S

MAY 17 2000

ENGINEERING DATA TRANSMITTAL

1. EDT 628378

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Process Engineering	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: Criticality Safety /Technical Operations/Process Engineering	6. Design Authority/ Design Agent/Cog. Engr.: E. V. Weiss	7. Purchase Order No.: N/A
8. Originator Remarks: This document is being released into the supporting document system for retrievability purposes.		9. Equip./Component No.: N/A 10. System/Bldg./Facility:
11. Receiver Remarks: For release. 11A. Design Baseline Document? [] Yes [X] No		12. Major Assm. Dwg. No.: N/A 13. Permit/Permit Application No.: N/A 14. Required Response Date: 05/16/00

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	RPP-6384	N/A	0	Nuclear Criticality Safety Requirements Implementation Matrix for Tank Farms	NA	2	1	1

16. KEY

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

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (M) MSIN (L) Date	(G) Reason	(H) Disp.	(J) Name (K) Signature (M) MSIN (L) Date
		Design Authority			
		Design Agent			
2	1	Cog.Eng. E. V. Weiss 5-16-2000			K. Fowler 5/17/00
2	1	Cog. Mgr. C. DeFigh-Price 5-16-2000			
		QA			
		Safety			
		Env.			

18. A.E. Young 5-17-00 Signature of EDT/Date Originator	19. N. W. Kirch 5/17/00 Auth.Representative/Date for Receiving Organization	20. N. W. Kirch 5/17/00 Design Authority/Date Cognizant Manager	21. DOE APPROVAL (if required) Ctrl. No. [] Approved [] Approved w/comments [] Disapproved w/comments

BD-7400-172-2 (05/96) GEF097

Nuclear Criticality Safety Requirements Implementation Matrix for Tank Farms

E. E. Weiss
CH2M HILL Hanford Group, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: EDT-628378 UC: 2070
Org Code: 74B50 CACN/COA: 101965/A020
B&R Code: EW 3120074 Total Pages: 50

Key Words: Criticality Safety Requirements, CSR

Abstract: This document provides a detailed matrix of specific Tank Farms nuclear criticality safety program elements indexed to primary requirements documents. These requirements are collected at a highter level in HNF-SD-MP-SRID-001, "Tank Waste Remediation System Standards/Requirements Identification Document." The intended use of this document is to provide a roadmap for implementing procedures and assessments.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

5/17/00
Release Approval Date

DATE: HANFORD RELEASE ID:
STA. 4 2
MAY 17 2000
Release Stamp

Approved for Public Release

NUCLEAR CRITICALITY SAFETY REQUIREMENTS IMPLEMENTATION MATRIX FOR TANK FARMS

Evelyn V. Weiss

May 2000

EXECUTIVE SUMMARY

This document provides a detailed matrix of specific Tank Farms nuclear criticality safety program elements indexed to primary requirements documents. These requirements are collected at a higher level in HNF-SD-MP-SRID-001, Tank Waste Remediation System Standards/Requirements Identification Document. *The intended use of this document is to provide a roadmap for implementing procedures and assessments.*

This page intentionally left blank

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION 5

1.1 PURPOSE 5
1.2 BACKGROUND 5
1.3 ROLES AND RESPONSIBILITIES 6
1.4 REQUIREMENTS MATRIX 6

2.0 REQUIREMENTS MATRIX 8

3.0 REFERENCES 48

This page intentionally left blank

1.0 INTRODUCTION

1.1 Purpose

This document provides a detailed matrix of specific Tank Farms nuclear criticality safety program elements indexed to primary requirements documents. These requirements are collected at a higher level in HNF-SD-MP-SRID-001, *Tank Waste Remediation System Standards/Requirements Identification Document* (S/RID). The intended use of this document is to provide a roadmap for implementing procedures and assessments.

The matrix itemizes S/RID compliance items directly related to nuclear criticality safety. Although the primary Department of Energy (DOE) directive related to nuclear criticality safety (DOE 5480.24, *"Nuclear Criticality Safety"*) has been superceded by topical inclusion in DOE 420.1 "*Facility Safety*," the approved S/RID includes compliance with DOE 5480.24 along with requirements of American National Standards Institute/American Nuclear Society (ANSI/ANS) Series 8 standards of the revision referenced in DOE 5480.24.

The matrix in this document is an update of a tables found in TWR-3721, *Tank Waste Remediation System Nuclear Criticality Safety Program Management Review,* Appendix B, and document 9454500, *"Tank Farms Compliance Assessment and Implementation Plan for DOE Order 5480.24 Nuclear Criticality Safety,"* (referenced in Internal Memo, E. J. Lipke to T. C. Geer, "Criticality Compliance," September 3, 1997, DE&S Hanford). The update provides current implementing references and removes safety analysis requirements for which compliance is provided in other Tank Farms programs.

1.2 Background

CH2MHill Hanford Group, Inc. (CHG) manages the Hanford Tank Farms portion of the River Protection Project for the DOE Office of River Protection. The Tank Farms nuclear criticality safety program applies to activities associated with the safe receipt, transfer and storage of waste in Tank Farms 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 current Tank Farms mission is to continue to safely store 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 Tank Farms in a manner that complies with environmental regulations and minimizes public and worker risk.

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 fissionable material in the waste tanks is distributed at subcritical concentrations with excess neutron absorbers present, and that no mechanisms exist to concentrate the fissile material to result in an accidental nuclear criticality. Related accident analyses are documented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report* (FSAR). Section 6.3.2 of the FSAR states that a criticality accident in the Tank Farms is not credible for operations discussed in that document, and that the facility is classified for the purposes of nuclear criticality safety as a Limited Control Facility. The Tank Farms 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. Controls for the program are discussed in HNF-SD-WM-TSR-006, *Tank Waste Remediation System Technical Safety Requirements, Administrative Control 5.7, "Nuclear Criticality Safety."* The program is described in HNF-IP-1266, *Tank Farms Operations Administrative Controls*, Chapter 5.7, "Nuclear Criticality Safety."

1.3 Roles and Responsibilities

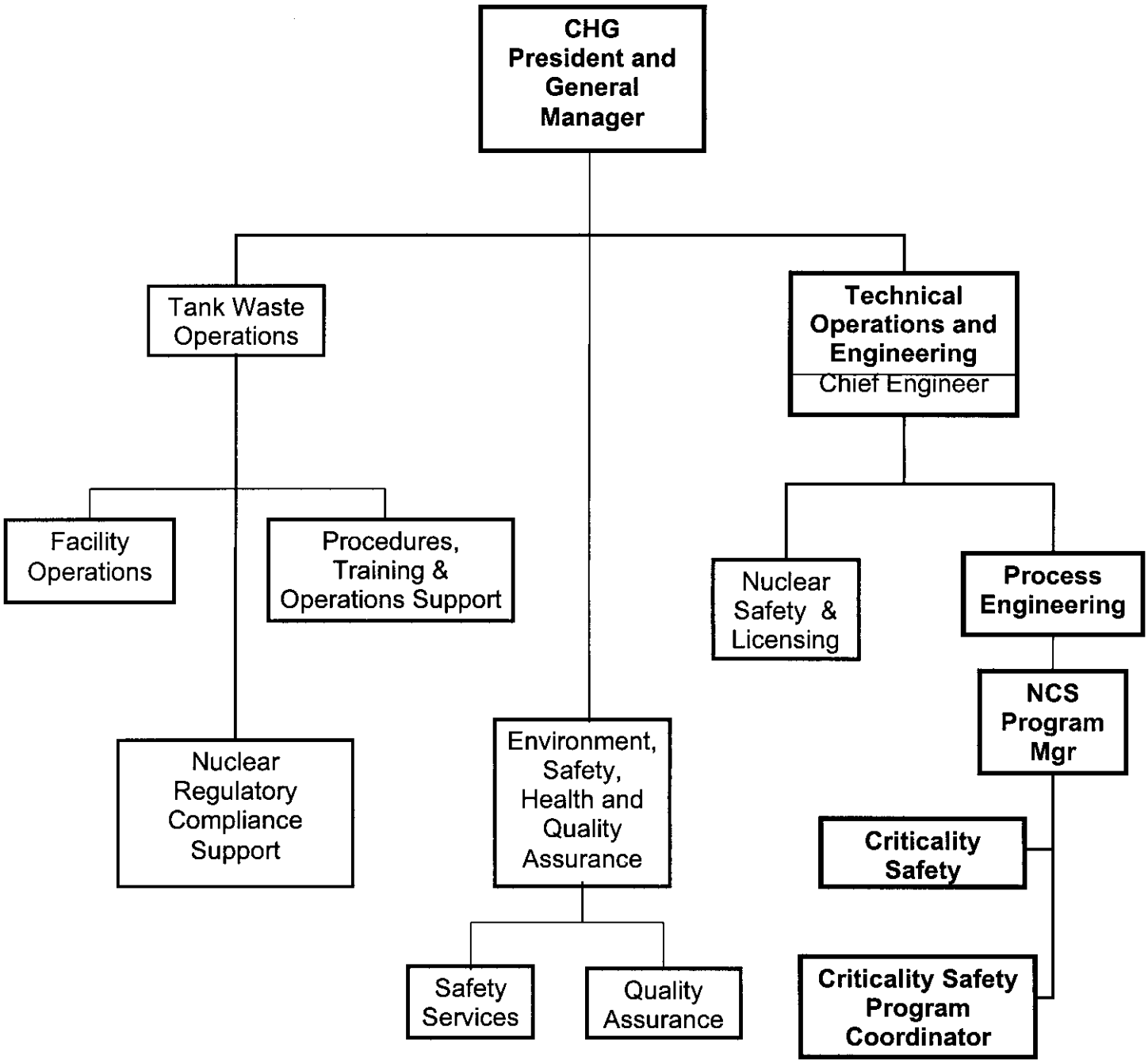
The criticality safety program at Tank Farms is focused on maintaining the facility status as a Limited Control Facility. Organizationally, the program manager and Criticality Safety Representative (CSR) report to the facility manager from within the engineering function. The functional organization chart is shown in Figure 1 below.

1.4 Requirements Matrix

The detailed matrix of requirements versus implementing documents is shown in Table 1 later in this document. The table is organized to show:

- Item – a sequential number for ease of reference
- Requirements Identification -- where each individual requirement is captured in either the Tank Farms S/RID document or the ANSI/ANS Standard derived from a DOE directive. In a few cases toward the end of the table, this column is used to cite an S/RID paragraph.
- Requirement Source -- in general a paragraph within a DOE directive, in a few cases shows the Tank Farms source document for a derivative requirements (for example, a Technical Safety Requirement (TSR) which refers back to the FSAR).
- Requirement Text – a brief quote from the requirements document
- RPP Implementing Document – the document number, and in most cases, the section in which each requirement is implemented.
- Comment – additional text describing the way in which Tank Farms complies with a requirement or a reason why the requirement is not applicable.

Figure 1. Tank Farms Nuclear Criticality Safety Program
Functional Organization



Update: 4/24/2000

2.0 Requirements Matrix

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
1	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR (HNF-SD-WM-SAR-067) 6.3.2 TSR AC 5.7 HNF-IP-1266 Ch 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	FSAR 6.3.2 describes the criticality accident analysis. The TSR provides administrative controls that preserve the conditions of the FSAR analysis.
2	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 6.3.2 TSR AC 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	FSAR 6.3.2 describes the analysis that serves as the basis for criticality safety. No criticality requirements for RPP resulted in LCOs., The TSR provides administrative controls that preserve the conditions of the FSAR analysis.
3	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 2.0, FSAR 6.3.2, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	The FSAR 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.
4	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 6.3.2, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	Addressed in the FSAR and comprehensively addressed in FSAR references, especially the CSERs.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
5	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 6.3.2, HNF-IP-1266 Ch. 5.7 Sec. 3.C.5.a HNF-IP-0842, Vol. IV, Sec. 6.4	The FSAR provides descriptions of the basic numeric elements and processes. The program description and implementing procedure provide detailed limits.
6	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 6.3.2, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	FSAR 6.3.2 addresses waste receipts from non-Tank Farms sources and the evaporators, and supernate transfers between tanks. Transfers of solids or sludge between tanks, and transfers through the RCSTS, are evaluated separately.
7	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 7.c.(5)	"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."	FSAR 6.3.2, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	The FSAR provides a full accident analysis, even though a criticality accident is not considered credible. Tank Farms was determined to meet criteria as a Limited Control Facility, hence a CAS is not required.
8	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 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."	FSAR 6.3.2, TSR AC 5.7, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	Descriptions of pertinent administrative controls are provided in the FSAR and the TSR. Physical controls are not required due to Tank Farms status as a Limited Control Facility.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
9	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 7.c.(7)	"A description of the installed CAS and emergency procedures, including alarm levels, failt-safe features, response time of devices, and frequency of evacuation drills. Pertinentn documents shall show the location of all detectors, their distance to possible sources of criticality, and intervening shielding and audio and visual alarms."	NA	In t he FSR, Tank Farms was determined to meet criteria as a Limited Control Facility, hence a CAS is not required.
10	S/RID 18.3.1 Safety Analysis Report	DOE5480.24 Sec. 7.c.(8)	"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.""	FSAR 4.12 HNF-IP-0842, Vol. IV, Sec. 6.5	The FSAR contains a thorough discussion in Chapter 6 of the QA program and its applicability to criticality safety. Author's Note: DOE5700.6C has been superceded by text contained in 10 CFR 830, Nuclear Safety Management
11	Deleted (another program)				

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
12	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	"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: ANSI/ANS 8.1 ANSI/ANS 8.3 ANSI/ANS 8.5 ANSI/ANS 8.7 ANSI/ANS 8.15 ANSI/ANS 8.19	FSAR 4.3, HNF-IP-1266 Ch. 5.7	FSAR Sec. 4.3 states that the criticality protection program complies with DOE 5480.24 and industry standards. IP-1266, CH. 5.7 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards.
13	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	[comply with] ANS-8.1, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors," except paragraphs 4.2.2 and 4.2.3 as stated in this Sec."	FSAR 4.3, HNF-IP-1266 Ch. 5.7	FSAR Sec. 4.3 states that the criticality protection program complies with DOE 5480.24 and industry standards. IP-1266, CH. 5.7 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards.
14	ANS-8.1 Sec. 4.1.1(1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Responsibilities**. Management shall clearly establish responsibility for nuclear criticality safety.	HNF-IP-0842 Vol. II Sec. 4.1.1 Att. D, HNF-IP-1266 Ch. 5.7	
15	ANS-8.1 Sec. 4.1.1(2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Responsibilities**. Supervision shall be made as responsible for nuclear criticality safety as for production, development, research or other functions.	HNF-IP-1266 Ch. 5.7	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
16	ANS-8.1 Sec. 4.1.1(3)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Responsibilities**. Each individual, regardless of position, shall be made aware that nuclear criticality safety in his work area is ultimately his responsibility.	HNF-IP-0842 Vol. II Sec. 4.1.1 Att. D, HNF-IP-1266 Ch. 5.7	
17	ANS-8.1 Sec. 4.1.1 (4)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7	
18	ANS-8.1 Sec. 4.1.1 (5)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Responsibilities**. These specialists shall be to the extent practicable, administratively independent of process supervision.	IP-1266, Ch. 5.7	
19	ANS-8.1 Sec. 4.1.1 (6)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Responsibilities**. Management shall establish the criteria to be satisfied by nuclear criticality safety controls.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
20	ANS-8.1 Sec. 4.1.2 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
21	ANS-8.1 Sec. 4.1.2 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Process Analysis**. Care shall be exercised to determine those conditions which result in the maximum effective multiplication factor (k_{eff}).	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
22	ANS-8.1 Sec. 4.1.3 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Written Procedures.** Operations to which nuclear criticality safety is pertinent shall be governed by written procedures.	HNF-IP-0842 Vol. I Sec. 2.11, HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
23	ANS-8.1 Sec. 4.1.3 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Written Procedures.** All persons participating in these operations shall understand and be familiar with the procedures.	HNF-IP-0842 Vol. I Sec. 2.11 HNF-IP-0842, Vol. IV, Sec. 6.5	
24	ANS-8.1 Sec. 4.1.3 (3)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Written Procedures.** The procedures shall specify all parameters they are intended to control.	HNF-IP-0731 HNF-IP-0842, Vol. IV, Sec. 6.5	
25	ANS-8.1 Sec. 4.1.3 (4)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Written Procedures.** They shall be such that no single, inadvertent departure from a procedure can cause a criticality accident.		DRAFT HNF-IP-1266 Ch. 5.7 and HNF-IP-0842, Vol. IV, Sec. 6.5
26	ANS-8.1 Sec. 4.1.4 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Materials Control**. The movement of fissionable materials shall be controlled.	HNF-IP-1266 Ch. 5.7 RPP-PRO-545	
27	ANS-8.1 Sec. 4.1.4 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 RPP-PRO-542	
28	ANS-8.1 Sec. 4.1.5 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842 Vol. II Sec. 4.6.2 CPS-T-149-00010 HNF-IP-0842, Vol. IV, Sec. 6.3	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
29	ANS-8.1 Sec. 4.1.5 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Operational Control**. Action shall be taken to prevent a recurrence.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842 Vol. II Sec. 4.6.2 CPS-T-149-00010 HNF-IP-0842, Vol. IV, Sec. 6.3	
30	ANS-8.1 Sec. 4.1.6 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.1	
31	ANS-8.1 Sec. 4.1.6 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.1	
32	ANS-8.1 Sec. 4.1.7 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Emergency Procedures.** Emergency Procedures shall be prepared and approved by management.	RPP-IP-0971 RPP-IP-0263-TF RPP-IP-0839-TF RPP-IP-1178 HNF-IP-0842, Vol. IV, Sec. 6.5	
33	ANS-8.1 Sec. 4.1.7 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Emergency Procedures.** Organizations, local and offsite, that are expected to respond to emergencies shall be made aware of conditions that might be encountered.	RPP-IP-0971 RPP-IP-0263-TF RPP-IP-0839-TF RPP-IP-1178 HNF-IP-0842, Vol. IV, Sec. 6.5	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
34	ANS-8.1 Sec. 4.1.7 (3)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Emergency Procedures.** They (local and offsite organizations) shall be assisted in preparing suitable procedures governing their responses.	RPP-IP-0971 RPP-IP-0263-TF RPP-IP-0839-TF RPP-IP-1178 HNF-IP-0842, Vol. IV, Sec. 6.5	
35	ANS-8.1 Sec. 4.2.1	DOE5480.24 Sec. 7 invokes ANS 8.1	**Controlling Factors**. The effective multiplication fact (k_{eff}) 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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5 HNF-IP-0842, Vol. IV, Sec. 6.4	
36	ANS-8.1 Sec. 4.2.2	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	NA	5480.24 7.a(2)(a) overrides this section.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
37	ANS-8.1 Sec. 4.2.3	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	NA	5480.24 7.a(2)(b) overrides this section.
38	ANS-8.1 Sec. 4.2.4 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
39	ANS-8.1 Sec. 4.2.4 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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 of absorbers because of the difficulty of exercising such control. *Interpretive Guidance*: 8.1 4.2.4(2) per guidance remains a should.	TSR-006, Sec.5.7.2 CPS-T-149-0010	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan for DOE Order 5480.24, Nuclear Criticality Safety.* No explanation provided. However, see TSR and implementing procedures as noted

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
40	ANS-8.1 Sec. 4.2.5	DOE5480.24 Sec. 7 invokes ANS 8.1	**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 Sec. 4.3	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
41	ANS-8.1 Sec. 4.3.1 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
42	ANS-8.1 Sec. 4.3.1 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	NA	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan for DOE Order 5480.24, Nuclear Criticality Safety*. No explanation provided.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
43	ANS-8.1 Sec. 4.3.2	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
44	ANS-8.1 Sec. 4.3.3 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
45	ANS-8.1 Sec. 4.3.3(2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
46	ANS-8.1 Sec. 4.3.4 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
47	ANS-8.1 Sec. 4.3.4 (2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Validation of a Calculational Method.** Any changes in the computer program shall be followed by reconfirmation that the mathematical operations are performed as intended.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
48	ANS-8.1 Sec. 4.3.5	DOE5480.24 Sec. 7 invokes ANS 8.1	**Validation of a Calculational Method.** Nuclear properties such as cross Sec's should be consistent with experimental measurements of these properties. *Interpretive Guidance*: ANSI/ANS 8.1 Sec. 4.3.5 per guidance remains a should.	NA	NA per 9454500 Rev A, *Tank Farms Compliance Assessment and Implementation Plan for DOE Order 5480.24, Nuclear Criticality Safety.* No explanation provided.
49	ANS-8.1 Sec. 4.3.6	DOE5480.24 Sec. 7 invokes ANS 8.1	**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 Sec. 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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
50	ANS-8.1 Sec. 5.0 (1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	NA	See Interpretive Guidance in text. *Interpretive Guidance*: Sec. 5.0 only applies if the tables are used in an analysis. Tank Farms does not use these tables.
51	ANS-8.1 Sec. 5.0(2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**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.	NA	See Interpretive Guidance in text. *Interpretive Guidance*: Sec. 5.0 only applies if the tables are used in an analysis. TANK FARMS does not use these tables.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
52	ANS-8.1 Sec. 6.0(1)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Multi-parameter 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 multi-parameter control may be found in the technical literature.	NA	Sec. 6.0 only applies if the tables are used in an analysis. TANK FARMS does not use these tables.
53	ANS-8.1 Sec. 6.0(2)	DOE5480.24 Sec. 7 invokes ANS 8.1	**Multi-parameter Control**. Process specifications shall incorporate margins to protect against uncertainties in process variables and against a limit being accidentally exceeded.	NA	Sec. 6.0 only applies if the tables are used in an analysis. TANK FARMS does not use these tables.
54	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	[comply with] ANS-8.3, "Criticality Accident Alarm System," except paragraphs 4.2 and 4.2.2.	FSAR 6.3.2 HNF-IP-1266, Chapter 5.7	FSAR Sec. 6.3.2 provides necessary information to justify not having a CAS or CDS.
55	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	ANS-8.5, "Use of Borosilicate-Glass Raschig Rings as a Neutron Absorber in Solutions of Fissile Material."	NA	RPP S/RID exempts Tank Farms from ANS-8.5. Borosilicate-glass raschig rings are not used at Tank Farms. (Ref. 9454500 Rev. B Sec. 4.1)

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
56	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	ANS-8.7, "Guide for Nuclear Criticality Safety in the Storage of Fissile Materials."	FSAR 4.3, HNF-IP-1266 Ch. 5.7	FSAR Sec. 4.3 states that the criticality protection program complies with DOE 5480.24 and industry standards. IP-1266, CH. 5.7 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards.
57	ANS-8.7 Sec. 4.1.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
58	ANS-8.7 Sec. 4.1.2(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Administrative Practices**. Methods of storage control and operational practices approved by management shall be described in written procedures.	TSR AC 5.7 RPP-PRO-543	
59	ANS-8.7 Sec. 4.1.2(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Administrative Practices**. Persons participating in the transfer and storage of material shall be familiar with these procedures.	FSAR 4.11, TSR AC 5.7, HNF-IP-1266 Ch. 5.7 RPP-PRO-543	
60	ANS-8.7 Sec. 4.1.2(3)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Administrative Practices**. Limits for storage shall be posted.	HNF-IP-1266 Ch. 5.7 RPP-PRO-543	Criticality safety postings are not required for the Tank Farms because key limits and controls are not manageable or observable by the operator.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
61	ANS-8.7 Sec. 4.1.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**Administrative Practices**. Management shall provide for inspections to verify compliance with established procedures.	HNF-IP-1266 Ch. 5.7 RPP-PRO-543 HNF-IP-0842, Vol. IV, Sec. 6.1	
62	ANS-8.7 Sec. 4.1.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**Administrative Practices**. Access to storage areas shall be controlled.	HNF-IP-0842 Vol. II Sec. 3.1 HNF-IP-1266 Ch. 5.7 RPP-PRO-543	
63	ANS-8.7 Sec. 4.2.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**Technical Practices**. Limits for the storage of fissile material shall be based on experimental data or the results of validated computational techniques.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5 HNF-IP-0842, Vol. IV, Sec. 6.4	
64	ANS-8.7 Sec. 4.2.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**Technical Practices**. Storage facilities and structures shall be designed, fabricated, and maintained in accordance with good engineering practices.	RPP-PRO-543	
65	ANS-8.7 Sec. 4.2.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 RPP-PRO-543	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
66	ANS-8.7 Sec. 4.2.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Tank Farms does not include passive engineering controls such as shelving cages and floor mounts for storage of fissionable material.
67	ANS-8.7 Sec. 4.2.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Storage of fissionable material in Tank Farms does not include considerations of birdcage fixtures, covered metal cans or shelving.
68	ANS-8.7 Sec. 4.2.6(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Technical Practices**. Storage areas shall be maintained essentially free of combustible materials.	HNF-IP-1266 Ch. 5.7 RPP-PRO-543	
69	ANS-8.7 Sec. 4.2.6(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Fissionable material at Tank Farms is stored outside in underground tanks. Significant combustibles are not present that would require fire protection.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
70	ANS-8.7 Sec. 4.2.7	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	CSERs document overmoderation of tank contents. Tank storage is not restricted by water accumulation.
71	ANS-8.7 Sec. 4.2.8	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	CSERs document overmoderation of tank contents. Tank storage is not restricted by water accumulation.
72	ANS-8.7 Sec. 4.2.9	DOE5480.24 Sec. 7 invokes ANS 8.7	**Technical Practices**. A criticality alarm shall be provided as appropriate.	FSAR 6.3.2 HNF-IP-1266 Ch. 5.7	HNF-PRO-546 states that a CAS or CDS is not needed if justification is shown in a DOE approved SAR. FSAR Sec. 6.3.2 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 FSAR as part of the 1998 annual update. The program is not affected.
73	ANS-8.7 Sec. 4.2.10	DOE5480.24 Sec. 7 invokes ANS 8.7	**Technical Practices**. Good housekeeping shall be incorporated as an important part of nuclear criticality safety practices.	HNF-IP-1266 Ch. 5.7 RPP-PRO-543	Good housekeeping applies at all areas.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
74	ANS-8.7 Sec. 5.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**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 TANK FARMS. If they are used in the future as a sole source, these requirements shall be addressed.	NA	RPP does not use spacing criteria to ensure criticality control.
75	ANS-8.7 Sec. 5.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Minimum critical parameters in Tank Farms were calculated assuming optimum moderation; therefore moderation considerations are not applicable.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
76	ANS-8.7 Sec. 5.3(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	RPP does not use spacing criteria to ensure criticality control.
77	ANS-8.7 Sec. 5.3(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.).	NA	RPP does not use spacing criteria to ensure criticality control.
78	ANS-8.7 Sec. 5.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Minimum critical parameters in Tank Farms were calculated assuming full reflection; therefore reflection considerations are not applicable.
79	ANS-8.7 Sec. 5.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	RPP does not use total mass controls. The storage units (tanks) are of fixed sizes.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
80	ANS-8. Sec. 5.6	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	RPP does not use vaults for the storage of fissile materials.
81	ANS-8.7 Sec. 5.7(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
82	ANS-8.7 Sec. 5.7(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	
83	ANS-8.7 Sec. 5.9	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
84	ANS-8.7 Sec. 5.10	DOE5480.24 Sec. 7 invokes ANS 8.7	**Unit Subcriticality**. The contents of each storage cell shall be subcritical if submerged. *Interpretive Guidance*. "Submerged" means "submerged in water."	NA	
85	ANS-8.7 Sec. 5.11	DOE5480.24 Sec. 7 invokes ANS 8.7	**Unit Spacing**. Unit surface separations shall be at least 152 mm (6 in.) where flooding is credible.	NA	
86	ANS-8.7 Sec. 6. - 6.3, 6.5 and 6.6	DOE5480.24 Sec. 7 invokes ANS 8.7	*EDITORIAL NOTE---Additional guidance is provided for the use and application of the tables in this standard.*	NA	
87	ANS-8.7 Sec. 6.4(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	RPP does not use spacing criteria to ensure criticality control.
88	ANS-8.7 Sec. 6.4(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.).	NA	RPP does not use spacing criteria to ensure criticality control.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
89	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	ANS-8.15, "Nuclear Criticality Control of Special Actinide Elements."	NA	Approved RPP S/RID exempts Tank Farms from compliance with ANS-8.15. Fissionable material inventories of Tank Farms were compared to the single and multi-parameter 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 Sec. 4.5)
90	S/RID 18.6 NUCLEAR CRITICALITY SAFETY	DOE5480.24 Sec. 7.a. Introduction	ANS-8.19, "Administrative Practices for Nuclear Criticality Safety."	FSAR 4.3, HNF-IP-1266 Ch. 5.7	FSAR Sec. 4.3 states that the criticality protection program complies with DOE 5480.24 and industry standards. IP-1266, CH. 5.7 describes the Project Hanford criticality safety program, and states that it implements the applicable requirements of DOE 5480.24, including the mandatory ANS standards.
91	ANS-8.19 Sec. 4.1.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Management shall accept overall responsibility for safety of operations.	RPP-POL-CRIT-SAF	*Interpretive Guidance.* A policy statement and/or a statement in the job description will adequately meet this requirement.
92	ANS-8.19 Sec. 4.1.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Continuing interest in safety shall be evident.	HNF-IP-1266 Ch. 5.7	
93	ANS-8.19 Sec. 4.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Management shall formulate nuclear criticality safety policy and make it known to all employees involved in operations with fissile material.	RPP-POL-CRIT-SAF HNF-IP-1266 Ch. 5.7	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
94	ANS-8.19 Sec. 4.3.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Management shall assign responsibility and delegate commensurate authority to implement established policy.	HNF-IP-1266 Ch. 5.7	
95	ANS-8.19 Sec. 4.3.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Responsibility for nuclear criticality safety shall be assigned in a manner compatible with that for other safety disciplines.	HNF-IP-1266 Ch. 5.7	
96	ANS-8.19 Sec. 4.4.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7	
97	ANS-8.19 Sec. 4.4.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** This function shall, to the extent practicable, be administratively independent of operations.	HNF-IP-1266 Ch. 5.7	
98	ANS-8.19 Sec. 4.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Management shall establish a means for monitoring the nuclear criticality safety program.	HNF-IP-1266 Ch. 5.7 NF-IP-0842, Vol. IV, Sec. 6.1	
99	ANS-8.19 Sec. 4.6	DOE5480.24 Sec. 7 invokes ANS 8.7	**Management Responsibilities.** Management shall periodically participate in auditing the overall effectiveness of the nuclear criticality safety program.	HNF-IP-1266 Ch. 5.7	The referenced implementing document requires management to ensure the performance of periodic inspections and assessments, but do not otherwise require management participation in audits.
100	ANS-8.19 Sec. 5.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities.** Each supervisor shall accept responsibility for the safety of operations under his control.	HNF-IP-0842 Vol. II Sec. 4.1.1 HNF-IP-0842, Vol. IV, Sec. 6.1	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
101	ANS-8.19 Sec. 5.2.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities**. Each supervisor shall be knowledgeable in those aspects of nuclear criticality safety relevant to operations under his control.	HNF-IP-0842 Vol. II Sec. 4.1.1 HNF-IP-0842, Vol. IV, Sec. 6.1	
102	ANS-8.19 Sec. 5.2.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities**. Training and assistance shall be obtained from the nuclear criticality safety staff.	HNF-IP-1266 Ch. 5.7	
103	ANS-8.19 Sec. 5.3.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-0842 Vol. II Sec. 4.1.1 HNF-IP-1266 Ch. 5.7	
104	ANS-8.19 Sec. 5.3.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities**. Records of training activities and verification of personnel understanding shall be maintained.	HNF-IP-0842 Vol. III Sec. 3.1 HNF-IP-1266 Ch. 5.7	
105	ANS-8.19 Sec. 5.4.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities**. Supervisors shall develop or participate in the development of written procedures applicable to the operations under their control.	HNF-IP-0842 Vol. I Sec. 2.11, Vol. II Sec. 4.1.1 , Vol. IV, Sec. 6.5	
106	Requirement removed (in other program				
107	ANS-8.19 Sec. 5.4.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities**. Maintenance of these procedures to reflect changes in operations shall be a continuing supervisory responsibility.	HNF-IP-0842 Vol. I Sec. 2.11 HNF-IP-0842, Vol. IV, Sec. 6.5	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
108	ANS-8.19 Sec. 5.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-0842, Vol IV, Sec 6.4	
109	ANS-8.19 Sec. 5.6	DOE5480.24 Sec. 7 invokes ANS 8.7	**Supervisory Responsibilities.** Each supervisor shall require conformance with good safety practices including unambiguous identification of fissile materials and good housekeeping.	HNF-IP-0842 Vol. II Sec. 4.1.1 HNF-IP-1266 Ch. 5.7 RPP-PRO-543	
110	ANS-8.19 Sec. 6.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7	
111	ANS-8.19 Sec. 6.2.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Nuclear Criticality Safety Staff.** The staff shall maintain familiarity with current developments in nuclear criticality safety standards, guides and codes.	Qualification Card and Guide for RPP Facility Criticality Safety Engineer, 350004 HNF-IP-1266 Ch. 5.7	
112	ANS-8.19 Sec. 6.2.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	Qualification Card and Guide for RPP Facility Criticality Safety Engineer, 350004 HNF-IP-1266 Ch. 5.7	Tank Farms requires CSR and alternate to complete qual card and training, periodic refreshers

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
113	ANS-8.19 Sec. 6.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**Nuclear Criticality Safety Staff**. The staff shall consult with knowledgeable individuals to obtain technical assistance as needed.	HNF-IP-1266 Ch. 5.7 (applies only to RPP CSRs and assistants)	Tank Farms participates in the Hanford Center of Excellence for Criticality Safety and maintains a consulting relationship with other onsite contractors.
114	ANS-8.19 Sec. 6.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**Nuclear Criticality Safety Staff**. The staff shall maintain familiarity with all operations within the organization requiring nuclear criticality safety controls.	Qualification Card and Guide for RPP Facility Criticality Safety Engineer, 350004 HNF-IP-1266 Ch. 5.7 (applies only to RPP CSRs and assistants)	
115	ANS-8.19 Sec. 6.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**Nuclear Criticality Safety Staff**. The staff shall assist supervision, on request, in training personnel.	HNF-IP-1266 Ch. 5.7 (applies only to RPP CSR)	
116	ANS-8.19 Sec. 6.6	DOE5480.24 Sec. 7 invokes ANS 8.7	**Nuclear Criticality Safety Staff**. The staff shall conduct or participate in audits in criticality safety practices and compliance with procedures as directed by management.	HNF-IP-1266 Ch. 5.7 Sec's 3.B.2.a and 3.C.11 HNF-IP-0842, Vol. IV, Sec. 6.1	HNF-IP-1266 does not require participation by Criticality Safety Specialist.
117	ANS-8.19 Sec. 6.7	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.		DRAFT IP-1266, Ch. 5.7
118	ANS-8.19 Sec. 7.1.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Procedures shall be organized and presented for convenient use by operators.	HNF-IP-0842 Vol. I Sec. 2.11 HNF-IP-0731	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
119	ANS-8.19 Sec. 7.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Procedures shall include those controls and limits significant to the nuclear criticality safety of the operation.	HNF-IP-0731 HNF-IP-0842, Vol. IV, Sec. 6.5	
120	ANS-8.19 Sec. 7.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Supplementing and revising procedures as improvements become desirable shall be facilitated.	HNF-IP-0842 Vol. I Sec. 2.11 HNF-IP-0842, Vol. IV, Sec. 6.5	
121	ANS-8.19 Sec. 7.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Active procedures shall be reviewed periodically by supervision.	HNF-IP-0842 Vol. I Sec. 2.11 HNF-IP-0842, Vol. IV, Sec. 6.5	
122	ANS-8.19 Sec. 7.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** New or revised procedures impacting nuclear criticality safety shall be reviewed by the nuclear criticality safety staff.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
123	ANS-8.19 Sec. 7.6	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Procedures shall be supplemented by posted nuclear criticality safety limits or limits incorporated in operating check lists or flow sheets.	HNF-IP-0842, Vol. IV, Sec. 6.5	
124	ANS-8.19 Sec. 7.7.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-0842, Vol. IV, Sec. 6.5	
125	ANS-8.19 Sec. 7.7.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Operating Procedures.** Action shall be taken to prevent a recurrence [of deviation from operating procedure ...]	HNF-IP-0842, Vol. IV, Sec. 6.5	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
126	ANS-8.19 Sec. 7.8	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-0842, Vol. IV, Sec. 6.1	
127	ANS-8.19 Sec. 8.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
128	ANS-8.19 Sec. 8.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
129	ANS-8.19 Sec. 8.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**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 judgment of results.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	
130	ANS-8.19 Sec. 8.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.4	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
131	ANS-8.19 Sec. 9.1	DOE5480.24 Sec. 7 invokes ANS 8.7	**Materials Control**. The movement of fissile materials shall be controlled.	HNF-IP-1266 Ch. 5.7 RPP-PRO-545	
132	ANS-8.19 Sec. 9.2	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 RPP-PRO-542	
133	ANS-8.19 Sec. 9.3	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	Fissionable material in Tank Farms is not considered "in process," but is contained within waste in storage.
134	ANS-8.19 Sec. 9.4	DOE5480.24 Sec. 7 invokes ANS 8.7	**Materials Control**. Access to areas where fissile materials is handled, processed, or stored shall be controlled.	HNF-IP-0842 Vol. II Sec. 3.1 HNF-IP-1266 Ch. 5.7 RPP-PRO-543	Fissionable material in Tank Farms is not considered "in process," but is contained within waste in storage. Tank Farms does not directly handle fissile materials relative to the intent of this section.
135	ANS-8.19 Sec. 9.5	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
136	ANS-8.19 Sec. 10.2.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Emergency procedures shall be prepared and approved by management.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
137	ANS-8.19 Sec. 10.2.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
138	ANS-8.19 Sec. 10.2.(3)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. They [on and offsite organizations] shall be assisted in preparing suitable emergency response procedures.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
139	ANS-8.19 Sec. 10.3.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Emergency procedures shall clearly designate evacuation routes.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
140	ANS-8.19 Sec. 10.3.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Evacuation shall follow the quickest and most direct routes practicable.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
141	ANS-8.19 Sec. 10.3 (3)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. These routes shall be clearly identified and shall avoid recognized areas of higher risk.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
142	ANS-8.19 Sec. 10.4 (1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Personnel assembly stations, outside the areas to be evacuated, shall be designated.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
143	ANS-8.19 Sec. 10.4.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Means to account for personnel shall be established.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
144	ANS-8.19 Sec. 10.5.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
145	ANS-8.19 Sec. 10.5.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned response to Nuclear Criticality Accidents**. Provision shall be made for the evacuation of transient personnel.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
146	ANS-8.19 Sec. 10.5.(3)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Drills shall be performed at least annually to maintain familiarity with the emergency procedures.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
147	ANS-8.19 Sec. 10.5.(4)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Drills shall be announced in advance.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
148	ANS-8.19 Sec. 10.6.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Arrangements shall be made in advance for the care and treatment of injured and exposed persons.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
149	ANS-8.19 Sec. 10.6.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. The possibility of personnel contamination by radioactive materials shall be considered.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
150	ANS-8.19 Sec. 10.7	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Planning shall include a program for the immediate identification of exposed individuals and shall include personnel dosimetry.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
151	ANS-8.19 Sec. 10.8.(1)	DOE5480.24 Sec. 7 invokes ANS 8.7	**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.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
152	ANS-8.19 Sec. 10.8.(2)	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Information shall be correlated at a central control point.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
153	ANS-8.19 Sec. 10.9	DOE5480.24 Sec. 7 invokes ANS 8.7	**Planned Response to Nuclear Criticality Accidents**. Emergency procedures shall address re-entry procedures and the membership of response teams.	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
154	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Sec. 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."	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	HNF-IP-1266 requires designs to comply with DOE orders/industry standards related to criticality safety. Note that criticality is prevented by form and distribution of materials in Tank Farms equipment under current waste conditions.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
155	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Sec. 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."	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	HNF-IP-1266 requires designs to comply with DOE orders related to criticality safety.
156	S/RID 18.6.1 Criticality Safety Design Practices	DOE5480.24 Sec. 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."	FSAR 6.3.2 HNF-IP-1266, Chapter 5.7	The FSAR provides all the necessary information to justify not having a CAS or CDS.
157	S/RID 18.6.1 Criticality Safety Design Practices	DOE6430.1A Sec. 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."	FSAR 6.3.2	The FSAR 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.

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
158	S/RID 18.6.2 Materials Control	DOE5480.24 Sec. 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."	NA	A criticality accident at Tank Farms is not a credible event, as documented in FSAR Sec. 6.3.2
159	S/RID 18.6.2 Materials Control	DOE5480.24 Sec. 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."	HNF-IP-1266 Ch. 5.7 HNF-IP-0842, Vol. IV, Sec. 6.5	
160	S/RID 18.7 KEY INTERFACES	HNF-SD-MP-SRID-001	Maintain key functional interfaces between the Nuclear Criticality Safety program and other functional areas within the Tank Farms.	HNF-IP-1266, Ch. 5.7	
161	S/RID 18.7.1 Management Systems	HNF-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.	FSAR Chapter 4.0	
162	S/RID 18.7.2 Quality Assurance	HNF-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.	FSAR Sec. 4.12	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
163	S/RID 18.7.3 Training and Qualification	HNF-SD-MP-SRID-001	Training and Procedure Support group establishes the procedures and requirements that control the training and/or selection of certain technical personnel, develops training curriculum and keeps training records.	FSAR Sec. 4.11 HNF-IP-1266 Ch. 5.7 HNF-IP-0842 Vol. III	
164	S/RID 18.7.4 Emergency Management	HNF-SD-MP-SRID-001	Nuclear Criticality Safety information is supplied to Emergency Planning and Preparedness so they can design their programs and plans	FSAR 4.13 TSR 5.14 HNF-IP-0971	A criticality accident is not credible at the Tank Farms. TSR AC 5.14 does not specifically address criticality accidents.
165	S/RID 18.7.5 Engineering Program	HNF-SD-MP-SRID-001	Engineering incorporates Nuclear Criticality 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.	RPP-PRO-544	
166	S/RID 18.7.6 Operations	HNF-SD-MP-SRID-001	Tank Waste Operations provides input and review to Nuclear Criticality to ensure that nuclear safety principles are incorporated into daily operations. Operations staff receive facility-specific NCS training from the CSR.	FSAR Sec's 4.8 and 4.9	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
167	S/RID 18.7.7 Maintenance	HNF-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.	FSAR Sec. 4.7	
168	S/RID 18.7.10 Fire Protection	HNF-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.	FSAR 4.10	FSAR Sec. 4.10 describes the essential elements of the fire protection program and states that Tank Farms is a Category A facility, ie no special controls are required for fire fighting.
169	TSR AC 5.7.1	HNF-SD-WM-SAR-067	A program shall be maintained for ensuring WASTE remains subcritical.	HNF-IP-1266 Ch. 5.7	
170	TSR AC 5.7.2.a Program Key Element	HNF-SD-WM-SAR-067	Criticality limits and controls shall be documented in Criticality Safety Evaluation Reports (CSERs) and implemented in Criticality Prevention Specifications (CPSs) and procedures.	HNF-IP-1266 Ch. 5.7	
171	TSR AC 5.7.2.b Program Key Element	HNF-SD-WM-SAR-067	Procedures shall be established for recovery from a CPS nonconformance.	HNF-IP-1266 Ch. 5.7	
172	TSR AC 5.7.2.c Program Key Element	HNF-SD-WM-SAR-067	Criticality safety training shall be provided for operations and technical personnel.	HNF-IP-1266 Ch. 5.7	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
173	TSR AC 5.7.2.d Program Key Element	HNF-SD-WM-SAR-067	For transfers into the tank farms from non-tank farm facilities (e.g., Plutonium Finishing Plant, B-Plant) specific physical pre-transfer conditions shall be met. Independent verification is required.	HNF-IP-1266 Ch. 5.7	A check for parameters important to criticality safety is included within waste transfer checksheets monitored by the CSR.
174	TSR AC 5.7.2.e Program Key Element	HNF-SD-WM-SAR-067	Activities other than sampling/monitoring in miscellaneous inactive storage facilities (MISF) are prohibited without characterization of the WASTE and, if required, preparation of a CSER and CPS.	HNF-IP-1266 Ch. 5.7	
175	TSR AC 5.7.2.f Program Key Element	HNF-SD-WM-SAR-067	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.	HNF-IP-1266 Ch. 5.7 CPS T-149-00010	
176	TSR AC 5.7.3 Applicability	HNF-SD-WM-SAR-067	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. 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.	HNF-IP-1266 Ch. 5.7	

Item	Requirement Identification	Requirement Source (S/RID)	Requirement Text	RPP Implementing Document	Comment
177	TSR AC 5.12.2.c (Bullet 1) Final Tank State Controls Application	HNF-SD-WM-SAR-067	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."	HNF-IP-1266 Ch. 5.12 Sec. 3.C.2.e	
178	TSR AC 5.12.2.c (Bullet 2) Chemical Compatibility	HNF-SD-WM-SAR-067	Ensure chemical addition pH is $\geq$ 8 prior to transfer into Tank Farms (excluding water additions and drums containing caustic chemicals).	HNF-IP-1266 Ch. 5.12 Sec. 3.C.2.f	
179	TSR AC 5.12.3 Transfer Controls Applicability	HNF-SD-WM-SAR-067	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).	HNF-IP-1266 Ch. 5.12 Sec. 2	

--end--

3.0 REFERENCES

DOE O 420.1, *Facility Safety,* 1996, Change 2, Department of Energy, Washington, D.C..

DOE 5480.24, *Nuclear Criticality Safety,* 1992, Department of Energy, Washington, D.C.

HNF-IP-1266, *Tank Farms Operations Administrative Controls*, current version as of May 10, 2000, CH2MHill Hanford Group, Incorporated, Richland, Washington.

HNF-SD-MP-SRID-001, 1999, *High Level Waste Storage Tank Farms/242-A Evaporator Standards/Requirements Identification Document*, Rev. 2, CH2MHill Hanford Group, Incorporated, Richland, Washington.

HNF-SD-WM-SAR-067, 2000, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1H, CH2MHill Hanford Group, Incorporated, Richland, Washington.

HNF-SD-WM-TSR-006, 2000, *Tank Waste Remediation System Technical Safety Requirements*, Rev. 1H, CH2MHill Hanford Group, Incorporated, Richland, Washington.

Internal Memo, E. J. Lipke to T. C. Geer, "Criticality Compliance," September 3, 1997, Attachment 2 *" 9454500, Tank Farms Compliance Assessment and Implementation Plan for DOE Order 5480.24 Nuclear Criticality Safety,"* DE&S Hanford, Richland, Washington.

TWR-3721, M. C. Brady Rapp et al, *Tank Waste Remediation System Nuclear Criticality Safety Program Management Review,* April 1999, DE&S Hanford Corporation, Richland, Washington.

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

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Process Control	Date 05/15/00
Project Title/Work Order		EDT No. EDT-628378
RPP-6384, Rev. 0, "Nuclear Criticality Safety Requirements Implementation Matrix for Tank Farms"		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
CH2M Hill Hanford Group, Inc.					
M. J. Brown	S6-15	X			
C. DeFigh-Price	R2-12	3			
R. A. Dodd	R3-72	X			
L. A. Fort	R2-12	X			
K. D. Fowler	R2-11	X			
C. J. Hopkins	R2-50	X			
W. J. Kennedy	S5-07	X			
N. W. Kirch	R2-11	X			
R. G. Stickney	R1-43	X			
L. E. Thomas	S7-86	X			
E. V. Weiss	R2-12	X			
T.C.S.R.C.	R1-10	X			
Fluor Hanford					
G. R. Franz	A0-26	X			
E. J. Lipke	A0-26				X
B. S. Mo	T5-54				X
T. S. Vail	T4-56				X
Fluor Federal Services					
H. Toffer	B4-44	X			
Lockheed Martin Services, Inc.					
Central Files	B1-07	X			
Office of River Protection					
J. S. Shuen	H6-60	2			
J. D. Voice	H6-60	X			
DOE Reading Room	H2-53	X			
Numatec Hanford Corporation					
A. F. Choho	R3-73	X			
Waste Management Federal Services of Hanford, Inc.					
R. J. Nicklas	T4-56	X			