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TANK WASTE REMEDIATION SYSTEM NUCLEAR CRITICALITY SAFETY PROGRAM MANAGEMENT REVIEW

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This document provides the results of an internal management review of the Tank Waste Remediation System (TWRS) criticality safety program, performed in advance of the DOE/RL assessment for closure of the TWRS Nuclear Criticality Safety Issue, March 1994. Resolution of the safety issue was identified as Hanford Federal Facility Agreement & Consent Order (Tri-Party Agreement) Milestone M-40-12, due September 1999.

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TANK WASTE REMEDIATION SYSTEM NUCLEAR CRITICALITY SAFETY PROGRAM MANAGEMENT REVIEW

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April 1999

EXECUTIVE SUMMARY

This document provides the results of an internal management review of the Tank Waste Remediation System (TWRS) criticality safety program, performed in advance of the DOE/RL assessment for closure of the TWRS Nuclear Criticality Safety Issue, which was defined in March 1994. Resolution of the safety issue was identified as Hanford Federal Facility Agreement and Consent Order *(Tri-Party Agreement) Milestone M-40-12, with a due date of September 1999.*

The safety issue comprises a technical and an administrative part. The technical portion of the safety issue is uncertainty in the amounts and distribution of fissile material in the high-level waste storage tanks, and was resolved in 1996 (i.e., it is considered closed). The administrative part relates to the need to strengthen the nuclear criticality safety program. Formal closure of the safety issue is contingent on establishing that the administrative criticality safety program at TWRS is sufficient to ensure continued safe operations in support of the TWRS Mission. This review supports closure of the administrative portion of the TWRS Nuclear Criticality Safety Issue by evaluating the TWRS nuclear criticality safety program for compliance with applicable requirements. The primary sources of those requirements include WHC-SD-MP-SRID-001, High Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document, *HNF-SD-WM-TSR-006,* Tank Waste Remediation System Technical Safety Requirements, *and Project Hanford Management System procedures (HNF-PRO documents). The requirements were taken from the source documents that were current in July through September 1998.*

Those requirements were screened to determine which were applicable to the TWRS nuclear criticality safety requirements. The applicable requirements were traced to TWRS implementing documents (i.e., administrative procedures) to evaluate compliance with the requirements. Detailed requirements compliance matrixes are included as Appendixes to this document. In addition, personnel qualification records and safety equipment identification documents were reviewed to assess the implementation of requirements applicable to personnel and equipment.

The evaluations of program, personnel, and equipment readiness related to nuclear criticality safety did not identify any issues of noncompliance, but did identify the need for improvement in several areas. Recommended actions were developed to address each area for improvement.

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APPENDIX C	Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide the results of an internal management review of the Tank Waste Remediation System criticality safety program, performed in advance of the DOE/RL assessment for closure of the Nuclear Criticality Safety Issue. This review comprehensively assesses the viability of the administrative program, the final requirement for closure of the safety issue, by evaluating whether the program meets the criticality safety requirements defined in the following documents.

WHC-SD-MP-SRID-001, *High Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document*
HNF-SD-WM-TSR-006, *Tank Waste Remediation System Technical Safety Requirements*
Project Hanford Management System procedures (HNF-PRO documents)

This review includes the requirements of American National Standards Institute/American Nuclear Society (ANSI/ANS)-8.19, *Administrative Practices for Nuclear Criticality Safety*, and other related ANSI/ANS-8 series standards as required under DOE Order 5480.24.

1.2 Background

The Tank Waste Remediation System (TWRS) criticality safety program applies to activities associated with the safe receipt, handling, and storage of waste in TWRS facilities. Specifically, the program applies to the following fissionable materials storage areas:

- High-level waste (HLW) storage tanks and ancillary equipment,
- Double-contained receiver tanks (DCRTs) and ancillary equipment,
- Miscellaneous inactive storage facilities (MISFs) and other inactive facilities,
- Ponds, cribs, and ditches.

The original HLW tank design (149 tanks constructed between 1943 and 1964) was a single, reinforced concrete shell and dome with mild carbon steel lining the bottom and walls. The capacity of these single-shell tanks (SST) varies from 208,000 to 3.79 million liters (55,000 to 1 million gallons). Twenty-eight (28) double-shell tanks (DST) were built between 1968 and 1986. The DST design is a carbon-steel primary tank and a carbon-steel secondary tank in a protective reinforced-concrete shell with a capacity of 3.79 million liters (1 million gallons). The ancillary systems that support operations in the tank farms include underground and aboveground waste transfer pipelines, valves, diversion boxes, jumper connectors, waste transfer pumps, catch tanks, process pits, the 204-AR Waste Unloading Facility, and the 244-AR vault. The DCRTs are used for temporary storage of waste during transfer operations. Inactive facilities (including MISFs), and ponds, cribs, and ditches may contain fissionable material and are therefore addressed by the criticality safety program.

The HLW tanks are used to store wastes generated by Hanford Site production operations involved in the chemical processing of irradiated uranium. The wastes discharged to the tanks were alkaline slurries containing heavy metals, organic solvents, inorganic salts, uranium,

plutonium, and mixed fission products. The current TWRS mission is to continue to safely store the remaining tank waste and to conduct waste retrieval and disposal activities in support of the long-term goal for the complete removal and final disposition of the tank waste. Activities are performed at TWRS in a manner that complies with environmental regulations and minimizes public and worker risk.

A series of nuclear criticality safety reviews of the HLW tanks, conducted in 1991 and 1992, led to the conclusion that an insufficient technical basis existed to support the claim that accidental criticality was not credible in the tanks, and the subsequent declaration of an Unreviewed Safety Question (USQ). After extensive study of the available process data, waste chemistry data, and characterization sample data, it was determined that the waste in the tanks was subcritical by a large margin. Closure of the USQ was approved in March 1994 (Grumbly 1994). At that time, a safety issue was defined related to nuclear criticality safety in the HLW tanks. The safety issue comprised a technical part and an administrative part. The technical portion of the safety issue addressed the uncertainty in the amounts and distribution of fissile material in the HLW tanks. The administrative part related to the need to strengthen the nuclear criticality safety program. Resolution of the safety issue was identified as *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) Milestone M-40-12, with a due date of September 1999 (Ecology et al. 1996).

Collectively, the DSTs and SSTs contain an estimated 500 to 1,000 kg (1,100 to 2,200 lb) of plutonium. Analyses of tank waste samples show that the plutonium content of the waste is primarily associated with the sludge phase. WHC-SD-WM-TI-725, *Tank Farm Nuclear Criticality Review*, established that fissile material in the waste tanks is distributed at subcritical concentrations and that no mechanisms exist to concentrate the fissile material to result in an accidental nuclear criticality. The technical portion of the TWRS Nuclear Criticality Safety Issue was resolved (i.e., is considered closed) (Tayloe 1996) on the basis of the arguments in WHC-SD-WM-TI-725. However, formal closure of the safety issue remains contingent on establishing that the administrative criticality safety program at TWRS is sufficient to ensure continued safe operations in support of the TWRS Mission.

A technical evaluation of the phenomenological aspects of the receipt and storage of waste at TWRS led to the conclusion, documented in HNF-SD-WM-BIO-001, *Tank Waste Remediation System Basis for Interim Operation* Section 5.3.2.1, that a criticality accident at TWRS is "beyond extremely unlikely." The TWRS criticality safety program, therefore, consists primarily of administrative controls designed to protect against altering the waste inventory in a way that could increase the probability of a criticality accident.

1.3 Review Scope

This review supports closure of the administrative portion of the TWRS Nuclear Criticality Safety Issue by evaluating the TWRS nuclear criticality safety program for compliance with the applicable requirements (see Section 2.0 of this document). The review plan and identification of the team members is included in Appendix A.

2.0 REVIEW REQUIREMENTS

2.1 Requirements Identification

Nuclear criticality safety requirements are identified at the Tank Waste Remediation System (TWRS) from several sources. The primary requirements sources include WHC-SD-MP-SRID-001, *High Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document* (the S/RID), HNF-SD-WM-TSR-006, *Tank Waste Remediation System Technical Safety Requirements* (the TSR), and Project Hanford Management System procedures (HNF-PRO documents). The requirements were taken from the source documents that were current in July through September 1998.

2.2 Requirements Screening

2.2.1 Applicability of Nuclear Criticality Safety Requirements. The requirements from the above sources were reviewed to identify those that apply to the nuclear criticality safety program at TWRS.

2.2.2 Review Criteria. To facilitate the review of implementation of requirements, the requirements found to be applicable to the nuclear criticality safety program at TWRS were binned into the following three groupings:

(1) Program Requirements
(2) Equipment Requirements
(3) Personnel Requirements

Detailed assessments were performed for each of these three groupings. The groupings facilitate both the review, and the development of actions to address areas for improvement identified during the review.

3.0 PROGRAMMATIC EVALUATION

3.1 Traceability to Implementing Documents

The requirements found to be applicable to the nuclear criticality safety program at TWRS were then mapped to implementing documents. A matrix of TWRS-specific (S/RID and TSR) requirements to implementing documents is provided in Appendix B. That matrix also includes the American National Standards Institute (ANSI)/American Nuclear Society (ANS) standards required by reference in DOE 5480.24. A matrix of Project Hanford Management System (HNF-PRO) requirements to implementing documents is provided in Appendix C.

3.2 Items for Improvement

Table 3-1 provides a summary of items for improvement that were identified from the matrices described above, and from a review of HNF-IP-1266, *Tank Farms Operations Administrative Controls*, Chapter 5.7, "Nuclear Criticality Safety," against the TWRS Authorization Basis. The table also identifies recommended actions to address each item. In addition to the description of each recommended action, the table includes a column to indicate whether the action includes revising HNF-IP-1266, *Tank Farms Operations Administrative Controls* (with an entry of Yes, No, or Maybe), and a column that briefly identifies other documents that may require change.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
1	NA	The applicability statement for TSR AC 5.7 is different from the requirement stated in the BIO Chapter 5.3.2.1.	Yes, if a TSR change is made first	TSR, BIO, CSERs, CPSs	Request an Authorization Basis Clarification regarding the difference between the applicability statement for TSR AC 5.7 and the requirement stated in the BIO Chapter 5.3.2.1. If a TSR change results, then implement the change as necessary through revisions to HNF-IP-1266, CSERs and CPSs.
2	NA	The applicability statement for HNF-IP-1266 Chapter 5.7 is taken from the TSR AC 5.7 applicability statement. However, the criticality safety program described in the IP-1266 chapter has a broader application than what is required by the TSR.	Yes	No	Revise the Chapter 5.7 applicability statement to reflect the full scope of the criticality safety program described in the chapter, which is broader than what is required by the TSR AC 5.7.
3	334.01 (B)	No statement was found outside of HNF-IP-1266 that would require compliance with the TWRS criticality safety program described in Chapter 5.7 of that document.	No	020302 (JSO)	Include information about HNF-IP-1266 Chapter 5.7 in the TWRS Criticality Safety Job-Specific Orientation.
4	334.03 (B)	No clear statement for the classification of TWRS as a Limited Control Facility was found in any approved facility safety analysis document or criticality safety evaluation.	No	BIO, FSAR	Notify the TWRS Safety Analysis manager of the need to clarify the BIO/FSAR discussion of the probability of an accidental criticality as it relates to the classification of TWRS as a Limited Control Facility.
5	334.10 (B) 62.1.05 (A) 62.5.07 (A)	The requirement to provide the names of the current and alternate CSR to FDH and the facility safety representative, and the requirement for the CSR to be administratively independent of operations management, were not explicitly stated in TWRS-level documents, but incorporated in HNF-IP-1266 by reference to HNF-PRO-334.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 to clarify the requirement to provide the names of the current and alternate CSR to FDH and the facility safety representative, and the requirement for the CSR to be administratively independent of operations management.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
6	334.15 (B)	There is no TWRS-level program for "annual management assessments" to ensure that TWRS is following the requirements of the PHMC criticality safety program. Periodic (not annual) management assessments, including criticality safety assessments, are addressed in HNF-IP-0842 Vol. I Section 2.10. Periodic independent assessments of the criticality safety program, as required by HNF-PRO-548, are addressed in Action # 31 of this table.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 to clarify the requirement for periodic management assessments to ensure that TWRS is following the requirements of the PHMC criticality safety program.
7	334.20 (B)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.4 requires the maintenance of files on CPSs and CSERs, but does not require the files to be "auditable."	Yes	No	Revise HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.4 to include the requirement that the files maintained on CPSs and CSERs be "auditable."
8	334.31 (B)	HNF-IP-1266 Chapter 5.7 requires the involvement of the independent safety review organization in criticality safety activities and events, but does not specify the responsibilities of the facility safety representative other than by reference to HNF-PRO-334.	No	HNF-IP-0030 SAF 1.2	Notify the manager responsible for HNF-IP-0030 of the need to revise the document as appropriate to specify the responsibilities of the facility safety representative, as related to criticality safety.
9	334.32 (B) 334.33 (B)	The Engineering Organization responsibilities defined in HNF-IP-1266 Chapter 5.7 do not match those in HNF-PRO-334.	Yes	No	Revise Engineering Organization responsibilities defined in HNF-IP-1266 Chapter 5.7 to match those in HNF-PRO-334. Include the organization manager in the approval cycle of the change to HNF-IP-1266 Ch. 5.7.
10	334.47 (B)	Criticality safety related responsibilities of the facility quality assurance representative are not explicitly stated at the TWRS level.	Yes	No	Specify Quality Assurance Organization responsibilities in HNF-IP-1266 Chapter 5.7 to match those in HNF-PRO-334. Include the organization manager in the approval cycle of the change to HNF-IP-1266 Ch. 5.7.
11	334.56 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b requires notification of only the independent safety review manager upon violation of a designated control.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 Section 3.C.1.b to include notification of the operations manager and the CSR upon violation of a designated control.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
12	537.05 (B)	The requirements for the measured values of operating parameters that are subject to criticality safety limits are not specified in HNF-IP-1266 Chapter 5.7 or in the CPSs. They are included in SD-WM-DQO-001.	Yes	No	Include the requirements in HNF-IP-1266 Chapter 5.7, either directly or by reference to SD-WM-DQO-001.
13	537.06 (B)	The list of isotopes requiring criticality safety control provided in HNF-IP-1266 Chapter 5.7 Section 3.A.6 does not include ^{240}Pu. However, that isotope is included in SD-WM-DQO-001.	Yes	No	Add ^{240}Pu to the list of isotopes requiring criticality safety control provided in HNF-IP-1266 Chapter 5.7 Section 3.A.6.
14	537.30 (B)	The requirement that criticality safety shall not be eroded for the sake of expediency, production, or economic pressure is not explicitly stated at the TWRS level.	Yes	No	Revise HNF-IP-1266 to include the HNF-PRO requirement and/or a method for ensuring compliance with the HNF-PRO-537 requirement.
15	538.06 (B)	The requirement prohibiting an individual from handling fissionable material or supervising others, until that individual has completed formal criticality safety training (or retraining), and the statement regarding JSO and specific job training, are not specified by HNF-IP-1266. However, a similar statement is found in HNF-IP-0842 Vol. III Section 10.4, which states that waste transfers should not be approved by operating engineers who have not completed the formal training and JSO. Note that TWRS does not have fissionable material handlers.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 to reference HNF-IP-0842 Vol. III Section 10.4.
16	538.07 (B)	The training completion records for courses 020012, 020013, and 020302 still refer to WHC-CM-4-29.	No	020012, 020013, 020302	Notify FDH of the need to update the training completion records for courses 020012, 020013, and 020302.
17	538.10 (B)	TWRS provides supplemental training to address new or modified CPSs as part of the annual retraining, but the requirement to cover this topic is not specified in HNF-IP-1266.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 as necessary to address training on new or modified CPSs.
18	538.11 (B)	The requirement to maintain records of specific material covered to complete JSO is not specified in a TWRS procedure, but is met by Course 020302 handout and records.	No	No	Establish and document training objectives for Course 020302, to be maintained by the TWRS training organization.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
19	538.12 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.4 requires the completion of retraining every two years, but does not address special retraining.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 Section 3.C.4 as necessary to address special retraining (538.12).
20	538.14 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.4.b.1 meets the part of the requirement that applies to limited control facilities, which is appropriate. The HNF-PRO-538 requirement is misleading because its heading indicates it applies to fissionable material facilities, while its text includes requirements for limited control facilities.	No	HNF-PRO-538	Notify the FDH responsible authority of the need to eliminate the conflict between the heading and the text.
21	538.22 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.4.b.1 requires annual criticality refresher training for all TWRS personnel. It references HNF-PRO-538 for details, rather than repeating the details of the HNF-PRO-538 requirements. As written, the HNF-IP-1266 statement can be misinterpreted as referring to the annual HGET criticality segment.	Yes	No	Clarify HNF-IP-1266 Chapter 5.7 Section 3.C.4.b.1 to provide the level of detail of the HNF-PRO-538 requirement. Revise the HNF-IP-1266 statement to make it clear that "annual refresher training" refers to the training meetings provided by the CSR, and not to the annual HGET criticality segment.
22	538.20 (B)	No requirement for facility specific orientation including criticality information was explicitly stated in TWRS level procedures, but the requirement is included in HNF-IP-1266 Chapter 5.7 by reference to HNF-PRO-538.	Yes	No	Explicitly include in HNF-IP-1266 the requirement for facility specific orientation to address criticality information.
23	538.28 (B) 538.29 (B) 538.30 (B) 538.31 (B)	Requirements for training of criticality safety specialists were not found in any TWRS level document, but the requirements are included in HNF-IP-1266 Chapter 5.7 by reference to HNF-PRO-538.	Yes	No	Explicitly include in HNF-IP-1266 the requirements for training of criticality safety specialists.
24	539.01 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.5 discusses CSEs and CSERs, and references HNF-PRO-538, but it does not include the details of when a new or modified CSE is required.	Yes	No	Clarify HNF-IP-1266 Chapter 5.7 Section 3.C.5 to discuss when a new or modified CSE is required.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
25	544.02 (B)	The HNF-PRO requires maintenance of a safety equipment list that designates all equipment that may impact criticality safety as safety-related equipment. This requirement is not explicitly stated at the TWRS level. (Note that the TWRS BIO does not identify any equipment important to criticality safety; therefore the TWRS SEL does not currently include any such equipment.)	Yes	HNF-IP-0842 Volume IV Section 5.2	Ensure that the HNF-PRO-544 requirement is included in HNF-IP-1266 Chapter 5.7 and in HNF-IP-0842 Volume IV Section 5.2, to be applied to any future criticality safety related equipment.
26	544.08 (B)	The requirement addressing criticality safety approval of drawings is not explicitly included in HNF-IP-1266 Chapter 5.7. HNF-PRO-544 is referenced, but not specifically in the context of this requirement.	Yes	HNF-IP-0842 Volume IV Section 4.25	Revise HNF-IP-1266 Chapter 5.7 and HNF-IP-0842 Vol. IV Section 4.25 to capture this requirement.
27	544.10 (B)	The requirement addressing equipment design during a project's detailed design phase is not explicitly included in HNF-IP-1266 Chapter 5.7. HNF-PRO-544 is referenced, but not specifically in the context of this requirement.	Yes	No	Clarify the reference to HNF-PRO-544 in HNF-IP-1266 Chapter 5.7.
28	544.11 (B)	The requirement addressing the identification of equipment dimensions that require verification, and completion of the verification, during a project's construction phase is not explicitly included in HNF-IP-1266 Chapter 5.7. HNF-PRO-544 is referenced, but not specifically in the context of this requirement.	Yes	No	Clarify the reference to HNF-PRO-544 in HNF-IP-1266 Chapter 5.7.
29	544.13 (B)	The HNF-PRO requirement states that dimensions vital to criticality safety shall be identified in accordance with WHC-CM-6-3. That manual has been replaced by HNF-PRO-242, which states that all drawings prepared by or for the PHMC shall be in accordance with ICF KH A-E Standard General Manual, Sections GG-DWG-001 through –004. That statement is not explicitly included in HNF-IP-1266 Chapter 5.7. HNF-PRO-544 is referenced, but not specifically in the context of this requirement.	Maybe	Maybe IP-0842	Notify FDH of the need to update HNF-PRO-544 to reference HNF-PRO-242 instead of the obsolete WHC-CM-6-3, and of the need to determine whether Sections GG-DWG-001 through –004 of ICF KH A-E Standard General Manual, referenced by HNF-PRO-242, are still valid. Update HNF-IP-1266 Chapter 5.7 and/or HNF-IP-0842, as appropriate, based on the results of the HNF-PRO updates.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
30	544.14 (B)	The requirement addressing verification of design limits is not found in a TWRS level document. HNF-PRO-544 is referenced by HNF-IP-1266 Chapter 5.7, but not specifically in the context of this requirement.	Maybe	Maybe IP-0842	Clarify the reference to HNF-PRO-544 in HNF-IP-1266 Chapter 5.7.
31	548.03 (B) 548.04 (B) 548.05 (B) 548.06 (B) 548.08 (B) 548.09 (B) 548.10 (B) 548.11 (B) 548.13 (B) 548.14 (B) 548.17 (B) 548.20 through 548.48 (B)	HNF-IP-1266 Chapter 5.7 Section 3.C.11 is titled INSPECTIONS, AUDITS, AND APPRAISALS, but addresses only semi-annual internal inspections of the TWRS criticality safety program. Independent inspections and assessments required by HNF-PRO-548 are not covered. The frequencies, responsibilities, reporting requirements, and response requirements specified in HNF-IP-1266 are different from those in HNF-PRO-548.	Yes	Inspection plan and checklist, waiver to PRO-548	Revise HNF-IP-1266 as appropriate. Request a waiver of selected HNF-PRO-548 requirements. Prepare a more detailed inspection plan and checklist as necessary to clarify TWRS compliance with HNF-PRO-548.
32	549.01 through 549.21 (B)	HNF-IP-1266 Chapter 5.7 section 3.C.12 and CPS-T-149-00010 Limit A.7 require that recovery actions from any CPS or program nonconformance shall be in accordance with HNF-PRO-549. It is not clear whether corresponding procedures in HNF-IP-0842 comply with HNF-PRO-549 requirements.	No	JSO training, maybe IP-0842	Determine whether revisions to HNF-IP-0842 sections (e.g., Vol. II Sec. 4.6.2, occurrence reporting) are necessary for compliance with HNF-PRO-549. Make any necessary revisions. Include this requirement in the development of JSO training objectives.
33	550.01 through 550.11 (B)	HNF-IP-1266 Chapter 5.7 section 3.C.12 and CPS-T-149-00010 Limit A.7 require that recovery actions necessary to return to safe operating conditions after a criticality accident has occurred, or a potential criticality hazard is reported, shall be in accordance with HNF-PRO-550. It is not clear whether corresponding procedures in HNF-IP-0842 comply with HNF-PRO-550 requirements.	No	JSO training, maybe IP-0842	Determine whether revisions to HNF-IP-0842 sections (e.g., Vol. IV Sec. 5.7, IOSR/TSR compliance) are necessary for compliance with HNF-PRO-550. Make any necessary revisions. Include this requirement in the development of JSO training objectives.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
34	46 (A)	The requirement addressing emergency actions that depart from the TSR cannot be found in HNF-IP-0842 or in HNF-IP-1266. It is covered by LCO 3.0.7. It is not exclusive to criticality safety so it does not belong in HNF-IP-1266 Chapter 5.7.	No	Maybe IP-0842	Consider adding this requirement to HNF-IP-0842 Volume II Section 4.6.2 or Volume IV Section 5.7.
35	62.1.12 (A)	TWRS level documents do not include the requirement that procedures be written such that no single, inadvertent departure from a procedure can cause a criticality accident.	Yes	Maybe IP-0731	Add Requirement 62.1.12 to HNF-IP-1266 Chapter 5.7 and/or HNF-IP-0731.
36	62.5.09 (A)	HNF-IP-1266 Chapter 5.7 Sections 3.B.1 and 3.C.11 require management to ensure the performance of inspections and assessments, but not to participate in audits.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 Sections 3.B.1 and 3.C.11 to require management participation in audits.
37	62.5.17 (A)	The requirement to verify that equipment complies with criticality safety specifications cannot be found in a TWRS level procedure. Currently no criticality safety specifications applicable to equipment exist for TWRS.	No	No	No change to HNF-IP-1266 Chapter 5.7 is required at this time, because no TWRS equipment has been identified as important to criticality safety. This requirement will be reviewed in future program assessments to determine potential changes in its applicability to TWRS.
38	62.5.25 (A)	HNF-IP-1266 Chapter 5.7 Sections 3.B.2.a and 3.C.11 require participation of the Criticality Safety Representative, but not the Criticality Safety Specialist, in audits.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 Sections 3.B.2.a and 3.C.11 as necessary to address the Criticality Safety Specialist's participation in audits.
39	62.5.26 (A)	The requirement for the Criticality Safety Staff (i.e., the Criticality Safety Specialist) to review deficiency reports for possible improvement of practices and procedures is not found in a TWRS level procedure.	Yes	No	Add the requirement to HNF-IP-1266 Chapter 5.7.
40	67 (A)	The requirement for a program to detect and prevent unsafe accumulations of fissionable materials in piping and equipment is not found in HNF-PROs or in TWRS documents.	Yes	No	Check with FDH Criticality Safety to determine whether this requirement will be added to HNF-PROs. Revise HNF-IP-1266 Chapter 5.7 to include a discussion of the technical basis of the TWRS criticality safety program's reliance on control of the form and distribution of fissionable material.

Table 3-1. Criticality Safety Program Items for Improvement

Action #	Reqmt. # (Appendix)	Item for Improvement	HNF-IP-1266 Change	Other Change	Recommended Action
41	78 (A)	The required interface between the S/RID Nuclear Safety functional area and the Transportation and Packaging functional area, applying to the physical management of special nuclear material, is not found in HNF-PROs or in TWRS documents.	Yes	Maybe IP-0842	Check with FDH Criticality Safety to determine whether this requirement will be added to HNF-PROs. Add a discussion of this interface to HNF-IP-1266 Chapter 5.7 and, if necessary, to the appropriate HNF-IP-0842 section.
42	87 (A)	TSR AC Key Element 5.7.2.f, for transfers via the Replacement Cross-Site Transfer System, is not included in HNF-IP-1266.	Yes	No	Revise HNF-IP-1266 Chapter 5.7 to include TSR AC Key Element 5.7.2.f, for transfers via the Replacement Cross-Site Transfer System.
43	89 (A)	TSR Section 5.7.3, stating the applicability of the Criticality Safety Program, includes the Replacement Cross-Site Transfer System. The applicability statement for HNF-IP-1266 Chapter 5.7 does not include the Replacement Cross-Site Transfer System.	Yes	No	Revise the applicability statement for HNF-IP-1266 Chapter 5.7 to include the Replacement Cross-Site Transfer System.
44	92 (A)	TSR Section 5.12.3, stating the applicability of Transfer Controls, includes the Replacement Cross-Site Transfer System. The applicability statement for HNF-IP-1266 Chapter 5.12 does not include the Replacement Cross-Site Transfer System.	Yes	No	Revise the applicability statement for HNF-IP-1266 Chapter 5.12 to include the Replacement Cross-Site Transfer System.

4.0 EQUIPMENT EVALUATION

Requirements applicable to equipment are addressed in Section 3.0, Programmatic Evaluation. However, neither the analysis summarized in Section 5.3.2.1 of HNF-SD-WM-BIO-001, *Tank Waste Remediation System Basis for Interim Operation* (BIO), nor HNF-SD-WM-SEL-040, *TWRS Facility Safety Equipment List*, prepared in conjunction with the BIO, identifies any structures, systems, or components for prevention or mitigation of a criticality accident. At this time there are no TWRS equipment items to evaluate for compliance with the criticality safety requirements.

5.0 PERSONNEL EVALUATION

5.1 Criticality Safety Roles and Responsibilities

Figure 5-1 shows the relationships between the various Lockheed Martin Hanford Corporation (LMHC) organizations that have responsibilities for aspects of TWRS nuclear criticality safety. Following is a summary of the responsibilities of each organization shown in the figure.

LMHC President and General Manager: Overall responsibility for safe operations at TWRS

Tank Waste Operations: Responsible for TWRS Operations

Shift Operations: Responsible for qualification and training of Shift Managers/Operations Engineers

Tank Farms Facility Operations: Responsible for managing/approving Tank Farm transfer activities

TWRS Training: Responsible for maintaining training and qualification records for TWRS, and for serving as training interface with FDH

Environment, Safety, Health and Quality Assurance: Responsible for ESH&QA at TWRS

Safety Services: Responsible for providing independent safety reviews of documents and activities, and for qualification and training of Safety Engineers

Quality Assurance: Responsible for providing quality assurance reviews of documents and activities, and for qualification and training of Quality Engineers

TWRS Technical Operations and Engineering (TOE): Responsible for engineering activities at TWRS

Chief Engineer: Responsible for final approval of qualifications for cognizant engineers and design authorities

Process Engineering: Responsible for maintenance of the plutonium inventory database, Data Quality Objectives, and waste compatibility program

Plant Engineering: Responsible for coordinating reviews of new and modified processes, systems, and equipment, and for training and qualification of cognizant engineers and design authorities

Nuclear Safety and Licensing: Responsible for the TWRS criticality safety program

Nuclear Safety Support: Direct line management for the TWRS criticality safety representative and criticality safety specialist/engineer/analyst; responsible for implementation of the criticality safety program and for providing criticality safety subject matter experts

5.2 Criticality Safety Training

Personnel training and qualification requirements are addressed in Section 3.0, Programmatic Evaluation. For determination of Personnel Readiness, records were reviewed to ensure that individuals who are required to receive criticality safety training or to meet other qualification requirements actually do meet those requirements.

Review of the requirements for nuclear criticality safety training of TWRS personnel, as found in HNF-IP-1266, *Tank Farms Operations Administrative Controls,* and HNF-PRO-538, *Criticality Safety Training,* led to the identification of five groups of personnel:

all TWRS personnel,
exempt personnel,
engineering personnel,
the Criticality Safety Representative (CSR), and
assistants to the CSR.

5.2.1 All TWRS Personnel as stated in HNF-IP-1266, Section 5.7.3.C.4.b.2

Requirement: minimum criticality safety training with annual Hanford General Employee Training (HGET) and annual refresher training

TWRS status: satisfied by HGET and by annual CSR presentations at shift meetings

5.2.2 Exempt personnel

Requirement: Training designated by facility manager as appropriate for specific job assignment (HNF-IP-1266, Section 5.7.3.C.4.b.2), managers and engineers criticality safety training course (initial training 020012, retrain 020013, job specific orientation 020302 is usually included). HNF-PRO-538 (included by reference in HNF-IP-1266, Section 5.7.3.C.4) requires training for managers and supervisors who oversee the activities of fissionable material handlers.

TWRS status: TWRS has no personnel designated as fissionable material handlers (HNF-SD-WM-HSP-002). Tank Waste Operations has responsibility for personnel involved in activities that could alter the form or distribution of fissionable material (principally waste transfers). HNF-IP-0842, Vol. III, Section 10.4, "Operations Engineer/Shift Operations Manager Training" assigns nuclear criticality safety classroom training to operations engineers/shift operations managers and prohibits operating engineers who have not completed the training from approving waste tank transfers.

5.2.3 Engineering personnel

Requirement: Training designated by engineering managers as appropriate for specific job assignment (HNF-IP-1266, Section 5.7.3.C.4.b.3), managers and engineers criticality safety training course (initial training 020012, retrain

020013, job specific orientation 020302 is usually included). HNF-PRO - 538 (included by reference in HNF-IP-1266, Section 5.7.3.C.4) provides the following additional detail relative to engineering personnel requiring training:

> managers and engineers directly involved in the design of equipment for the handling, storage or transportation of significant quantities of fissionable material
>
> safety and QA managers or engineers who directly oversee or audit criticality safety programs

TWRS status: TWRS Technical Operations and Engineering has responsibility for cognizant engineers and design authority. HNF-IP-0842, Volume III, Section 10.3, "Technical Staff Qualification Program Description" requires Qualification Cards for Cognizant Engineers (350860), Quality Assurance Engineers (350885) and Design Authority (350865). Management directly responsible for the individual and the Chief Engineer are responsible for approving qualifications for Cognizant Engineers and Design Authority. Currently, every cognizant engineer and design authority, with three exceptions, is current with nuclear criticality safety training. The responsibilities of the three exceptions have been reviewed, and it has been verified that they do not require criticality safety training.

Line managers and the manager of TWRS Quality Assurance are responsible for approval of qualifications for Quality Assurance Engineers. No QA managers or engineers are currently trained. However, the QA representative who performed the most recent audit of criticality safety was matrixed from the safety organization, and was verified to be current in TWRS criticality safety training. All other members of the assessment team were external employees qualified by resume.

The requirements, responsibilities, and instructions for qualification of safety professionals are defined in WHC-IP-0030, *Safety Department Administrative Manual*, SAF-1.2 Rev. 4, "Safety Personnel Qualification Procedure." The Core Training Plan described in section 4.4 of that procedure cites Criticality Safety Training as optional but recommended for Nuclear Safety Engineers. This requirement applies to safety engineers within TWRS Environmental, Safety and Quality Assurance who are responsible for the Safety reviews as required in HNF-PRO-233, *Review and Approval of Documents*. The individual performing safety reviews was verified to be current in criticality safety training.

TWRS Nuclear Safety and Licensing (NS&L) is responsible for direct oversight of the TWRS Criticality Safety Program. Within NS&L, workscope, budget and personnel responsible for overseeing the nuclear criticality safety program are part of the Nuclear Safety Support group.

The criticality safety representative, the criticality safety specialist, and the manager directly responsible for the criticality safety program were verified to be current in criticality safety training.

5.2.4 Criticality Safety Representative (CSR) as stated in HNF-IP-1266, Section 5.7.3.C.4.a.3 through 5.7.3.C.4.a.6

Requirement: managers and engineers criticality safety training course (initial training 020012, retrain 020013)
facility specific orientation (JSO training 020302)
examination by qualified board
annual training meeting

TWRS status: Training is specified in HNF-IP-1266 as stated above and a Qualification Card and Guide for TWRS Facility Criticality Safety Engineer (350004) has been developed and is being incorporated into the CSR required training. The CSR's training and qualifications have been verified to be valid until May 1999, when re-examination by the qualified board is required.

5.2.5 CSR assistants as stated in HNF-IP-1266, Section 5.7.3.C.4.a.3

Requirement: managers and engineers criticality safety training course (initial training 020012, retrain 020013, job specific orientation 020302 is usually included)

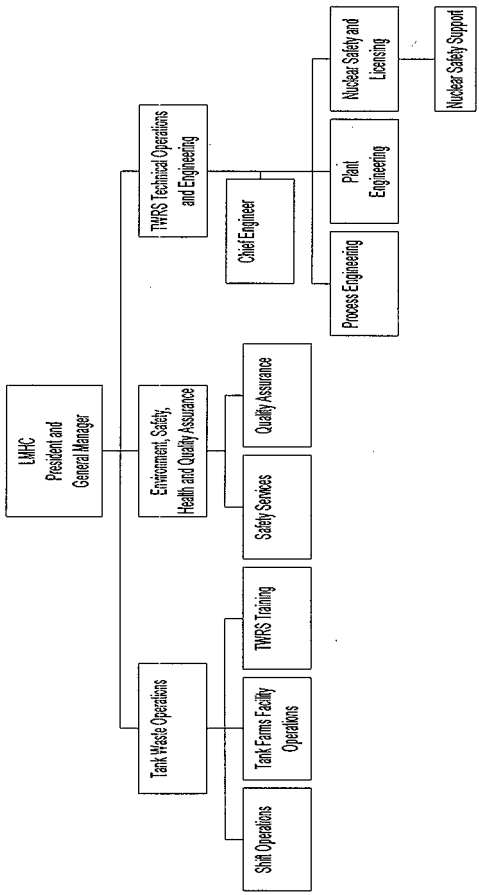
TWRS status: Activities supporting the nuclear criticality safety program are the responsibility of the Nuclear Safety Support group. Work assignments within NS&L are made using Individual Work Authorizations (IWAs). IWAs for staff outside of NSS yet still within NS&L require a one-over signature thereby notifying responsible management that assignments have been made related to nuclear criticality safety and appropriate training should be assigned as necessary. Personnel external to NS&L are tasked via the Task Package Commitment Agreement (TPCA) process. That process requires line management concurrence/acceptance and therefore notification of job responsibilities directly related to nuclear criticality safety. All personnel with criticality safety related responsibilities assigned through the TPCA process have been verified to be current in criticality safety training.

5.3 Areas for Improvement

Management awareness of nuclear criticality safety training requirements should be reinforced because of the major reorganizations within TWRS since the beginning of fiscal year 1999.

The training requirements specified in HNF-IP-1266 Chapter 5.7 should be updated and clarified consistent with HNF-PRO-538, particularly the requirement for annual refresher training.

Figure 5-1. TWRS Criticality Safety Program Related Organizations



6.0 LESSONS LEARNED

Criticality safety program assessment reports that were prepared for DOE facilities other than TWRS were reviewed for items that could also be applied as "Lessons Learned" at TWRS. Those items, and the TWRS response to each, are listed below.

The following recommendations and suggestion were extracted from DOE/EH-0571, *The Plutonium Finishing Plant Criticality Safety Program Review.*

Recommendation 3. *In the absence of effective criticality safety programs at DOE-RL and FDH, consideration should be given to extending the exclusivity clause for FDNW because, even with the above programmatic deficiencies noted, several members of the FDNW criticality safety staff have Hanford and PFP experience and the demonstrated technical ability to provide support to PFP. DOE-RL, FDH, and BWHC should form a partnership to ensure that FDNW provides the best criticality safety engineer (CSE) support available to PFP in the near term until specific guidance is developed by FDH to provide necessary nuclear criticality safety (NCS) technical support in the longer term. Alternatively, BWHC could retain its own CSE staff as permanent employees or FDH could assume the NCS role for the site and matrix CSE to the facilities as needed. While the first of these three options fits best with the current Integrating Management Contractor arrangements, the third has the best chance of providing a vigorous NCS program for Hanford.*

TWRS Response: TWRS retains its own criticality safety engineering staff as permanent employees within the Nuclear Safety Support organization.

Recommendation 11. *FDH and FDNW should review the Rocky Flats criticality safety evaluation procedure for documenting controls and contingencies.*

TWRS Response: The Savannah River criticality safety program will be reviewed, rather than the Rocky Flats program. The original recommendation applies to the Plutonium Finishing Plant, which is similar to the Rocky Flats facility. Because the TWRS facility is similar to Savannah River, it is expected that aspects of the Savannah River program would be more applicable to TWRS.

Recommendation 13. *The FDH CSE training and qualification program for PFP should include formal coursework (similar to that at Y-12 and Savannah River), on-the-job training under appropriate NCS mentors, and a formal program of familiarization with facility operations followed by an oral board similar to that used to qualify CSRs. The qualification for peer reviewers should require specific facility related NCS experience and evidence of technical competence and leadership such as technical papers and reports at professional conferences. FDH should ensure funding is provided for CSE training and qualification.*

TWRS Response: Criticality safety classroom training is provided by a private contractor. Under the terms of the contract, the FDH Training

Programs/Standards organization is responsible for monitoring the course 4 times per year, qualifying instructors, and establishing performance measures. Changes in course content/curriculum are reviewed and approved by the FDH Nuclear Criticality Safety Technical Authority, who solicits feedback from facility CSRs.

In addition, facility orientation requirements and other relevant aspects of the above recommendation have been included in the TWRS Criticality Safety Engineer Qualification Card, required for completion by the CSR and the CSE.

Recommendation 18. *All BWHC, FDH, and FDNW criticality safety personnel working at or for PFP should have professional development opportunities related to ANSI/ANS-8 standards and other subjects pertaining to their areas of support for PFP work.*

TWRS Response: Professional development activities for criticality safety personnel are included in the FY 1999 plan and budget for TWRS Criticality Safety through the Technical Basis Review process.

Recommendation 22. *Some of the NCS responsibilities currently assigned to the CSR should be transferred to the FDNW CSE supporting PFP. Among these responsibilities are reviewing operating procedures and postings, process and equipment modifications, assisting with NCS training, performing regular audits, and evaluating infractions and developing corrective actions.*

TWRS Response. The TWRS CSR and CSE positions are part of the same organization, providing synergy and opportunities for cross training to increase the skills of both. There are no procedural barriers to utilizing the CSE for performing audits, evaluating infractions, or developing corrective actions.

Suggestion 8. *Implementation of the Deficiency Tracking System should be improved. Emphasis should be focused on training and other guidance to ensure that project managers use the DTS as a management system and tool for improving performance rather than allowing it to become an administrative "bean counting" device.*

TWRS Response. TWRS requires use of the Deficiency Tracking System as a management tool by including the DTS as an integral part of its Management Assessment Program and Corrective Action Management process. Reference HNF-IP-0842, *TWRS Administration*, Volume I, Section 2.4 "Corrective Action Management," and Section 2.10 "Management Assessment Program."

The following recommendations were extracted from *First-Quarter Criticality Safety Program Review at the Oak Ridge Y-12 Plant*, dated September 1998.

Recommendation 1. *Identify subject matter experts (SMEs) that have personally operated processes, have a thorough understanding of the system/process, are capable of identifying credible process upsets important to criticality safety, and who are authorized to work with the Nuclear Criticality Safety Organization (NCSO) to develop and accept criticality controls on behalf of supervision. Require SMEs and Technical Support personnel to team with the NCS engineers in developing criticality safety evaluations (CSEs) to describe the process, develop assumptions, and identify contingencies and appropriate controls that are understood and accepted by Operations. Operations should formally accept CSEs by signing them. Make the CSEs or appropriate sections from them available to line supervision. Rocky Flats provides sections 1-9 (See DOE-STD-3007-93) to operations.*

TWRS Response. PHMC procedure HNF-PRO-334, *Criticality Safety: General Requirements*, is being revised to specifically address the responsibilities of Operations supervision and the criticality safety specialist. These responsibilities under the revised procedure include the following.

Operations Supervision. Review contingency conditions presented in new or revised criticality safety evaluation reports (CSERs) to ensure that all credible accidents, errors, or equipment malfunctions are considered. Develop or participate in the development of written procedures applicable to the operations under their control. Maintain operating procedures to reflect changes in operations. Verify compliance with new or modified criticality prevention specifications (CPSs), including those for new equipment before its use.

Criticality Safety Specialist. Provide technical guidance for the preparation, development, and technical peer review of all new CSERs, and revisions to previously prepared CSERs. Provide technical guidance for the preparation, development, and review of new and revised CPSs at Fissionable Material Facilities and Limited Control Facilities. The criticality safety specialist's involvement in CPSs at Isolated Facilities is determined by the CSR and facility management on an as-needed basis.

Recommendation 5. *The Team recommends that the NCSO CSE development process be restructured to ensure that stand-alone CSEs are developed that meet the intent of ANSI/ANS-8.19 Section 8. To that end, the Team recommends the following specific steps be taken.* (Followed by six steps not included here.)

TWRS Response. The development of CSERs at TWRS is governed by PHMC procedure HNF-PRO-539, *Criticality Safety Evaluations*, and by HNF-IP-1266 Chapter 5.7, "Nuclear Criticality Safety," section 5.7.3.C.5.

Both procedures have been verified to be compliant with the requirements of ANSI/ANS-8.19 Section 8. See Table A-1, Requirements 62.5.36 through 62.5.39, in Appendix B of this document.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The evaluations of program, personnel, and equipment readiness related to nuclear criticality safety did not identify any issues of noncompliance. However, the evaluations led to the identification of areas for improvement, which are described below for each of the three areas of the assessment. This review also satisfied the objectives of the Phase II verification of the criticality safety requirements of the S/RID.

7.2 Recommendations

7.2.1 Areas for Improvement from the Programmatic Evaluation. These recommended actions are identified in Table 3-1, and summarized here.

Revise PHMC internal publications as necessary to:

- formalize aspects of the nuclear criticality safety program not currently documented,
- provide clarification and eliminate ambiguities, and
- update the program requirements for conformance with the PHMC procedures (HNF-PRO documents) that replaced WHC-CM-4-29, *Nuclear Criticality Safety Manual.*

The specific internal publications, owned by TWRS, that require revisions are:

- HNF-IP-1266, *Tank Farms Operations Administrative Controls*, Chapter 5.7, "Nuclear Criticality Safety," and Chapter 5.12, "Transfer Controls"
- HNF-IP-0842, *TWRS Administration*
- HNF-IP-0731, *Tank Waste Remediation Systems Technical Procedure Format and Preparation Guide*

Request waivers or revisions to specific requirements from the following HNF-PRO documents, where the requirements need improvement or are not appropriate for implementation at TWRS.

- HNF-PRO-334, *Criticality Safety General Requirements*
- HNF-PRO-537, *Criticality Safety Control of Fissionable Material*
- HNF-PRO-538, *Criticality Safety Training*
- HNF-PRO-548, *Criticality Safety Inspections and Assessments*

Update the content of the Criticality Safety Job-Specific Orientation (Course Number 020302) as necessary to reflect current nuclear criticality safety program requirements, and to incorporate program improvements that result from this assessment. Notify the manager responsible for PHMC level criticality training courses of recommended improvements to those courses.

Prepare and process changes to the TWRS Authorization Basis, criticality safety evaluation reports, and/or criticality prevention specifications as detailed in Table 3-1.

7.2.2 Areas for Improvement from the Equipment Evaluation. TWRS has no structures, systems, or components credited with prevention or mitigation of a criticality accident, as stated

in Section 4.0 of this document. Therefore, at this time, no criticality safety requirements apply to any equipment at TWRS, and no areas for improvement have been identified.

7.2.3 Areas for Improvement from the Personnel Evaluation. The following actions are recommended in addition to the training-related changes to PHMC internal publications and training courses addressed in Section 7.2.1.

Reinforce management awareness of nuclear criticality safety training requirements. This is necessary because of major reorganizations within TWRS that have occurred since the beginning of fiscal year 1999.

Ensure that personnel who are not current in criticality safety training as required for their job positions (e.g., Quality Assurance managers and engineers) are aware of training requirements. Those personnel shall not perform or authorize criticality safety related activities until they complete the training.

Revise HNF-IP-1266 Chapter 5.7 to specify that both the CSR and the Criticality Safety Engineer/Specialist are required to complete the Qualification Card and Guide for TWRS Facility Criticality Safety Engineer (350004).

Replace the matrixed support personnel with a permanent employee in the TWRS CSR position within the Nuclear Safety Support organization.

7.3 Deficiency Tracking System Items

The following items will be entered into the Deficiency Tracking System.

1) Revise HNF-IP-1266 Chapter 5.7 consistent with the detailed recommendations of this report.

2) Develop detailed training objectives for Criticality Safety Job-Specific Orientation (Course Number 020302).

3) Reinforce TWRS management awareness of nuclear criticality safety training requirements.

4) Develop a more detailed criticality safety inspection plan.

8.0 REFERENCES

CPS-T-149-00010, 1998, *Waste Storage in Double-Shell Tanks and Associated Equipment*, Rev./Mod. I-0, Lockheed Martin Hanford Corporation, Richland, Washington.

DOE/EH 1998, *First-Quarter Criticality Safety Program Review at the Oak Ridge Y-12 Plant*, U.S. Department of Energy, Office of Environment, Safety and Health, September 1998.

DOE/EH-0571, 1998, *The Plutonium Finishing Plant Criticality Safety Program Review*. U.S. Department of Energy, Office of Environment, Safety and Health/Office of Nuclear and Facility Safety, May 1998.

Ecology, EPA, and DOE, 1996, *Hanford Federal Facility Agreement and Consent Order*, as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Grumbly, T. P., 1994, *Approval to Close the Criticality Unreviewed Safety Question at the Hanford High-Level Waste Tank Farms* (memorandum to Manager, U.S. Department of Energy, Richland Operations Office, March 17), U.S. Department of Energy, Washington, D.C.

HNF-IP-0731, 1997, *Tank Waste Remediation Systems Technical Procedure Format and Preparation Guide*, Rev./Mod. 5, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-IP-0842, *TWRS Administration*, Lockheed Martin Hanford Corporation, Richland, Washington. Sections as listed below.

- Volume I, Section 2.4, "Corrective Action Management," Rev. 4, May 1998
- Volume I, Section 2.10, "Management Assessment Program," Rev. 1a, November 1997
- Volume III, Section 10.3, "Technical Staff Qualification Program Description," Rev. 4, December 1997
- Volume III, Section 10.4, "Operations Engineer/Shift Operations Manager Training," Rev. 2a, October 1997

HNF-IP-1266, *Tank Farms Operations Administrative Controls*, Lockheed Martin Hanford Corporation, Richland, Washington. Chapters as listed below.

- Chapter 5.7, "Nuclear Criticality Safety," Rev. 1A, July 1998
- Chapter 5.12, "Transfer Controls," Rev. 1C, July 1998

HNF-PRO-233, 1997, *Review and Approval of Documents*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-242, 1997, *Engineering Drawing Requirements*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-334, 1997, *Criticality Safety General Requirements*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-537, 1997, *Criticality Safety Control of Fissionable Material*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-538, 1997, *Criticality Safety Training*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-539, 1997, *Criticality Safety Evaluations*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-548, 1998, *Criticality Safety Inspections and Assessments*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-549, 1997, *Criticality Safety Nonconformance Response*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-PRO-550, 1997, *Criticality or Potential Criticality Accident*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-SD-WM-BIO-001, 1998, *Tank Waste Remediation System Basis for Interim Operation*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-SD-WM-HSP-002, 1998, *Tank Farms Health and Safety Plan*, Rev. 3, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-SEL-040, 1998, *TWRS Facility Safety Equipment List*, Rev. 1, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-TSR-006, 1997, *Tank Waste Remediation System Technical Safety Requirements*, Rev. 0, Fluor Daniel Hanford, Inc., Richland, Washington.

Tayloe, R. W., 1996, *Final Report - Review of Hanford High-Level Radioactive Waste Tank Nuclear Criticality Safety Documentation for DOE Richland Operations Office* (external letter to Distribution, September 17), Battelle, Columbus, Ohio.

WHC-CM-4-29, 1996, *Nuclear Criticality Safety Manual*, Rev. 9, Westinghouse Hanford Company, Richland, Washington.

WHC-CM-6-3, 1992, *Drafting Standards Manual*, Westinghouse Hanford Company, Richland, Washington.

WHC-IP-0030, 1996, *Safety Department Administrative Manual*, SAF-1.2, "Safety Personnel Qualification Procedure," Rev. 4, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-MP-SRID-001, 1996, *High Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document*, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-TI-725, 1996, *Tank Farm Nuclear Criticality Review*, Rev. 0A, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

Review Plan for the Criticality Safety Program
at the Tank Waste Remediation System (TWRS)

Review Plan for the Criticality Safety Program at the Tank Waste Remediation System (TWRS)

Responsible Manager: M. C. Brady Raap

Lead Assessor: M. A. Smith-Fewell

Team Members: T. S. Vail
D. R. Bratzel
N. J. Milliken

The assessment scope is defined as:

- Evaluate the following sources for requirements to be satisfied by the Tank Waste Remediation System (TWRS) Criticality Safety Program:

  WHC-SD-MP-SRID-001, Functional Area 18, "Nuclear Safety"

  The key elements of the Administrative Control programs of HNF-SD-WM-TSR-006

  The ANS standards invoked by DOE Order 5480.24, Section 7.a

- Identify which requirements from the above sources are applicable to the TWRS Criticality Safety Program. Provide a justification for those requirements judged to be not applicable.

The assessment performance objectives are:

1. Categorize each requirement according to its applicability to the following areas:

   - Program Readiness
   - Personnel Readiness
   - Hardware Readiness

2. Identify the elements necessary for demonstrating compliance/implementation in each of the above areas, as follows:

   - Program Readiness
     Analysis and Control
     Documentation
     Training Program

- Personnel Readiness
  Staffing
  Training
  Key Personnel

- Hardware Readiness
  TWRS Facilities (DSTs, 204-AR, etc.)

The assessment criteria are to identify how compliance with each of the necessary requirements is demonstrated (e.g., through a CSER, an Operating Procedure, Training Records, etc.). Therefore, the criteria are the requirements themselves as listed in the source documents.

The assessment methodology will be primarily observation and record review and shall be documented as a map of the list of documents that demonstrate requirement compliance to the elements of readiness identified in the performance objectives. The assessment team will also perform a review of the map to ensure that the TWRS Criticality Safety Program implements the appropriate controls for each TWRS facility.

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APPENDIX B

Matrix of TWRS-Specific Requirements to Implementing Documents

Table B-1. Matrix of TWRS-Specific Requirements to Implementing Documents (77 Sheets)

Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
1	S/RID 18.1 MANAGEMENT	WHC-SD-MP-SRID-001	The general aspects of management, policy, staffing, and training are covered in the Management Systems Functional Area.			x	NA	NA				Not a requirement.	
2	S/RID 18.2.1 Independent Peer Review	WHC-SD-MP-SRID-001	Author's Note: Peer review requirements for processes within the scope of Nuclear Safety are noted in Tank Farms Nuclear Safety S/RID elements 18.3 through 18.6, where applicable.			x	NA	NA				Not a requirement.	
3	S/RID 18.2.2 Operations Review	WHC-SD-MP-SRID-001	Author's Note: Review requirements for Operational procedures are included within Tank Farm S/RID functional areas 1.0, Management Systems, and 9.0, Operations. Author's Note: Review requirements for safety analyses and design changes to ensure that any proposed change or operation falls within the safety bases of the facility are included within the Tank Farm Nuclear Safety S/RID elements 18.3 through 18.6, where applicable. Author's Note: Requirements for Operational Readiness Review are included in the Management Systems Functional Area.			x	NA	NA				Not a requirement.	
4	S/RID 18.2.3 Safety Oversight Review	WHC-SD-MP-SRID-001	Author's Note: Refer to the Westinghouse Hanford Company S/RID QA Functional Area document for requirements under this subelement. There are no specific Tank Farm Nuclear Safety requirements.			x	NA	NA				Not a requirement.	

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5	S/RID 18.3 SAFETY ANALYSIS	WHC-SD-MP-SRID-001	Author's Note: Tank Farms will verify facility risk assessments are performed in accordance with facility risk analysis procedures.			x	NA	NA			x	Facility risk analyses include consideration of criticality risks, but are outside the scope of the criticality safety program.	

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6	S/RID 18.3 SAFETY ANALYSIS	DOE5480.23 (940310) Section 8	"A contractor, as designated in writing by the PSO, who is responsible for the design, construction, or operation of DOE nuclear facilities shall be required to perform a safety analysis that develops and evaluates the adequacy of the safety basis for each such facility. The safety basis to be analyzed shall include management, design, construction, operation, and engineering characteristics necessary to protect the public, workers, and the environment from the safety and health hazards posed by the nuclear facility or nonfacility nuclear operations. All contractors shall be held responsible for adhering to assumptions and commitments set forth in the safety analysis. Contractors shall be required to prepare, and shall submit to DOE for its approval, SARs documenting safety analyses for each DOE nuclear facility under their cognizance. Contractors responsible for conducting one or more nonfacility nuclear operations are required to maintain up to date analyses of the safety of such operations and analyses documented in a form that is auditable by DOE. Attachment I provides guidance in greater detail than the requirements of this Order."			x	NA	NA			x	General requirement for preparation and maintenance of safety analysis reports.	

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7	S/RID 18.3 SAFETY ANALYSIS	DOE5480.23 (940310) Section 8.a.(1)	"Justification for the level of analyses and documentation for each hazard considered shall be provided as part of the plan and schedule submitted in accordance with paragraph 9(b)(2) of this Order. The level of analysis and documentation for each facility must be commensurate with: (a) The magnitude of the hazards being addressed; (b) The complexity of the facility and/or systems being relied on to maintain an acceptable level of risk; and © The stage or stages of the facility life cycle for which DOE approval is sought."			x	NA	NA			x	Applies to plan and schedule for safety analysis preparation.	
8	S/RID 18.3 SAFETY ANALYSIS	DOE5480.24 Section 7.f.(1)	"Contractors shall establish guidelines for permitting fire fighting water or other moderating materials used to suppress fires within or adjacent to moderation controlled areas. These guidelines shall be based on comparisons of risk and consequences of accidental criticality with the risks and consequences of postulated fires for the respective area(s). The basis for the guidelines shall be fully documented in a DOE approved Safety Analysis."	x				BIO 4.10			x	BIO Section 4.10 describes the essential elements of the fire protection program, but does not address criticality concerns related to fire protection. This will be rectified by including a discussion of the issue in BIO 5.3.2.1 as part of the 1998 annual update. The issue is also considered in CSERs and CPSs.	
9	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 8.b.(1)	"SARs shall define the safety basis, document the logic of its derivation, demonstrate adherence to the safety basis, and justify its adequacy."			x	NA	NA			x	General statement for SAR development.	

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10	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 8.b.(2)	"Each SAR required by this Order shall include thorough documentation of the assumptions employed in the safety analysis."		x		700, 2.1.2.0.2	BIO 5.3.2.1 TSR 5.7 HNF-IP-1266 Ch. 5.7			x	The BIO states the assumptions used in the criticality accident analysis; the TSR administrative controls were developed to protect those assumptions.	

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11	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 8.b.(3)	"A SAR shall include the results of the safety analysis that identifies the dominant contributors to the risk of the facility so that these vulnerabilities can be better managed. The safety analysis report shall address the following topics: (a) Executive summary; (b) Applicable statutes, rules, regulations and Departmental Orders; © Site characteristics; (d) Facility description and operation, including design of principal structures, components, all systems, engineered safety features, and processes; (e) Hazard analysis and classification of the facility; (f) Principal health and safety criteria; (g) Radioactive and hazardous material waste management; (h) Inadvertent criticality protection; (I) Radiation protection; (j) Hazardous material protection; (k) Analysis of normal, abnormal, and accident conditions, including design basis accidents; assessment of risks; consideration of natural and manmade external events; assessment of contributory and casual events, mechanisms, and phenomena; and evaluation of the need for an analysis of beyond-design-basis accidents; however, the SAR is to exclude acts of sabotage and other malevolent acts since these actions are covered under		x		700, 2.1.2.0.5	BIO 4.3, BIO 5.3.2.1			x	BIO 4.3 describes the Criticality Protection Program. BIO 5.3.2.1 provides the results of the criticality accident analysis, and recommends controls to protect the analyzed conditions.	

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12	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 8.b.(3) (continued)	(continued) (m) Procedures and training; (n) Human factors; (o) Initial testing, inservice surveillance, and maintenance; (p) Derivation of TSRs; (q) Operational safety; (r) Quality assurance; (s) Emergency preparedness; (t) Provisions for decontamination and decommissioning; and (u) Applicable Facility design codes and standards."		x		700, 2.1.2.0.5	BIO 4.3, BIO 5.3.2.1			x	BIO 4.3 describes the Criticality Protection Program. BIO 5.3.2.1 provides the results of the criticality accident analysis, and recommends controls to protect the analyzed conditions.	
13	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 8.d	"Document Control. Contractors with the primary responsibility for the design, construction, operation, or decommissioning of DOE nuclear facilities must maintain such document control as may be necessary to ensure that all users of SARs and their supporting documentation designated by DOE or the contractor as authorized users, including DOE line management and the Department's safety oversight groups, have current editions."			x	NA	NA			x	Document control is established outside the scope of the criticality safety program.	
14	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 9.a.(1), Sentence 1	"Contractors shall be required to obtain PSO approval of Preliminary Safety Analysis Reports (PSARs) prior to undertaking procurement of materials and components, construction, and preoperational testing of DOE nuclear facilities."			x	NA	NA			x	PSAR approval requirements are outside the scope of the criticality safety program.	

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15	S/RID 18.3.1 Safety Analysis Report	DOE5480.23 (940310) Section 9.a.(1), Sentence 3	"PSARs shall document the adequacy of the safety basis for a new nuclear facility and provide assurance that the facility can be constructed, operated, maintained, and shut down safely and in compliance with applicable laws and regulations."			x	NA	NA			x	PSAR content requirements are outside the scope of the criticality safety program.	
16	S/RID 18.3.1 Safety Analysis Report	DOE5480.23(940310) Section 9.a.(2)	"Contractors shall be required to submit Final Safety Analysis Reports (FSARs) to the PSO for approval and authorization to operate DOE nuclear facilities. FSARs shall document the adequacy of the safety basis and provide assurance that the facility can be operated, maintained, and shut down safely and in compliance with applicable laws and regulations."			x	NA	NA			x	FSAR development and approval requirements are outside the scope of the criticality safety program.	

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17	S/RID 18.3.1 Safety Analysis Report	DOE5480.23(940 310) Section 9.b.(2)	"Plan and Schedule for Safety Analysis Reports. Each contractor responsible for submitting a SAR shall be required to submit to the PSO, for its review and approval, an overall plan and schedule for completing this effort. For existing facilities or operations, the plan and schedule shall be submitted to the Department for approval by 6 months after the date of issuance of this Order. This submittal shall describe the need for upgrading the SAR and shall include a preliminary assessment of facility hazards, the basis for the content, schedule, and level of detail proposed, bases for interim operation or restrictions on interim operations, and administrative controls during the upgrade process. Once a submitted plan and schedule is approved by DOE, the contractor shall comply with the plan and schedule, including any DOE modifications. The plan and schedule submitted by a contractor shall be considered approved 180 days after submittal, including any modifications made or directed by DOE during or after this period, unless it is approved by DOE at an earlier date. Approved plans and schedules may be changed, but such changes must be approved in the same manner as initial plans and schedules."			x	NA	NA			x	SAR planning and scheduling requirements are outside the scope of the criticality safety program.	

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18	S/RID 18.3.1 Safety Analysis Report	DOE5480.23(940 310) Section 9.c.	"Periodic Updates of Safety Analysis Reports. Contractors shall be required to review and update as necessary, SARs annually, pursuant to this Order to ensure that the information in each SAR is current and remains applicable. Revisions shall be submitted to the PSO at least annually and shall reflect all changes implemented up to 6 months prior to the filing of the updated SAR. The DOE approval of any Unreviewed Safety Question Pursuant to DOE 5480.21, amendments to the TSR's, and the material submitted by the contractor to the PSO in support of these approvals shall be considered an addendum to the SAR until the information is incorporated into the SAR as part of the next annual update."			x	NA	NA			x	SAR annual update requirements are outside the scope of the criticality safety program.	
19	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c. Paragraph 1	"Nuclear criticality safety programs shall be fully documented. In addition to the requirements of the ANS standards, contractors shall perform detailed nuclear criticality safety analyses for specific operations, storage arrangements, and the handling and transportation of fissionable materials."	x			334, 1.1 334, 1.3.1.0.1 537, 1.2	BIO 5.3.2.1 TSR 5.7 HNF-IP-1266 Ch. 5.7			x	BIO 5.3.2.1 describes the criticality accident analysis. The TSR provides administrative controls that preserve the conditions of the BIO analysis.	

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20	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c. Paragraph 2, Sentence 1 and 2	"The basis for criticality safety shall be included in the facility SAR. Additionally, the limiting conditions of operation for criticality safety shall be included in the facility TSRs."	x			537, 1.4.1.4.1 537, 1.4.2.3 700, C.2.2.2 700, C.2.2.2.2	BIO 5.3.2.1 TSR 5.7			x	BIO 5.3.2.1 describes the analysis that serves as the basis for criticality safety. No criticality requirements for TWRS resulted in LCOs, but the TSR provides administrative controls that preserve the conditions of the BIO analysis.	
21	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(1)	"A description, using appropriate sketches or drawings, of equipment and facilities in which the hazard of criticality exists showing dimensions in sufficient detail to permit evaluation of the information mentioned in subparagraphs 7c(3) through 7c(6) below."	x			539, 1.4.5.2	BIO 2.0, BIO 5.3.2.1, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	The BIO meets the intent of this requirement by describing the concentration and makeup of the waste and by describing the various types of tanks used for storage. No further implementation is required.	
22	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(2)	"A statement of the chemical and physical form of fissionable material in each step of the process, including isotopic content, the nature of any material, and the resulting concentrations, densities, and degrees of moderation throughout the steps of the process."	x			539, 1.4.5.2	BIO 5.3.2.1, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	Addressed in the BIO and comprehensively addressed in BIO references, especially the CSERs.	
23	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(3)	"A statement of the maximum quantities of fissionable material at any one time in each step of the process, including a description of the technical practices which are intended to prevent exceeding these maximum quantities."	x			539, 1.4.5.2	BIO 5.3.2.1, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	The BIO provides descriptions of the basic numeric elements and processes.	

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24	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(4)	"A description of the methods of collection, handling, and transportation products from each process area or individual operation and evaluation of the nuclear safety of these methods."	x			539, 1.4.5.2	BIO 5.3.2.1, BIO Addendum 1, BIO Addendum 2, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	BIO 5.3.2.1 addresses waste transfers from outside sources and the evaporators, and supernate transfers between tanks. Transfers of solids or sludge between tanks, and transfers through the RCSTS, are evaluated separately in the Addenda.	
25	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(5)	Author's Note: A CAS is not required at Tank Farms. "An analysis of criticality incident scenarios and their impact on health and safety of the workers and/or public. This analysis will be used to determine the conditions of operation for criticality safety, the design of the CAS as noted in subparagraph (7) below, and the need for audible and/or visual alarms."	x			539, 1.4.5	BIO 5.3.2.1, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	The BIO provides a full accident analysis, even though a criticality accident is not considered credible.	
26	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(6)	"A description of the safety control parameters which are intended to prevent criticality resulting from such events as: accumulation of fissionable material in scrap or waste, lathe turnings, crucible slag, pickling solutions, choppings, sumps, filters, etc. Also included shall be the description of the technical practices used to prevent exceeding the safety control parameters."	x			539, 1.4.5.2	BIO 5.3.2.1, TSR 5.7, HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x	Descriptions of pertinent controls are provided in the BIO and the TSR. Only administrative controls are necessary.	

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27	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Section 7.c.(8)	Author's Note: Substitute 10 CFR 830, Nuclear Safety Management, for reference to DOE5700.6C. "A description of the technical practices and measurement control program (including reliability and operability characteristics) used in determining the quantities of fissionable material (or other materials such as soluble poisons to prevent accidental criticality) present in any location and the uncertainties of the measured values. The measurement control program shall be in accordance with the latest edition of DOE 5700.6C, "QUALITY ASSURANCE.""	x			537, 1.4.1.4	BIO 4.12			x	The BIO states that a Quality Assurance Program exists in accordance with DOE 5700.6C. However, the applicability of the QA program to criticality is not described with the specificity required by DOE 5480.24. This is rectified in the FSAR with a thorough discussion in Chapter 6. No changes to the program are required; the FSAR discussion merely describes the existing QA program and its applicability to criticality safety.	

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28	S/RID 18.3.1 Safety Analysis Report	DOE5480.7A Section 9.a.(3)	Author's Note: Preparation and contents of the FHA is included in the Fire Protection Functional Area. Nuclear Safety personnel will assure that the FHA is addressed in the SAR. "Fire Hazards Analyses. The purpose of a fire hazards analysis (FHA) is to comprehensively assess the risk from fire within individual fire areas in a DOE facility in relation to existing or proposed fire protection so as to ascertain whether the objectives of paragraph 4, are met. A graded FHA, that reflects the risks from fire in a facility, shall be performed for new facilities as directed by DOE 6430.1A, for nuclear facilities where safety analyses are required by DOE 5480.23, and as directed by the PSO. A Safety Analysis Report (SAR) that addresses the following elements will satisfy the requirements for an FHA. A graded FHA shall contain, but not be limited to, the following elements: (a) Description of construction (b) Protection of essential safety class equipment © Fire protection features (d) Description of fire hazards (e) Life safety considerations (f) Critical process equipment (g) High value property (h) Damage potential: Maximum Credible Fire Loss (MCFL) and Maximum Possible Fire Loss (MPFL) (I) Fire Department/Brigade response			x	NA	NA			x	Fire Hazard Analysis preparation is outside the scope of the criticality safety program.	

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29	S/RID 18.3.1 Safety Analysis Report	DOE5480.7A Section 9.a.(3) (continued)	(Continued) (m) Emergency planning (n) Security considerations related to fire protection (o) Natural hazards (earthquake, flood, wind) impact on fire safety (p) Exposure fire potential, including the potential for fire spread between fire areas. An FHA shall be performed under the direction of a qualified fire protection engineer."			x	NA	NA			x		
30	S/RID 18.3.2 Hazard Classification	DOE5480.23(940 310) Section 8.c.(1)	"Classification Categories. The consequences of unmitigated releases of radioactive and/or hazardous material shall be evaluated and classified by the following hazard categories: (a) Category 1 Hazard. The hazard analysis shows the potential for significant offsite consequences. (b) Category 2 Hazard. The hazard analysis shows the potential for significant onsite consequences. © Category 3 Hazard. The hazard analysis shows the potential for only significant localized consequences."			x	NA	NA			x		

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31	S/RID 18.3.2 Hazard Classification	DOE5480.23(940 310) Section 8.c.(2)	"Inventory of Hazardous Materials. The hazard analysis shall be based on an inventory enveloping all radioactive and nonradioactive hazardous materials that are stored, utilized, or may be formed within a nuclear facility."	?			704, 2.1 and 2.2				x		
32	S/RID 18.3.2 Hazard Classification	DOE5480.23(940 310) Section 8.c.(3)	"Evaluation of Potential Releases. The hazard analysis shall identify energy sources or processes that might contribute to the generation or uncontrolled release of hazardous materials. The hazard analysis shall estimate the consequences of accidents in which the facility or process and/or materials in the inventory are assumed to interact, react, or be released in a manner to produce a threat or challenge to the health and safety of individuals on site and off site."		x		700, 2.1.1.4 and A.2.a 704, 2.2.1.3 and 2.3.2.A				x		
33	S/RID 18.3.2 Hazard Classification	DOE5480.23(940 310) Section 8.c.(4)	"Submission of Hazard Analysis to DOE. The hazard analysis shall be submitted to DOE for approval in accordance with the safety analysis plan and schedule required by paragraph 9(b)(2) of this Order."			x	NA	NA			x		

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34	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.a	"A contractor responsible for the operation of a DOE nuclear facility shall: (1) prepare Technical Safety Requirements for the facility; (2) submit the Technical Safety Requirements to the PSO for approval; and (3) operate the facility in accordance with the Technical Safety Requirements as approved by the PSO including any modification by the PSO;"			x	NA	NA			x		
35	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.b, Sentences 1 and 2	"Technical Safety Requirements shall define the operating limits and surveillance requirements, the basis thereof, safety boundaries, and management or administrative controls necessary to protect the health and safety of the public and to minimize the potential risk to workers from the uncontrolled release of radioactive or other hazardous materials and from radiation exposure due to inadvertent criticality. Technical Safety Requirements shall be based on the facility Safety Analysis Report and shall set forth specific limits and other requirements as specified in this Order and Attachment 1 to this Order, "Guidelines for Technical Safety Requirements.""		x		700, 2.2	TSR 5.7			x	Based on the criticality accident analysis in Section 5.3.2.1 of the BIO, the administrative controls in TSR 5.7 are sufficient to protect against an inadvertent criticality.	

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36	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(1)	"Use and Application. Definitions of terms, operating modes, frequency notations, and actions to be taken in the event of violation of Technical Safety Requirements operating limits or surveillance requirements are to be included in the Use and Application section. This section of the Technical Safety Requirements shall contain the basic instructions for using and applying the safety restriction contained in the Technical Safety Requirements."			x	NA	NA			x		

Table B-1. Matrix of TWRS-Specific Requirements to Implementing Documents (77 Sheets)

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37	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(2)	Author's Note: Substitute DOE 0 232.1 for the referenced document DOE Order 5000.3A. "Safety Limits (SL). Safety Limits are limits on process variables associated with those physical barriers, generally passive, that are necessary for *the intended facility function* and which are found to be required to guard against the uncontrolled release of radioactivity and other hazardous materials (this includes releases into the complex and/or the community). If any Safety Limit is exceeded at *any* reactor or nonreactor nuclear facility, action shall begin immediately to place the facility in the most stable, safe condition attainable including total shutdown of either reactor or nonreactor nuclear facilities. The appropriate time frame for the completion of the action for each nuclear facility has to be developed and justified by the contractor, as appropriate, in the TSR document which requires PSO approval. The SLs shall describe the action to be taken when an SL is exceeded. If a SL is exceeded, the contractor shall notify DOE in accordance with *DOE 5000.3A*, review the matter, and record the results of the review. The review shall include the cause of the condition and the basis for any corrective actions taken to preclude reoccurrence. The safe, stable condition entered as			x	NA	NA			x	No Safety Limits are required for prevention or mitigation of *the criticality accident as* analyzed in BIO 5.3.2.1.	

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38	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(3)(a)	Author's Note: Substitute DOE 0 232.1 for the referenced document DOE Order 5000.3A. "Limiting Control Settings (LCS). Limiting Control Settings are settings on safety systems that control process variables to prevent exceeding Safety Limits. This subsection of the Technical Safety Requirements shall contain the settings for automatic alarms and automatic or non-automatic initiation of protective actions related to those variables having significant safety functions. The specific settings shall be chosen such that if exceeded, sufficient time is available to automatically or manually correct the condition prior to exceeding Safety Limits. If the automatic alarms or protective devices do not function as required during applicable operating modes, the contractor shall take action as defined in the Limiting Control Setting to maintain the variables within the requirements and to promptly repair the automatic devices or the affected part of the process or, if required, the facility shall be placed in its most safe, stable condition. The LCS shall describe the action to be taken in case of exceedance of LCS. If an LCS is exceeded, the contractor shall notify DOE in accordance with DOE 5000.3A, review the matter, and record the results of the review including the cause of the condition and the basis for any corrective actions taken to preclude				700, 2.2.2 and 4.0.4			x	x	No Limiting Control Settings are required for prevention or mitigation of the criticality accident as analyzed in BIO 5.3.2.1.	

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39	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(3)(b)	Author's Note: Substitute DOE 0 232.1 for the referenced document DOE Order 5000.3A. "Limiting Conditions for Operation (LCO). Limiting Conditions for Operation are the lowest functional capability or performance level of safety-related structures, systems, component and their support systems required for normal safe operation of the facility. This subsection of the TSR shall contain the limits on functional capability or performance level. When a Limiting Condition for Operation is not met, the contractor shall take remedial actions defined by the Technical Safety Requirements until the condition can be met. The LCO shall describe the action to be taken in case of exceedance of the LCO. In cases of exceedance of an LCO, the contractor shall notify DOE in accordance with DOE 5000.3A, review the matter, and record the results of the review including the cause of the condition and the basis for any corrective actions taken to preclude reoccurrence."				700, 2.2.2 and 4.0.4			x	x	No Limiting Conditions for Operation are required for prevention or mitigation of the criticality accident as analyzed in BIO 5.3.2.1.	

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Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
40	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(4)	"Surveillance Requirements. Surveillance Requirements are requirements relating to test, calibration, or inspection to ensure that the necessary operability and quality of safety-related structures, systems, components, and their support systems required for safe operation of the facility are maintained. This section of the Technical Safety Requirements shall contain the requirements necessary to maintain operation of the facility within the Safety Limits, Limiting Control Settings, and Limiting Conditions for Operations. In the event that Surveillance Requirements are not successfully completed or accomplished within their required frequency, the systems or components involved shall be assumed to be inoperative and actions defined by the Limiting Condition for Operation or Limiting Control Setting shall be taken until the systems or components can be shown to be operable."				700, 2.2.3			x	x	No Surveillance Requirements are required for prevention or mitigation of the criticality accident as analyzed in BIO 5.3.2.1.	

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Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
41	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.e.(5)	"Administrative Controls. Administrative Controls are the provisions relating to organization and management, procedures, recordkeeping, reviews, and audits necessary to ensure safe operation of the facility. This section of the Technical Safety Requirements shall contain the requirements associated with Administrative Controls including those for reporting deviations from Technical Safety Requirements (i.e., exceedances of LCO, LCS, or SR, or violation of TSR). Staffing requirements for facility position important to safe operation of the facility shall be provided in the Administrative Controls sections. Physical and administrative controls of the criticality safety program shall also be provided in the Administration Controls section."		x		700, 2.2.4	TSR 5.4 TSR 5.5 TSR 5.6 TSR 5.7 HNF-IP-1266 Chapters 5.4, 5.5, 5.6, 5.7 HNF-IP-0842 Volume I Sections 3.0, 3.10, 3.24, 3.32 HNF-IP-0842 Volume II Sections 4.1.1, 4.2.1, 4.6.2 HNF-IP-0842 Volume IV Section 5.7	X		x	TSR AC 5.4 defines and outlines the response to TSR violations. TSR 5.5 provides occurrence reporting requirements. TSR 5.6 provides organization and management and staffing requirements. TSR 5.7 requires the establishment of a nuclear criticality safety program, and defines the required key elements of the program.	

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42	*S/RID 18.4* TECHNICAL SAFETY REQUIREMENTS	*DOE5480.22* Section 9.e.(6)	"*Appendices. The following* information shall be in the Appendices: (a) Basis. This Appendix shall provide summary statements of the reasons for the operating limits and associated surveillance requirements. The basis shall show how the numeric value, the condition, or the surveillance does fulfill the purpose derived from the safety documentation. The primary purpose for describing the basis for each requirement will not affect its original intent or purpose. (b) Design Features. This Appendix shall describe passive design features of the facility which, if altered or modified, would have a significant effect on safe operation. If Design Features are in a DOE-approved Safety Analysis Report, this Appendix is not required."			*x*	*NA*	*NA*			*x*	*No operating limits, surveillance* requirements, or design features are required for prevention or mitigation of the criticality accident as analyzed in BIO 5.3.2.1.	

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43	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.f	"The TSR shall be kept current at all times so that it reflects the facility as it exists and as it is analyzed in Safety Analysis Reports. Contractors shall determine whether revisions to the Technical Safety Requirements are required upon originating or proposing a revision to a Safety Analysis Report, and, if so, shall prepare revisions and submit them with their basis for PSO approval concurrent with the revisions to the Safety Analysis Report. The TSR must be approved prior to facility or facility practice change. To assure that the TSR is current, it shall be reviewed at least annually along with the facility Safety Analysis Report."		x		700, 4.0.7	HNF-IP-0842 Vol. IV Sec. 5.10			x		
44	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.g	"All proposed revisions to Technical Safety Requirements or its Appendices shall be submitted for PSO approval. Such submittals shall include the basis for the proposed revision. Revision implementation shall occur only after PSO approval."		x		700, 4.0.1 705	HNF-IP-0842 Vol. IV Sec. 5.10			x		
45	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.h	"Only the current PSO-approved Technical Safety Requirements shall be used for the operation of the facility. The current PSO-approved Technical Safety Requirements shall be a controlled document."		x		700, 4.0.1 705	HNF-IP-0842 Vol. IV Sec. 5.10			x		

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46	S/RID 18.4 TECHNICAL SAFETY REQUIREMENTS	DOE5480.22 Section 9.I	"A contractor may take emergency actions that depart from the approved Technical Safety Requirements when no actions consistent with the Technical Safety Requirements are immediately apparent, and when these actions are needed to protect the public health and safety. Such contractor actions shall be approved, as a minimum, by a certified operator or supervisor certified on that system through an accredited training program. If emergency actions are taken, verbal notifications shall be made to the Head of the Field Element within 2 hours and by written reports to the PSO within 24 hours."		x		700, 4.0.5	TSR LCO 3.0.7			x	The requirement is not found in HNF-IP-1266 or in HNF-IP-0842.	34
47	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 2, Sentences 1 and 2	"Once the contractor organization has determined the various sources of change, it must then determine the process by which these sources of change should be integrated into the USQ review process. This process should ensure that the need for completion of a safety evaluation is not overlooked and that this process is integrated into existing procedures or that new procedures are developed, as necessary."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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48	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 3.c	"It is expected that, as an initial step toward developing a USQ process, each contractor will define for their facility those aspects and documents that constitute the authorization basis and identify these documents within the facility USQ procedures."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
49	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 4.d	"The application of screening criteria for administrative changes may prove useful, but contractors must ensure that the use of these criteria do not inappropriately screen out changes that require safety evaluations."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
50	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 5.a	"Contractors are required to develop procedures that provide detailed guidance for the performance and review of USQ determinations. At a minimum, the procedures shall define the purpose of the procedure; set forth the procedure's applicability; provide definitions of appropriate terms, including those set forth in this Order; include screening criteria, as appropriate, and the basis for their application; include detailed guidance on what must be considered and evaluated when performing or reviewing a safety evaluation; define the qualifications needed and responsibilities of personnel performing and reviewing safety evaluations; and include documentation requirements for each USQ determination."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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51	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 5.b, Sentences 1 and 2	"The purpose of the procedure should reflect the purpose of the Order and its implementation as defined herein. The applicability of the procedure should set forth the facility(s) to which it applies and the types of change processes to which it applies."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
52	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 5.c, Sentence 1 and 2	"Contractors are expected to provide detailed guidance and instructions on how to perform a safety evaluation. This guidance should include, at a minimum, the information provided in Chapter IV of this guidance document, refined to include the specifics of the applicable facility."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
53	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 5.d	"The implementing procedures should address the personnel qualifications needed in order to perform or review a safety evaluation. This includes required educational background, years and/or types of work experience, knowledge of the facility, understanding of DOE requirements, and familiarity with the facility authorization basis. Specific responsibilities of those performing or reviewing safety evaluations should be clearly defined."			x	NA	NA	x		x	This requirement applies to the USQ process, not to Criticality Safety.	

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54	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 5.e, Sentences 1 and 2	"Documentation requirements should also be discussed in the USQ implementing procedures. They should identify the level of detail necessary to document performance of the safety evaluation and conclusions reached; a list of references relied upon to reach this conclusion as well as guidance for the retention of records should also be included."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
55	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Chapter III, Section 8, Sentence 1	"Training. All personnel responsible for performing, reviewing, or approving USQ determinations should receive initial training on the application of the Order and of facility-specific procedures."			x	NA	NA	x			This requirement applies to the USQ process, not to Criticality Safety.	
56	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 8.c	"Primary responsibility, authority, and accountability for the direction and management of the USQ process reside with the line management of the facility organization responsible for the design and safety analyses."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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57	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 10.a	"A contractor authorized to operate DOE nuclear facilities shall: (1) Perform all safety evaluations required by paragraph (b) of this section to determine whether a situation involves USQ; (2) Prior to implementation of a proposed action, obtain PSO approval for situations determined to involve a USQ or a Technical Safety Requirements (TSR) change; and (3) Develop and implement procedures to govern the need for, and the performance of, safety evaluations under this section."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	
58	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 10.b	"A safety evaluation shall be performed for: (1) Temporary or permanent changes in the facility as described in the existing safety analyses; (2) Temporary or permanent changes in the procedures as described in existing safety analyses; or (3) Test or experiments not described in existing safety analyses."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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59	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 10.c	"A situation involves a USQ if: (1) The probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the facility safety analyses could be increased; (2) The possibility for an accident or malfunction of a different type than any evaluated previously in the facility safety analyses could be created; or (3) Any margin of safety, as defined in the bases of the TSRs, could be reduced."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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60	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 10.d	"When a contractor identifies information that indicates a potential inadequacy of previous safety analyses or a possible reduction in the margin of safety as defined in the TSRs, the contractor shall: (1) Notify the PSO of the situation upon discovery of the information; (2) Make an evaluation in accordance with paragraphs 10a and 10c; (3) Take action to place the facility in a safe condition until the safety evaluation is completed; and (4) Submit the completed safety evaluation prior to removing any operational restrictions initiated pursuant to paragraph 10d(2)."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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61	S/RID 18.5 UNREVIEWED SAFETY QUESTIONS	DOE5480.21 Preamble, Section 10.e	"For all safety evaluations required under this section, a contractor shall: (1) Document the basis for the USQ determination, utilizing the procedures provided for in paragraph 10a(3) of this section and the criteria of paragraph 10c; (2) Maintain documentation required by paragraph 10e(1) for the authorized operating period of the nuclear facility and ensure the complete transfer of all documentation to any subsequent contractor prior to termination of its contract; (3) Incorporate in the existing SAR, any changes that are needed as a result of the safety evaluation or any action taken; and (4) Submit to the PSO, on a schedule corresponding to the periodic updates of the SAR, a report summarizing all situations for which a safety evaluation was required by this section and indicating all "changes" considered in a safety evaluation and implemented 6 months or more before the submittal date of the report."			x	NA	NA			x	This requirement applies to the USQ process, not to Criticality Safety.	

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62	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	Author's Note: ANS-8.5 and ANS-8.15 are not applicable to Tank Farms. "The basic elements and control parameters of programs for nuclear criticality safety shall satisfy the requirements of the following mandatory American Nuclear Society's ANSI/ANS nuclear criticality safety standards:	x			334	BIO 4.3, HNF-IP-1266 Ch. 5.7			x	BIO Section 4.3 states that the criticality protection program follows DOE 5480.24 and industry standards. HNF-PRO-334 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards. HNF-PRO-334 is invoked by HNF-IP-1266, Chapter 5.7, Nuclear Criticality Safety, Section 3.C, "Program."	
62.1	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.1, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," except paragraphs 4.2.2 and 4.2.3.	x			334	BIO 4.3, HNF-IP-1266 Ch. 5.7	x	x	x	BIO Section 4.3 states that the criticality protection program follows DOE 5480.24 and industry standards. HNF-PRO-334 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards. HNF-PRO-334 is invoked by HNF-IP-1266, Chapter 5.7, Nuclear Criticality Safety, Section 3.C, "Program." See the following individual sections of ANS-8.1.	
62.1.01	ANS-8.1 Section 4.1.1(1)		**Responsibilities.** Management shall clearly establish responsibility for nuclear criticality safety.	x			334, 1.3.1	HNF-IP-0842 Vol. II Sec. 4.1.1 Att. D, HNF-IP-1266 Ch. 5.7 Sec. 3.B.1	x		x		
62.1.02	ANS-8.1 Section 4.1.1(2)		**Responsibilities.** Supervision shall be made as responsible for nuclear criticality safety as for production, development, research or other functions.	x				HNF-IP-1266 Ch. 5.7 Sec. 3.B.1	x		x		

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62.1.03	ANS-8.1 Section 4.1.1(3)		**Responsibilities.** Each individual, regardless of position, shall be made aware that nuclear criticality safety in his work area is ultimately his responsibility.	Yes			334, 1.3.1	HNF-IP-0842 Vol. II Sec. 4.1.1 Att. D, HNF-IP-1266 Ch. 5.7 Sec. 3.B.1	x				
62.1.04	ANS-8.1 Section 4.1.1 (4)		**Responsibilities.** Management shall provide personnel skilled in the interpretation of data pertinent to nuclear criticality safety and familiar with operations to serve as advisors to supervision.	x			334, 1.3.1	HNF-IP-1266 Ch. 5.7 Sec. 3.B.1.h	x				
62.1.05	ANS-8.1 Section 4.1.1 (5)		**Responsibilities.** These specialists shall be to the extent practicable, administratively independent of process supervision.	x			334, 1.3.1		x			Not found in TWRS implementing document.	5
62.1.06	ANS-8.1 Section 4.1.1 (6)		**Responsibilities.** Management shall establish the criteria to be satisfied by nuclear criticality safety controls.	x			537	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.g and 3.C.1.b			x		
62.1.07	ANS-8.1 Section 4.1.2 (1)		**Process Analysis.** Before a new operation with fissionable materials is begun or before an existing operation is changed, it shall be determined that the entire process will be subcritical under both normal and credible abnormal conditions.	x			539, 1.4.1 and 1.4.3	HNF-IP-1266 Ch. 5.7 Sections 3.C.1.b and 3.C.5			x		
62.1.08	ANS-8.1 Section 4.1.2 (2)		**Process Analysis.** Care shall be exercised to determine those conditions which result in the maximum effective multiplication factor.	x			539, 1.4.3	HNF-IP-1266 Ch. 5.7 Section 3.C.5			x	HNF-IP-1266 Ch. 5.7 Section 3.C.5 requires development of the CSE in accordance with HNF-PRO-539, but does not specify this detail.	

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62.1.09	ANS-8.1 Section 4.1.3 (1)		**Written Procedures.** Operations to which nuclear criticality safety is pertinent shall be governed by written procedures.		x		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11, HNF-IP-1266 Ch. 5.7 Sections 3.B.1.c and 3.B.1.f			x		
62.1.10	ANS-8.1 Section 4.1.3 (2)		**Written Procedures.** All persons participating in these operations shall understand and be familiar with the procedures.		x		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11	x				
62.1.11	ANS-8.1 Section 4.1.3 (3)		**Written Procedures.** The procedures shall specify all parameters they are intended to control.		x		537, 1.4.3.3	HNF-IP-0731			x		
62.1.12	ANS-8.1 Section 4.1.3 (4)		**Written Procedures.** They shall be such that no single, inadvertent departure from a procedure can cause a criticality accident.	x			537, 1.4.3.3				x	Statement not found in TWRS level procedure	35
62.1.13	ANS-8.1 Section 4.1.4 (1)		**Materials Control.** The movement of fissionable materials shall be controlled.	x			545	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c			x		
62.1.14	ANS-8.1 Section 4.1.4 (2)		**Materials Control.** Appropriate materials labeling and area posting shall be maintained specifying material identification and all limits on parameters that are subjected to procedural control.	x			541 542	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.c and 3.C.7		x	x		

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62.1.15	ANS-8.1 Section 4.1.5 (1)		**Operational Control.** Deviations from procedures and unforeseen alterations in process conditions that affect nuclear criticality safety shall be reported to management and shall be investigated promptly.		x		549	HNF-IP-1266 Ch. 5.7 Section 3.C.12 HNF-IP-0842 Vol. II Section 4.6.2 CPS-T-149-00010			x		
62.1.16	ANS-8.1 Section 4.1.5 (2)		**Operational Control.** Action shall be taken to prevent a recurrence.		x		549	HNF-IP-1266 Ch. 5.7 Section 3.C.12 HNF-IP-0842 Vol. II Section 4.6.2 CPS-T-149-00010			x		
62.1.17	ANS-8.1 Section 4.1.6 (1)		**Operational Reviews.** Operations shall be reviewed frequently (at least annually) to ascertain that procedures are being followed and that process conditions have not been altered so as to affect the nuclear criticality safety evaluations.	x			548	HNF-IP-1266 Ch. 5.7 Section 3.C.11			x		
62.1.18	ANS-8.1 Section 4.1.6 (2)		**Operational Reviews.** These reviews shall be conducted, in consultation with operating personnel, by individuals who are knowledgeable in nuclear criticality safety and who, to the extent practicable, are not immediately responsible for the operation.	x			548, 3.0	HNF-IP-1266 Ch. 5.7 Section 3.C.11	x				

Table B-1. Matrix of TWRS-Specific Requirements to Implementing Documents (77 Sheets)

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62.1.19	ANS-8.1 Section 4.1.7 (1)		**Emergency Procedures.** Emergency Procedures shall be prepared and approved by management.		x		537, 1.4.3.5 424	WHC-IP-0971 WHC-IP-0263-TF WHC-IP-0839-TF WHC-IP-1178			x		
62.1.20	ANS-8.1 Section 4.1.7 (2)		**Emergency Procedures.** Organizations, local and offsite, that are expected to respond to emergencies shall be made aware of conditions that might be encountered.		x		537, 1.4.3.5 424	WHC-IP-0971 WHC-IP-0263-TF WHC-IP-0839-TF WHC-IP-1178			x		
62.1.21	ANS-8.1 Section 4.1.7 (3)		**Emergency Procedures.** They (local and offsite organizations) shall be assisted in preparing suitable procedures governing their responses. *Interpretive Guidance:* Contractors will make available assistance that might be requested by local and offsite organizations expected to respond to emergencies in preparing suitable procedures. A letter to their respective Emergency Preparedness Offices so stating would be appropriate. Any assistance provided to these organizations shall be documented.		x		537, 1.4.3.5 424	WHC-IP-0971 WHC-IP-0263-TF WHC-IP-0839-TF WHC-IP-1178			x		

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62.1.22	ANS-8.1 Section 4.2.1		**Controlling Factors.** The effective multiplication fact (k_m) of a system containing fissionable material depends on: (1) The mass and distribution of all fissionable materials and (2) The mass, distribution, and nuclear properties of all other materials with which the fissionable materials are associated. Nuclear criticality safety is achieved by controlling one of more parameters of the system within subcritical limits. All controlled parameters and their limits shall be specified.	x			537 539, 1.4.3 and subparagraphs	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		
62.1.23	ANS-8.1 Section 4.2.2		**Double Contingency Principle.** Process designs shall in general, incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible.			x	NA	NA			x	Replaced with new definition 5480.24 7.a(2)(a)	

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62.1.24	ANS-8.1 Section 4.2.3		**Geometry Control.** Where practicable, reliance shall be placed on equipment design in which dimensions are limited rather that on administrative controls. Full advantage may be taken of any nuclear characteristics of the process materials and equipment. All dimensions and nuclear properties on which reliance is placed shall be verified prior to beginning operations, and control shall be exercised to maintain them.			x	NA	NA		x	x	Replaced with new definition §480.24 7.a(2)(b)	
62.1.25	ANS-8.1 Section 4.2.4 (1)		**Neutron Absorber.** Reliance may be placed on neutron-absorbing materials, such as cadmium and boron, that are incorporated in process materials or equipment, or both. Control shall be exercised to maintain their continued presence with the intended distributions and concentrations.	x			539, 1.4.3.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a		x	x		
62.1.26	ANS-8.1 Section 4.2.4 (2)		**Neutron Absorbers.** Reliance may be placed on neutron-absorbing material, such as cadmium and boron, that are incorporated in process materials or equipment, or both. Extraordinary care should be taken with solutions and absorbers because of the difficulty of exercising such control. *Interpretive Guidance*: 8.1 4.2.4(2) per guidance remains a should.			x	NA	NA		x	x	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan of DOE Order 5480.24, Nuclear Criticality Safety.* No explanation provided.	

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62.1.7	ANS-8.1 Section 4.2.5		**Subcritical Limits**. Where applicable data are available, subcritical limits shall be established on bases derived from experiments, with adequate allowance for uncertainties in the data. In the absence of directly applicable experimental measurements, the limits may be derived from calculations made by a method shown by comparison with experimental data to be valid in accordance with 4.3	x			537, 1.4.1.3	HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.1			x		
62.1.8	ANS-8.1 Section 4.3.1 (1)		**Validation of a Calculational Method.** Bias shall be established by correlating the results of criticality experiments with results obtained for these same systems by the method being validated.	x			539, 1.4.4.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		
62.1.29	ANS-8.1 Section 4.3.1 (2)		**Validation of a Calculational Method.** Generally neither the bias nor its uncertainty is constant; both should to be functions of composition and other variables. *Interpretive Guidance*: 8.1 4.3.1(2) per guidance remains a should.			x	NA	NA			x	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan of DOE Order 5480.24, Nuclear Criticality Safety*. No explanation provided.	

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62.1.30	ANS-8.1 Section 4.3.2		**Validation of a Calculational Method.** The area(s) of applicability of a calculational method may be extended beyond the range of experimental conditions over which the bias is established by making use of the trends in the bias. Where the extension is large, the method shall be supplemented by other calculational methods to provide a better estimate of the bias in the extended area(s). *Interpretive Guidance*: Use of some "other" (e.g., experimental data, handbook, etc.) validated method will be acceptable.	x			539, 1.4.4.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		
62.1.31	ANS-8.1 Section 4.3.3 (1)		**Validation of a Calculational Method.** A margin in the correlating parameter, which margin may be a function of composition and other variables, shall be described that is sufficient to ensure subcriticality.	x			539, 1.4.4.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		
62.1.32	ANS-8.1 Section 4.3.3(2)		**Validation of a Calculational Method.** This margin of subcriticality shall include allowances for the uncertainty in the bias and for uncertainties due to any extensions of the area(s) of applicability.	x			537, 1.4.12	HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.1			x		
62.1.33	ANS-8.1 Section 4.3.4 (1)		**Validation of a Calculational Method.** If the margin involves a computer program, checks shall be performed to confirm that the mathematical operations are performed as intended.	x			539, 1.4.4.1	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		

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62.1.34	ANS-8.1 Section 4.3.4 (2)		**Validation of a Calculational Method.** Any changes in the computer program shall be followed by reconfirmation that the mathematical operations are performed as intended.	x			539, 1.4.4.1	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		
62.1.35	ANS-8.1 Section 4.3.5		**Validation of a Calculational Method.** Nuclear properties such as cross sections should be consistent with experimental measurements of these properties. *Interpretive Guidance*: ANSI/ANS 8.1 Section 4.3.5 Per guidance remains a should. Exact consistency would rule out adjusted cross sections. Consistency can be demonstrated by comparison with experimental data or other calculations.			x	NA	NA			x	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan of DOE Order 5480.24, Nuclear Criticality Safety*. No explanation provided.	

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62.1.36	ANS-8.1 Section 4.3.6		**Validation of a Calculational Method.** (1) A written report of the validation shall be prepared. (2) State computer programs used, the options, recipes for choosing mesh points where applicable, the cross section sets, and any numerical parameters necessary to describe the input. (3) Identify experimental data and list parameters derived therefrom for use in the validation of the method. (4) State the area(s) of applicability. (5) State the bias and the prescribed margin of subcriticality over the area(s) of applicability. State the basis for the margin.	x			539, 1.4.4.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a			x		

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62.1.37	ANS-8.1 Section 5.0 (1)		**Single-Parameter Limits for Fissile Nuclides.** Operations with fissile materials may be performed safety by complying with any one of the limits given in 5.1, 5.2, 5.3, and 5.4 for single units provided the conditions under which the limit applies are maintained; these limits were calculated by methods satisfying the requirements of 4.3. A limit shall be applied only when surrounding materials, including other nearby fissionable materials, can be shown to increase the effective multiplication factor (k,m) no more than does enclosing the unit by a contiguous layer of water of unlimited thickness. A limit may be applied to a mixture to be the one with the most restrictive limit. *Interpretive Guidance*: Section 5.0 only applies if the tables are used in an analysis. WHC does not use these tables.			x	NA	NA			x	See Interpretive Guidance in text.	
62.1.38	ANS-8.1 Section 5.0(2)		**Single-parameter Limits for Fissile Nuclides.** Process specifications shall incorporate margins to protect against uncertainties in process variables and against a limit being accidentally exceeded. *Interpretive Guidance*: Section 5.0 only applies if the tables are used in an analysis. WHC does not use these tables.			x	NA	NA			x	See Interpretive Guidance in text.	

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62.1.39	ANS-8.1 Section 6.0(1)		**Multiparameter Control.** Although the single-parameter limits are adequate for many purposes, they are inconveniently and uneconomically small for many others. Simultaneous limitation of two or more parameters results in a less restrictive limit for the one of interest. A few particularly useful examples are given in 6.1 through 6.4. All were calculated by methods satisfying 4.3. These limits shall be applied only when surrounding materials can be shown to increase the effective multiplication fact (k,m) no more than does enclosing the system by a contiguous layer of water of unlimited thickness. General guidance for multiparameter control may be found in the technical literature. NOTE: Section 6.0 only applies if the tables are used in an analysis. WHC does not use these tables.			x	NA	NA			x	See Note in text.	
62.1.40	ANS-8.1 Section 6.0(2)		**Multiparameter Control.** Process specifications shall incorporate margins to protect against uncertainties in process variables and against a limit being accidentally exceeded. NOTE: Section 6.0 only applies if the tables are used in an analysis. WHC does not use these tables.			x	NA	NA			x	See Note in text.	

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62.2	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.3, "Criticality Accident Alarm System," except paragraphs 4.2 and 4.2.2.	x			546	BIO 5.3.2.1		x	x	HNF-PRO-546 implements the requirements of ANS-8.3. Both the ANS standard and the PHMC procedure state that a CAS or CDS is not needed if justification is shown in a DOE approved SAR. BIO Section 5.3.2.1 provides all the necessary information to justify not having a CAS or CDS, but does not state the conclusion that the CAS or CDS is not necessary. The necessary statement will be added to the BIO as part of the 1998 annual update. The program is not affected.	
62.3	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.5, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material."			x	NA	NA			x	TWRS S/RID exempts Tank Farms from ANS-8.5. Borosilicate-glass raschig rings are not used at Tank Farms. (Ref. 9454500 Rev. B Section 4.1)	
62.4	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.15, "Nuclear Criticality Control of Special Actinide Elements."			x	NA	NA			x	TWRS S/RID exempts Tank Farms from ANS-8.15. Fissionable material inventories of WHC facilities (including Tank Farms) were compared to the single and multiparameter subcritical mass limits of ANS-8.15, and were found not to exceed those limits except as permitted with allowance for form and distribution. (Ref. 9454500 Rev. B Section 4.5)	

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62.5	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.19, "Administrative Practices for Nuclear Criticality Safety."	x			334	BIO 4.3, HNF-IP-1266 Ch. 5.7 Section 3.C				BIO Section 4.3 states that the criticality protection program follows DOE 5480.24 and industry standards. *HNF-PRO-334* describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards. HNF-PRO-334 is invoked by HNF-IP-1266, Chapter 5.7, Nuclear Criticality Safety, Section 3.C, "Program." See the following individual sections of ANS-8.19.	
62.5.01	ANS-8.19 Section 4.1.(1)		**Management Responsibilities.** Management shall accept overall responsibility for safety of operations. *Interpretive Guidance.* A policy statement and/or a statement in the job description will adequately meet this requirement.		x		334, 1.3.1	HNF-IP-1266, Ch. 5.7, Section 3.B.1	x		x		
62.5.02	ANS-8.19 Section 4.1.(2)		**Management Responsibilities.** Continuing interest in safety shall be evident.		x		334, 1.3.1	HNF-IP-1266, Ch. 5.7, Section 3.B.1	x				
62.5.03	ANS-8.19 Section 4.2		**Management Responsibilities.** Management shall formulate nuclear criticality safety policy and make it known to all employees involved in operations with fissile material.		x		334, 1.3.1 and 1.3.3	HNF-IP-1266, Ch. 5.7, Section 3.B.1	x		x		
62.5.04	ANS-8.19 Section 4.3.(1)		**Management Responsibilities.** Management shall assign responsibility and delegate *commensurate authority to* implement established policy.		x		334, 1.3.1	HNF-IP-1266, Ch. 5.7, Section 3.B.1	x		x		

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62.5.05	ANS-8.19 Section 4.3.(2)		**Management Responsibilities.** Responsibility for nuclear criticality safety shall be assigned in a manner compatible with that for other safety disciplines.	x			334, 1.3.1	HNF-IP-1266, Ch. 5.7, Section 3.B.1			x		
62.5.06	ANS-8.19 Section 4.4.(1)		**Management Responsibilities.** Management shall provide personnel familiar with the physics of nuclear criticality and with associated safety practices to furnish technical guidance appropriate to the scope of operations.	x			334, 1.3.1 and 1.3.2	HNF-IP-1266, Ch. 5.7, Sections 3.B.1.h and 3.B.2	x				
62.5.07	ANS-8.19 Section 4.4.(2)		**Management Responsibilities.** This function shall, to the extent practicable, be administratively independent of operations.	x			334, 1.3.1	None found	x		x	Not found in TWRS level procedures.	5
62.5.08	ANS-8.19 Section 4.5		**Management Responsibilities.** Management shall establish a means for monitoring the nuclear criticality safety program.	x			548	HNF-IP-1266, Ch. 5.7, Sections 3.C.11			x		
62.5.09	ANS-8.19 Section 4.6		**Management Responsibilities.** Management shall periodically participate in auditing the overall effectiveness of the nuclear criticality safety program.	x			548	HNF-IP-1266, Ch. 5.7, Sections 3.B.1 and 3.C.11			x	The referenced implementing documents require management to ensure the performance of periodic inspections and assessments, but do not otherwise require management participation in audits.	36
62.5.10	ANS-8.19 Section 5.1		**Supervisory Responsibilities.** Each supervisor shall accept responsibility for the safety of operations under his control.		x			HNF-IP-0842 Vol. II Section 4.1.1	x				
62.5.11	ANS-8.19 Section 5.2.(1)		**Supervisory Responsibilities.** Each supervisor shall be knowledgeable in those aspects of nuclear criticality safety relevant to operations under his control.	x				HNF-IP-0842 Vol. II Section 4.1.1	x				

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62.5.12	ANS-8.19 Section 5.2.(2)		**Supervisory Responsibilities.** Training and assistance shall be obtained from the nuclear criticality safety staff.	x			334, 1.3.2 538	HNF-IP-1266 Ch. 5.7 Sections 3.B.2 and 3.C.4	x				
62.5.13	ANS-8.19 Section 5.3.(1)		**Supervisory Responsibilities.** Each supervisor shall provide training and shall require that the personnel under his supervision have an understanding of procedures and safety considerations such that they may be expected to perform their functions without undue risk.		x		334, 1.3.1	HNF-IP-0842 Vol. II Section 4.1.1 HNF-IP-1266 Ch. 5.7 Sections 3.B.1 and 3.C.4	x				
62.5.14	ANS-8.19 Section 5.3.(2)		**Supervisory Responsibilities.** Records of training activities and verification of personnel understanding shall be maintained.		x		538, 1.4.2.5	HNF-IP-0842 Vol. III Section 3.1 HNF-IP-1266 Ch. 5.7 Section 3.B.4			x		
62.5.15	ANS-8.19 Section 5.4.(1)		**Supervisory Responsibilities.** Supervisors shall develop or participate in the development of written procedures applicable to the operations under their control.		x		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11 and Vol. II Section 4.1.1	x		x		
62.5.16	ANS-8.19 Section 5.4.(2)		**Supervisory Responsibilities.** Maintenance of these procedures to reflect changes in operations shall be a continuing supervisory responsibility.		x		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11	x		x		
62.5.17	ANS-8.19 Section 5.5		**Supervisory Responsibilities.** Supervisors shall verify compliance with nuclear criticality safety specifications for new or modified equipment before its use. Verification may be based on inspection reports or other features of the quality control system.		x		537, 1.4.2.3		x	x		Not found in TWRS procedures.	37

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62.5.18	ANS-8.19 Section 5.6		**Supervisory Responsibilities.** Each supervisor shall require conformance with good safety practices including unambiguous identification of fissile materials and good housekeeping.		X		541 543	HNF-IP-0842 Vol. II Section 4.1.1 HNF-IP-1266 Ch. 5.7 Sections 3.B.1 and 3.C.7	x				
62.5.19	ANS-8.19 Section 6.1		**Nuclear Criticality Safety Staff.** The nuclear criticality safety staff shall provide technical guidance for the design of equipment and processes and for the development of operating procedures.	x			334, 1.4.2	HNF-IP-1266 Ch. 5.7 Section 3.C	x	x	x		
62.5.20	ANS-8.19 Section 6.2.(1)		**Nuclear Criticality Safety Staff.** The staff shall maintain familiarity with current developments in nuclear criticality safety standards, guides and codes.	x			334, 1.4.1	Qualification Card and Guide for TWRS Facility Criticality Safety Engineer, 350004	x				
62.5.21	ANS-8.19 Section 6.2.(2)		**Nuclear Criticality Safety Staff.** Knowledge of current nuclear criticality information shall be maintained. *Interpretive Guidance.* Criticality staff shall be able to demonstrate that they are able to obtain criticality safety information necessary to perform their duties.	x			538, 1.4.7 and 1.4.8	Qualification Card and Guide for TWRS Facility Criticality Safety Engineer, 350004 HNF-IP-1266 Ch. 5.7 Section 3.C.4.a (applies only to TWRS CSRs and assistants)	x				

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62.5.22	ANS-8.19 Section 6.3		**Nuclear Criticality Safety Staff.** The staff shall consult with knowledgeable individuals to obtain technical assistance as needed. *Interpretive Guidance.* This requirement may be demonstrated by Criticality Safety Committee meeting minutes and/or letters to file documenting consultations with other criticality experts.	x			538, 1.4.7 and 1.4.8	HNF-IP-1266 Ch. 5.7 Section 3.C.4.a (applies only to TWRS CSRs and assistants)	x				
62.5.23	ANS-8.19 Section 6.4		**Nuclear Criticality Safety Staff.** The staff shall maintain familiarity with all operations within the organization requiring nuclear criticality safety controls.	x			538, 1.4.7 and 1.4.8	Qualification Card and Guide for TWRS Facility Criticality Safety Engineer, 350004 HNF-IP-1266 Ch. 5.7 Section 3.C.4.a (applies only to TWRS CSRs and assistants)	x				
62.5.24	ANS-8.19 Section 6.5		**Nuclear Criticality Safety Staff.** The staff shall assist supervision, on request, in training personnel.	x			334, 1.4.1	HNF-IP-1266 Ch. 5.7 Section 3.B.2.a (applies only to TWRS CSR)	x				

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62.5.25	ANS-8.19 Section 6.6		**Nuclear Criticality Safety Staff.** The staff shall conduct or participate in audits in criticality safety practices and compliance with procedures as directed by management.	x			334, 1.4 and 1.5 548, 3.0	HNF-IP-1266 Ch. 5.7 Sections 3.B.2.a and 3.C.11	x			HNF-IP-1266 does not require participation by Criticality Safety Specialist.	38
62.5.26	ANS-8.19 Section 6.7		**Nuclear Criticality Safety Staff.** The staff shall examine reports of procedural violations and other deficiencies for possible improvement of safety practices and procedural requirements, and shall report their findings to management.	X			334, 1.5		x		x	Not found in TWRS documents.	39
62.5.27	ANS-8.19 Section 7.1.(1)		**Operating Procedures.** Procedures shall be organized and presented for convenient use by operators. *Interpretive Guidance.* Contractor line management is responsible for the organization and presentation of procedures for convenient use by operators. A directive to line management in the facility safety manual would meet this requirement. The same is true for making sure procedures are clear of extraneous material.		X		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11 HNF-IP-0731			x		
62.5.28	ANS-8.19 Section 7.2		**Operating Procedures.** Procedures shall include those controls and limits significant to the nuclear criticality safety of the operation.		X		537, 1.4.3.3	HNF-IP-0731			x		
62.5.29	ANS-8.19 Section 7.3		**Operating Procedures.** Supplementing and revising procedures as improvements become desirable shall be facilitated.		X		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11			x		

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62.5.30	ANS-8.19 Section 7.4		**Operating Procedures.** Active procedures shall be reviewed periodically by supervision.		X		537, 1.4.3.3	HNF-IP-0842 Vol. I Section 2.11			x		
62.5.31	ANS-8.19 Section 7.5		**Operating Procedures.** New or revised procedures impacting nuclear criticality safety shall be reviewed by the nuclear criticality safety staff.	X			334, 1.4.2 537, 1.4.3.3		x		x		
62.5.32	ANS-8.19 Section 7.6		**Operating Procedures.** Procedures shall be supplemented by posted nuclear criticality safety limits or limits incorporated in operating check lists or flow sheets.	X			537, 1.4.3.4				x		
62.5.33	ANS-8.19 Section 7.7.(1)		**Operating Procedures.** Deviations from operating procedures and unforeseen alterations in process conditions that affect nuclear criticality safety shall be documented, reported to management, and investigated promptly.		x		537, 1.4.3.3				x		
62.5.34	ANS-8.19 Section 7.7.(2)		**Operating Procedures.** Action shall be taken to prevent a recurrence.		x		537, 1.4.3.3				x		
62.5.35	ANS-8.19 Section 7.8		**Operating Procedures.** Operations shall be reviewed frequently (at least annually) to ascertain that procedures are being followed and that process conditions have not been altered so as to affect the nuclear criticality safety evaluation.		x		548				x		
62.5.36	ANS-8.19 Section 8.1		**Process Evaluation for Nuclear Criticality Safety.** Before starting a new operation with fissile materials or before an existing operation is changed, it shall be determined that the entire process will be subcritical under both normal and credible abnormal conditions.	X			539, 1.4	HNF-IP-1266 Ch. 5.7 Section 3.C.5			x		

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62.5.37	ANS-8.19 Section 8.2		**Process Evaluation for Nuclear Criticality Safety.** The nuclear criticality safety evaluations shall determine and explicitly identify the controlled parameters and their associated limits upon which nuclear criticality safety depends.	x			539, 1.4.5.1	HNF-IP-1266 Ch. 5.7 Section 3.C.5			x		
62.5.38	ANS-8.19 Section 8.3		**Process Evaluation for Nuclear Criticality Safety.** The nuclear criticality safety evaluation shall be documented with sufficient detail, clarity, and lack of ambiguity to allow independent judgement of results.	x			539, 1.4.5.2	HNF-IP-1266 Ch. 5.7 Section 3.C.5			x		
62.5.39	ANS-8.19 Section 8.4		**Process Evaluation for Nuclear Criticality Safety.** Before starting operation, there shall be an independent assessment that confirms the adequacy of the nuclear criticality safety evaluation.	x			539, 1.4.6.1	HNF-IP-1266 Ch. 5.7 Section 3.C.5			x		
62.5.40	ANS-8.19 Section 9.1		**Materials Control.** The movement of fissile materials shall be controlled.	X			545	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c		x	x		
62.5.41	ANS-8.19 Section 9.2		**Materials Control.** Appropriate material labeling and area posting shall be maintained specifying material identification and all limits on parameters that are subject to procedural control.	x			541 542	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.c and 3.C.7			x		

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62.5.42	ANS-8.19 Section 9.3		**Materials Control.** If reliance is placed on neutron absorbing materials that are incorporated into process materials or equipment, control shall be exercised to maintain their continued presence with the intended distributions and concentrations.			x	NA	NA		x	x	Fissionable material in Tank Farms is not considered in process.	
62.5.43	ANS-8.19 Section 9.4		**Materials Control.** Access to areas where fissile materials is handled, processed, or stored shall be controlled.	x			543, 1.4.2.9	HNF-IP-0842 Vol. II Section 3.1 HNF-IP-1266 Ch. 5.7 Section 3.B.1.c			x	The referenced HNF-PRO applies only to storage.	
62.5.44	ANS-8.19 Section 9.5		**Materials Control.** Control of spacing, mass, density, and geometry of fissile material shall be maintained to assure subcriticality under all normal and credible abnormal conditions.	x			334, 1.10.4 537, 1.4.2.3	HNF-IP-1266 Ch. 5.7 Sections 3.B.3.a and 3.C.1.b		x	x		
62.5.45	ANS-8.19 Section 10.2.(1)		**Planned Response to Nuclear Criticality Accidents.** Emergency procedures shall be prepared and approved by management.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.46	ANS-8.19 Section 10.2.(2)		**Planned Response to Nuclear Criticality Accidents.** Organizations, on and off-site, that are expected to provide assistance during emergencies shall be informed of conditions that might be encountered.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.47	ANS-8.19 Section 10.2.(3)		**Planned Response to Nuclear Criticality Accidents.** They shall be assisted in preparing suitable emergency response procedures.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	

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62.5.48	ANS-8.19 Section 10.3.(1)		**Planned Response to Nuclear Criticality Accidents.** Emergency procedures shall clearly designate evacuation routes. *Interpretive Guidance.* These requirements are interpreted to mean that egress shall be made by the quickest exit.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.49	ANS-8.19 Section 10.3.(2)		**Planned Response to Nuclear Criticality Accidents.** Evacuation shall follow the quickest and most direct routes practicable.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.50	ANS-8.19 Section 10.3.(3)		**Planned Response to Nuclear Criticality Accidents.** These routes shall be clearly identified and shall avoid recognized areas of higher risk.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.51	ANS-8.19 Section 10.4.(1)		**Planned Response to Nuclear Criticality Accidents.** Personnel assembly stations, outside the areas to be evacuated, shall be designated.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.52	ANS-8.19 Section 10.4.(2)		**Planned Response to Nuclear Criticality Accidents.** Means to account for personnel shall be established.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.53	ANS-8.19 Section 10.5.(1)		**Planned response to Nuclear Criticality Accidents.** Personnel in the area to be evacuated shall be trained in evacuation methods and informed of routes and assembly stations.			x	NA	NA	x			A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	

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62.5.54	ANS-8.19 Section 10.5.(2)		**Planned response to Nuclear Criticality Accidents.** Provision shall be made for the evacuation of transient personnel.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.55	ANS-8.19 Section 10.5.(3)		**Planned Response to Nuclear Criticality Accidents.** Drills shall be performed at least annually to maintain familiarity with the emergency procedures.			x	NA	NA	x			A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.56	ANS-8.19 Section 10.5.(4)		**Planned Response to Nuclear Criticality Accidents.** Drills shall be announced in advance.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.57	ANS-8.19 Section 10.6.(1)		**Planned Response to Nuclear Criticality Accidents.** Arrangements shall be made in advance for the care and treatment of injured and exposed persons.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.58	ANS-8.19 Section 10.6.(2)		**Planned Response to Nuclear Criticality Accidents.** The possibility of personnel contamination by radioactive materials shall be considered.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.59	ANS-8.19 Section 10.7		**Planned Response to Nuclear Criticality Accidents.** Planning shall include a program for the immediate identification of exposed individuals and shall include personnel dosimetry.			x	NA	NA	x		x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.60	ANS-8.19 Section 10.8.(1)		**Planned Response to Nuclear Criticality Accidents.** Instrumentation and procedures shall be provided for determining the radiation at the assembly area and in the evacuated area following a criticality accident.			x	NA	NA		x	x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	

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62.5.61	ANS-8.19 Section 10.8.(2)		**Planned Response to Nuclear Criticality Accidents.** Information shall be correlated at a central control point.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.5.62	ANS-8.19 Section 10.9		**Planned Response to Nuclear Criticality Accidents.** Emergency procedures shall address re-entry procedures and the membership of response teams.			x	NA	NA			x	A criticality accident at TWRS is not a credible event, as documented in BIO Section 5.3.2.1	
62.6	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Section 7.a. Introduction	ANS-8.7, "Guide for Nuclear Criticality Safety in the Storage of Fissile Materials.""	x			334	BIO 4.3, HNF-IP-1266 Ch. 5.7				BIO Section 4.3 states that the criticality protection program follows DOE 5480.24 and industry standards. HNF-PRO-334 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards. HNF-PRO-334 is invoked by HNF-IP-1266, Chapter 5.7, Nuclear Criticality Safety, Section 3.C, "Program." See the following individual sections of ANS-8.7.	
62.6.01	ANS-8.7 Section 4.1.1		**Administrative Practices.** All operations with fissile material, including storage, shall be conducted in accordance with ANS for Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, N16.1-1975/ANS-8.1.	x			537, 1.4.2.3	HNF-IP-1266 Ch. 5.7 Section 3.B.3			x		
62.6.02	ANS-8.7 Section 4.1.2(1)		**Administrative Practices.** Methods of storage control and operational practices approved by management shall be described in written procedures.	x			543, 1.4.2.2	TSR 5.7.2.a			x		

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62.6.03	ANS-8.7 Section 4.1.2(2)		**Administrative Practices.** Persons participating in the transfer and storage of material shall be familiar with these procedures.		x		543, 1.4.2.2	BIO 4.11, TSR 5.7.2.c, HNF-IP-1266 Ch. 5.7 Section 3.C.4	x				
62.6.04	ANS-8.7 Section 4.1.2(3)		**Administrative Practices.** Limits for storage shall be posted.	x			543, 1.4.5.1	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.c and 3.C.7		x	x	Criticality safety postings are not required for the TWRS limited storage facilities because key limits and controls are not manageable or observable by the operator per HNF-PRO-541.	
62.6.05	ANS-8.7 Section 4.1.3		**Administrative Practices.** Management shall provide for inspections to verify compliance with established procedures.	x			543, 1.4.2.7 548	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.c and 3.C.11			x		
62.6.06	ANS-8.7 Section 4.1.4		**Administrative Practices.** Access to storage areas shall be controlled.		x		543, 1.4.2.9	HNF-IP-0842 Vol. II Section 3.1 HNF-IP-1266 Ch. 5.7 Section 3.B.1.c			x		
62.6.07	ANS-8.7 Section 4.2.1		**Technical Practices.** Limits for the storage of fissile material shall be based on experimental data or the results of validated computational techniques.	x			537, 1.4.1.3 539, 1.4.4	HNF-IP-1266 Ch. 5.7 Sections 3.C.1.b.1 and 3.C.5.a			x		
62.6.08	ANS-8.7 Section 4.2.2		**Technical Practices.** Storage facilities and structures shall be designed, fabricated, and maintained in accordance with good engineering practices.	X			543			x			
62.6.09	ANS-8.7 Section 4.2.3		**Technical Practices.** Storage of fissile materials shall be such as to obviate concern with accidental nuclear criticality in the event of fire, flood, earthquake, or other natural calamities.	X			543, 1.4.1.3	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c		x			

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62.6.10	ANS-8.7 Section 4.2.4		**Technical Practices**. The design of storage structures shall tend to preclude unacceptable arrangements or configurations, thereby reducing reliance on administrative controls. *Interpretive Guidance*. Comply with as per DOE Order 5480.24 paragraph 7.a(2)(b) where "storage structures" can be considered "passive engineering controls." Storage containers, shelving cages, and floor mounts are examples of storage structures that may be considered passive engineering controls.			x	NA	NA		x		Tank Farms does not include passive engineering controls such as shelving cages and floor mounts for storage of fissionable material.	
62.6.11	ANS-8.7 Section 4.2.5		**Technical Practices**. Spacing of material may be maintained by the use of birdcage fixtures, covered metal cans, or physical barriers on shelves. Shelving shall be sturdy and noncombustible.			x	NA	NA		x		Storage of fissionable material in Tank Farms does not include considerations of birdcage fixtures, covered metal cans or shelving.	
62.6.12	ANS-8.7 Section 4.2.6(1)		**Technical Practices**. Storage areas shall be maintained essentially free of combustible materials.	X			543, 1.4.2.10	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c		x			
62.6.13	ANS-8.7 Section 4.2.6(2)		**Technical Practices**. Where the presence of significant quantities of combustibles cannot be avoided, as in the storage of combustible scrap, a fire protection system shall be installed.			x	NA	NA		x		Fissionable material at Tank Farms is stored outside in underground tanks. Significant combustibles are not present that would require fire protection.	

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62.6.14	ANS-8.7 Section 4.2.7		**Technical Practices.** Containers of fissile material in areas with sprinkler systems shall be designed to prevent accumulation of water. *Interpretive Guidance.* Pertinent only if the introduction of water to the immediate container or package could pose a criticality problem.			x	NA	NA		x		CSERs document overmoderation of tank contents. Tank storage is not restricted by water accumulation.	
62.6.15	ANS-8.7 Section 4.2.8		**Technical Practices.** Where sprinkler systems are installed in fissile material storage areas, consideration shall be given to the possibility of criticality occurring in an accumulation of runoff water.			x	NA	NA		x		CSERs document overmoderation of tank contents. Tank storage is not restricted by water accumulation.	
62.6.16	ANS-8.7 Section 4.2.9		**Technical Practices.** A criticality alarm shall be provided as appropriate.	x			546	BIO 5.3.2.1		x	x	HNF-PRO-546 states that a CAS or CDS is not needed if justification is shown in a DOE approved SAR. BIO Section 5.3.2.1 provides all the necessary information to justify not having a CAS or CDS, but does not state the conclusion that the CAS or CDS is not necessary. The necessary statement will be added to the BIO as part of the 1998 annual update. The program is not affected.	
62.6.17	ANS-8.7 Section 4.2.10		**Technical Practices.** Good housekeeping shall be incorporated as an important part of nuclear criticality safety practices.		x		543, 1.4.2.10	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c			x	Good housekeeping applies at all areas.	

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62.6.18	ANS-8.7 Section 5.1		**Unit Mass Limits.** The mass of the limits shall not exceed the values in Tables 5.1 through 5.12. *Interpretive Guidance.* The mass of the units shall not exceed the values in Tables 5.1 through 5.12 if this standard, ANS-8.7, is the sole source used to determine material spacing. Different spacing may be used if computational means or experimental data are employed to make the spacing determination. EDITOR NOTE: ANS 8.7, 5.0 through 6.4.2: These tables have not been used at WHC. If they are used in the future as a sole source, these requirements shall be addressed.			x	NA	NA			x	TWRS does not use spacing criteria to ensure criticality control.	
62.6.19	ANS-8.7 Section 5.2		**Moderation.** The hydrogen-to-fissile atomic ratios are determined within the fissile region and do not include contiguous hydrogenous materials. Margins inherent in the mass limits specified are sufficient to compensate for incidental moderation such as would result from enclosing each unit in a thin plastic bag. The effects of more significant moderation shall be evaluated using a validated computational technique.			x	NA	NA			x	Minimum critical parameters in Tank Farms were calculated assuming optimum moderation; therefore moderation considerations are not applicable.	

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62.6.20	ANS-8.7 Section 5.3(1)		**Position of Unit in Cell.** The units shall be centered to within 10% of the cell dimension. This restriction may be relaxed to permit freedom of horizontal position provided the unit mass limit is reduced to 60% of the stated value.			x	NA	NA		x		TWRS does not use spacing criteria to ensure criticality control.	
62.6.21	ANS-8.7 Section 5.3(2)		**Position of Unit in Cell.** If this reduced value exceeds 20% of the unreflected spherical critical mass, the minimum unit surface separation shall be 152 mm (6 in.).			x	NA	NA		x		TWRS does not use spacing criteria to ensure criticality control.	
62.6.22	ANS-8.7 Section 5.4		**Other Reflectors.** The mass limits in the tables are also applicable for concrete reflectors of thicknesses up to 127 mm (5 in.), areal density of concrete = 290 kg/m^2. The mass limits shall be reduced to 75% of stated values for a concrete reflector of 203 mm (8 in.) and to 60% for greater thicknesses. Equivalent thicknesses of other masonry construction materials may be established on the basis of their surface densities.			x	NA	NA		x		Minimum critical parameters in Tank Farms were calculated assuming full reflection; therefore reflection considerations are not applicable.	
62.6.23	ANS-8.7 Section 5.5		**Double Batching.** Double batching shall be considered in storage safety analyses and in the establishment of operating procedures. Administrative controls, limited capacity containers, and storage cell design may be useful for the prevention of double batching.			x	NA	NA			X	TWRS does not use total mass controls. The storage units (tanks) are of fixed sizes.	

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62.6.24	ANS-8.7 Section 5.6		**Vault Pairs.** The tabulated mass limits shall be reduced to 55% of stated values for two contiguous vaults where the concrete walls separating and surrounding the storage areas have the same thickness; this factor is sufficient to include the effect of concrete as a reflector.			x	NA	NA			X	TWRS does not use vaults for the storage of fissile materials.	
62.6.25	ANS-8.7 Section 5.7(1)		**Reduction Factors.** The several mass reduction factors, as called for in 5.3 through 5.6 are multiplicative. If the result is unnecessarily conservative, calculations specific to the system of interest shall be performed by a validated computational technique.			x	NA	NA			X		

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62.6.26	ANS-8.7 Section 5.7(2)		**Reduction Factors.** Consideration shall be given to the precision and any bias in the calculational technique used in determining that the recommended k_{eff} of 0.95 is not exceeded. Increases in cell size to effect reduction factors may be more desirable than decreases in the mass limits. *Interpretive Guidance.* Subcritical limits for operations shall be based upon applicable subcritical/critical measurements and allowances made for experimental uncertainties. When it is necessary to extend such data by a calculational technique, the accuracy and precision of the technique shall be addressed by the contractor. The calculational technique may involve neutron multiplication factor calculations. The maximum value permitted for a calculated subcritical neutron multiplication factor shall make adequate allowance for the precision of the technique to reproduce the applicable experimental data as well as for the precision of the technique.			x	NA	NA			X		
62.6.27	ANS-8.7 Section 5.9		**Container and Shelving Materials.** The specified limits provide for thicknesses of iron less than 12.7 mm (0.5 in.) as shelving or as close-fitting containers. Effects of greater thicknesses of iron or of other materials shall be investigated experimentally or by validated computational techniques.			x	NA	NA			x		

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62.6.28	ANS-8.7 Section 5.10		**Unit Subcriticality.** The contents of each storage cell shall be subcritical if submerged. *Interpretive Guidance.* "Submerged" means "submerged in water."			x	NA	NA		x			
62.6.29	ANS-8.7 Section 5.11		**Unit Spacing.** Unit surface separations shall be at least 152 mm (6 in.) where flooding is credible.			x	NA	NA		x			
62.6.30	ANS-8.7 Section 6. - 6.3 6.5 and 6.6		*EDITORIAL NOTE---Additional guidance is provided for the use and application of the tables in this standard.*			x	NA	NA					
62.6.31	ANS-8.7 Section 6.4(1)		**Position of Unit in Cell.** Units placed in noncubic cells shall be centered to within 10% of the smallest cell dimension. This restriction may be relaxed to permit freedom of horizontal position provided the mass limit is reduced to 60% of the stated value.			x	NA	NA		x		TWRS does not use spacing criteria to ensure criticality control.	
62.6.32	ANS-8.7 Section 6.4(2)		**Position of Unit in Cell.** If this reduced value exceeds 20% of the unreflected spherical critical mass, the minimum unit surface separation shall be 152 mm (6 in.).			x	NA	NA		x		TWRS does not use spacing criteria to ensure criticality control.	

Table B-1. Matrix of TWRS-Specific Requirements to Implementing Documents (77 Sheets)

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63	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Section 7.a.(2)(a)	"4.2.2 Double Contingency Principle. Process designs shall incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. Protection shall be provided by either (a) the control of two independent process parameters (which is the preferred approach, if practical) or (b) a system of multiple (at least two) controls on a single parameter. In all cases, no single failure shall result in the potential for a criticality accident. The basis for selecting either approach shall be fully documented."	x			537, 1.4.1.1	HNF-IP-1266 Ch. 5.7, Section 3.B.3		x	x	The referenced section of HNF-IP-1266 requires designs to comply with DOE orders related to criticality safety.	

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Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
64	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Section 7.a.(2)(b)	"4.2.3 Geometry Control. As a first priority, reliance shall be placed on equipment design in which dimensions of the contained fissionable material and spacing between equipment are limited via passive engineering controls. Where geometry control is not feasible, the preferred order of controls is other passive engineering controls, active engineering controls, and administrative controls. Feasibility is determined by weighing risk versus practicality/cost. Full advantage may be taken of any nuclear characteristics of the process materials and equipment. All dimensions, nuclear properties, and other features upon which reliance is placed shall be verified prior to beginning operations, and control shall be exercised to maintain them. The basis for not selecting geometry control shall be fully documented."	x			537, 1.4.2.3	HNF-IP-1266 Ch. 5.7, Section.3.B.3		x	x	The referenced section of HNF-IP-1266 requires designs to comply with DOE orders related to criticality safety.	
65	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Section 7.b.(4)	"The decision to install a criticality detection system rather than a CAS, and the decision that neither a CAS nor a criticality detection system is necessary, must be justified based upon a documented DOE approved Safety Analysis."	x			546, 1.4.1	BIO 5.3.2.1			x	BIO Section 5.3.2.1 provides all the necessary information to justify not having a CAS or CDS, but does not state the conclusion that the CAS or CDS is not necessary. The necessary statement will be added to the BIO as part of the 1998 annual update. The program is not affected.	

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66	S/RID 18.6.1 Criticality Safety Design Practices	DOE6430.1A Section 1300- 4 Paragraph 5, Sentence 1	"Structures, systems, and components that provide nuclear criticality safety shall be designed as safety class systems and be capable of performing their criticality safety functions during and following design basis accidents and events."	x			704, 2.2.1 and App. F 2.1	BIO 5.3.2.1		x	x	The BIO criticality accident analysis concludes that administrative controls are sufficient to protect the analyzed conditions. No SSCs were credited in preventing or mitigating a criticality accident.	
67	S/RID 18.6.2 Materials Control	DOE5480.24 Section 7.d	"Contractors shall establish a monitoring and surveillance program to prevent accumulations of fissionable materials in, but not limited to, process equipment and storage, pipe, and ventilation systems. If unsafe accumulations are detected, corrective measures shall be taken to prevent criticality hazards."	x							x	Not found in HNF-PROs or TWRS documents.	40
68	S/RID 18.6.2 Materials Control	DOE5480.24 Section 7.e.(1)	"The requirements of this Order shall apply to all activities where fissionable material is transferred from one operation to another within a facility and from one on-site location to another."	x			537, 1.2	HNF-IP-1266 Ch. 5.7 Section 3.C			x		
69	S/RID 18.7 KEY INTERFACES	WHC-SD-MP-SRID-001	All facility activities are governed by the site wide Nuclear Safety Program. Specific functional areas must implement the programs/requirements developed by Nuclear Safety. The interfaces between Nuclear Safety and other functional areas within the Tank Farms are as follows:			x	NA	NA			x		

Table B-1. Matrix of TWRS-Specific Requirements to Implementing Documents (77 Sheets)

Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
70	S/RID 18.7.1 Management Systems	WHC-SD-MP-SRID-001	Program management systems provides the general aspects of management, policy, staffing, training, occurrence reporting, and self assessment required to run a nuclear facility. Nuclear Safety interacts with program management to determine what programs can be developed to give assurance that Nuclear Safety is maintained.		X			BIO Chapter 4.0			x		
71	S/RID 18.7.2 Quality Assurance	WHC-SD-MP-SRID-001	Quality Assurance (QA) develops the QA program that provides the requirements to be applied to activities determined to be important to quality as described in the Nuclear Safety QA Plan. QA also provides for the performance of audits and surveillances of activities plus quality control inspections to be performed by the QA organization.		X			BIO Section 4.12			x		
72	S/RID 18.7.3 Training and Qualification	WHC-SD-MP-SRID-001	Training and Qualification establishes the procedures and requirements that control the training and/or selection of certain technical personnel. Training and Qualification develops training curriculum and keeps records for Nuclear Safety training.		X			BIO Section 4.11 HNF-IP-1266 Ch. 5.7 Section 3.B.4 HNF-IP-0842 Vol. III			x		
73	S/RID 18.7.4 Emergency Management	WHC-SD-MP-SRID-001	Nuclear Safety information is supplied to Emergency Planning and Preparedness so they can design their programs and plans. This information will deal with the potential for accidental criticality and the results of the potential accident.	x				BIO 4.13 TSR 5.14 HNF-IP-0971			x	TSR AC 5.14 does not specifically address criticality accidents, which are not credible occurrences at TWRS (BIO 5.3.2.1).	

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Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
74	S/RID 18.7.5 Engineering Program	WHC-SD-MP-SRID-001	Engineering incorporates Nuclear Safety requirements into design and design modifications. They also develop and update the SAR per Nuclear Safety requirements to identify additional engineering nuclear safety features, and to ensure that current safety features are not affected by modifications.		X						x		
75	S/RID 18.7.6 Operations	WHC-SD-MP-SRID-001	The Operations Functional Area interfaces and provides Nuclear Safety input in areas of operations that may be different from the safety analysis basis for determination of any possible USQs. This interface is needed to ensure that nuclear safety principles are incorporated into daily operations.		x			BIO Sections 4.8 and 4.9			x		
76	S/RID 18.7.7 Maintenance	WHC-SD-MP-SRID-001	Input is received from Maintenance if systems/equipment do not perform per design and determines if there is a safety impact of these problem areas. This interface is also necessary to assure that maintenance personnel are familiar with areas containing material with the potential for accidental criticality events, and to assure that engineered safety systems receive the proper maintenance.		x			BIO Section 4.7	x	x	x		
77	S/RID 18.7.8 Radiation Protection	WHC-SD-MP-SRID-001	An interface between the Nuclear Safety Functional Area and the Radiation Protection (RP) Functional Area is necessary to ensure that radiation protection standards are incorporated into the nuclear safety program.		x			BIO Section 4.4			x		

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Reqmt. #	Requirement Identification	Requirement Source (S/RID)	Requirement Text	Specific to TWRS Crit. Safety	Applies to TWRS Crit. Safety	NA	Implementing HNF-PRO-XXX	TWRS Implementing Document	Personnel	Equipment	Program	Comment	Action #
78	S/RID 18.7.9 Packaging and Transportation	WHC-SD-MP-SRID-001	Physical management of special nuclear material requires an interface to the Packaging and Transportation Functional Area to ensure proper labelling, packaging, and transportation of those materials.		x						x		41
79	S/RID 18.7.10 Fire Protection	WHC-SD-MP-SRID-001	Fire Protection provides input to the SAR and provides notification if there are changes to any systems or requirements described in the SAR. This interface is necessary to assure that fire fighting activities do not create the potential for criticality.	x				BIO 4.10			x	BIO Section 4.10 describes the essential elements of the fire protection program, but does not address criticality issues related to fire protection. The necessary discussion will be added to BIO Section 5.3.2.1 as part of the 1998 annual update. The issue is also considered in CSERs and CPSs.	
80	S/RID 18.7.11 Occupational Safety and Health	WHC-SD-MP-SRID-001	Occupational Safety and Health provides information regarding health related areas for inclusion in and modification to the SAR.			x	NA	NA			x		
81	TSR AC 5.7.1 Requirement for Nuclear Criticality Safety		A program shall be maintained for ensuring WASTE remains subcritical.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C			x		
82	TSR AC 5.7.2.a Program Key Element		Criticality limits and controls shall be documented in Criticality Safety Evaluation Reports (CSERs) and implemented in Criticality Prevention Specifications (CPSs) and procedures.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C			x		
83	TSR AC 5.7.2.b Program Key Element		Procedures shall be established for recovery from a CPS nonconformance.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C.12			x		
84	TSR AC 5.7.2.c Program Key Element		Criticality safety training shall be provided for operations and technical personnel.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C.4	x				

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85	TSR AC 5.7.2.d Program Key Element		For transfers into the tank farms from non-tank farm facilities (e.g., Plutonium Finishing Plant, B-Plant) the following pretransfer conditions shall be met: The pH shall be ≥ 8. The plutonium concentration shall be < 0.04 g/L averaged over the entire volume of the transferred WASTE. The neutron absorber (X) to plutonium (Pu) mass ratio (X/Pu) shall be greater than at least one of the minimum subcritical ratios shown in Table 5.7-1. This condition is not required if the plutonium concentration is ≤ 0.001 g/L). Compliance with the above conditions may be demonstrated by sample analysis or calculation of final conditions based on initial sample analysis, but requires INDEPENDENT VERIFICATION.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C.2			x	HNF-IP-1266 requires the plutonium concentration to be < 0.04 g/L averaged over the batch volume for each transfer, rather than over the entire volume of the transferred waste as stated in the TSR. The HNF-IP-1266 requirement is appropriately more conservative than the TSR requirement.	
86	TSR AC 5.7.2.e Program Key Element		Activities in MISFs (except for sampling/monitoring) are prohibited without characterization of the WASTE and, if required, preparation of a CSER and CPS.	x			NA	HNF-IP-1266 Ch. 5.7 Section 3.C.3			x		

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87	TSR AC 5.7.2.f Program Key Element		Transfers via the Replacement Cross Site Transfer System which will intentionally transfer high solids contents will require characterization of the WASTE, and preparation and approval of a CSER and, if required, a CPS prior to initiating the transfer.	x			NA				x	HNF-IP-1266 was not revised when this statement was added to the TSR.	42
88	TSR AC 5.7 Table 5.7-1 Minimum Neutron Absorber/ Plutonium Subcritical Mass Ratios		Neutron Absorber (X)(X/Pu) Minimum Chromium (Cr) 135 Iron (Fe) 160 Manganese (Mn) 32 Nickel (Ni) 105 Total Uranium (U) 770 (Insoluble neutron absorbers)	x			NA	HNF-IP-1266 Ch. 5.7 Table 5.7.3.C.2			x		

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89	TSR AC 5.7.3 Applicability		This program applies to DSTs, AWF tanks, DCRTs, catch tanks, MISFs, or 244-AR Vault that would receive transfers from a non-tank farm facility (i.e., transfers from outside the tank farm into the tank farm). This includes all WASTE transfers made through direct transfer piping systems, or received by bulk via the 204-AR Waste Unloading Facility. Non-tank farm facilities include but are not limited to B-Plant, T-Plant, U-Plant, Z-Plant, 222-S Laboratories, N-reactor, 300 Area tanks, PUREX, and Fast Flux Test Facility. This requirement does not apply to WASTE transfers to or from the 242-A Evaporator facility during an evaporation campaign, or to any transfers made between tank farm facilities. This requirement also does not apply to chemical or water additions to tank farm facilities. Only the pH control condition applies to chemical shipments received from non-tank farm facilities or bulk shipment. Requirement 5.7.2.f applies to transfers of solids made through the replacement cross-site transfer system. The concentration limit and subcritical mass ratios do not apply to the sluicing of Tank 241-C-106 to Tank 241-AY-102 under Project W-320. This exemption is justified in HNF-SD-W320-CSA-001, Rev. 1, *Criticality Safety Assessment of the Tank 241-C-106*	x			NA	HNF-IP-1266 Ch. 5.7 Section 2			x	The referenced HNF-IP-1266 applicability statement conflicts with requirements stated elsewhere in Chapter 5.7. In addition, it has not been revised to include the statement about the replacement cross-site transfer system.	43

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90	TSR AC 5.12.2.c (Bullet 1) Final Tank State Controls Application		Evaluate pumped and receiving tanks prior to WASTE transfers to ensure that controls for criticality, tank bumps, flammable gas deflagrations, organic solvent fires, and organic salt-nitrate reactions are applied to the final state of the tank. See also AC 5.15, "Moisture Controls."		x		NA	HNF-IP-1266 Ch. 5.12 Section 3.C.2.e			x		
91	TSR AC 5.12.2.c (Bullet 2) Chemical Compatibility		Ensure chemical additions are ≥ pH of 8 prior to transfer into tank farms (excluding water additions and drums containing caustic chemicals).	x			NA	HNF-IP-1266 Ch. 5.12 Section 3.C.2.f			x		
92	TSR AC 5.12.3 Transfer Controls Applicability		Each transfer control key element, unless otherwise noted, shall apply to the following ACTIVE WASTE transfer systems: The 200E and 200W SST Transfer Systems (including overground WASTE transfer systems), the 200E and 200W DST Transfer Systems, AWF Transfer System, existing Cross-Site Transfer System, Replacement Cross-Site Transfer System, WRSS, and the Processing Plant Transfer System (lines from PUREX, B-Plant, T-Plant, 222-S Laboratory, U-Plant, Plutonium Finishing Plant, 204-AR Waste Unloading Facility).		x		NA	HNF-IP-1266 Ch. 5.12 Section 2			x	The referenced HNF-IP-1266 applicability statement was not revised to implement the TSR change that added the replacement cross-site transfer system to the TSR statement.	44

APPENDIX C

Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.01	HNF-PRO-334 Section 1.3.1	Organizations with custody of fissionable material Each organization with custody of greater than exempt quantities of fissionable material ensures the criticality safety of their facilities and complies with Project Hanford criticality safety requirements and procedures. Management responsibility is assigned and authority delegated to ensure these requirements are implemented. As the managers of these organizations...	HNF-IP-1266 Chapter 5.7 Section 3.B.1. General note: Revise the JSO to reference HNF-IP-1266 as the implementing document for TSR AC programs.	3
334.02	HNF-PRO-334 Section 1.3.1(01)	Classify facilities that contain or could contain more than three percent of a minimum critical mass (MCM) into one of the following categories (See Table 1): Fissionable material facility - contains >1/3 of a MCM Limited control facility - contains >1/3 of a MCM in a form which precludes a criticality Isolated facility - contains between 3 percent and 1/3 of a MCM and is physically isolated from other facilities containing fissionable material.	HNF-IP-1266 Chapter 5.7 Section 3.B.1.a, CSERs	
334.03	HNF-PRO-334 Section 1.3.1(02)	Justify the proposed facility classification by either the facility safety analyses documentation or criticality safety evaluations. Approval of the safety analyses constitutes facility status approval.	Safety analysis should but doesn't specify "Limited Control" status.	4
334.04	HNF-PRO-334 Section 1.3.1(03)	Ensure that written procedures for standard and off-standard conditions involving the processing, handling, storing, transporting, and accumulation prevention of fissionable materials are prepared, approved, and implemented. This implementation includes training of operating personnel on these procedures.	HNF-IP-0842 Vol. I Section 2.11, HNF-IP-1266 Chapter 5.7 Section 3.B.1.b	
334.05	HNF-PRO-334 Section 1.3.1(04)	Make it clear that maintaining criticality safety is the responsibility of each individual in their work area.	HNF-IP-0842 Vol. II Section 4.1.1 Attachment D, and Stop Work direction	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.06	HNF-PRO-334 Section 1.3.1(05)	Ensure that personnel selected for handling or supervising the handling of fissionable material have the required medical clearance, criticality safety training, and are qualified to carry out their assigned responsibilities. This includes providing the responsible training organization with the current list of individuals required to receive criticality safety training and ensuring that those individuals complete that training before being permitted to handle or supervise the handling of fissionable materials.	HNF-IP-1266 Chapter 5.7 Sections 3.B.1.d and 3.C.4	
334.07	HNF-PRO-334 Section 1.3.1(06)	Direct recovery actions according to an approved recovery plan when an unacceptable criticality safety condition is judged to exist. (See "Criticality Safety Nonconformances", and "Criticality or Potential Criticality Response".	CPS-T-149-00010	
334.08	HNF-PRO-334 Section 1.3.1(07)	Ensure that processes or equipment involving fissionable material are not changed outside existing analyses without prior independent criticality safety review. (See "Criticality Safety Control of Fissionable Material", "Criticality Safety Evaluation", and "Criticality Plant Configuration Control".	CPS-T-149-00010 Section E	
334.09	HNF-PRO-334 Section 1.3.1(08)	Provide appropriate criticality prevention specifications (CPSs), criticality postings, and criticality safety evaluation reports (CSERs) for facilities under their technical direction or control. (See "Criticality Safety Control of Fissionable Material", "Criticality Safety Evaluation", "Criticality Prevention Specifications", and "Criticality Safety Postings".	HNF-IP-1266 Chapter 5.7 Section 3.B.1.g	
334.10	HNF-PRO-334 Section 1.3.1(09)	Appoint a person to become a certified criticality safety representative (CSR) who will coordinate the criticality safety program for the operation or facility. For facilities where the workload permits, one CSR may represent more than one facility. Depending on facility needs, alternate and designated back-shift assistant CSRs may also be appointed, and provide the names of the current and alternate CSR to FDH Nuclear Safety and the appropriate facility safety representative. NOTE: Where practical, the CSR shall be administratively independent of management directly supervising operations or processes. Also appoint an alternate CSR and for CSR training requirements, see "Criticality Safety Training".	HNF-IP-1266 Chapter 5.7 Section 3.B.1.h IP-1266 does not include the requirement to provide names of CSR(s) to FDH nuclear safety and the facility safety rep, or the requirements from the NOTE.	5

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.11	HNF-PRO-334 Section 1.3.1(10)	Maintain a criticality alarm system (CAS) in accordance with the requirements of this procedure and, as needed, informing the manager of all facilities within the 12 RAD boundary of a fissionable material facility of their responsibilities under the criticality safety program. (See "Criticality Alarm System".)	Not required at TWRS per HNF-IP-1266 Chapter 5.7 Section 3.C.9	
334.12	HNF-PRO-334 Section 1.3.1(11)	Develop and use a procedure or checklist for performing internal criticality safety inspections, implementing corrective actions for identified deficiencies, and documenting the results of internal reviews and corrective actions. (See "Criticality Inspections and Assessments".)	HNF-IP-1266 Chapter 5.7 Section 3.B.1.i	
334.13	HNF-PRO-334 Section 1.3.1(12)	Generate documentation required by this manual (e.g., training records) and implementing proper disposition procedures.	HNF-IP-1266 Chapter 5.7 Section 3.B.1.j	
334.14	HNF-PRO-334 Section 1.3.1(13)	Provide facility personnel with emergency response training and providing emergency evacuation routes to follow in the event of an accidental criticality. Where practical, use the most direct evacuation routes and avoid higher risk areas; maintain specific information in the facility-specific emergency plans.	Building Emergency Plans	
334.15	HNF-PRO-334 Section 1.3.1(14)	Provide a program for periodic informal inspections and annual management assessments of sufficient depth to validate that the facility is following the requirements of the Project Hanford criticality safety program (See "Criticality Inspections and Assessments".)	HNF-IP-1266 Chapter 5.7 Section 3.C.11 Requires inspections; does not address management assessments	6
334.16	HNF-PRO-334 Section 1.3.2	Criticality safety representatives As primary and alternate CSR...	(NA; intro for following steps)	
334.17	HNF-PRO-334 Section 1.3.2(01)	Serve as the liaison for criticality matters between organizations having custody of fissionable material and all other organizations.	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.1	
334.18	HNF-PRO-334 Section 1.3.2(02)	Coordinate the preparation, review, and approval of CSERs and CPSs required to support safe operations within the assigned facilities. (See "Criticality Safety Evaluation" and "Criticality Prevention Specifications".)	HNF-IP-1266 Chapter 5.7 Sections 3.B.2.a.2, 3.C.5.a, 3.C.6.a	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.19	HNF-PRO-334 Section 1.3.2(03)	Request CSERs needed to support operations.	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.3	
334.20	HNF-PRO-334 Section 1.3.2(04)	Maintain current, auditable files on CPSs and their supporting criticality safety evaluations. (See "Criticality Prevention Specifications".)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.4; does not include "auditable"	7
334.21	HNF-PRO-334 Section 1.3.2(05)	Ensure that facility modifications and process changes are reviewed and approved in accordance with the requirements of this manual. (See "Criticality Plant Configuration Control".)	HNF-IP-1266 Chapter 5.7 Sections 3.B.2.a.5, 3.C.8	
334.22	HNF-PRO-334 Section 1.3.2(06)	Advise operating personnel and supervision on questions concerning conformance to criticality safety requirements and the need to consult appropriate facility safety representative for approval of any changes.	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.6; does not include "and supervision," says safety organization, not safety rep.	
334.23	HNF-PRO-334 Section 1.3.2(07)	Provide advice and assistance in criticality safety training. (See "Criticality Safety Training".)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.7	
334.24	HNF-PRO-334 Section 1.3.2(08)	Assist responsible safety, operations, and engineering personnel in developing specific recovery plans after a CPS nonconformance has been discovered, and providing management with a recommendation for approval or disapproval of the corrective actions. (See "Criticality Safety Nonconformances and Recovery".)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.8	
334.25	HNF-PRO-334 Section 1.3.2(09)	Conduct or supervise the performance and reporting of inspections and ensure that corrective actions are implemented. (See "Criticality Inspections and Assessments".)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.9	
334.26	HNF-PRO-334 Section 1.3.2(10)	Approve all facility procedures that implement criticality safety requirements for the handling, processing, storage, or transporting of fissionable material.	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.10	
334.27	HNF-PRO-334 Section 1.3.2(11)	Inform the facility manager and building administrator if any criticality related changes in the facility will affect the prefire plans. (See "Criticality Safety for Firefighting".)	HNF-IP-1266 Chapter 5.7 Section 3.B.2.a.11	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.28	HNF-PRO-334 Section 1.3.2(12)	Ensure that the appropriate criticality safety postings are properly placed throughout their facilities. (See "Criticality Safety Postings".)	HNF-IP-1266 Chapter 5.7 Section 3.C.7 states postings are not used at TWRS	
334.29	HNF-PRO-334 Section 1.3.3	Fissionable material handlers 1. Know the criticality safety requirements established for the operation and handle fissionable material in strict accordance with those requirements. 2. Handle fissionable material only after successfully completing the required prerequisite criticality safety training. 3. Ask for additional guidance and instructions when needed. 4. Communicate any criticality safety questions and concerns to the responsible management, CSR, and coworkers, as appropriate. 5. Know and follow criticality emergency procedures. 6. Communicate criticality safety related information to coworkers and responsible management at shift turnover for example.	N/A HNF-IP-1266 Chapter 5.7 Section 3.C.4 states that TWRS operations and technical personnel are classified as non-fissionable workers.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.30	HNF-PRO-334 Section 1.4.1	FDH Nuclear safety As the manager of Nuclear Safety... 1. Design and implement the Project Hanford criticality safety program. 2. Identify and interpret the relevant DOE and RL orders and national consensus standards. 3. Coordinate and support development of implementation plans for requirements. 4. Develop, document, or present requirements review packages, action letters, records of decision, conflict resolution results, standards/programs, etc. 5. Upon request, provide independent review of facility specific criticality related designs, procedures, specifications, nonconformances, etc. 6. Upon request, assist the line organization perform periodic criticality safety inspections and annual management assessments to verify compliance with criticality safety requirements. (See "Criticality Inspections and Assessments".) 7. Approve the criticality safety classification of facilities. 8. Ensure that Project Hanford is represented with national organizations for criticality related issues. 9. Ensure that criticality safety training courses and examinations are adequately reviewed. (See "Criticality Safety Training".) 10. Ensure a qualified nuclear criticality safety staff, familiar with Project Hanford operating plants and processes and with current developments in nuclear criticality safety standards, guides, and analytical codes, is available to all Project Hanford facilities. 11. Ensure that validated calculational methods for evaluating compliance with Project Hanford criticality prevention technical criteria are maintained. (See "Criticality Safety Control of Fissionable Material" and Criticality Safety Evaluation".) 12. Maintain this manual.	N/A Applies to FDH, not to TWRS	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.31	HNF-PRO-334 Section 1.4.2	Facility safety representatives 1. Review the criteria established for the prevention of an inadvertent criticality. 2. Review and approve CSERs and CPSs. (See "Criticality Safety Evaluation" and "Criticality Prevention Specifications".) 3. Review and approve the designs for fissionable material handling, processing, storage, and transportation equipment, including reviews to ensure that the design features that require verifications by a facility quality assurance representative (features with criticality safety functions) are identified. (See "Criticality Safety Control of Fissionable Material" and "Criticality Plant Configuration Control".) 4. Review and approve the design, placement, calibration, and testing of criticality alarm systems and nuclear accident dosimeters and evaluations identifying areas within facilities that require criticality detector coverage. (See "Criticality Alarm System".) 5. Review and approve administrative and operating procedures for fissionable material handling, processing, storage, or transportation. 6. Provide safety review of all criticality specification nonconformance and approve corrective actions. (See "Criticality Safety Nonconformances".) 7. Approve CPS infraction and violation recovery plans. (See "Criticality Safety Nonconformances".) 8. Perform annual assessments of the criticality safety programs at each facility required to be in compliance with this manual. A criticality safety specialist shall participate in these annual assessments. (See "Criticality Inspections and Assessments".) 9. Upon request, assist the line organization in performing periodic criticality safety inspections to verify compliance with criticality safety requirements. (See "Criticality Inspections and Assessments".)	HNF-IP-1266 Chapter 5.7 Section 3.C requires notification, review, and approval of the independent safety review organization for criticality safety related activities and events, but does not specify facility safety representative responsibilities.	8

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.32	HNF-PRO-334 Section 1.5(1)	Engineering Organizations 1. Establish technical criteria for criticality prevention in accordance with program criteria. 2. Maintain the analytical capability to evaluate compliance with the criteria. 3. Assist in maintenance of requirements and procedures for the uniform implementation of the Project Hanford criticality safety program. 4. Ensure that technical guidance, advice, and analytical services are available to organizations responsible for fissionable material, engineering organizations responsible for the facilities, and to the facility safety representative . 5. Ensure that a criticality safety specialist is provided to participate in annual assessments of criticality safety programs at each facility required to be in compliance with this manual. 6. Perform, review, and document criticality safety evaluations at the request of engineering organizations, project organizations, or organizations having custody of fissionable material. (See "Criticality Safety Evaluation".) 7. Ensure that one-on-one technical reviews of ex-reactor criticality safety evaluations are provided. (See "Criticality Safety Evaluation".) 8. Ensure that technical guidance, assistance, and analytical advice from a criticality safety specialist is made available to organizations concerned with fissionable materials and the facility safety representative, as required. 9. Ensure that technical guidance and criteria are provided for the design of fissionable material handling, processing, storage, or transportation equipment, including reviews to ensure that the design features that require verifications by a facility quality assurance representative (features with criticality safety functions) are identified. (See "Criticality Safety Control of Fissionable Material".) 10. Ensure that technical assistance in developing CPS infraction and violation recovery plans, from a criticality safety specialist, is provided. (See "Criticality Safety Nonconformances" and Criticality or Potential Criticality Response".) 11. Review reported procedural violations and other deficiencies that affect criticality safety for possible improvements and report their findings to management.	HNF-IP-1266 Chapter 5.7 Section 3.B.3 defines responsibilities of the Engineering Organizations, but those responsibilities do not match the ones listed here.	9

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.33	HNF-PRO-334 Section 1.5(2)	As the radiological safety engineers... 1.Perform (and maintain documentation of) the analyses used to determine: The CAS detector placement and setpoints required to detect the minimum accident of concern The 25 rem boundaries around fissionable material facilities (by evaluation of the dose rate obtained from the maximum accident of concern). NOTE: These analyses may also be performed under a project or by other engineering organizations. (See "Criticality Alarm System".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3 defines responsibilities of the Engineering Organizations, but those responsibilities do not match the ones listed here.	9
334.34	HNF-PRO-334 Section 1.5.1	Design, process, and other engineering organizations As a member of an engineering organization supporting facilities with fissionable materials...	N/A Introduction to following steps	
334.35	HNF-PRO-334 Section 1.5.1(01)	Provide requested designs and procedures that meet the requirements of this program and the DOE criticality safety codes, standards, orders, and other regulations.	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.1	
334.36	HNF-PRO-334 Section 1.5.1(02)	Ensure that the design or modification of fissionable material processes, systems, and equipment receives independent nuclear criticality safety review, analysis, and approval. NOTE: This includes equipment and systems whose performance affects nuclear criticality safety (such as fire sprinkler systems in areas containing fissionable materials and process instruments that indicate or control fissionable material operating parameters). Criticality and Shielding can provide technical guidance and the CSR may assist in obtaining the reviews. (See "Criticality Safety Evaluation" and "Criticality Plant Configuration Control".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.2	
334.37	HNF-PRO-334 Section 1.5.1(03)	Ensure that process and equipment designs use the best practical methods that provide positive criticality accident prevention. The CSR or Criticality and Shielding may advise in the design of equipment. (See "Criticality Safety Control of Fissionable Material".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.3	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.38	HNF-PRO-334 Section 1.5.1(04)	Ensuring that design changes which may affect the coverage of the criticality detection and alarm system and nuclear accident dosimeters are reviewed and approved by the appropriate facility safety representative. (See "Criticality Plant Configuration Control" and "Criticality Alarm System".)	N/A HNF-IP-1266 Chapter 5.7 Section 3.C.9 states that CAS is not required.	
334.39	HNF-PRO-334 Section 1.5.1(05)	Write or help write criticality safety evaluations by determining the set of credible errors, operating errors, or failures affecting nuclear criticality safety and establishing appropriate process controls and limits to mitigate the consequences of these failures (in conjunction with the facility operations organization and subject to review and approval by the appropriate facility safety representative.) Review new or modified CSERS and CPSs as requested. (See "Criticality Safety Evaluation" and "Criticality Prevention Specifications".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.4	
334.40	HNF-PRO-334 Section 1.5.1(06)	Assist organizations with custody of fissionable material in preparing plans and procedures that implement CPSs when requested, and ensuring that such material is independently reviewed. (See "Criticality Safety Control of Fissionable Material".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.5	
334.41	HNF-PRO-334 Section 1.5.1(07)	Developing new designs or modifications of the CAS. (See "Criticality Alarm System".)	N/A HNF-IP-1266 Chapter 5.7 Section 3.C.9 states that CAS is not required.	
334.42	HNF-PRO-334 Section 1.5.1(08)	Establishing or reviewing CAS maintenance, calibration, and testing procedures. (See "Criticality Alarm System".)	N/A HNF-IP-1266 Chapter 5.7 Section 3.C.9 states that CAS is not required.	
334.43	HNF-PRO-334 Section 1.5.1(09)	Establishing and maintaining accurate, complete documentation for each CAS (including technical information, design drawings, detector coverage, and 25 rem boundary maps or other identification). (See "Criticality Alarm System".)	N/A HNF-IP-1266 Chapter 5.7 Section 3.C.9 states that CAS is not required.	
334.44	HNF-PRO-334 Section 1.5.1(10)	Assisting in the development of CPS infraction and violation recovery plans, as requested. (See "Criticality Safety Nonconformances".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.6	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.45	HNF-PRO-334 Section 1.5.1(11)	Ensuring that the safety equipment list for any facility with fissionable material identifies those systems and equipment important to nuclear criticality safety. (See "Criticality Plant Configuration Control".)	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.7	
334.46	HNF-PRO-334 Section 1.5.1(12)	Ensuring engineers are provided with criticality training appropriate for their assigned responsibilities.	HNF-IP-1266 Chapter 5.7 Section 3.B.3.a.8	
334.47	HNF-PRO-334 Section 1.6	Quality Assurance As the facility quality assurance representative... 1. Perform periodic management assessments of the criticality alarm and dosimetry systems, the job-specific orientation of fissionable material handlers, and other program assessments as requested by facility management. (See "Criticality Alarm System".) 2. Verify equipment dimensions and installations essential to criticality safety. (See "Criticality Safety Control of Fissionable Material" and "Criticality Safety Evaluation".)	Not covered at TWRS level. HNF-IP-1266 Ch. 5.7 does not include QA responsibilities.	10
334.48	HNF-PRO-334 Section 1.7	Transportation and Packaging 1. Administer the loading, transporting, and unloading of intact/sealed fissionable material packages for offsite shipments in accordance with "Fissionable Material Packaging and Transportation". 2. Administer the receiving, storing, and shipping of fissionable material packages in the 1100 Area. 3. Notify the appropriate facility safety representative before handling any damaged fissionable material package.	HNF-IP-1266 Chapter 5.7 Section 3.C.1.c requires shipment and transportation to be in accordance with "Fissionable Material Packaging and Transportation"	
334.49	HNF-PRO-334 Section 1.8	Training Training Services provide a criticality training program for fissionable material handlers, supervisors, professionals, and other workers requiring criticality related training. (See "Criticality Safety Training".)	HNF-IP-1266 Chapter 5.7 Section 3.B.4	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.50	HNF-PRO-334 Section 1.9	Project Organizations If no operating organization has been established, the projects department is responsible for the elements in Section 1.3.1 of this procedure that must be completed before the operating organization is established. If the project organization has engineering responsibility, then the requirements of Section 1.5 of this procedure also apply.	HNF-IP-1266 Ch. 5.7 Sections 3.B.1 (if the projects department in this situation is considered an "organization with custody of fissionable material") and 3.B.3.	
334.51	HNF-PRO-334 Section 1.10.1	General requirements Ex-reactor operations in nuclear reactor facilities are governed by the same requirements as those applied to nonreactor facilities.	N/A TWRS is not a nuclear reactor facility.	
334.52	HNF-PRO-334 Section 1.10.2	Tenant operations Fissionable material handling operations conducted by other DOE contractors as tenants in a Project Hanford facility shall be controlled in a fashion consistent with the requirements of this manual. All CPSs controlling tenant fissionable material handling are subject to equivalent safety review and approval as Project Hanford CPSs.	N/A Tenant operations are outside the current TWRS mission.	
334.53	HNF-PRO-334 Section 1.10.3	Fissionable material facilities 1. Fissionable material facilities shall fully implement all Project Hanford criticality safety related procedures. 2. Handling, storage, and processing of fissionable material in fissionable material facilities shall be controlled by CPSs, except as discussed below. 3. Fissionable material in approved shipping containers may be off-loaded and stored at fissionable material facilities, subject to the limitations of the appropriate safety analysis report for packaging (SARP), DOT container specification, or DOE or Nuclear Regulatory Commission certification of compliance. The required CPS shall be in place before containers are opened.	HNF-IP-1266 Ch. 5.7 Section 3.B.1 (including reference to HNF-PRO-543 in 3.B.1.c)	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.54	HNF-PRO-334 Section 1.10.4	Limited control facilities A facility's status as a limited control facility requires that the conditions stated in the facility's safety analysis be maintained. If the use of the facility, processes, or equipment is to be changed, the safety analysis must be updated to ensure that the limited control facility classification will remain the appropriate classification. The facility manager shall ensure that the conditions of the safety analysis that permit the facility to be classified as a limited control facility are not violated. For limited control facilities the following requirements apply:	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b	
334.55	HNF-PRO-334 Section 1.10.4(1)	A documented criticality safety evaluation shall demonstrate that a criticality is prevented by the form or distribution of fissionable material, after allowing for credible accidents as detailed in "Criticality Safety Control of Fissionable Material" and "Criticality Safety Evaluation".	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b.1	
334.56	HNF-PRO-334 Section 1.10.4(2)	Criticality safety requirements shall be designated in the facility safety analysis documentation and/or by CPS and criticality safety postings. (See "Criticality Safety Control of Fissionable Material", "Criticality Prevention Specifications", and "Criticality Safety Postings".) If a nonconformance to a designated requirement is discovered, the operations manager, the appropriate facility safety representative, and the Criticality Safety Representative shall be notified immediately. The incident shall be evaluated and reported as detailed in "Criticality Safety Nonconformances".	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b.3 requires notification of the independent safety review manager upon violation of a designated control	11
334.57	HNF-PRO-334 Section 1.10.4(3)	Limited control facility personnel training shall be conducted based on a safety evaluation in accordance with "Criticality Safety Training".	HNF-IP-1266 Chapter 5.7 Section 3.C.4	
334.58	HNF-PRO-334 Section 1.10.4(4)	A criticality alarm system (CAS) is normally not required for a limited control facility. Exceptions or conditions that would require installation of a CAS are covered in "Criticality Alarm System".	HNF-IP-1266 Chapter 5.7 Section 3.C.9 states that a CAS is not required at TWRS.	
334.59	HNF-PRO-334 Section 1.10.4(5)	The organization responsible for the operation of a limited control facility shall conduct periodic inspections in accordance with "Criticality Inspections and Assessments" to determine whether the conditions which were assumed in assigning the facility to this status are unchanged.	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b.5	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.60	HNF-PRO-334 Section 1.10.4(6)	The facility manager/building administrator shall notify the appropriate facility safety representative before making any changes which might invalidate the facility's status as a limited control facility (or promptly following any unplanned changes).	HNF-IP-1266 Chapter 5.7 Section 3.C.1.b.6	
334.61	HNF-PRO-334 Section 1.10.5(1)	The amount of fissionable material in an isolated facility shall be no more than one-third of an MCM. If the allowable limit is exceeded, the incident shall be treated as a CPS nonconformance and corrective action shall be initiated in accordance with "Criticality Safety Nonconformances".	N/A There are no isolated facilities within TWRS	
334.62	HNF-PRO-334 Section 1.10.5(2)	All entrances into an isolated facility shall be posted to identify the facility as an isolated facility and specify the individual to contact before bringing fissionable material into the facility.	N/A There are no isolated facilities within TWRS	
334.63	HNF-PRO-334 Section 1.10.5(3)	Fissionable material shall be labeled as required by "Fissionable Material Labeling".	N/A There are no isolated facilities within TWRS	
334.64	HNF-PRO-334 Section 1.10.5(4)	Other fissionable material shall be physically separated from an isolated facility by a minimum of six feet, edge-to-edge.	N/A There are no isolated facilities within TWRS	
334.65	HNF-PRO-334 Section 1.10.5(5)	The facility manager shall keep an accurate, auditable, fissionable material inventory for the facility.	N/A There are no isolated facilities within TWRS	
334.66	HNF-PRO-334 Section 1.10.5(6)	At all times, the facility manager shall maintain the documentation necessary to establish that the fissionable material inventory in the isolated facility is within the established limits for that facility. As a minimum, this documentation shall be audited as a part of the annual audit.	N/A There are no isolated facilities within TWRS	
334.67	HNF-PRO-334 Section 1.10.6	Exempt facilities Facilities which are limited to no more than 3 percent of an MCM (see Table 2 and "Criticality Safety Control of Fissionable Material") are exempt from the criticality controls of this manual, except as required by "Criticality Alarm System" for those facilities within the 12 RAD boundary of a fissionable material facility.	No implementing requirements necessary; TWRS does not require a CAS.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
334.68	HNF-PRO-334 Section 1.10.7	Fissionable material shipment and transportation Onsite and offsite transportation of fissionable material shall be in accordance with "Fissionable Material Packaging and Transportation".	HNF-IP-1266 Chapter 5.7 Section 3.C.1.c	
334.69	HNF-PRO-334 Section 1.10.8	Waivers Waivers to this manual are controlled in accordance with WHC-CM-1-3, Management Requirements and Procedures, 2.21, "Controlled Manual Waiver Process." For waiver requests for this manual, Nuclear Safety Programs is the responsible organization and is the manual approval and Interpretive Authority.	NA. Not a TWRS specific or Criticality Safety specific requirement.	
334.70	HNF-PRO-334 Section 1.10.9	Declaring and lifting stop work orders Direction and requirements for effecting facility or program/project shutdown and activity stop work direction for safety, quality or environmentally-related issues is provided in WHC-CM-1-5, Standard Operating Practices, 15.0, "Shutdown and Stop-Work Direction." Any person acting in his/her area of assigned responsibility has authority to stop work on any specific activity, job or task when it is believed necessary to prevent imminent danger (a hazard that threatens immediate physical harm) to any employee, other persons or the environment.	HNF-IP-0842 Vol. IX, Section 1.1 Para. 4.2 states that every TWRS employee has stop-work authority per HNF-MD-035, which in turn adopts WHC-CM-1-5, 15.1, "Shutdown and Stop-Work Direction" (which is still in effect but can't be found on the Intranet).	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.01	HNF-PRO-537 Section 1.4.1.1(1)	Double contingency principle Process designs shall incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. Protection shall be provided by either (a) the control of two independent process parameters (which is the preferred approach, if practical) or (b) a system of multiple (at least two) controls of a single parameter. In all cases, no single credible failure shall result in the potential for a criticality accident. The basis for selecting one approach over another shall be fully documented. New criticality safety evaluations (CSEs) and major revisions to existing CSEs shall provide this documentation; existing CSEs are not required to be revised just to provide this documentation. Judgement is required in determining whether two events related and consequently whether they represent two contingencies or a single contingency. For example, exceeding storage limits and then flooding an area would constitute two independent events; however, fire and flooding from an automatic sprinkler system would be considered a single event. Anticipated or expected events are not considered contingencies, but are analyzed as part of the base condition or as part of a single contingency based on multiple errors.	WHC-SD-SQA-CSA-20368 Section 3.0	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.02	HNF-PRO-537 Section 1.4.1.2	Acceptable margin of subcriticality In evaluating the contingency criterion, the margin of subcriticality shall, after any foreseeable contingency, meet one of the following: 1. Maximum calculated k-effective (k_{eff}) is less than the appropriate limiting value specified in Item 1.4.1.3 of this procedure. The determination of the maximum calculated k_{eff} shall include the calculational bias and statistical uncertainty (>95% confidence level). Restrictions on the calculational technique imposed by the method of determining the calculational bias shall be observed. 2. The fraction of a critical dimension, volume, mass, etc., including allowance for accuracy, is equal to or less than 0.90. When mass control is used and maintained only by administrative controls, the fraction of critical mass set as the operational limit shall be < 0.45, unless doublebatching is not credible. 3.The evaluated parameter is equal to or less than a corresponding subcritical limit given in accepted American Nuclear Society (ANS) standards or guides.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.1 requires documented criticality safety evaluations in accordance with HNF-PRO-537.	
537.03	HNF-PRO-537 Section 1.4.1.3	Maximum calculated k-effective The limiting k_{eff} value, or maximum calculated k_{eff} accepted as subcritical, shall include a safety margin as follows: 1. If reliable experimental data are available for closely similar systems and adequate calculational techniques exist for relatively small extrapolations of the data, the k_{eff} of spheres and cylinders shall not exceed 0.98 and the k_{eff} of slabs shall not exceed 0.97. The k_{eff} of complicated geometries shall not exceed 0.95. 2. If limited experimental data exist for a similar system and relatively large but reasonable interpolations or extrapolations are necessary, the calculated k_{eff} of the system shall not exceed 0.95. 3. If no applicable experimental data are available, such that calculations must be based on very large extrapolations from experimental data, the calculated k_{eff} of the system shall not exceed 0.90. The documentation of calculations in the relevant criticality safety evaluation report (CSER) shall include justification for the adopted limiting k_{eff} value and cite the adjustments made for the calculational bias.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.1 requires documented criticality safety evaluations in accordance with HNF-PRO-537.	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.04	HNF-PRO-537 Section 1.4.1.4.1	Design tolerance specifications Information on dimensions, volumes, concentrations, densities, arrangements, and masses, provided for use in a criticality safety evaluation shall include the following information, as appropriate: 1. Tolerances. 2. Expected biases. 3. Whether the value is a maximum or minimum, or a range is given. 4. Changes in dimensions due to anticipated corrosion during the equipment's useful life. Once a request for a criticality safety evaluation has been made, all changes impacting the evaluation shall be communicated to the engineer performing the analysis. The facility quality assurance representative inspects and verifies that new equipment meets design requirements prior to use. Dimensions, or other design features identified in the criticality safety evaluation as having a significant effect on k_{eff} shall be verified.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.1 requires documented criticality safety evaluations in accordance with HNF-PRO-537.	
537.05	HNF-PRO-537 Section 1.4.1.4.2	Operating control parameters Measured values of operating parameters subject to criticality safety limits shall conservatively account for assessed biases and uncertainties for the measurement methods. For measurements of fissionable material under a critical mass limit, where the accuracy of the fissile mass measurement method is controlled to within ±5% at the 95% confidence limit (CL), the reported mass may be used as the mass control value. If the method's accuracy is outside ±5% (at the 95% CL), as it is for certain nondestructive assay methods (NDA), then allowance for a potentially higher mass due to inaccuracy shall be accounted for in one of these ways: 1. The sum of the measured mass and the mass corresponding to the uncertainty in the measurement method shall be less than the Criticality Prevention Specification (CPS) mass limit. 2. The applicable facility safety organization shall give a written exemption to the requirement for considering the uncertainties in the measurement method at a given location, or for a given type of fissionable unit.	Not specified in HNF-IP-1266 Ch. 5.7 or in CPSs.	12

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.06	HNF-PRO-537 Section 1.4.2.1.1	Material types Fissionable materials shall be controlled under the criticality safety program. The primary concerns are the fissile isotopes ^{233}U, ^{235}U, ^{239}Pu, and ^{241}Pu. Other routinely encountered fissionable isotopes which require criticality safety consideration if in sufficient quantities are ^{237}Np, ^{238}Pu, ^{240}Pu, and ^{241}Am.	HNF-IP-1266 Ch. 5.7 Section 3.A.6 includes all the listed isotopes except ^{240}Pu.	13
537.07	HNF-PRO-537 Section 1.4.2.1.2	Controlled materials Quantities of fissionable materials in excess of 3% of the minimum critical mass (MCM) for the specific isotopes are subject to criticality safety control.	HNF-IP-1266 Ch. 5.7 Section 3.A.5	
537.08	HNF-PRO-537 Section 1.4.2.1.3	Exempt materials The following quantities or forms of materials are exempt from criticality safety control. 1. Fifteen grams or less of ^{241}Am or any fissionable nuclide with atomic number less than 95 (^{233}U, ^{235}U, ^{239}Pu, ^{241}Pu.) 2. Two grams or less of any fissionable nuclide with atomic number greater than or equal to 95. 3. Depleted and natural uranium in any amount (except as reflectors). 4. Uranium solutions, compounds and metal, if homogeneous (not latticed), enriched to <=1.0% ^{235}U or its nuclear equivalent. 5. ^{237}Np, ^{238}Pu, ^{241}Am, and ^{244}Cm with H/X >=5 in any amount (X = fissionable material). The potential for changes in the H/X ratio due to errors or accidents, such as fire or evaporation, must be evaluated.	HNF-IP-1266 Ch. 5.7 Section 3.A.6	

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537.09	HNF-PRO-537 Section 1.4.2.1.4	*Fissionable material equivalence* Unless another limit is approved by the applicable facility safety review organization with the technical guidance and advice of a criticality safety specialist, the following relationships shall apply for small quantities of these isotopes associated with plutonium processing. Questions of applicability will be considered by the facility CSR. 1. One gram of plutonium is treated as one gram of ^{239}Pu. 2. One gram of ^{235}U is treated as one gram of ^{239}Pu. 3. One gram of ^{233}U is treated as 10 grams of ^{239}Pu. 4. One gram of americium is treated as 1/50 gram of ^{239}Pu. 5. One gram of ^{237}Np or ^{244}Cm is treated as one gram of ^{239}Pu. NOTE: The converse does not always apply and should not be used.	WHC-SD-SQA-CSA-20368 Section 4.0 CPS-T-149-00010 Section A	
537.10	HNF-PRO-537 Section 1.4.2.2	*Types of controls* The following types of criticality parameter and controls of fundamental physical characteristics ("property controls"), distinct from the subordinate "process controls" discussed elsewhere, shall be incorporated into the design, operation and administration of a fissionable material facility to the extent necessary to ensure conformance with the criteria set forth in section 1.4.1 of this procedure.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.11	HNF-PRO-537 Section 1.4.2.2(1)	Mass Controls--Restrictions on the quantity of fissionable material permitted in individual units or in the total configuration.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.12	HNF-PRO-537 Section 1.4.2.2(2)	Volume Controls--Restrictions on fissionable material volumes, or container and vessel volumes; may be specific to compositions.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.13	HNF-PRO-537 Section 1.4.2.2(3)	Geometry Controls--Dimension and shape restrictions on equipment design to provide inherently "geometrically safe," or "geometrically favorable" containers and vessels for fissionable materials. Includes floor areas allowed for leakage accumulations, and geometrically favorable drain-heights ("criticality drains").	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.14	HNF-PRO-537 Section 1.4.2.2(4)	Density Controls--Restrictions on permitted concentrations of fissionable material dissolved or dispersed in another medium.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.15	HNF-PRO-537 Section 1.4.2.2(5)	Areal Density Control--Restrictions on allowed fissionable mass per unit area of a large slab, as for the bottom of a glovebox or floor.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.16	HNF-PRO-537 Section 1.4.2.2(6)	Enrichment Controls--Restrictions on maximum relative fraction of fissionable-isotope constituents in total heavy-metal (U+Pu) concentration.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.17	HNF-PRO-537 Section 1.4.2.2(7)	Moderation Controls--Restrictions on allowed range of hydrogenous-material density relative to fissionable material density in moderator/fissionable mixtures (H/X ratio) or on the total amount of moderating materials allowed. Appropriate allowance shall be made for materials that are more effective moderators than water.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.18	HNF-PRO-537 Section 1.4.2.2(8)	Controls on Material Compounds and Form--Restrictions on allowed composition (nitrates, oxides, etc.) and allowed physical state (metallic, salt-crystal, powder, solution, etc.) for fissionable materials at particular process stages, work stations, or storage locations.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.19	HNF-PRO-537 Section 1.4.2.2(9)	Piece-Count Controls--Restrictions on the number of fissionable units (such as fuel pins) or moderator units in a glovebox or array.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.20	HNF-PRO-537 Section 1.4.2.2(10)	Interaction Controls--Restrictions to minimize potential neutron interactions between various units, vessels, containers, and accumulations of fissionable materials; includes controls on spacing, arrangement and/or shielding.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.21	HNF-PRO-537 Section 1.4.2.2(11)	Reflection Controls--Restrictions on the composition and/or configuration of reflector materials in proximity to fissionable configurations. Normally established by control of the design configuration. Appropriate allowance shall be made for materials that are more effective reflectors than water.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.22	HNF-PRO-537 Section 1.4.2.2(12)	Absorber Controls--Requirements defining need for, solution concentration, distributions, minimums, and required permanence of solid neutron absorbers (such as boron and cadmium) used for criticality safety purposes. Soluble neutron absorbers may be used in certain restricted circumstances (see, "Criticality Safety Evaluation," Section 1.4.3.4).	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.23	HNF-PRO-537 Section 1.4.2.2(13)	Flow Controls--Requirements for designed features or operational procedures which exclude or restrict the rate of flow of aqueous solutions in process pipelines; included in this category are: nuclear blanks--temporary replacement of pipe sections with non-flow bars or plug flanges; and in-line orifices--which limit the maximum potential flow rate.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.24	HNF-PRO-537 Section 1.4.2.2(14)	Placement or Displacement Controls--Requirements for fixtures or barriers which prevent positioning fissionable units in particular locations or prevent motions of units from designated positions.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.25	HNF-PRO-537 Section 1.4.2.2(15)	Chemistry Controls--Restrictions on concentrations or specifications of the makeup of process chemicals incorporated with the fissionable materials in the processing streams. These controls are to ensure the intended physical and chemical forms of the fissionable material, to prevent material buildup (such as precipitation or internal refluxing in a solvent extraction column), and to ensure control of fissionable material concentration.	NA; this requirement applies to fissionable material facilities, and TWRS is a limited control facility	
537.26	HNF-PRO-537 Section 1.4.2.3(1)	The designs and procedures formulated for handling, processing and storage of fissionable materials shall meet applicable DOE orders, ANSI/ANS standards, and other regulations related to criticality safety.	HNF-IP-1266 Ch. 5.7 Section 3.B.3	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.27	HNF-PRO-537 Section 1.4.2.3(2)	As a first priority, reliance shall be placed on equipment design in which dimensions of the contained fissionable material and spacing between equipment are limited via passive engineering controls. Where geometry control is not feasible, the preferred order of controls is other passive engineering control, active engineering controls, and administrative controls. Feasibility is determined by weighing risk versus practicality/cost. For existing operations where it can be shown that protection is provided by double contingency, that analysis can be used as the risk versus cost/practicality analysis. Full advantage may be taken of any nuclear characteristics of the process materials and equipment. All dimensions, nuclear related properties, other features upon which reliance is placed, as defined in the CSER, and compliance to CPS requirements, for new or modified equipment, shall be verified by supervision prior to beginning operations. Before operations, the supervisor shall verify compliance with CPS requirements for new or modified equipment, and all divisions, nuclear related properties, and after features relied on for nuclear safety, as defined in the CSER. Control shall be exercised to maintain these requirements. In the preparation of a new CSER or major revision to an existing CSER, the basis for not selecting geometry control shall be fully documented.	HNF-IP-1266 Ch. 5.7, Section 3.B.3 requires designs to comply with DOE orders related to criticality safety. This HNF-PRO requirement is a re-statement of DOE Order 5480.24 Section 7.a.(2)(b).	
537.28	HNF-PRO-537 Section 1.4.2.3(3)	The design of process and equipment shall use the most positive practical method to prevent a criticality accident. The following methods are listed in order of decreasing safety assurance: geometrically safe equipment; geometrically favorable equipment; fixed poisons; nuclear blanks; instrumentation; soluble poisons; and administrative controls. Deviations from this guidance shall be justified based on clear technical reasons. Administrative controls should be used as the primary control only when no practical design measure is available.	HNF-IP-1266 Ch. 5.7 Section 3.B.3.a.3	
537.29	HNF-PRO-537 Section 1.4.2.3(4)	When reliance on administrative controls cannot be eliminated, such controls shall be few, simple, self-consistent, and directly controllable. Procedures shall provide controls and appropriate verification of compliance.	TSR AC 5.7.2 and HNF-IP-0731	
537.30	HNF-PRO-537 Section 1.4.2.3(5)	Criticality safety shall not be eroded for the sake of expediency, production, or economic pressure.	Not found in TWRS documents.	14

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.31	HNF-PRO-537 Section 1.4.3.1	*Technical safety requirements* The facility safety analysis report (SAR) shall establish technical safety requirements (TSR) for criticality safety in accordance with the requirements and procedures in WHC-CM-4-46, *Nonreactor Facility Safety Analysis Manual*. If TSRs are not yet developed, interim safety basis documents [e.g., interim operational safety requirements (OSRs) and technical specifications] shall be used to maintain criticality safety. Except for low hazard facilities, isolated and limited control classified facilities have controls (such as TSRs) to ensure that the conditions that establish the facility classifications are maintained. Limits and controls are based on maintaining an acceptable margin of subcriticality. Limited control settings and limiting conditions of operation are based on maintaining double contingency under conditions analyzed in approved criticality safety evaluations (CSEs).	BIO Section 5.3.2.1, TSR AC 5.6	
537.32	HNF-PRO-537 Section 1.4.3.2	*Criticality prevention specifications (CPSs)* The limits and controls required to ensure the safe handling of greater than exempt quantities of fissionable materials in fissionable material facilities or limited control facilities are established in CPSs prepared in accordance with, "Criticality Prevention Specifications," Section 1.4. The CPS limits and controls are based on CSEs performed and documented in accordance with, "Criticality Safety Evaluation," Section 1.3.	HNF-IP-1266 Ch. 5.7 Sections 3.C and 3.C.6	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.33	HNF-PRO-537 Section 1.4.3.3 par. 1	*Operating procedures* The CPS limits and controls are implemented in written operating procedures which provide step-by-step instructions for fissionable material handling operations which includes criticality safety warnings and cautions as appropriate. Operations to which criticality safety is pertinent shall be governed by written procedures. All persons participating in these operations shall understand and be familiar with the procedures. All new or revised procedures shall specify all parameters they are intended to control. Operating procedures are prepared in accordance with approved procedure control programs. Supervision shall develop or participate in development of written procedures applicable to the operations under their control. Maintenance of these procedures to reflect changes in operations shall be a continuing supervisory responsibility. Operating procedures shall be written such that no single, inadvertent failure to follow a procedure can cause a criticality accident. Procedures shall be organized and presented for convenient use by operators. Procedures shall be free of any extraneous material.	HNF-IP-1266 Ch. 5.7 Section 3.C, HNF-IP-0842 Vol. I Section 2.11, HNF-IP-0731	
537.34	HNF-PRO-537 Section 1.4.3.3 par. 2	Active procedures shall be reviewed periodically by supervision. Supplementing and revising procedures as improvements become desirable shall be facilitated. New or revised procedures that impact criticality safety shall be reviewed and approved by the criticality safety representative (CSR). All procedures that impact criticality safety shall also be reviewed by using the unreviewed safety question (USQ) process. Deviations from operating procedures and unforseen alterations in process conditions that affect criticality safety shall be documented, reported to management, and investigated promptly. Refer to "Recovery from Criticality Prevention Specification Nonconformance," of this manual for responses to CPS infractions or "Disarming/Terminating a Critical or Potentially Critical System, if appropriate. Actions shall be taken to prevent a recurrence".	HNF-IP-1266 Ch. 5.7 Sections 3.B.2, 3.C.12; HNF-IP-0842 Vol. I Section 2.11, Vol. IV Section 5.4	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
537.35	HNF-PRO-537 Section 1.4.3.4	*Criticality safety postings* The operating procedures are supplemented by criticality safety postings which provide the operator with a ready reference to criticality safety limits or controls which are under the operator's control and/or observation. Criticality safety postings are prepared in accordance with "Nuclear Criticality Safety Postings,".	HNF-IP-1266 Ch. 5.7 Section 3.C.7	
537.36	HNF-PRO-537 Section 1.4.3.5	*Emergency procedures* Emergency response procedures for a criticality event are provided in each building emergency plan (WHC-IP-0263) for facilities having a criticality event potential. Site emergency management, including onsite and offsite assistance, are notified and informed of the expected conditions. The event is classified and notification provided as specified in WHC-CM-4-43, *Emergency Management Procedures.*	NA; as stated in BIO Section 5.3.2.1, there is no criticality event potential at TWRS	
538.01	HNF-PRO-538 Section 1.4.1	General criticality safety training is required by all All WHC employees receive the criticality safety training appropriate for their job assignment. Visitors and other on-site personnel that can be affected by a nuclear criticality accident receive orientation and emergency response training as required by their potential exposure to risk. New employees and other persons taking the Hanford General Education and Training (HGET) receive minimum criticality safety training as part of initial orientation and training and refresher training programs. Facility specific orientation and training is provided by the facility management responsible for access control.	HNF-IP-1266 Ch. 5.7 Section 3.C.4	
538.02	HNF-PRO-538 Section 1.4.2	Formal criticality safety training	NA; header	
538.03	HNF-PRO-538 Section 1.4.2(1)	Formal criticality safety training is provided at least every two years for those personnel actively involved with fissionable material (i.e., handling, direct supervision or engineering functions.) Refresher training requirements are documented in accordance with training program procedures.	HNF-IP-1266 Ch. 5.7 Sections 3.B.4 and 3.C.4 HNF-IP-0842 Vol. III Section 10.4	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.04	HNF-PRO-538 Section 1.4.2(2)	The learning objectives of each lesson should be made available to the trainees. A written test or computer-based test over the formal training topics is required. The employee must pass the test with an acceptable score, which is set by the training organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b Student handout for Courses 020012 and 020013 (Criticality Safety for Managers and Engineers)	
538.05	HNF-PRO-538 Section 1.4.2(3)	Certification of fissionable material handlers, managers, and engineers is based on completion of the formal training, with a written examination, and the JSO training checklist which may include an oral, written or operational examination administered by their own supervision.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b for managers and engineers (TWRS has no fissionable material handlers)	
538.06	HNF-PRO-538 Section 1.4.2(4)	If formal training (or retraining) is not completed, the individual is not allowed to handle fissionable material or supervise others, even under the direction of a certified employee. After formal training, an individual may handle fissionable materials as a part of JSO and specific job training under the constant direction of a fully certified fissionable material handler or supervisor.	Not found in a TWRS level procedure. HNF-IP-0842 Vol. III Section 10.4 states only that operating engineers who have not completed training should not approve waste transfers.	15
538.07	HNF-PRO-538 Section 1.4.2.2	Training course content All formal criticality safety training for fissionable material handlers, managers, and engineers certification covers the following major topics and will include specific requirements and recommended subjects to be covered within these topics that are specified in the American Nuclear Society standard for nuclear criticality safety training, ANSI/ANS 8.20. - Fission chain reaction, criticality and accident consequences - Criticality accident history - Neutron behavior in fissioning systems and other factors that affect criticality safety - Control parameters and double contingency principle - Criticality prevention policy and procedures - Labeling and posting requirements - Response to criticality alarm signals - This manual	Handouts for training courses 020012 and 020013 (Criticality Safety for Managers and Engineers) and 020302 (JSO). The courses need updating to reference HNF-PRO-538 instead of WHC-CM-4-29.	16

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.08	HNF-PRO-538 Section 1.4.2.3(1)	JSO and facility specific criticality orientation cover specific job requirements The JSO checklist is included as part of the formal training and includes facility specific criticality orientation which is administered by the facility.	Handout for training course 020302 (JSO)	
538.09	HNF-PRO-538 Section 1.4.2.3(2)	The JSO training includes appropriate training in abnormal conditions and emergency response.	Handout for training course 020302 (JSO)	
538.10	HNF-PRO-538 Section 1.4.2.3(3)	Supplemental job specific training is required before any new or modified criticality prevention specification (CPS) is used.	Annual retraining has been sufficient for addressing CPS changes. Consider requesting waiver for this requirement from HNF-PRO-538.	17
538.11	HNF-PRO-538 Section 1.4.2.3(4)	The facility maintains records of specific material covered to complete JSO.	Not specified as a requirement in a TWRS document; requirement is met by Course 020302 handout and records.	18
538.12	HNF-PRO-538 Section 1.4.2.4	Retraining must be completed every two years Formal retraining must be completed on a nominal two year frequency. Special retraining may be required, depending on the length of absence and job assignment, for: 1.Absences up to 12 months 2.Absences of one year or more (formal and JSO are required) 3.Changes in the facility, procedures, or employee's status For special retraining, the extent of retraining is determined by the facility management and the training organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.4 (does not address special retraining)	19

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.13	HNF-PRO-538 Section 1.4.2.5	Training records are maintained by the training organization The training organization maintains the central record system of personnel training status. Managers have access to summary training records for each employee and receive delinquent status updates and notices of approaching need for retraining.	HNF-IP-1266 Ch. 5.7 Section 3.B.4	
538.14	HNF-PRO-538 Section 1.4.2.6	Fissionable material facilities hold periodic criticality safety training meetings Fissionable material facility management holds one semiannual and one annual criticality safety training meetings. Management in the limited control facilities and isolated facilities hold one annual training meetings. Attendance at all meetings is required for Fissionable Material Handlers (FMH) and designated managers and engineers and support personnel to maintain certification and for others to keep current with facility requirements. Documenting followup review of the material presented is adequate for meeting absentees. Content of the annual meetings include refresher on emergency evacuation and programmatic topics, such as review of occurrences and lessons learned. The semiannual meetings will typically emphasize more facility specific information.	HNF-IP-1266 Chapter 5.7 Section 3.C.4.b.1 appropriately meets the limited control facility requirement. The discussion in HNF-IP-1266 needs clarification. The HNF-PRO-538 requirement should be rewritten because the heading does not reflect the content of the text.	20

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.15	HNF-PRO-538 Section 1.4.3	Formal fissionable material handlers training is required prior to work assignment Fissionable material handlers must have pertinent experience commensurate with the degree of responsibility and complexity of the work. Formal fissionable material handlers training is required for all persons, in all categories, who may be assigned to handle, process, store, or transport more than exempt quantities of fissionable material in a fissionable material facility where an accidental criticality accident is assumed to be credible. Fissionable material handlers, in specified occupations, who work in facilities which are allowed to contain significant quantities of fissionable material, but where it has been established by criticality safety evaluation that a criticality accident is incredible, shall be provided options to full certification. These employees shall also complete the formal fissionable handlers course and be requalified every two years. The facility, with written concurrence of the FDH Nuclear Safety organization, may reduce the other requirements that contribute to certification. This would eliminate having to maintain hands-on work with fissionable material, and permits reducing course content of the JSO from the full program requirements, and reduction of content and frequency requirements for periodic training meetings.	NA; TWRS does not have fissionable material handlers	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.16	HNF-PRO-538 Section 1.4.4	Managers and engineers Criticality safety training is required for 1.Managers and supervisors who directly oversee the activities of fissionable material handlers. 2.Managers and engineers who are directly involved in the design of equipment for the handling, storage or transportation of significant quantities of fissionable material. 3.Safety and QA managers or engineers who directly oversee or audit criticality safety programs. NOTE: Attendance at periodic training meetings is encouraged, but not required for these positions. By definition, anyone who passes the formal Criticality Safety Training Course for Managers and Engineers class has met the formal qualification requirements for a fissionable material handler. If formal training (or retraining) is not completed, the individual is not allowed to supervise the handling of fissionable material or perform engineering functions that require expertise/understanding of criticality safety requirements. Full certification of those who supervise the handling of fissionable material is based on completion of the formal training with a written examination and completion of the associated JSO checklist. Attendance at periodic training meetings is also required. Managers and engineers at limited control facilities and isolated facilities and others selected by their managers are permitted options to qualification requirements or otherwise reduce training requirements, subject to written concurrence of the FDH Nuclear Safety organization. Attendance at the periodic training sessions and biennial requalification is required to maintain certification.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b addresses this by requiring formal criticality safety training for exempt and engineering personnel designated by their managers . HNF-IP-0486 Vol. III Sections 10.3 and 10.4	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.17	HNF-PRO-538 Section 1.4.5	Special training is required for support personnel in fissionable material facilities Personnel who work in a fissionable material facility performing tasks that may contact/affect but not directly handle fissionable material or only handle limited quantities under the direct supervision of a certified fissionable material handler, must complete the formal criticality safety training course for support personnel. This includes maintenance personnel regularly assigned to a facility or those workers that may be expected to do this type of work on a temporary basis. Designated Health Physics personnel are also required to complete this formal training. Management may send other personnel who need more specific training than that provided by HGET to this training once or on a continuing basis. There is no JSO checklist for those maintaining formal support personnel qualification. Facilities are responsible for providing additional job or facility specific training associated with the support role. Attendance at the annual periodic training session and biennial retraining is required to maintain qualification.	NA; TWRS is not a fissionable material facility.	
538.18	HNF-PRO-538 Section 1.4.6	General facility workers and administrative staff training	NA; header	
538.19	HNF-PRO-538 Section 1.4.6.1	Criticality safety training General facility workers and administrative staff not directly associated with fissionable materials receive criticality safety orientation training as part of the Hanford General Employee Training (HGET).	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b.1	
538.20	HNF-PRO-538 Section 1.4.6.2	Facility specific orientation Facility specific orientation, which is administered by each facility, tells the employee of the criticality hazards and risk associated with the specific facility and basis for the criticality safety classification of the facility. Employee responsibilities are represented and evacuation procedures, if applicable, are covered.	The requirement is not found in a TWRS level document. No evidence was found that this happens.	22

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.21	HNF-PRO-538 Section 1.4.6.3	Retraining Retraining is provided in the annual HGET refresher course and the facility specific information is provided at the facility by an annual update.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b	
538.22	HNF-PRO-538 Section 1.4.6.4(1)	Periodic training meetings Fissionable Material Facilities and Limited Control Facilities Occupants of facilities who perform work not involving fissionable material (secretaries, janitors, craftsmen, etc.) are instructed in the importance of not moving or handling fissionable materials (including very briefly how to identify fissionable materials - by signs, labels, and type of material) and in emergency procedures. This training should be given or scheduled by the employee's immediate manager when the employee is first assigned, and repeated annually. This annual refresher training should be held as a special meeting oriented to the employee's needs rather than a part of the training meetings for fissionable material handlers. Facility management may modify these training requirements based on individual facility conditions with concurrence of the FDH Nuclear Safety organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b.1 discussion requires expansion	21
538.23	HNF-PRO-538 Section 1.4.6.4(2)	Isolated Facilities There are no requirements for periodic training specifically covering criticality safety for those not working with fissionable material.	NA; TWRS is not an isolated facility	
538.24	HNF-PRO-538 Section 1.4.7	Criticality safety representatives (CSR) training	NA; header	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.25	HNF-PRO-538 Section 1.4.7.1	Formal training Criticality safety representatives (CSR) shall successfully complete and maintain certification for the managers and engineers criticality safety training course with associated JSO form. Attendance at the annual criticality safety representative training meeting, given by the FDH Nuclear Safety organization, is also required. Additional criticality safety training is primarily self-taught and consists of facility specific information, policy requirements and review of various subject-specific material provided by other criticality safety specialists. This also may include tutoring or other special instruction methods. The expertise, topics, and depth of required knowledge is appropriate to the complexity of the criticality safety program in the specific facility, and is subject to review by a qualification board. The CSR certification is completed by examination by a qualification board. Qualification board member(s) will represent the facility safety review organization, process/plant engineering, the operating organization, a criticality safety specialist, and may include others as agreed by the board. Training and experience in area listed in 1.4.8.3 below, for criticality safety specialists are recommended for the CSR.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.a	
538.26	HNF-PRO-538 Section 1.4.7.2	Two-year recertification process may be satisfied by one of the following 1.Recertification including an oral requalification examination by the qualification board 2.A recertification evaluation based on an appraisal of the CSRs work conducted by the qualification boards. 3.A waiver of the recertification process by the qualification board (on a case-by-case basis)	HNF-IP-1266 Ch. 5.7 Section 3.C.4.a	
538.27	HNF-PRO-538 Section 1.4.8	Criticality safety specialist (engineers/analysts) training	NA; header	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.28	HNF-PRO-538 Section 1.4.8.1	Formal training Criticality safety specialists are required to complete formal academic degree programs in an appropriate technical discipline, and to have directly applicable work experience (commensurate to personnel selection guidance). Completion of available criticality safety short courses or seminars is encouraged. Completion and maintaining the criticality safety training course requirements for managers and engineers, including applicable JSO form, is required. Areas of specialization in analysis, evaluation, implementation and confirmation have different capabilities or areas of expertise which are demonstrated by continuing competence.	Not found; need to add to HNF-IP-1266 Chapter 5.7.	23
538.29	HNF-PRO-538 Section 1.4.8.2	Verification of qualification Verification of training and retraining and qualification is made and documented by individual managers established for areas of specialization for work assignments. A qualified criticality safety specialist shall assist in the determination of qualification.	Not found; need to add to HNF-IP-1266 Chapter 5.7.	23
538.30	HNF-PRO-538 Section 1.4.8.3	Training and experience which establish or enhance qualification include: 1.Authoring or peer-reviewing analytical reports 2.Attending seminars, topical meetings, or university short courses in criticality safety 3.Authoring criticality safety papers, documents, books, or participating in related technical sessions 4.Participating in standards committees or criticality safety work groups 5.Job performance that enhances the criticality safety program	Not found; need to add to HNF-IP-1266 Chapter 5.7.	23
538.31	HNF-PRO-538 Section 1.4.8.4	Training records Training Services and their management retain records of training and qualification. The management of the qualified specialist may also retain information files of training and qualification documents to assist in determining initial qualification and requalification.	Not found; need to add to HNF-IP-1266 Chapter 5.7.	23

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
538.32	HNF-PRO-538 Section 1.4.9	Visitors training Management of the facility to be visited, or a delegate, will supply the visitor with a briefing that covers, as a minimum, the identification of fissionable material and stresses that only qualified fissionable handlers are authorized to work with it. Identification and proper response to the facility emergency signals, including the criticality alarm shall be covered. If several facilities are to be visited and the alarm responses are similar, the briefing need not be repeated.	HNF-IP-0842 Volume I Section 4.2; HNF-IP-0971	
538.33	HNF-PRO-538 Section 1.4.10(1)	New employee training Human Resources administers new employee orientation and indoctrination for all new hires.	HNF-PRO-044; outside TWRS scope	
538.34	HNF-PRO-538 Section 1.4.10(2)	Each new employee in a fissionable, limited control, or isolated facility, as part of the new employee check-in procedures, is introduced to criticality safety by reading the building emergency procedures and receiving appropriate facility criticality orientation training.	HNF-IP-1266 Ch. 5.7 Section 3.C.4.b.1	
539.01	HNF-PRO-539 Section 1.4.1	When a CSE is required A new CSE is required whenever a new fissionable material handling operation is planned or an existing operation is changed beyond the scope of the supporting CSER(s). Whenever any of the following change, a new CSR is required: Fissionable material nuclide or enrichment Physical form of material to be handled Density or concentration of fissionable material to be handled Amount of material to be handled or batch size Moderation of fissionable material Processing sequence Method of containment Method of storage or transport Credible errors or accidents considered in existing evaluations Fissionable material handled in a new/modified location, piece of equipment, glovebox, etc.	HNF-IP-1266 Ch. 5.7 Section 3.C.5 discusses CSEs and CSERs, but does not include the details of when a new or modified CSE is required. (Assume "new CSR" is a typo and that "new CSE" is intended.)	24

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.02	HNF-PRO-539 Section 1.4.2	When a CSER is required The CSE must be documented in an approved CSER before handling fissionable material in the new or modified operation (see 4.1 above).	HNF-IP-1266 Ch. 5.7 Section 3.C.5.b	
539.03	HNF-PRO-539 Section 1.4.3	Items to be considered in the CSE 1. Demonstrate that there is an acceptable margin of subcriticality for all normal and credible abnormal conditions. (See, "Criticality Safety Control of Fissionable Material.") Determine those conditions which result in the maximum k_{eff}. 2. The effect of each of the following factors (5.31 - 5.3.2) on the margin of subcriticality, as appropriate.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.04	HNF-PRO-539 Section 1.4.3.1	*Fissile and fissionable materials* Identify all fissile and fissionable materials, including chemical and physical form, which are or may be present and consider in the evaluation, except those specifically exempted in "Criticality Safety Control of Fissionable Material", Section 1.4.2.1.3. If important to the analysis, consider the isotopic content, nature of the material, concentrations, densities, and degree of moderation and their effects.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.05	HNF-PRO-539 Section 1.4.3.2	*Neutron moderation* 1. Consider the reactivity effects from all materials with neutron moderating properties (water, plastics, organic solutions, or carbon) that are normally present or may be introduced during contingency conditions (such as water from fire sprinklers) or under off-normal events (such as earthquakes, flood, etc.). 2.Assume the most conservative (optimal) credible moderation that could result from the materials and geometry, unless detailed analysis or experiment justifies using a lesser value. Append this analysis to the CSER. If no control is exercised over moderation, consider the most conservative (optimal) moderation as the normal condition.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.06	HNF-PRO-539 Section 1.4.3.3	*Neutron reflection* Consider neutron reflection factors; consider the actual reflectors normally present and those expected during the contingency conditions that are analyzed for in the CSE. Some effective neutron reflectors are water, concrete, hydrocarbons, plastics, carbon, beryllium, and heavy metals such as steel and uranium.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.07	HNF-PRO-539 Section 1.4.3.4	*Neutron absorbers ("neutron poisons")* 1. For systems with strong neutron absorption characteristics near (as defined in the specific calculations) the fissionable materials, show how the continued presence and intended distribution and concentration of such materials is ensured. Neutron absorbers, such as boron or cadmium, may be specifically included in the design. Other common materials which may function as absorbers are nitrogen, ^{240}Pu, steel and concrete. 2. For systems that include the use of soluble poisons as a secondary means of precluding criticality, show how the presence of the soluble poison is ensured. 3. For systems designed to use soluble poisons as the primary means of precluding criticality, show that the system design requires such systems to be behind a massive shield.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.08	HNF-PRO-539 Section 1.4.3.5	*Neutron interaction* Consider neutron interaction, generally affected by spacing between systems or individual units (individual fissionable material batches, containers, or vessels) unless the systems are isolated and satisfy at least one of the following criteria: 1. Each system or unit is separated from other systems or units by at least eight inches of water, or by some other material or combination of materials that gives the equivalent or better isolation than eight inches of water, and it is not credible that this separating material can be inadvertently removed. 2. Solid angle subtended by surrounding fissile material is less than or equal to a fractional solid angle of 0.005 (4 steradians equals a fractional solid angle of 1.0). 3. Interaction has been shown by previous calculations to be insignificant under the conditions being investigated. reference previous calculations when used.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.09	HNF-PRO-539 Section 1.4.4	Analysis Methods Validate any analytical method used to determine criticality safety limits by comparison with known critical or subcritical systems. There are many calculation methods (computer codes, solid angle, density analog) suitable for determining the effective multiplication factor (k-effective or k_{eff}) of a system or for deriving subcritical limits.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.10	HNF-PRO-539 Section 1.4.4.1	*Computer codes* Many different computer codes are available for criticality safety analysis ranging from one-dimensional codes, which can satisfactorily describe single units, to three dimensional codes which can describe complex geometries. Code used for CSE shall: 1. Be appropriate to the complexity of the problem. 2. Be validated according to the requirements of 1.4.4.4 of this procedure, and be known to give identical results to the code version validated. 3. Identify the computer on which the validated version of the code is used and the date last modified. Codes used shall comply with HNF-CM-6-1, Standard Engineering Practices, EP 2.1, "Computer Software Configuration Management." 4. Be use only by an analyst whose training or experience demonstrate sufficient familiarity with the code.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.11	HNF-PRO-539 Section 1.4.4.2	*Cross section libraries* Neutron cross sections are required to be used in most computer codes used in criticality analysis. The cross sections are obtained either directly or through processing codes which provide cross sections in a format which can be used by the primary code. Validate the cross section library (and processing code) simultaneously with the computer code in which it is used to comply with the following criteria: 1. Validate each set or identification number where multiple cross section sets or identification numbers exist before it is used to determine criticality safety limits. 2. Identify the computer used and the date last modified for the cross section library and processing code used in validation. 3. Ensure that the analyst using a cross section library to determine criticality safety limits has training or experience that demonstrate sufficient familiarity with the cross section library.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.12	HNF-PRO-539 Section 1.4.4.3	*Other methods* Other methods and sources that may be used in determining criticality safety limits include the solid angle method, density analog method, various published parameter studies (such as surface density determinations), and national standards subcritical values. Normally these are used for backup or scoping studies but can be used, if properly validated and applied under appropriate conditions, for limit determination.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.13	HNF-PRO-539 Section 1.4.4.4	*Method validation* 1. Establish calculation bias for any method used in an analysis to determine criticality safety limits by correlating the results of criticality experiments with results obtained for these same systems by the method being validated. 2. Ensure that the validation meets the validation requirements listed in National Standard ANS-8.1. Use sufficient correlation to determine if major changes in the bias can occur over the range of variables in the operation being analyzed. Where the extrapolation is large, supplement the method with other calculation methods to provide a better estimate of the bias in the extended areas.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.14	HNF-PRO-539 Section 1.4.5	CSER organization and content Include the following sections, as appropriate, and comply with the requirements for those sections.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.15	HNF-PRO-539 Section 1.4.5.1	*Introduction and summary of limits and controls* 1. State the purpose and scope of the evaluation, and include relevant background material. Determine and explicitly identify the controlled parameters and their associated limits upon which nuclear criticality safety depends. 2. Clearly state the limits, controls and engineered features required for safe handling of fissionable material under the described conditions. 3. State the dimensions requiring quality control verification and assumptions about conditions.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.16	HNF-PRO-539 Section 1.4.5.2 Par. 1	*Facility or operation description* Provide a description of the facility or operation with sufficient detail, clarity, and lack of ambiguity so that a peer technical reviewer can independently evaluate the system or process, or independently assess the adequacy and accuracy of the existing evaluation. As appropriate, any of the following may be provided as an aid to the reviewer: simple sketches, dimensioned and labeled conceptual drawings, and engineering drawings (if used, the revision number should be included).	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.17	HNF-PRO-539 Section 1.4.5.2 Par. 2	Provide references, including drawings, to give the reviewer the opportunity to further review the system being evaluated and verify accuracy of descriptive information. Provide specific references with page numbers. Avoid multiple levels of references and those that reference other documents. Provide sufficient information to support the assumptions used in the evaluation.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.18	HNF-PRO-539 Section 1.4.5.2 Par. 3	Provide information required by DOE 5480.24, Section 7.c, and 7.c(1) through 7.c.(9) that provides reference bases for subcritical operating values that may be used to demonstrate criticality safety of an operating process in a safety analysis report. Details of this information include the following: 1. Maximum quantities of fissionable material at any one time in each step of the process 2. A statement of the chemical and physical form of fissionable material in each step of the process 3. Description of the methods of collection, handling, and transfer of fissionable material, but not including DOT guidelines 4.Description of the methods of waste or scrap handling of fissionable material 5.Description of technical practices and/or process features that are intended to prevent exceeding limits and safety control parameters.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.19	HNF-PRO-539 Section 1.4.5.3	*Requirements and exemptions* 1. List any requirements that are uniquely applicable to this evaluation. 2. Identify specific requirement documents, but list general requirement documents only if there are specific sections that are applicable. 3. Discuss exemptions to requirements also.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.20	HNF-PRO-539 Section 1.4.5.4 Pt. 1	*Method of analysis and results* Describe the calculation methods used in the analysis. In general, provide the technical reviewer with sufficient detailed information, without ambiguity, to judge the applicability and accuracy of the results. Provide the following: 1. Assumptions used. 2. Appropriate sketches or computer plots of a complex configuration, as analyzed. 3. Graphs and/or tables of calculation results used in selecting limits, as well as justification for limits determined. 4. Qualification of the analysis methods used, including reference to computer code validation studies as appropriate.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.21	HNF-PRO-539 Section 1.4.5.4 Pt. 2	In addition, in order to establish that a proposed system or operation will remain subcritical under normal and postulated process upset conditions, establish the acceptable subcritical values for the operation using acceptable methods. The four currently acceptable methods for the establishment of these values are: 1. Reference to national standards which present subcritical limits. 2. Reference to widely accepted handbooks of subcritical limits. 3. Reference to experiments with appropriate adjustments to ensure subcriticality when the uncertainties of parameters reported in the experiment are considered. 4. Calculation techniques which include a validation to establish an upper cut off limit. All four methods must be supported in the text of this procedure.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.22	HNF-PRO-539 Section 1.4.5.5	*Contingency analysis* Describe credible abnormal and/or accident conditions (relative to the normal or intended situation) considered for analysis. Examples of contingencies that may require analysis are provided in Appendix A of this procedure. 1. For simple cases, standard contingencies may be assumed without explanation (such as a double batch, tank rupture, etc.). 2. In more complex cases, the selection of conditions classified as the most severe must be justified. 3. As needed, the analysis must present the reasoning used to exclude situations judged incredible, especially those with criticality implications more severe than the situations/accidents which were considered credible and were analyzed in the evaluation. 4. Changes in conditions which could result from firefighting determine any firefighting restrictions necessary for criticality safety. ("Criticality Safety for Firefighting.")	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.23	HNF-PRO-539 Section 1.4.5.6	*Appendices* Append necessary supporting information to the CSER. Examples include correspondence containing pertinent information used in the evaluations, tables and descriptions methods used to determine base data results, blueprints sketches, and microfiche of computer runs.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
539.24	HNF-PRO-539 Section 1.4.6.1	*Technical review* 1. Before starting a new operation with fissile materials or before an existing operation is changed, conduct an independent review of all associated CSERs. Have a qualified criticality safety specialist, who was not involved in the original analysis, conduct the review or, at a minimum, provide technical assistance and concurrence.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
539.25	HNF-PRO-539 Section 1.4.6.2	*Issue and control* 1. Issue and control CSERs as supporting documents in accordance with HNF-CM-6-1, EP 1.12, "Supporting Documents." 2. The operating organization is responsible for ensuring that copies of all original evaluations performed, along with diskettes of calculations, are kept.	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a requires the preparation and review of the CSE according to HNF-PRO-539.	
540.01	HNF-PRO-540 Section 1.4(1)	When a new operation is planned, or changes in the process, work location, equipment, fissionable material, or other aspects of the operation could place the fissionable material handling outside the envelope of the existing CPS, the CSR shall consider the proposed work and determine if a new CSER is needed.	HNF-IP-1266 Ch. 5.7 Sections 3.C.5.a, 3.C.8.	
540.02	HNF-PRO-540 Section 1.4(2)	If required, a new CSER shall be prepared in accordance with the "Criticality Safety Evaluation."	HNF-IP-1266 Ch. 5.7 Section 3.C.5.a	
540.03	HNF-PRO-540 Section 1.4(3)	The CSR shall prepare a new CPS, update an existing CPS or prepare a temporary change (procedure change authorization) or similar documentation when the new CSE is complete (or after determining that the existing CSE is considered adequate for the new work). The CSR coordinates the review, approval, and issue of the CPS according to the requirements of this procedure.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a	
540.04	HNF-PRO-540 Section 1.4.1	CPS content Each CPS shall contain the following sections or equivalent sections as appropriate. Existing documents that serve the purpose of a CPS may continue in use until revisions are needed, when this format should be adopted.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.05	HNF-PRO-540 Section 1.4.1(1)	A FISSIONABLE MATERIAL DESCRIPTION section, specifying the fissionable materials that may be handled and the physical and chemical forms of the materials that are approved for use under the CPS limits.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
540.06	HNF-PRO-540 Section 1.4.1(2)	A DESCRIPTION OF OPERATIONS AND EQUIPMENT section, specifying the operations that are allowed and equipment that may be used.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.07	HNF-PRO-540 Section 1.4.1(3)	A LIMITS section, specifying the technical limits required to ensure double contingency for the approved operations, equipment, and material. Applicable controlled parameters and their limits identified in the CSER shall be specified. Process specifications shall incorporate margins as identified or required by the CSER to protect against uncertainties in process variables and against a limit being accidentally exceeded.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.08	HNF-PRO-540 Section 1.4.1(4)	A PROCESS CONTROLS section, specifying additional controls to support the technical limits. These instructions establish control points that, if exceeded, could lead to nonconformance with a limit.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.09	HNF-PRO-540 Section 1.4.1(5)	A SUPPORTING INFORMATION section, including notes to help clarify the limits or process controls. If necessary for clarity, items that are not limited (within the scope of approved operations) are noted in this section.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.10	HNF-PRO-540 Section 1.4.2	Criticality safety evaluation report (CSER) reference Each CPS shall reference the CSER(s) that support the CPS requirements. (See "Criticality Safety Evaluation.")	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	
540.11	HNF-PRO-540 Section 1.4.3	Numbering 1. The CPS shall be uniquely numbered in accordance with the operating document procedure for the particular area or facility. 2. Criticality prevention specifications based on new CSERs are issued as revisions (e.g., Rev. A-0 becomes Rev. B-0). The revision status may be indicated by other means when the CPS are contained in facility SARs. 3. Revised criticality prevention specifications based on existing CSERs are issued as modifications (e.g., Rev. A-0 becomes Rev. A-1). The revision status may be indicated by other means when the CPSs are contained in facility SARs.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the preparation of the CPS according to HNF-PRO-540.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
540.12	HNF-PRO-540 Section 1.4.4	Approvals Criticality prevention specifications are reviewed and approved per assigned approval designation. Approval of CPSs contained in SARs shall be consistent with the SAR change procedures.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the review and approval of the CPS according to HNF-PRO-540.	
540.13	HNF-PRO-540 Section 1.4.5	Issue and Control The originator shall issue and control each CPS in accordance with an approved operating document control procedure. The originator will submit the record copy to Configuration Management for archival storage within 30 days of completion, in accordance with the operating documents system for the responsible facility. Temporary changes using procedure change authorizations (PCAs) or other, similar, documentation, are also controlled per the facility document control procedures and require identical approvals as the CSE.	HNF-IP-1266 Ch. 5.7 Section 3.C.6.a requires the issuance of the CPS according to HNF-PRO-540.	
541.01	HNF-PRO-541 Section 1.4(1)	Facility management shall prepare facility-specific criteria and procedures to implement the requirements of this procedure and submit them to the facility safety organization for review and approval.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.02	HNF-PRO-541 Section 1.4(1)	The facility-specific criteria and procedures shall include instructions for determining which criticality safety limits and controls shall be posted at work locations.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.03	HNF-PRO-541 Section 1.4(1)	Criticality safety postings shall not be covered, removed, relocated or modified except by the CSR or delegate.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.04	HNF-PRO-541 Section 1.4.1	Posting exempt facilities Criticality safety postings are not required in exempt facilities.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
541.05	HNF-PRO-541 Section 1.4.2	Posting isolated facilities All entrances into an isolated facility shall be posted to identify the facility as an isolated facility and specify a person to contact to obtain permission to bring fissionable material into the facility. A sign like that shown in Figure 1should be used. These signs are available from the sign shop.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.06	HNF-PRO-541 Section 1.4.3	Posting limited control or fissionable material facilities	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.07	HNF-PRO-541 Section 1.4.3.1(1)	Postings include the following minimum information: a. Type of fissionable material allowed b. Mass, concentration, or amount c. Moderation, volume, and spacing limits d. CPS number NOTE: Posting all limits and controls reduces the effectiveness of postings in emphasizing key operating limits; however, operating procedures may implement all applicable criticality prevention limits and controls. Use facility-specific posting criteria to determine which limits and controls will be posted and which will appear only in the operating procedures.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.08	HNF-PRO-541 Section 1.4.3.1(2)	Limits to an operation that do not implement criticality safety requirements shall not be included on the criticality safety posting.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.09	HNF-PRO-541 Section 1.4.3.1(3)	Limits to operations that are not controlled by the operator (e.g., inner diameter of a fixed process vessel) shall not be included on the criticality safety posting.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
541.10	HNF-PRO-541 Section 1.4.3.2(1)	Post criticality safety limits conspicuously near fissionable material workstations and storage locations. Do not locate postings where the posting can be inadvertently covered or blocked from view of the operator(s) for whom the posting is intended (e.g., locating a sign on or near doors that can be fixed open covering the posting).	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.11	HNF-PRO-541 Section 1.4.3.2(2)	Post key limits and controls required to ensure compliance with the CPS at each work station where parameters are controlled, except as approved by the facility safety organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.12	HNF-PRO-541 Section 1.4.3.2(3)	Posting requirements may be waived in unprotected outdoor storage areas (such as burial ground trenches and receiving dock entrances) with approval of the facility safety organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.13	HNF-PRO-541 Section 1.4.3.3(1)	Type or print postings on white paper with a nominal 0.64 cm (0.25 inch) purple or magenta border. Equivalent signs may be used. NOTE: The facility CSR may issue handwritten criticality safety postings for use until typed or printed postings are available.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.14	HNF-PRO-541 Section 1.4.3.3(2)	Make criticality safety postings distinctive in design and easily distinguishable from other types of postings. The facility-specific criteria shall establish any additional requirements for design features.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.15	HNF-PRO-541 Section 1.4.3.3(3)	Make postings of durable materials or place in water resistant, transparent covers.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.16	HNF-PRO-541 Section 1.4.4	Inventory sheets Maintain an inventory sheet or logbook at the work station or storage location if a current inventory is required to provide tracking and verification of material for CPS compliance. The person making the transfer shall initial the inventory sheets.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	

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Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
541.17	HNF-PRO-541 Section 1.4.5	Firefighting symbol posting Firefighting category postings are described in "Criticality Safety for Firefighting".	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
541.18	HNF-PRO-541 Section 1.4.6	Fissile material symbol posting Signs with the fissile material symbol are used to signify the presence of fissile and fissionable material. Signs should be displayed as prominently as is practical when used to identify material, areas, or locations involving control of fissile materials, such as for criticality safety. The symbol should be removed or covered when the fissile material is no longer present.	HNF-IP-1266 Ch. 5.7 Section 3.C.7 states that postings are not required at TWRS per HNF-PRO-541.	
542.01	HNF-PRO-542 Section 1.4.1	Labeling required for packages and containers	NA; header	
542.02	HNF-PRO-542 Section 1.4.1.1	When required Approved labels shall be used to identify packages or containers holding one or more grams of any fissionable nuclide present as pure form, compound, or mixture. The outer containers used for transport, storage, or burial also have to be labeled; they should be identified by a readily visible fissile material symbol. Items inside some enclosures may not require individual labels if the items are uniquely identified and the associated labels are kept outside the enclosure and moved with the items. Containers received from off-site which meet the requirements of DOE 5480.3, do not require immediate relabeling. The relabeling may be done when the fissionable material items removed from the container, repackaged, or otherwise handled to avoid causing unnecessary radiation exposure.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	
542.03	HNF-PRO-542 Section 1.4.1.2	Information required on labels Labels shall clearly show information necessary to ensure adequate and unambiguous identification of fissionable materials and provide other pertinent information useful for criticality safety purposes. Generally this consists of type of material, element weight, net weight, gross weight and atomic ratio H/X.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
542.04	HNF-PRO-542 Section 1.4.1.3	Standard labels for fissionable material Standard labels have been developed for nuclear material management (see WHC-CM-4-35, Safeguards Material Control Manual). Where practical, these standard labels should be used; however, existing labels do not need to be replaced. In certain circumstances, use of nonstandard labels or other deviations in labeling practices is permitted once approved by the facility safety organization. Examples of exceptions: - When labeling of individual units is not practical (such as fuel pins), a single posting or other easily understandable means of identification (such as follower cards) may be used to take the place of individual labels. Information 5.1.2 above is still required. - When nuclear fuel is stored in water basins, or in other inaccessible locations, it may be identified by an appropriate label, list, or sign posted in the immediate vicinity of the storage facility or array. - When labeling is not practical because material is in a small container.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	
542.05	HNF-PRO-542 Section 1.4.1.4	Labels for nonfissionable/nonfissile material Labels are used when it is possible to misidentify material or items which are not fissionable or fissile. For example, labels may be used to identify mock-up fuel pins and assemblies and also containers of normal or depleted uranium and thorium, which are exempt from criticality safety controls. At a minimum, these labels shall include the words "nonfissionable or nonfissile material" or specifically identify the material type. Some standard labels are available but handwritten markings may be used. Positive identification that the materials are nonfissionable or nonfissile shall be made before attaching the labels.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
542.06	HNF-PRO-542 Section 1.4.2	Empty containers Containers which have been emptied of their fissionable material shall be prominently labeled "empty," unless the old label is removed or unmistakably crossed out, or unless the absence of fissionable material is readily apparent. These labels may be either printed or handwritten. A single prominently displayed sign may be used for groups of empty containers. Use of "empty" labels inside gloveboxes is optional. Containers may be labeled as "unloaded" to indicate the status of solution containers from which fissionable material has only been substantially removed and a residue may be remaining.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	
542.07	HNF-PRO-542 Section 1.5	Procedure Each nuclear material custodian shall develop procedures as needed to ensure that fissionable material is labeled in accordance with the requirements of this procedure.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires labeling of fissionable material per HNF-PRO-542.	
543.01	HNF-PRO-543 Section 1.4.1.1	General All new storage facilities or conversions of an existing facility to a storage function shall conform to the requirements DOE 6430.1A. Existing storage facilities not meeting the design requirements of DOE 6430.1A should have a documented risk assessment showing that the variances do not result in undue risk.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.02	HNF-PRO-543 Section 1.4.1.2	Storage racks Storage racks shall be designed to provide a geometrically favorable arrangement of the fissionable material. Individual storage cubicles or pedestals should be designed to prevent double batching or other unacceptable arrangements, thereby reducing reliance on administrative controls. Double batching shall be considered in storage safety analysis and in developing operating procedures. Storage racks and shelving shall be sturdy and noncombustible.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.03	HNF-PRO-543 Section 1.4.1.3	Earthquake or accident resistance Storage facilities shall be designed to prevent an unacceptable rearrangement of the fissionable material due to a design basis earthquake or any design basis accident.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
543.04	HNF-PRO-543 Section 1.4.2.1	Specifications All storage shall be conducted in accordance with an approved CPS.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.05	HNF-PRO-543 Section 1.4.2.2	Operating procedures Methods of storage control and operational practices approved by management shall be described in written procedures. Persons participating in the transfer and storage of material shall be familiar with these procedures.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.06	HNF-PRO-543 Section 1.4.2.3	Storage racks All material shall be stored in racks or equivalent equipment (such as bird cages) capable of securely locating stored material to prevent displacement, to ensure spacing control, and to meet designs for safety under operational and credible accident conditions, according to the requirements established in the criticality safety evaluation document.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.07	HNF-PRO-543 Section 1.4.2.4	Floor storage Floor storage within the storage facility will be permitted only where control of location and other safety requirements (equivalent to those for racks) are inherently provided by the individual containers and their restraints.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.08	HNF-PRO-543 Section 1.4.2.5	Storage in shipping containers Fissionable material in approved shipping containers may be off-loaded and stored unopened in a fissionable material facility within the limitations of the appropriate Department of Transportation container specifications, or DOE or Nuclear Regulatory Commission certificate of compliance. Storage in shipping containers for the purpose of avoiding either DOE 5480.5, Section 13, "Safe Storage for Unirradiated Fissionable Material," or the other storage requirements of this procedure, is prohibited.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.09	HNF-PRO-543 Section 1.4.2.6	Restricted operations in storage areas Process operations, storage of non-nuclear materials or equipment not directly required for storage operations, and all other functions not directly a part of normal storage operations, shall be excluded from the storage area unless the facility is designated as a multipurpose facility.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
543.10	HNF-PRO-543 Section 1.4.2.7	Inspections Documented periodic inspections, in situ tests, and preventive maintenance shall be performed at designated frequencies to ensure that the safety systems, components, and procedures necessary for criticality safety are being properly maintained.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.11	HNF-PRO-543 Section 1.4.2.8	Excess fissionable material Fissionable material in excess of process requirements shall not be construed to be "in process" to avoid the requirements of this procedure.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.12	HNF-PRO-543 Section 1.4.2.9	Access Access to storage areas shall be controlled.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.13	HNF-PRO-543 Section 1.4.2.10	Good housekeeping and control of combustible materials Nonessential combustible materials shall not be stored in the storage area. If presence of significant quantities of combustibles cannot be avoided, a fire protection system shall be installed. Good housekeeping practices appropriate for nuclear criticality safety shall be followed.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.14	HNF-PRO-543 Section 1.4.3.1	Containers Fissionable material shall be stored in securely closed containers meeting criticality safety requirements and designed to provide the maximum practical confinement under accident conditions. Containers of fissile material in areas with sprinkler systems shall be designed so as not to accumulate water or be affected by runoff water.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.15	HNF-PRO-543 Section 1.4.3.2	Labeling All storage containers shall be labeled in accordance with,"Fissionable Material Labeling".	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
543.16	HNF-PRO-543 Section 1.4.4.1	"In Process" material Operations management shall specify which manufacturing, production, or laboratory materials may be termed "in process" and which may not. U. S. Department of Energy-Richland Operations Office and the applicable facility safety organization approvals are required.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.17	HNF-PRO-543 Section 1.4.4.2	Conduct of operations Operations shall be consistent with the approved "in process" material definition for the facility. Materials in excess of "in process" requirements shall be promptly placed in approved storage facilities.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.18	HNF-PRO-543 Section 1.4.5.1	Limit postings Limits for criticality safety shall be posted in conspicuous places near the storage area in accordance with, "Criticality Safety Postings,".	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.19	HNF-PRO-543 Section 1.4.5.2	Signs Signs or other appropriate devices shall be posted at strategic locations to provide instructions for: 1.interpretations of and response to alarms; 2.evacuation routes; and/or 3.combating fires.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
543.20	HNF-PRO-543 Section 1.5	Procedures The operating organization for fissionable material storage facilities or multipurpose facilities shall comply with these requirements for the critically safe storage of fissionable materials. The facility safety organization shall review the operation for compliance with this procedure, in accordance with "Nuclear Criticality Safety Inspections and Appraisals."	HNF-IP-1266 Ch. 5.7 Section 3.B.1.c requires storage of fissionable material per HNF-PRO-543.	
544.01	HNF-PRO-544 Section 1.4.1.1	Work authorization A system shall be in place that uses an approved safety equipment list. Also, a system shall be in place to ensure that the appropriate environmental, safety, and health reviews and approvals are obtained for all work that may impact criticality safety. Criticality safety related work authorization shall also include review by the CSR or an approved alternate CSR and approval by the facility safety organization.	HNF-IP-0842 Volume IV Section 5.2 and Volume V Section 7.1; HNF-IP-1266 Ch. 5.7 Section 3.C.8.c	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
544.02	HNF-PRO-544 Section 1.4.1.2	Safety equipment list Operating organizations shall maintain a safety equipment list that designates all equipment that may impact criticality safety as safety-related equipment. This list shall be approved by the facility safety organization with technical assistance and guidance, as required, from a criticality safety specialist.	HNF-IP-0842 Volume IV Section 5.2 requires the SEL to include the safety SSCs identified in AB documents; there are no criticality-related safety SSCs for TWRS. Note: Maintenance of the SEL may not be funded for FY 1999.	25
544.03	HNF-PRO-544 Section 1.4.1.3	Operational changes All operation changes that impact criticality safety shall be within the scope of an approved Criticality Prevention Specification (CPS). All proposed changes to design or process configuration shall be reviewed by the CSR to ensure that such a change can be performed under an approved evaluation and CPSs. All operational changes that impact criticality safety shall be documented and include proper approval designation.	HNF-IP-1266 Ch. 5.7 Sections 3.B.1, 3.B.2, 3.B.3, 3.C.8	
544.04	HNF-PRO-544 Section 1.4.1.4	Maintenance changes Maintenance procedures and work plans that may impact criticality safety shall be reviewed by the CSR and be approved by the facility safety organization. Maintenance changes to design configuration shall be controlled by a work authorization system that meets the requirements outlined in paragraph 1.4.1.1, of this procedure.	HNF-IP-0842 Volume V Section 7.1; HNF-IP-1266 Ch. 5.7 Section 3.C.8.c	
544.05	HNF-PRO-544 Section 1.4.1.5	Flowsheet changes All flowsheet changes that may have a potential criticality impact require review from the CSR and approval from the facility safety organization, including approvals in compliance with WHC-CM-6-1, Standard Engineering Practices.	HNF-IP-1266 Ch. 5.7 Sections 3.B.1, 3.B.2, 3.B.3, 3.C.8	
544.06	HNF-PRO-544 Section 1.4.1.6	Engineering change notices Engineering change notices that involve systems with a potential criticality impact require review from the CSR and approval from the facility safety organization, including approvals in compliance with WHC-CM-6-1, Standard Engineering Practices.	HNF-IP-1266 Ch. 5.7 Sections 3.B.1, 3.B.2, 3.B.3, 3.C.8	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
544.07	HNF-PRO-544 Section 1.4.1.7	Technical procedure changes All changes to technical procedures that affect criticality safety shall have an approval designator assigned by the originator. The CSR shall review and approve such changes. Procedure change authorization (PCA) forms may be used for a permanent or temporary change to a procedure or other operating document, including a criticality prevention specification. PCAs for a CPS shall have the same approvals as the original CPS.	HNF-IP-0842 Volume I Section 2.11	
544.08	HNF-PRO-544 Section 1.4.2	Criticality safety approval of drawings Engineering approval of drawings involving systems with potential criticality safety impact shall be reviewed by the CSR and approved by the facility safety organization, in compliance with WHC-CM-6-1, Standard Engineering Practices.	HNF-IP-1266 Ch. 5.7 Sections 3.B.2.a.5, 3.B.3.a.2 need rewording to capture this requirement. HNF-IP-0842 Vol. IV Section 3.5	26
544.09	HNF-PRO-544 Section 1.4.3.1	Conceptual design phase During the conceptual design phase of a project, considerations of equipment design shall include the most positive practical method to prevent a criticality accident. The following methods of criticality control are listed in order of decreasing safety assurance: geometrically safe equipment; geometrically favorable equipment; fixed poisons; nuclear blanks; and administrative controls.	HNF-IP-1266 Ch. 5.7 Section 3.B.3.a.3	
544.10	HNF-PRO-544 Section 1.4.3.2	Detailed design phase During the developmental phase, a criticality safety specialist shall provide preliminary guidelines for the geometrically safe and favorable dimensions and location, composition, and distribution of fixed poisons that must be determined before construction, upon request. Approval for deviations from the order of criticality controls listed in the conceptual design phase (5.3.1 above) shall be approved by the facility safety organization before construction begins. All design changes that may impact criticality safety that occur during the final design phase shall have approval of the facility safety organization with technical assistance and guidance, as needed, from a criticality safety specialist. Dimensions vital criticality safety shall be identified in accordance with WHC-CM-6-3, Drafting Standards Manual.	HNF-IP-1266 Ch. 5.7 Section 3.B.3.a needs expansion to incorporate this requirement	27

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
544.11	HNF-PRO-544 Section 1.4.3.3	Construction phase Those pieces of equipment which require verification of specific "as-built" and location dimensions shall be identified. Those pieces so identified shall be verified by the facility quality control organization.		28
544.12	HNF-PRO-544 Section 1.4.3.4	Criticality safety evaluation requirements All facilities controlled by this procedure standard shall have fissionable material controlled by a CPS and the supporting criticality safety evaluation. (Isolated facilities do not require a CPS.)	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.g, 3.C.1.b	
544.13	HNF-PRO-544 Section 1.4.3.5	Drawing change control Changes to engineering drawings with criticality safety impact shall be reviewed by the CSR and approved by the facility safety organization, in compliance with WHC-CM-6-1, Standard Engineering Practices. Dimensions vital to criticality safety shall be identified in accordance with WHC-CM-6-3, Drafting Standards Manual.	HNF-IP-1266 Ch. 5.7 Section 3.C.8 requires these reviews and approvals for design changes and modifications with criticality safety impacts. HNF-PRO-242, Engineering Drawing Requirements, states that all drawings prepared by or for the PHMC shall be in accordance with ICF KH A-E Standard General Manual, Sections GG-DWG-001 through -004.	29
544.14	HNF-PRO-544 Section 1.4.3.6	Verification of design limits Quality Control shall verify compliance with all design limits as specified in design documentation, as requiring verification for criticality safety.	Not found in a TWRS document.	30
544.15	HNF-PRO-544 Section 1.5	Procedures When a design or process configuration change is anticipated, the facility CSR shall be contacted. The CSR shall coordinate criticality safety review of the change and shall ensure the proper documentation and approvals are obtained. When a new facility is to be constructed or an old facility is to be modified and a CSR is not assigned to the project, then the facility safety organization, with assistance from a criticality safety specialist, shall provide criticality safety support and ensure that proper documentation and approvals are obtained.	HNF-IP-1266 Ch. 5.7 Sections 3.B.8.e and 3.C.8.f	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
545.01	HNF-PRO-545 Section 1.4.1.1	General requirements Onsite movement of fissionable materials requires that the nuclear criticality safety criteria be met prior to any such movement. All intra-area movements within Westinghouse Hanford Company (WHC) shall comply with the limits of an approved criticality prevention specification (CPS) and WHC-CM-2-14 exception: Any transportation container DOT approval (or a certificate of compliance from the DOE or Nuclear Regulatory Commission [NRC]) is accepted for the specified fissionable material and under the conditions given by the approval agency. Where a fissionable material shipment originates on the Hanford Site but was originally received from another contractor, an implied condition of acceptance by WHC is that adequate controls for criticality prevention during packaging, loading, and transport were established by the contractor. In addition, sufficient information should have been transmitted to WHC to ensure that limits and requirements of the CPS are met during receipt and unloading. A CPS must be used for loading shipping containers.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	
545.02	HNF-PRO-545 Section 1.4.1.2	Exempt quantities Exempt quantities may be shipped in containers that have not been reviewed for criticality safety. These shipments must, however, be in accordance with both shipping and receiving facility fissionable material limits and other radioactive material limits and restrictions (e.g., operational safety requirements SARP).	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
545.03	HNF-PRO-545 Section 1.4.2	Transportation within a limited area Movement of fissionable material in excess of an exempt quantity within a limited area, shall conform to either of the following: 1.Movement shall be made in containers which have a valid certificate of compliance approved by the NRC/DOE (or a valid DOT specification) and packaged/transported in accordance with the authorizing documentation (see Item 2 below). 2.If the use of containers in Item 1 is not economically or technically practical, the movement of fissionable material shall be governed by a CPS and a SARP containing administrative and engineering controls, as necessary, to meet the Project Hanford contingency philosophy considering the transport environment and credible accidents which may occur. In both cases, the container and associated administrative controls shall be reviewed and approved by the facility safety representative.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	
545.04	HNF-PRO-545 Section 1.4.3	Transportation between limited areas Movement of fissionable material in excess of an exempt quantity between limited areas, shall conform to either of the following: 1.The criticality safety requirements for transportation between limited areas are the same as those in item 1.4.2 of this procedure, except for reusable containers which do not have a valid certificate of compliance or DOT authorization and cannot be so certified because of design deficiencies (see Item 5.3(2) below). 2.For such reusable containers, specific approval shall be obtained from WHC Safety and RL, and any design or administrative controls in lieu of container design features required to provide adequate safety shall also be approved. Only approved type A, type B, or fissionable single-trip containers and movements do not require RL approval; however, a CPS controlling the movement shall be required.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
545.05	HNF-PRO-545 Section 1.4.4	Offsite shipments Criticality safety requirements for off-site shipment of fissionable material shall be satisfied by making such shipments only in containers and by methods in accordance with the requirements of DOE 5480.3, Safety Requirements for the Packaging and Transportation of Hazardous Materials, Hazardous Substances, and Hazardous Wastes, and Title 49, Code of Federal Regulations, Parts 171-179. Loading of the shipping containers shall controlled by CPS and implemented by written procedures approved by the manager of the independent safety review organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	
545.06	HNF-PRO-545 Section 1.5	Procedures The shipping organization shall comply with these requirements for the critically safe packaging and transportation of fissionable materials. Notification to the CSR of incoming or outgoing shipments is encouraged.	HNF-IP-1266 Ch. 5.7 Section 3.C.1.c requires onsite and offsite transportation of fissionable material to be in accordance with HNF-PRO-545.	
546.01	HNF-PRO-546 Section 1.2	Scope. The criticality alarm system (CAS) requirements apply to any operation or facility which handles, stores, processes and transports fissionable material in quantities under conditions that an accidental criticality is credible.	As documented in BIO 5.3.2.1, an accidental criticality is not credible at TWRS, and a CAS is not required. Therefore HNF-PRO-546 is not applicable to TWRS.	
547.01	HNF-PRO-547 Section 1.2	Scope This procedure applies to all Project Hanford facilities containing fissionable materials where it has been determined there is a potential for a criticality accident that could be caused by firefighting activities.	BIO Section 5.3.2.1 and the CSERs state that a criticality in Tank Farms is not a credible scenario; the CPSs state that firefighting is not restricted. It is concluded that this procedure is not applicable to TWRS.	
548.01	HNF-PRO-548 Section 3.0	Procedures for periodic inspections and annual assessments The following procedure addresses the facility inspection plan and summarizes the requirements for all inspections and assessments.	NA; header and intro	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.02	HNF-PRO-548 Section 3.0(1)	(Facility Manager) Write a plan for inspections and assessments of sufficient depth to validate that the facility is following the requirements of the Project Hanford criticality safety program (HNF-PRO-334, Rev 1, Section 2.0).	HNF-IP-1266 Ch. 5.7 Sections 3.B.1.i, 3.C.11	
548.03	HNF-PRO-548 Section 3.0(2)	(Facility Manager) Ensure that periodic internal inspections are conducted in accordance with the following frequencies: Monthly inspections for Fissionable Material Facilities Quarterly inspections for Isolated and Limited Control Facilities Note: In addition, informal walkthrough inspections should be considered during times of frequent fissionable material movements.	Not compliant. HNF-IP-1266 Ch. 5.7 Section 3.C.11.a.1 requires semi-annual internal inspections of limited control facilities. Section 3.C.1.b.5 requires periodic inspections according to HNF-PRO-548; this is an apparent contradiction.	31
548.04	HNF-PRO-548 Section 3.0(3)	(Facility Manager) Determine and document the need for periodic independent inspections at a frequency based on the criticality accident risk and level of work activity with fissionable material. Ensure that the individual(s) conducting the inspection is independent of the Operation Organization. Quarterly inspections are recommended in active fissionable material facilities, and semiannual inspections are recommended for isolated and limited control facilities.	HNF-IP-1266 Ch. 5.7 Section 3.C.11 provides requirements only for internal Operations inspections. No documentation of the need for (or justification for not requiring) independent inspections can be found.	31
548.05	HNF-PRO-548 Section 3.0(4)	(Facility Manager) Ensure that an independent assessment of sufficient depth to validate that the facility is following the requirements of the Project Hanford criticality safety program is performed annually (once within a calendar year). Ensure that the personnel performing the assessment are independent of the Operating Organization. Ensure that a criticality safety specialist is a member of the assessment team.	Not compliant. HNF-IP-1266 Ch. 5.7 Section 3.C.1.b.5 requires periodic inspections according to HNF-PRO-548, but Section 3.C.11 provides requirements only for internal Operations inspections.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.06	HNF-PRO-548 Section 3.0(5)	(FSR, CSR, or QA) Review the facility inspection plan annually, or, when changes to the facility or plan are made, and provide recommendations to facility manager.		31
548.07	HNF-PRO-548 Section 3.1	Periodic internal inspections The following procedure states the guidelines for performing periodic criticality safety inspections by personnel internal to the Operating Organization. The facility CSR, or alternate CSR, usually conduct these inspections. However, the FSR and other personnel internal to the Operating Organization may be designated.	HNF-IP-1266 Ch. 5.7 Section 3.C.11.	
548.08	HNF-PRO-548 Section 3.1(01)	(Inspector) Conduct formal periodic inspections in accordance with the facility specific inspection plan, and at the frequencies specified in Section 3.0.	Not compliant. HNF-IP-1266 Ch. 5.7 Section 3.C.11.a.1 requires internal inspections of limited control facilities at frequencies not compliant with Section 3.0.	31
548.09	HNF-PRO-548 Section 3.1(02)	(Inspector) Prepare checklist or procedure for inspections.	HNF-IP-1266 Ch. 5.7 Section 3.B.1.i lists preparation of the procedure or checklist as a responsibility of the facility manager; the inspector is usually the CSR.	31
548.10	HNF-PRO-548 Section 3.1(03)	(CSR) Review the checklist to ensure that criticality safety issues are adequately addressed.		31
548.11	HNF-PRO-548 Section 3.1(04)	(Inspector) Perform inspections in accordance with the prepared checklist. Negative responses and special problems on the checklist must b described or explained. Special emphasis should be placed on areas where fissile material handling activities take place and accessible fissionable material is stored.		31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.12	HNF-PRO-548 Section 3.1(05)	(Inspector) A specific format for recording the results of an inspection is not required; however, the following items are required: Date Name of inspector Area or activities inspected Status of items found on previous inspections New items for correction Signature of the inspector	HNF-IP-1266 Ch. 5.7 Section 3.C.11.a.2	

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.13	HNF-PRO-548 Section 3.1(06)	(Inspector) Address the following questions, as appropriate to the operation being inspected. a. Has corrective action been taken on previously identified deficiencies? b. Is fissionable material being handled, stored, or processed according to established procedures and criticality prevention specification (CPS) requirements? c. Are the criticality safety limits and controls posted at necessary locations and in the proper format? d. Are the criticality safety limits and controls appropriate, based on observations and discussions with operating personnel either during the inspection or at other times during the inspection period? e. Is the fissionable material correctly labeled and inventoried? f, Are the correct firefighting symbols properly displayed? g. Are combustibles or other accumulations which may contain fissionable material minimized? h. Are hood and glovebox visibility adequate, and lighting appropriate to maintain criticality safety? I. Are appropriate measurement or detection methods used to ensure limits are not exceeded?		31
548.14	HNF-PRO-548 Section 3.1(07)	(Inspector) During or immediately following the inspection, notify the appropriate organization management of any serious deficiency observed.	HNF-IP-1266 Ch. 5.7 Section 3.C.11.a.3 requires distribution of the inspection report to the organization management, but does not specify how quickly the distribution should be made.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.15	HNF-PRO-548 Section 3.1(08)	(Inspector) Nonconformances with criticality safety limits shall be reported in accordance with HNF-PRO-549, "Criticality Safety Nonconformance Response". In recommending corrective actions, consider the frequency of the deviation and whether a systemic problem is indicated.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 requires recovery steps including notifications in accordance with HNF-PRO-549.	
548.16	HNF-PRO-548 Section 3.1(09)	(There is no Step 9 in the procedure)	NA; placeholder note	
548.17	HNF-PRO-548 Section 3.1(10)	(Inspector) Distribute inspection report within 30 days of the inspection, as a minimum, to: Facility manager Facility safety representative Criticality Safety Representative HNF-PRO-548 Technical Authority	HNF-IP-1266 Ch. 5.7 Section 3.C.11.a.3 requires distribution of the inspection report to the operating organization management (facility manager), the independent safety review organization manager (FSR), the CSR, and the criticality analyst, but not the PRO-548 technical authority. There is no requirement for how quickly the distribution should be made.	31
548.18	HNF-PRO-548 Section 3.1(11)	(Facility manager) Retain inspection report according to the facility records retention plan.	HNF-IP-1266 Ch. 5.7 Section 3.C.11	
548.19	HNF-PRO-548 Section 3.1(12)	(Facility manager) Ensure copies of inspection reports are available for review during the annual assessment, and also for review of trending for nonconformances.	HNF-IP-1266 Ch. 5.7 Section 3.C.11	
548.20	HNF-PRO-548 Section 3.1(13)	(Facility manager) When corrective action is recommended, reply to the inspection within 10 days of receiving the inspection report.	HNF-IP-1266 Ch. 5.7 Section 3.C.11 requires prompt responses, but does not specify a time limit. Section 3.B.1.i requires compliance with HNF-PRO-548.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.21	HNF-PRO-548 Section 3.1(14)	(Facility manager) In the reply, list the corrective actions taken or planned and their estimated completion dates.		31
548.22	HNF-PRO-548 Section 3.1(15)	(Facility manager) Ensure that all open items entered on the appropriate facility action item tracking system.		31
548.23	HNF-PRO-548 Section 3.1(16)	(CSR) When the action is satisfactorily completed, close the action on that item with a statement in the next inspection report.		31
548.24	HNF-PRO-548 Section 3.2	Periodic independent inspections The following procedure states the guidelines for performing periodic criticality safety inspections by personnel independent of the Operating Organization. Note that these inspections are recommended, but not required. The Facility Safety Representative usually conducts these inspections. However, other personnel that are independent of the Operating Organization may be designated.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.25	HNF-PRO-548 Section 3.2(1)	Inspector Conduct periodic inspections in accordance with the facility specific inspection plan.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.26	HNF-PRO-548 Section 3.2(2)	Facility Manager Give the facility safety representative access to all portions of the facility that are safe to enter for inspection and to all pertinent records of the criticality safety program for review.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.27	HNF-PRO-548 Section 3.2(3)	Inspector Use On-the-spot inspections during times of physical or procedural changes in operations that affect criticality safety. NOTE: On-the-spot inspections should be unannounced, and the times should be chosen randomly.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.28	HNF-PRO-548 Section 3.2(4)	Inspector Upon arrival at the facility being inspected, contact the CSR or the building administrator to inform them of the inspection.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.29	HNF-PRO-548 Section 3.2(5)	Assess criticality safety in sufficient depth to provide assurance that the facility is being operated within the proper category of criticality safety control, that inspection programs are functioning properly, and that good nuclear safety practices are in effect. As a minimum, address the topics covered in Section 3.1, Item 6, to validate the effectiveness of the internal inspection program and whether corrective actions have been completed.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.30	HNF-PRO-548 Section 3.2(6)	Document any noncompliances in a report to the operating organization.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.31	HNF-PRO-548 Section 3.2(7)	If an unsafe condition exists in facility, immediately report it to facility operation management.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.32	HNF-PRO-548 Section 3.2(8)	Discuss comments and recommendations with the CSR or the building administrator at the conclusion of the inspection.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.33	HNF-PRO-548 Section 3.2(9)	CSR Interface with inspection and assessment teams to coordinate activities and respond to and process resolution of criticality safety concerns.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.34	HNF-PRO-548 Section 3.2(10)	Enter unresolved noncompliances into the tracking system.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.35	HNF-PRO-548 Section 3.2(11)	Notify FSR when noncompliances are resolved.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31
548.36	HNF-PRO-548 Section 3.2(12)	Facility manager Ensure corrective action is taken to resolve noncompliances.	HNF-IP-1266 Ch. 5.7 does not address independent inspections.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.37	HNF-PRO-548 Section 3.3	Annual independent assessments The following procedure states the guidelines for performing annual (once within a calendar year) criticality safety assessments by personnel independent of the Operating Organization. Note that a criticality safety specialist, who is not a member of the operating organization being assessed, shall be included on the assessment team.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.38	HNF-PRO-548 Section 3.3(1)	Inspector Conduct formal annual criticality safety assessments at facilities containing more than exempt quantities of fissionable material to verify compliance with the Project Hanford criticality safety program (HNF-PRO-334, Rev 1, Section 2).	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.39	HNF-PRO-548 Section 3.3(2)	Inspector Include the following topics as they apply to the facility: a. Compliance with criticality safety related technical safety requirements (TSRs) or other aspects of the facility safety bases. b. Internal administrative practices (assessments and inspections, training, including job-specific training and records c. Changes to: CPSs and postings Criticality safety evaluation reports (CSERs) Operating procedures that affect criticality safety Facility safety analysis report (SAR) and supplemental documents d. Prefire plan e. Organization and staffing f. Compliance with PHMC nuclear criticality safety policies and procedures (See HNF-PRO-334, Rev 1, Section 2.0). g. Modifications to the facility and equipment having criticality safety significance h. Occurrences or events relating to criticality safety	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.40	HNF-PRO-548 Section 3.3(3)	Also consider the trend of criticality safety related occurrences in making a subjective evaluation of the effectiveness of the criticality safety program.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.41	HNF-PRO-548 Section 3.3(4)	Make recommendations for changes within the plant or within the criticality safety system as appropriate.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
548.42	HNF-PRO-548 Section 3.3(5)	During the assessment, observe fissionable material operations if practical, and inspect storage areas within the facility for: - Conformance with and applicability of CPS limits and controls - Moderator restrictions - Fissionable material inventory records - Posting and labeling of fissionable material - Posting of firefighting categories	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.43	HNF-PRO-548 Section 3.3(6)	Report conditions in writing to Facility Manager.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.44	HNF-PRO-548 Section 3.3(7)	Facility Manager When corrective action is recommended, reply to the inspection within 10 days of receiving the inspection report.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.45	HNF-PRO-548 Section 3.3(8)	Facility Manager In the reply, list the corrective actions taken or planned and their estimated completion dates.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.46	HNF-PRO-548 Section 3.3(9)	Have all open items entered on the appropriate facility action item tracking system.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.47	HNF-PRO-548 Section 3.3(10)	When the action is satisfactorily completed, close the action on that item.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
548.48	HNF-PRO-548 Section 3.3(11)	Ensure records of the assessments are maintained.	HNF-IP-1266 Ch. 5.7 does not address independent assessments.	31
549.01	HNF-PRO-549 Section 1.4.1 (NOTE)	Immediate actions NOTE: IF A CRITICALITY HAS OCCURRED OR A POTENTIAL EXISTS FOR CRITICALITY REFER TO "CRITICALITY OR POTENTIAL CRITICALITY ACCIDENT".	0842 occurrence reporting or nonconformance response procedure	32

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
549.02	HNF-PRO-549 Section 1.4.1	Employee/On-Scene Manager If a known or suspected CPS nonconformance occurs, take the following actions: For a general condition and static systems: a. Leave the system as found and secure. b. Evacuate the immediate area if appropriate. Lock or cordon off the immediate location to prevent unauthorized reentry. c. Post warning signs at appropriate locations stating that permission from the operating organization's manager is required to enter the area. Additional instructions for a dynamic system: a. Take only those actions necessary to stabilize or maintain the safety of the system. b. Do not shut down equipment until it is determined that the actions can be performed safely.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.03	HNF-PRO-549 Section 1.4.2(1)	Employee/On-Scene Manager Immediately notify the responsible manager of any suspected nonconformance.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.04	HNF-PRO-549 Section 1.4.2(2)	Employee/On-Scene Manager Notify the CSR and obtain other technical assistance as required to determine if a nonconformance has occurred.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
549.05	HNF-PRO-549 Section 1.4.2(3)	Unless it can be immediately determined that no nonconformance has occurred, make notifications as required and include: - Manager of the operating organization - Manager of the facility safety organization - Manager of FDH Nuclear Safety - Building Emergency Director/Administrator (if different from the operating manager) - FDH Facility Project Director - Manager of the facility engineering support organization - Manager of the facility radiological control organization	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.06	HNF-PRO-549 Section 1.4.2(4)	Responsible manager Report the nonconformance per the occurrence reporting requirements.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.07	HNF-PRO-549 Section 1.4.2(5)	With the technical assistance of appropriate safety and engineering organizations, evaluate the situation to determine the appropriate method of recovery and if a formal recovery plan is required.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.08	HNF-PRO-549 Section 1.4.2(6)	When a CPS limit may have been breached and recovery could increase reactivity, prepare a written recovery plan to restore the situation to an in-limit condition and to implement any required temporary corrective action.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.09	HNF-PRO-549 Section 1.4.2(7)	If the nonconforming condition no longer exists at the time the nonconformance is declared, verify that the current situation is within limits and document these verifications and list any actions taken.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
549.10	HNF-PRO-549 Section 1.4.2(8)	Have the recovery plan reviewed and approved by: - Manager of the operating organization - Manager of the facility radiological control organization - Manager of the facility safety organization - Criticality Safety Representative - Facility Engineering manager	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.11	HNF-PRO-549 Section 1.4.3(1)	Recovering from a nonconformance Responsible manager Perform recovery actions. Ensure that the written plan is followed and any deficiency in equipment or administrative controls is corrected.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.12	HNF-PRO-549 Section 1.4.3(2)	Facility safety organization manager Following restoration to conditions within the CPS requirements, inspect the area or system, if appropriate, before concurrence to resume operations is given.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.13	HNF-PRO-549 Section 1.4.3(3)	Obtain approvals to lift the administrative hold from facility management and the manager of the facility safety organization. NOTE: For violations or other severe noncompliances, additional approvals (which may include DOE) or official restart/readiness review procedures may be needed.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.14	HNF-PRO-549 Section 1.4.4(1)	Performing corrective actions Responsible manager Determine short-term corrective action necessary to ensure safe continued operation	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.15	HNF-PRO-549 Section 1.4.4(2)	Document short-term corrective action prior to restarting operations. NOTE: Documentation may be included in the recovery plan.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
549.16	HNF-PRO-549 Section 1.4.4(3)	At the discretion of the facility Director or Manager, appoint a team to review of the cause(s) of the nonconformance and develop a long-term (permanent) corrective action plan.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.17	HNF-PRO-549 Section 1.4.5(1)	Documenting the nonconformance CSR Document the technical basis for the evaluation of the nonconformance.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.18	HNF-PRO-549 Section 1.4.5(2)	Identify nonconformances in order of increasing severity as: infraction, violation, near criticality per definitions in the glossary.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.19	HNF-PRO-549 Section 1.4.5(3)	Have documentation reviewed and approved by the manager of the facility safety organization.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.20	HNF-PRO-549 Section 1.4.5(4)	Perform a critique of the noncompliance, if appropriate, and distribute throughout the site as lessons learned.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
549.21	HNF-PRO-549 Section 1.4.5(5)	Keep documentation of actions taken in support of recovery from a CPS infraction or violation in compliance with records handling and retention procedures.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	32
550.01	HNF-PRO-550 Section 1.3.1.1	(Employees) IF there is a criticality accident: a. Immediately evacuate all areas of the affected facility. b. Follow standard facility emergency procedures. c. Take no action to disarm or terminate a criticality except as outlined in this procedure. NOTE: For suspected false criticality alarms, follow the specific recovery procedures for that facility.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
550.02	HNF-PRO-550 Section 1.3.1.2	(Employees) IF there is a potential criticality (When no known reliable mechanisms to prevent criticality are functional, or it is determined during the course of a criticality safety nonconformance investigation that a criticality could occur) a. Initiate an emergency alert. b. Evacuate the affected area in an orderly manner, according to standard facility emergency procedures.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.03	HNF-PRO-550 Section 1.3.1.3	(On-Scene/Facility Manager) Declare an emergency, make appropriate notifications, and notify the building emergency director.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.04	HNF-PRO-550 Section 1.3.1.4	(Building Emergency Director) Form a task team, with an appointed leader from the responsible facility/operations management and reporting directly to you, to assess the potential hazards and determine the method for disassembly, disarming, or terminating the nuclear chain reaction.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.05	HNF-PRO-550 Section 1.3.1.5	(Building Emergency Director) Include the following people on the task team: The facility Criticality Safety Representative At least one nuclear criticality safety specialist At least one engineer from the appropriate facility safety organization Cognizant manager from the radiological control organization Operating manager of the affected operation Manager of the appropriate engineering support group	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.06	HNF-PRO-550 Section 1.3.2.1	(Task Team) Evaluate the current status - If immediate remedial action is required, provide guidance to the area emergency commander/ECC.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33

Table C-1. Matrix of Hanford Site (HNF-PRO) Requirements to TWRS Implementing Documents (72 Sheets)

Reqmt. #	Requirement Identification	Requirement Text	TWRS implementing document	Action #
550.07	HNF-PRO-550 Section 1.3.2.2	(Task Team) Provide the building emergency director with technical advice and recommendations regarding recovery actions. NOTE: The CSR, the nuclear criticality safety specialist, and the facility safety engineer(s) shall concur in any recommended action affecting the system reactivity.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.08	HNF-PRO-550 Section 1.3.2.3	(Event Commander/ECC) Order direct action to disarm or terminate a critical or potentially critical system based on recommendations from the task team.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.09	HNF-PRO-550 Section 1.3.2.4	(Leader of the task team) Obtain the services of other specialists from within (or outside) the company, as needed to complete the task.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.10	HNF-PRO-550 Section 1.3.2.5	(Task team) Prepare detailed written procedures for recovering safely from the hazard.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33
550.11	HNF-PRO-550 Section 1.3.2.6	(Event Commander/ECC) Direct actions to recover from criticality according to task team procedures.	HNF-IP-1266 Ch. 5.7 Section 3.C.12 CPS-T-149-00010 HNF-IP-0842?	33

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