through the momentary power loss that occurs when an alternate power source comes on line and picks up the load. See Section 1690-3, Uninterruptible Power Systems.	Order 6430.1A, Section 1660	An uninterruptible power supply is incorporated in the water skid design to provide an emergency means of closing the skid's water supply valve. No other uninterruptible power supplies are required by the system's design.	HNF-4043
534	Emergency power shall be provided for protective alarm and communications systems as dictated by the system requirements.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
535	Switchover to emergency power shall be automatic on failure of the primary power source and shall be indicated on an annunciator panel. The annunciator shall be located in an occupied area and shall indicate any problems with the emergency system.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
536	Definition of "emergency systems" "legally required standby systems" and "optional standby systems" shall be in accordance with NFPA 70.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
537	Emergency power equipment areas shall be ventilated to exhaust hazardous gases (if applicable) and to maintain satisfactory ambient temperatures for equipment operation or personnel access.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
538	Emergency or standby power shall service fire alarm, security alarm, and supervisory sensing devices designated essential by the cognizant DOE authority.	Order 6430.1A, Section 1660	No such systems have been so designated by the cognizant DOE authority.	N/A
539	Emergency power systems shall comply with NFPA 37, NFPA 70, NFPA 101, NFPA 110, and IEEE 446.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
540	Emergency power systems shall be capable of maintaining full operation of emergency loads for the full time period specified by the cognizant DOE authority (nominally, a minimum of 24 hours).	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
541	Such power sources shall have the necessary built-in features to facilitate operational testing on a periodic basis to verify their readiness.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
542	Where emergency generators are required for loads 25 kVA and smaller, gasoline or LPG engines may be used. For loads greater than 25 kVA, diesel engines shall generally be used.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
543	Application of diesel engines shall comply with FCC Technical Report No. 69.	Order 6430.1A, Section 1660	No diesel engines are utilized in the project's design.	N/A
544	Batteries, when required, shall be rechargeable and shall be kept fully charged at all times when primary power is available.	Order 6430.1A, Section 1660	Batteries incorporated in the water skid's valve closure UPS are rechargeable and are kept fully charged whenever primary power is available.	HNF-4043
545	The charger shall automatically switch from float to fast charge rate at a preset drop in DC bus voltage.	Order 6430.1A, Section 1660	Components incorporated in the water skid's valve closure UPS perform the required switching functions.	HNF-4043
546	The charger shall be furnished with a capacity to charge the battery from a fully discharged state to not less than 85 percent of the rated ampere-hour capacity within 24 to 72 hours.	Order 6430.1A, Section 1660	Components incorporated in the water skid's valve closure UPS provide the requisite charging rate.	HNF-4043
547	Emergency power systems legally required by NFPA 70 shall be installed to meet normal emergency power requirements.	Order 6430.1A, Section 1660	Existing electrical distribution system is a high reliability system obviating the need for standby or emergency power.	HNF-4947
548	More stringent emergency power requirements shall be identified by the cognizant DOE authority on a case-by-case basis.	Order 6430.1A, Section 1660	No such requirements have been identified by the cognizant DOE authority.	N/A
549	Electric power and electrical instrumentation and control systems are designated safety class electric if they are required to satisfy the safety class criteria in Section 1300-3.1, General, through Section 1300-3.4, Equipment Environment Considerations. These components and systems are subject to the basic approach outlined in the IEEE 308 standards and to higher quality assurance requirements as needed.	Order 6430.1A, Section 1660	Safety class electrical equipment utilized in the project's design are subject to quality assurance requirements defined in NQA-1 and/or the CGI process.	HNF-SD-WM-BIO-001 HNF-4531
550	For safety class items that require electric power to perform their safety functions, the design shall provide safety class emergency electric power systems (AC, DC, and their distribution systems).	Order 6430.1A, Section 1660	Neither HNF-SD-WM-BIO-001 nor safety equipment list HNF-4531 call for instrumentation, standby, or safety class power as related to project safety class instrumentation. All safety systems are designed to fail in an alarm mode after a localized power loss. Loss of power to any of the instrumentation 120 AC panels results in a shutdown of the transfer pump operation. Flushing of the transfer line is via a bottle compressed air backup system (non electrical).	HNF-SD-WM-BIO-001 HNF-4531
551	The design shall define the type, capacity, performance characteristics, and features of the safety class electric systems, including generator and batteries, required to meet safety class system needs.	Order 6430.1A, Section 1660	Neither HNF-SD-WM-BIO-001 nor safety equipment list HNF-4531 call for emergency, standby, or safety class power as related to project safety class instrumentation. All safety systems are designed to fail in an alarm mode after a localized power loss. Loss of power to any of the instrumentation 120 AC panels results in a shutdown of the transfer pump operation. Flushing of the transfer line is via a bottle compressed air backup system (non electrical).	HNF-SD-WM-BIO-001 HNF-4531
552	Safety class electric systems shall be provided with suitable redundancy and separation to ensure that adequate capacity and capability are available with the addition of a single failure.	Order 6430.1A, Section 1660	Redundancy, separation, and fail-safe functionality are incorporated in the electrical design of all safety class equipment incorporated in the project's design. Physical redundancy is incorporated in the project's electrical systems design where warranted.	HNF-4235 HNF-4170
553	Redundant safety class electric systems shall be physically protected or separated to prevent a common external event from causing a failure of the redundant systems.	Order 6430.1A, Section 1660	Redundancy, separation, physical protection, and fail-safe functionality are incorporated in the electrical design of all safety class equipment incorporated in the project's design. Physical redundancy is incorporated in the project's electrical systems design where warranted.	HNF-4235 HNF-4170
554	IEEE 378, Standard Application of the Single Failure Criterion to Nuclear Power Generating Station Class 1E Systems and IEEE 384, Standard Criteria for Independence of Class 1E Equipment and Circuits shall be used as redundancy and separation criteria.	Order 6430.1A, Section 1660	Because the leak detector is fail safe, redundancy is not required. The pressure switches and related circuitry are redundant to each other and fail safe (ie alarm) if a discontinuity in the circuitry arises. The Yokogawa waste flow totalizer and the Brooks dilute water flow totalizer have built-in error detecting algorithms that will identify an internal failure and if power to the meters is lost from its host panel circuit breaker the transfer pump will shut down automatically. Therefore redundancy is not required.	HNF-SD-WM-BIO-001 HNF-4531 HNF-4235
555	The connection of loads that do not require safety class power to safety class buses shall be minimized.	Order 6430.1A, Section 1660	Neither HNF-SD-WM-BIO-001 nor safety equipment list HNF-4531 call for emergency, standby, or safety class power as related to project safety class instrumentation. All safety systems are designed to fail in an alarm mode after a localized power loss. Loss of power to any of the instrumentation 120 AC panels results in a shutdown of the transfer pump operation. Flushing of the transfer line is via a bottle compressed air backup system (non electrical).	HNF-SD-WM-BIO-001 HNF-4531
556	Where such loads must be connected to a safety class electric power system, the loads shall be provided with suitable separation or devices that will prevent failures from affecting the safety class electric system.	Order 6430.1A, Section 1660	Redundancy, separation, and fail-safe functionality are incorporated in the electrical design of all safety class equipment incorporated in the project's design. Physical redundancy is incorporated in the project's electrical systems design where warranted.	HNF-4235 HNF-4170 HNF-4169

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
557	Safety class electric systems shall be qualified to the requirements in Section 1300-3.4, Equipment Environment Considerations, and, as appropriate, to the structural requirements imposed on safety class items in Section 0111-99, Special Facilities.	Order 6430.1A, Section 1660	Neither HNF-SD-WM-BIO-001 nor safety equipment list HNF-4531 call for emergency, standby, or safety class power as related to project safety class instrumentation. All safety systems are designed to fail in an alarm mode after a localized power loss. Loss of power to any of the instrumentation 120 AC panels results in a shutdown of the transfer pump operation. Flushing of the transfer line is via a bottle compressed air backup system (non electrical).	HNF-SD-WM-BIO-001 HNF-4531
558	Testing or a combination of testing and analysis shall be the preferred method of demonstrating the operability of instrumentation and electrical equipment that are required to operate during and following a DBE. Seismic experience data may be used as an alternative to testing or dynamic analysis where such data have been documented and validated.	Order 6430.1A, Section 1660	This system is not required to operate during or following a DBE.	HNF-SD-WM-BIO-001 HNF-4531
559	The capability to periodically test safety class electric systems to verify system performance shall be provided.	Order 6430.1A, Section 1660	The design of the leak detectors allows easy testing of all safety class items in the leak detector loop to assure system performance. Testing of the pressure switches shall be by isolating the section of piping via valves that the sensors are mounted in and then introducing an air pressure through a port located near one of the switches. The waste flow totalizer transmitter and dilute water flow totalizer have simulators that can be attached in place of their related flow elements to check functionality and calibration.	HNF-4235 HNF-4170
560	The design shall provide, as necessary, safety class protection systems and safety class instrumentation and control systems to minimize the risk associated with facility operation.	Order 6430.1A, Section 1660	Safety class instrumentation as warranted is incorporated in the project's design.	HNF-4531 HNF-4235
561	A protection system is a system that initiates corrective action, e.g., fire detection/Halon release, UPS. The protection system shall provide automatic initiation of protective actions that require rapid response and automatic control of interlocks that prevent unsafe operator actions.	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria. The only UPS utilized in the project's design is that provided with the Water Skid to prevent over-filling of the Skid's water storage tank, and it is not a safety class protection system.	HNF-3885 HNF-4531 HNF-4043
562	Protection systems shall be designed to sense potentially hazardous conditions and to initiate actions to ensure that specific acceptable design limits are not exceeded as a result of anticipated operational occurrences.	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria.	HNF-3885 HNF-4531
563	The protection system shall automatically activate safety class systems and components that are required to ensure the safety of operating personnel and the public.	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria.	HNF-3885 HNF-4531
564	It shall provide audible and visual indication of system status.	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria.	HNF-3885 HNF-4531
565	Automatically initiated protective actions shall be provided with a manually initiated backup.	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria.	HNF-3885 HNF-4531
566	The design of the protection system shall provide suitable redundancy and diversity to ensure that safety functions can be completed, when required, and that no single failure will result in the loss of the protective functions.	Order 6430.1A, Section 1660	Because the leak detector is fail safe, redundancy is not required. The pressure switches and related circuitry are redundant to each other and fail safe (ie alarm) if a discontinuity in the circuitry arises. The Yokogawa waste flow totalizer and the Brooks dilute water flow totalizer have built-in error detecting algorithms that will identify an internal failure and if power to the meters is lost from its host panel circuit breaker the transfer pump will shut down automatically or be shut down by the operator.	HNF-4170 HNF-4235
567	The protection system shall be designed to fail in a safe state following a component or channel failure or loss of power (e.g., control air or electric power).	Order 6430.1A, Section 1660	There are no automatic safety class automatic protection systems required in the project's design as none are required to fulfill design criteria.	HNF-3885 HNF-4531
568	Safety class instrumentation shall sense abnormal conditions affecting safety and subsequently provide an alarm, e.g., low differential pressure between HVAC zones, criticality monitoring.	Order 6430.1A, Section 1660	Leak detectors and pressure switches provide for abnormal condition along with their related Safety Class Annunciations.	HNF-4235 HNF-4531 (SEL)
569	Safety class instrumentation and control systems shall provide audible and visual alarms so that the operator can take timely corrective actions to ensure the safety of operating personnel and the public.	Order 6430.1A, Section 1660	Audible and visual alarms of safety class instrumentation is provided.	HNF-4235
570	The safety class instrumentation shall be designed to monitor safety-related variables and safety class systems over expected ranges for normal operation, anticipated operational occurrences, DBA conditions, and for safe shutdown.	Order 6430.1A, Section 1660	Instrumentation is provided for normal operations, anticipated operational occurrences, and safe shutdown. Instrumentation is not required to be functional for DBA conditions.	HNF-4235 HNF-4531
571	Safety class controls shall be provided when they are necessary to control these variables. Typical systems whose design shall require safety class instrumentation and controls include safety-related process systems, safety class confinement systems, and safety class cooling systems.	Order 6430.1A, Section 1660	Safety class controls are provided as necessary to comply with this criterion.	HNF-4235 HNF-4531

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ORDER 6430.1A REQUIREMENTS		DESIGN COMPLIANCE CITATION		
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
572	The design of safety class instrumentation and controls shall provide suitable redundancy and diversity to ensure that safety functions can be completed, when required, and that no single failure will result in the loss of the protective functions.	Order 6430.1A, Section 1660	HNF-SD-WM-ER-736, intrinsically safe leak detector circuit design description notes that there is no credible single failure that would result in the loss of capability to perform the required safety function. The safety class pressure switches, relays and alarms measure the same variable at the same point and are redundant to each other. If the waste flow totalizer and/or the dilute water flow totalizer should fail, other means are available to detect mass transfer and shut down the process. As a consequence single failures may cause the process to be shut down, but not result in the loss of protective functions.	HNF-SD-WM-ER-736 HNF-4235 HNF-4531 HNF-3737 HNF-SD-WM-BIO-001
573	The safety class instrumentation and controls shall fail in a safe state following a component or channel failure or loss of power (e.g., control air, electric power)	Order 6430.1A, Section 1660	HNF-SD-WM-ER-736, intrinsically safe leak detector circuit design description notes that the leak detector is fail safe in that it alarms on loss of power. Furthermore, additional alarms in the two annunciator panels alarm on loss of power at the leak detector. The redundant pressure switches, relays, and annunciators will alarm on a loss of circuit continuity. Failure of the flow totalizers will result in the last total value being saved in their non-volatile memories and a blank readout on their displays. A blank readout will result in the operator shutting down the process, thereby performing the requisite safety function.	HNF-SD-WM-ER-736 HNF-4235 HNF-4531 HNF-3737 HNF-SD-WM-BIO-001
574	Protection systems and safety class instrumentation and control equipment shall be qualified to the environmental qualification requirements in Section 1303.4, Equipment Environment Considerations.	Order 6430.1A, Section 1660	Appropriate environmental conditions for the leak detectors were addressed in HNF-SD-WM-ER-736, intrinsically safe leak detector circuit design. Pressure switches, flow totalizers, and annunciators were procured to meet the environmental conditions of their surroundings.	HNF-SD-WM-ER-736 HNF-4170 HNF-4235
575	Redundant protection system and safety class instrument channels shall be physically protected or separated to prevent a common external event or failure of one channel from causing a failure in the redundant channel.	Order 6430.1A, Section 1660	The design of the leak detectors is fail safe, where any failure will cause an alarm. As such, redundancy is not required and is not included. There is no redundant system to protect. Design of the redundant pressure switches is fail safe as applied to circuit continuity. The flow totalizers are not redundant but perform their safety function by causing a shutdown of the process as required.	HNF-4235
576	The safety class protection system and safety class instrumentation and control system shall be appropriately separated or isolated from other instrumentation and control systems to the extent that a failure (e.g., electrical, control air) in these other systems will not degrade the safety class systems to the extent that they are unable to perform their necessary safety functions.	Order 6430.1A, Section 1660	The design of the leak detectors is fail safe, where any failure will cause an alarm. As such, redundancy is not required and is not included. There is no redundant system to protect. The design of the redundant pressure switches is fail safe as applied to circuit continuity and occupy conduit runs that are separate from non safety class instrumentation. The flow totalizers are physically separate from other instrumentation.	HNF-4235
577	The design of protection system and safety class instrumentation and control systems shall provide for the periodic in-place testing and calibration of instrument channels and interlocks.	Order 6430.1A, Section 1660	The design of the leak detectors allows easy testing of all safety class items in the leak detector loop to assure system performance. The two redundant pressure switches monitoring the pressure content of the waste to flush water interface piping have been equipped with a port for air pressurizing this section of pipe for the purpose of introducing a trip pressure level. The raw water totalizer and waste totalizer have simulators that can be wired in when needed to check their functionality. The annunciator displaying alarms for the leak detectors and pressure switches has a push to test switch that places all alarm windows and horn alert into an alarm condition.	HNF-4235
578	The design of instrumentation and control systems shall allow periodic testing of protective functions to determine whether failure or loss of redundancy may have occurred	Order 6430.1A, Section 1660	Because the leak detector is fail safe, redundancy is not required. The two redundant pressure switches monitoring the pressure content of the waste to flush water interface piping have been equipped with a port for air pressurizing this section of pipe for the purpose of introducing a trip pressure level. Flow totalizers included in the project's design may be tested, but do not have protective functions.	HNF-4235
579	An analysis shall be made to determine power requirements for safe shutdown of the process.	Order 6430.1A, Section 1660	There are no power requirements for safety shutting down the drop leg. There is no power requirements for safety shutting the transfer system process.	N/A
580	Safety class electric power or a safety class control air system shall be provided unless adequate system performance including fail-safe shutdown can be demonstrated when only the conventional power sources are used.	Order 6430.1A, Section 1660	There is no safety class power in the tank tanks. The leak detector is fail safe. Upon loss of any control power sources or electrical power in general the transfer pump operation will cease thereby negating the need for safety class instrumentation from continuing to operate.	HNF-4235
581	Specific project communications requirements shall be designated by the cognizant DOE authority.	Order 6430.1A, Section 1671.1	No specific project communications requirements have been specified by the cognizant DOE authority.	N/A
582	Interior communications and alarm systems shall be designed to use standard, commercially available equipment.	Order 6430.1A, Section 1671.1	No interior communications systems are incorporated in the project design. Alarm systems utilize commercially available components.	HNF-4235
583	The initial and projected requirements for telecommunications systems shall comply with DOE 5300.1B, Telecommunications.	Order 6430.1A, Section 1671.1	No telecommunications equipment is utilized in the project's design.	N/A
584	Secure communications systems shall comply with DOE 5300.3B.	Order 6430.1A, Section 1671.1	No secure communications systems are utilized in the project's design.	N/A
585	TEMPEST criteria shall be as set forth in DOE 5300.2B.	Order 6430.1A, Section 1671.1	No secure communications systems are utilized in the project's design.	N/A
586	Protected distribution systems shall comply with DOE 5300.4B.	Order 6430.1A, Section 1671.1	No protected distribution systems are utilized in the project's design.	N/A

DESIGN COMPLIANCE MATRIX				
Compliance Citations for DOE Order 6430.1A for the 241-SY-101 RAPID Mitigation System				
ORDER 6430.1A REQUIREMENTS			DESIGN COMPLIANCE CITATION	
Item #	Criteria	Source	Design Attribute	Configuration Control Reference
587	Data communications facilities, services, and equipment shall comply with DOE 5300.1B, Telecommunications.	Order 6430.1A, Section 1671.1	No data communications systems are utilized in the project's design.	N/A
588	Spectrum-dependent services shall comply with DOE 5300.1B, Telecommunications.	Order 6430.1A, Section 1671.1	Portable communications equipment provided to allow communications between field operators and those attending to the transfer pump's variable frequency drive comply with the noted criteria.	
589	Telephone circuits shall be used for other telecommunications and alarm services to the maximum extent practicable. If separate conductors are required, they shall be routed through the main telecommunications and signal raceway systems if raceway systems are present. Separate wireways and cabinets shall be used only when necessary to meet security, technical, or code requirements or to achieve significant economies.	Order 6430.1A, Section 1671.2	No telecommunications systems or alarm services are utilized in the project's design.	N/A
590	Telecommunications and alarm equipment and conductors shall be located outside areas subject to explosion, fire, flood, chemical fumes, excessive dust, radiation or vibration, and excessive electrical or electromagnetic noise levels. Where telecommunications and alarm services must be extended into these areas, equipment and installation shall be suitable for the hazard.	Order 6430.1A, Section 1671.3	No telecommunications systems or alarm services are utilized in the project's design.	N/A
591	Fire alarm and signaling systems shall comply with NFPA 72A	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
592	Fire alarm and signaling systems shall comply with NFPA 72B	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
593	Fire alarm and signaling systems shall comply with NFPA 72C	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
594	Fire alarm and signaling systems shall comply with NFPA 72D	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
595	Fire alarm and signaling systems shall comply with NFPA 72E	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
596	Fire alarm and signaling systems shall comply with NFPA 72F	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
597	Fire alarm and signaling systems shall comply with NFPA 72G	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A
598	Fire alarm and signaling systems shall comply with NFPA 72H	Order 6430.1A, Section 1671.2	No fire alarm or signaling systems are utilized in the project's design.	N/A

4.0 CONCLUSIONS

The design attributes noted in Section 3.0 fulfill all pertinent criteria contained in DOE Order 6430.1A as it relates to the 241-SY-101 RAPID Mitigation System, except as noted in this section. Criteria not fulfilled by the current state of the design are termed "open". Those "open" items where pending project activities will result in compliance with the Order are identified as "Pending activity" in Section 4.1 of this report. Those "open" items where technical basis exists to make a determination of "accept as is" are noted as such Section 4.1 of this report.

4.1 Specific criteria which are termed "open" are related to the following topics:

- 4.1.1 Pending activity - The applicability of wind missile loading of instrument enclosures is the subject of an interpretation to be issued by the LMHC chief engineer. To wit, that wind missile loading of instrument enclosures is not warranted as transfer is precluded by operational controls during high wind events, and that damage caused by wind-driven missiles during non-operational periods will be readily apparent to operators. This interpretation is applicable to criteria contained in matrix items 112 and 155. Issuance of this interpretation will be prior to initial operation of the RAPID Mitigation System.
- 4.1.2 Pending activity - Survey work to identify the as-built elevation of the PPP floor/transfer pump flange is a pending activity. The requirements contained in matrix items 193, 194, and 195 will be complied with during performance of this activity. Performance of this work will be accomplished prior to initial operation of the RAPID Mitigation System.
- 4.1.3 Pending activity - The project's operational test procedure and issuance of the resulting operational test report are pending activities. Demonstrating compliance with the criteria contained in matrix items 250, 299, and 300 requires conclusion of this activity. Performance of this work will be accomplished prior to initial operation of the RAPID Mitigation System.
- 4.1.4 Accept as is - The general criteria contained in Section 1161-2 of the Order requiring that penetrations of confinement barriers have integrity equal to or greater than the barrier itself (matrix item 252) cannot be complied with. This results from the fact that the confinement barrier of the ASSD consists of a solid stainless steel wall. While the requisite penetration in this secondary confinement wall to service the installed leak detector has been demonstrated to be adequate to confine and contain leakage from primary confinement piping, it is impossible to meet or exceed the integrity of solid steel with any type of sealed penetration. This barrier meets or exceeds the 60" w.c. requirement called out in the project's design criteria and assumed for the project's safety analysis. Therefore, it is recommended that the equipment be accepted as is.
- 4.1.5 Accept as is - The general criteria contained in Sections 1300-3.5 and 1300-3.6 of the Order (matrix item 305 and 314) are complied with in all respects save for the ability of the transfer line's encasement hose to be readily testable and be testable on a regular basis. The hose encasement

cannot be easily tested. Test of the transfer line encasement hose requires removal and fitting of the hose with test fixtures. As the transfer line's primary hose will be contaminated after initial use, testing of the encasement line on a regular basis is not ALARA. Also, as the hose lifetime is one year, replacement of the transfer line hose assembly is assured after one year. Therefore, it is recommended that the equipment be accepted as is.

- 4.1.6 Pending activity – The preparation of a decontamination and decommissioning plan as required for compliance with the criterion specified in matrix item 379 is a pending activity which will be accomplished prior to the onset of decontamination and decommissioning activities.
- 4.1.7 Accept as is – The general criteria contained in Section 1660 of the Order related to the provision for emergency power to Safety Class 1 items, and for automatic switchover to emergency power and annunciation thereof (matrix items 531 and 535) are not complied with. The safety basis (HNF-3737 and the BIO, HNF-SD-WM-BIO-001) do not require this project to have emergency power for safety class items to perform their safety function. Therefore, it is recommended that the equipment be accepted as is.
- 4.2 It should be noted that the general criteria contained in Section 1323-4.2 of the Order requiring that traps in radioactive liquid waste lines shall be avoided is complied with. However, as noted in the design attribute referred to for this criterion (matrix item 387), while said traps are avoided to the maximum extent practicable, two potential traps are present in the Rapid System design. The first, installed in the PPP, acts as a seal loop to provide a means for draining confined liquid waste back to Tank SY-101 without providing a path for the escapement of tank dome space gases and vapors to the atmosphere. The second, the transfer line and encasement hose, is the subject of a letter from the LMHC chief engineer to the project's manager, dated 7/2/99, which states that the presence of this trap is acceptable and unavoidable, due to the urgency associated with performance of the initial transfer.
- 4.3 The four pending activities recorded in Section 4.1 above will be tracked as open items on the project open item list. When they are completed, this document will be revised to show when and how they were completed.
- 4.4 The 1999 ORP contract document S/RID Section 7.1 requires compliance with portions of DOE Order 6430.1A. The following 7 items were extracted from S/RID Section 7.1 and repeated here, with compliance determined as part of the compliance matrix.
 - 4.4.1 S/RID Section 7.1.6 – DOE Order 6430.1A, Section 0110-1.1.1 – “Designs shall produce facilities that are straightforward and businesslike. Designs must respond to user needs but reflect a responsible use of public funds. Designs shall be defensible in terms of scope, cost, and appearance.” The design of the RAPID Mitigation System meets this requirement, as indicated in compliance matrix items 2 and 3.

- 4.4.2 S/RID Section 7.1.7 – DOE Order 6430.1A, Section 0109 – “This section lists the reference standards and guides cited in these criteria. The latest edition of standards and guides shall be used.” Compliance matrix item 1 documents the project’s general compliance with this criterion. However, as noted in compliance matrix 1, the 1994 version of the Unified Building Code was utilized in project design, in lieu of the latest version. The basis for this is as follows:

The 1996 PHMC contract specified the codes and standards to be followed; this includes DOE Order 5480.28, *Natural Phenomenon Hazards Mitigation*. Although this DOE Order has been superseded by DOE 420.1, DOE 420.1 has not been included in the contract, nor in the Tank Farms S/RID and therefore compliance with the DOE 5480.28 is still required. This Order in turn specifies the use of DOE-STD-1020, *Natural Phenomenon Hazards Design and Evaluation Criteria*. HNF-PRO-097 (now LMH-PRO-097), *Engineering Design and Evaluation*, was developed to ensure compliance with DOE Order 5480.28 and DOE-STD-1020. During the development of HNF-PRO-097, it was decided to use the then current version of the UBC, the 1994 version. The 1994 version of the UBC meets the requirements contained in DOE Order 5480.28 and DOE-STD-1020.

The 1997 version of the UBC (the latest edition) has several significant changes that do not match the requirements contained in DOE-STD-1020. To use this version of the UBC would require specific direction from DOE to resolve this discrepancy: specifically, one contractual requirement (DOE Order 5480.28) requires the use of the 1994 version of the UBC, another (S/RID 7.1.7 to 6430.1A, Section 0109) would require use of the 1997 version of the UBC. Pending further guidance, the 1994 version has, and will continue, to be used even though it is not the latest version.

- 4.4.3 S/RID Section 7.1.7 – DOE Order 6430.1A, Section 0140 [09] – “Deviations from specified standards shall be identified and procedures established to ensure their control.” No deviation from specified standards was required, except to add requirements in the case of SC items, or when existing standards are not totally appropriate for the item they are used on. These deviations from the standard may have included the waste transfer hose. This potential deviation has been identified and procedures established to ensure their control: the hose specification is HNF-4407 and is controlled and modified by Engineering Change Notice (ECN) and its associated procedure. These changes are identified and controlled by a QA program developed and implemented in compliance with DOE 5700.6b and using the elements of DOE 4700.1 and ANSI/ANS NQA-1.
- 4.4.4 S/RID Section 7.2 – DOE Order 6430.1A, Section 1300-6.1 – “Special facilities shall be designed to minimize personnel exposures to external and internal radiological hazards, provide adequate radiation monitoring and alarm systems, and provide adequate space for health physics

activities.” Compliance with this criterion is documented in matrix item 313 on page 25 of this document.

4.4.5 S/RID Section 7.2.2 – DOE Order 6430.1A, Section 0101-1 – “These criteria provide mandatory, minimally acceptable requirements for facility design. The predominant model building code in the region shall govern on issues not covered in these criteria.” DOE Order 6430.1A was used for facility design as shown in the matrix table of this document. The UBC code was used when other building codes were not available, see LMH-PRO-097, HNF-3885 and HNF-4252.

4.4.6 S/RID Section 7.2.2 – DOE Order 6430.1A, Section 0101-2 [03] – “The contractor and/or DOE organizations responsible for facility projects shall review these criteria early in the planning phase and at later phases during the project construction process to determine if any of these criteria are not applicable or are not appropriate.” The contractor did review DOE Order 6430.1A early in the planning phase to determine if any of its criteria were not applicable or appropriate. The safety analysis for the project (HNF-3737) specifically calls out exemptions to the wind missile for the waste transfer hose. Other non-appropriate items implicit in the HNF-3737 and the BIO include not requiring:

- emergency power to Safety Class 1 items or switchover to emergency power when not required by the safety basis;
- confinement barriers that meet safety requirements but do not require exceeding stainless steel barrier integrity;
- wind missile loading of electrical equipment when there is appropriate controls already on hand to detect and test for a failure of the devices;
- and, a difficult to test SC hose encasement.

All these items noted above are within the authorization basis for the project and do not require further explicit exemption.

4.4.7 S/RID Section 7.2.2 – DOE Order 6430.1A, Section 0140 [07 and 08] – “Wherever possible, design shall reflect experience gained on similar projects or similar types of construction.” The project’s design does reflect experience gained on similar project or similar types of construction. The team that brought together this design was well experienced with nuclear applications and construction. The Formal Design Review conducted provided an extra margin of safety and expertise for these applications.

4.5 The three accept-as-is determinations recorded in Section 4.1 above will not be pursued further. They are not required in order to meet the project’s Authorization Basis.