This document was too large to scan as a single document. It has been divided into smaller sections.

Section 1 of 2

Document Information			
Document #	**SD-WM-TSR-006**	**Revision**	**1**
Title	TWRS TECHNICAL SAFETY REQUIREMENTS		
Date	**10/08/1999**		
Originator	**JONES GL**	**Originator Co.**	**LMHC**
Recipient		**Recipient Co.**	
References	**ECN-649157,SD-WM-SAR-067**		
Keywords			
Projects	**TWRS**		
Other Information			

S

ENGINEERING CHANGE NOTICE

1. ECN 649157

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	T. G. Goetz, Licensing, R1-49, 373-4818	[X] Yes [] No USQD TF-99-0710, Rev. 0	10/04/99
	6. Project Title/No./Work Order No. RPP	7. Bldg./Sys./Fac. No. RPP	8. Approval Designator SQD
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-SAR-067, Rev. 0 HNF-SD-WM-TSR-006, Rev. 0-U	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

This ECN transmits complete revisions of HNF-SD-WM-SAR-067, Tank Waste Remediation System (TWRS) Final Safety Analysis Report (FSAR), and HNF-SD-WM-TSR-006, Tank Waste Remediation System Technical Safety Requirements. DOE approved Revision 0 of the FSAR through letter 99-ORP-002 [J. C. Hall, Approval of the Tank Waste Remediation System (TWRS) Final Safety Analysis Report (FSAR) (letter to R. D. Hanson, Fluor Daniel Hanford, Inc., March 31, 1999)]. In letter 99-TSD-034 [M. A. Hunemuller, Guidance for Preparations for Tank Waste Remediation System (TWRS) Final Safety Analysis Report (FSAR) Approval (letter to R. D. Hanson, Fluor Daniel Hanford, Inc., February 2, 1999)], DOE directed the Contractor to update the FSAR, which had been "frozen" in March 1997, to capture the technical changes made to the BIO over the past two years. In the same letter (i.e., 99-TSD-034) DOE also directed the Contractor to revise the TSR document so that it is compatible with the FSAR.

Also, a revision to AC 5.13, "Encasement Seal Loop Controls," has been incorporated into the TSR document, as authorized per letter 98-SCD-036 [J. D. Wagoner, Contract Number DE-AC06-96RL13200 - Approval of Engineering Change Notice (ECN) Package Number 605039 (letter to H. J. Hatch, Fluor Daniel Hanford, Inc., April 15, 1998)].

Detailed descriptions of the changes made to the two documents are included with USQD TF-99-0710.

14a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

14b. Justification Details

As described above, the changes to HNF-SD-WM-SAR-067 and HNF-SD-WM-TSR-006 were authorized by DOE in letters 98-SCD-036, 99-TSD-034, and 99-ORP-002.

15. Distribution (include name, MSIN, and no. of copies)

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OCT 08 1999 DATE: HANFORD RELEASE STA: 15 ID:

A-7900-013-2 (05/96) GEF095

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) 649157

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

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

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

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

Document Number/Revision	Document Number/Revision	Document Number Revision
For checklist addressing affected documents, see Interoffice Memo #79E00-99-009 dated 09/24/99, from TWRS Nuclear Reg. Compliance Support.		

21. Approvals

	Signature	Date		Signature	Date
Licensing Eng. TG Goetz R1-49	Thomas G Goetz	10/7/99	FDH/ESHQ N/A		
Cog. Mgr. RC Cash R1-44	RJC Johnson for RJC	10/7/99			
QA N/A					
Safety Services N/A					
Environ. N/A					
TWRS NS&L CE Leach R1-43	CE Leach	10/7/99			
NS&L Licensing JE Meacham R1-49		10/8/99			
NS&L Nuc. Safety Svcs RG Stickney R1-49		10/7/99	DEPARTMENT OF ENERGY		
TWRS Nuclear Reg. Compliance Spt C Difrango R2-50	P.L. Sitt For C.D.	10/8/99	Signature or a Control Number that tracks the Approval Signature		
					98-SCD-036/ 99-TSD-034/ 99-ORP-002
			ADDITIONAL		

A-7900-013-3 (05/96) GEF096

S

Tank Waste Remediation System Technical Safety Requirements

G. L. Jones
Lockheed Martin Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-99RL14047

EDT/ECN: 649157 UC: 2030
Org Code: 74F00 Charge Code: 109310 /BA10 HMLM0161
B&R Code: N/A Total Pages: ~~468~~ 469

Key Words: Final Safety Analysis Report, FSAR, Technical Safety Requirements, TSR, Authorization Basis, AB.

Abstract: The Tank Waste Remediation System (TWRS) Technical Safety Requirements (TSRs) for the facilities within the scope of the TWRS Final Safety Analysis Report (FSAR) define acceptable conditions, safe boundaries, bases thereof, and management or administrative controls required to ensure safe operation during tank waste storage, waste transfer, and waste characterization. The TSRs are based on the preventive and mitigative features determined to be essential in the FSAR.

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Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-WM-TSR-006	Page 1 of 2

(2) Title
Tank Waste Remediation System Technical Safety Requirements

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) EDT# 616904	Y. G. Noorani	G. W. Gault
0-A	Rotary Mode Core Sampling RL directed Change. ECN# 173679.	J. S. Schofield	R. E. Raymond
0-B	Compensatory Measure. ECN# 642484.	A. R. Tedeschi	J. L. Homan
0-C	Incorporate per ECN# 629258 (Authorization Basis Amendment RL directed change to recategorize Tank 241-BY-103 from Facility Group 2 to 3).	R. D. Smith	C. E. Leach
0-D	Incorporate ECN# 640410, changes for Waste Retrieval Sluicing System (WRSS) operations.	R. G. Stickney	C. E. Leach
0-E	Incorporate ECN# 625247, changes for the 702-AZ ventilation system (Project W-030) operation.	K. H. Morris	C. E. Leach
0-F	Incorporate ECN# 644225, changes for approval status of flammable gas monitoring success criteria in B 3.2.1.	Y. G. Noorani	G. W. Gault
0-G	Incorporate ECN# 646676 to establish an Addendum for individual AB controls transitioned from WHC-SD-WM-OSR-004 and WHC-SD-WM-OSR-005.	Y. G. Noorani	G. W. Gault
0-H	Incorporate ECN# 646678 to correct references.	Y. G. Noorani	G. W. Gault
0-I	ECN# 641985. Update references to HNF-SD-WM-RD-057 throughout Appendix A. Add SR 3.1.3.2 and revise basis for LCO 3.1.3. Page changes for i, 3.1-7, A 3.1-3, A 3.1-7, A 3.1-10, A 3.1-14, A 3.1-15, A 3.1-16, A 3.1-17, A 3.1-22, A 3.1-22-A, A 3.1-25, A 3.1-30, A 3.2-4, A 3.2-8, A 3.2-11, A 3.2-15, A 3.2-17, A 3.2-21, A 3.2-23, A 3.2-29, A 3.2-31, A 3.2-35, A 3.2-40, A 3.2-46, A 3.3-7, A 3.3-15, A 3.3-23, A 3.3-29.	Y. G. Noorani	G. W. Gault
0-J	Incorporate ECN# 173674, changes for Replacement Cross-Site Transfer System operations.	Y. G. Noorani	G. W. Gault
0-K	Incorporate ECN# 649126, changes for the Salt Well Jet Pumping of Single-Shell Tanks.	Y. G. Noorani	G. W. Gault
0-L	Incorporate ECN# 610897, changes to AC 5.12, to remove < 50% full requirement for DCRTs. This change was approved by RL on ECN# 605039 (RL Letter# 98-SCD-036).	G. L. Jones	G. W. Gault

RECORD OF REVISION	(1) Document Number HNF-SD-WM-TSR-006	Page 2 of 2

(2) Title
Tank Waste Remediation System Technical Safety Requirements

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0-M	Implement controls per BIO Addendum 4 which provides the completed safety analysis for the mixer pump process test in Tank 241-AZ-101. ECN# 643112.	Y. G. Noorani	G. W. Gault
0-N	Incorporate ECN# 646681 (Authorization Basis amendment to reflect reanalysis of ventilation system filter failures). Changes to the List of Terms and AC 5.18 approved by RL (Letter 98-TWR-023).	Y. G. Noorani	G. W. Gault
0-O	Incorporate ECN# 610880 (Authorization Basis amendment for Interim Stabilization) per approved RL letter 98-TWR-013.	Y. G. Noorani	G. W. Gault
0-P	Incorporate ECN# 646684 (deletion of Compensatory Measures TSRs - Bases only of LCO 3.1.3, LCO 3.1.4, and LCO 3.1.4A) to meet Performance Agreement 1.3.2.	Y. G. Noorani	G. W. Gault
0-Q	Incorporate ECN# 610881 (Authorization Basis amendment to redesignate Tank 241-AX-101 from Facility Group 3 to Facility Group 2) per RL letter 98-SCD-124.	Y. G. Noorani	G. W. Gault
0-R	Incorporate ECN# 610882 (Authorization Basis amendment for Limiting Conditions for Operation 3.1.4) per RL letter 99-TSD-025.	Y. G. Noorani	G. W. Gault
0-S	Incorporate ECN# 649144 (Authorization Basis amendment for backflow preventer in 204-AR). Changes to AC 5.12 and LCO 3.1.2, and new LCO 3.1.6 approved per RL letter 99-OPD-031.	G. L. Jones	G. W. Gault
0-T	Incorporate ECN# 650151 (Authorization Basis amendment to resolve potential conflict of TSR controls within BIO Addendum 4, "Tank 241-AZ-101 Mixer Pump Test"). Changes made to AC 5.10 and Appendix B were approved per RL letter 99-TSD-068.	G. L. Jones	G. W. Gault
0-U	Incorporate ECN# 649156 (Authorization Basis [AB] amendment to incorporate COB JCO into AB). New LCO 3.1.7, with associated bases, and changes to AC 5.20 were authorized per RL letter 98-WSD-052.	G. L. Jones	R. J. Cash
1 RS	Incorporate ECN# 649157 per DOE letter 99-TSD-034. Re-issue of entire document in parallel with release of Revision 1 of the FSAR (HNF-SD-WM-SAR-067).	G. L. Jones for GLJ 10/7/99	R. J. Cash for RJC 10-7-99

TANK WASTE REMEDIATION SYSTEM
TECHNICAL SAFETY REQUIREMENTS

PREFACE

The Tank Waste Remediation System (TWRS) Technical Safety Requirements (TSRs) for the facilities within the scope of the TWRS Final Safety Analysis Report (FSAR) define acceptable conditions, safe boundaries, bases thereof, and management or administrative controls required to ensure safe operation during tank waste storage, waste transfer, and waste characterization. Controls required for public safety, significant Defense-in-Depth, significant worker safety, and for maintaining radiological and toxicological consequences below risk guidelines when possible are included. Throughout these TSRs, TWRS facilities means the same as River Protection Project facilities.

The TSRs are based on the preventive and mitigative features determined to be essential in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses," which is prepared in accordance with DOE 5480.23, *Nuclear Safety Analysis Reports*. The TWRS TSRs constitute an agreement or contract between the U.S. Department of Energy (DOE) and Fluor Daniel Hanford, Inc. regarding the safe operation of the TWRS facilities. As such, once approved, the TSRs cannot be changed without the approval of the Cognizant Secretarial Officer (CSO), or designee, and Fluor Daniel Hanford, Inc.

The format and content for the TWRS TSRs are based on DOE 5480.22, *Technical Safety Requirements*; the guidance provided by contractor policy; NUREG 1431, *Standard Technical Specifications, Westinghouse Plants*; and HNF-SD-MP-TSR-001, *TSR Writers' Guide*. The TSRs are maintained as a separate, controlled document (HNF-SD-WM-TSR-006, *Tank Waste Remediation System Technical Safety Requirements*).

The control level designations of the TSRs were re-evaluated according to DOE direction in Wagoner, 1996. A control level verification process was developed and implemented to ensure that the TSRs are compliant with DOE 5480.22 and other TSR selection guidelines. The TSR verification process is documented in Funderburke, 1997.

The TSRs apply to the single-shell tanks (SSTs); double-shell tanks (DSTs); aging waste facility (AWF) tanks; double-contained receiver tanks (DCRTs); catch tanks; miscellaneous inactive storage facilities (MISFs); waste transfer systems; 204-AR Waste Unloading Facility; 244-AR Vault; 209-E Storage Area consisting of a *Resource Conservation and Recovery Act of 1976* (RCRA) less than 90-day waste storage pad and an Intermediate Holding Area for low-level radioactive waste; vertical storage units within the tank farm boundaries; 2727-W Sodium Storage Facility; 213-W Dry Waste Compactor Facility; cribs, ditches, and ponds owned and operated by TWRS; light-duty utility arm; cone penetrometer; instrumentation, waste sampling, and surveillance monitoring systems; and the 242-S Evaporator ("cold side" only). Supplemental operational control information specific to the projects is included in addenda to the TWRS FSAR. The Tank 241-C-106 Waste Retrieval Sluicing System (WRSS) was analyzed in Addendum 1 to the TWRS FSAR. The replacement cross-site transfer system was analyzed in Addendum 2. The AWF 241-AZ-702 ventilation system was analyzed in Addendum 3. The Tank 241-AZ-101 mixer pump test was analyzed in Addendum 4. New TSRs and revisions of existing TSRs have been incorporated into this document as changes.

PREFACE (continued)

The TSRs do not apply to TWRS facilities outside of the TWRS FSAR scope, which include the 242-A Evaporator, 242-S Evaporator ("hot side" only), 242-T Evaporator, Grout Treatment Facility, Liquid Effluent Retention Facility, Effluent Treatment Facility (nonnuclear facility), and Purgewater Storage Facility (nonnuclear facility). The TSRs also do not apply to the following TWRS projects: Initial Waste Tank Retrieval System (Project W-211) and rotary mode core sampling activities (excluding flammable gas hazards).

Protection of occupational workers from radiological and toxicological hazards is achieved by hardware systems and integrated safety management programs that provide operational control and discipline for preventing accidents. These programs are prescribed in TWRS regulatory and contractual systems that implement the applicable requirements. The safety management programs applicable to the TWRS FSAR facilities are discussed in the programmatic chapters of HNF-SD-WM-SAR-067. Commitments to maintain the programs are included in Section 5.0, "Administrative Controls."

The TWRS TSRs cover toxicological hazards for the accidents analyzed in the FSAR where the toxicological only consequences (nonnuclear) exceed offsite or onsite risk guidelines, or where the toxicological consequences exceed offsite or onsite risk guidelines and are not prevented or mitigated by the selected radiological controls. Controls for toxicological hazards where the consequences do not exceed risk guidelines are implemented through HNF-SD-WM-HSP-002, *Tank Farms Health and Safety Plan*.

The TWRS TSRs do not specifically cover environmental regulatory requirements, that is, those contained in Title 40 of the *Code of Federal Regulations*, "Protection of Environment." Environmental protection is assured as part of the TWRS facilities environmental compliance program.

All numeric values listed in requirements and bases discussions are presented in the units of field instrument markings for safe conduct of operations. As systems are modified in accordance with metric implementation plans, TSR notations will be changed accordingly.

Transitional Requirements are included as an Addendum to this document. Transitional Requirements are those controls that are directed by DOE to be retained in the TWRS Authorization Basis.

Table of Contents

Section		Page
	PREFACE	ii
	TABLE OF CONTENTS	iv
	LIST OF TABLES	vii
	LIST OF TERMS	viii
Section 1	USE AND APPLICATION	1-1
1.1	Definitions	1.1-1
1.2	Logical Connectors	1.2-1
1.3	Completion Times	1.3-1
1.4	Frequency	1.4-1
1.5	Notes	1.5-1
1.6	MODES	1.6-1
1.7	Safety Limits (SLs)	1.7-1
1.8	Limiting Control Settings (LCSs)	1.8-1
1.9	Limiting Conditions for Operation (LCOs)	1.9-1
1.10	Surveillance Requirements (SRs)	1.10-1
1.11	Administrative Controls (ACs)	1.11-1
1.12	Cross References	1.12-1
Section 2	SAFETY LIMITS	2-1
2.0	SAFETY LIMITS (SLs)	2.0-1
2.1.1	WASTE Temperature	2.0-1
Section 3	OPERATING LIMITS AND SURVEILLANCE REQUIREMENTS	3-1
3.0	LIMITING CONDITIONS FOR OPERATION (LCOs) APPLICABILITY	3.0-1
3.0	SURVEILLANCE REQUIREMENTS (SRs) APPLICABILITY	3.0-4
3.1	CONFINEMENT	3.1.1-1
3.1.1	Transfer System Covers and Entry Doors	3.1.1-1
3.1.2	Service Water Pressure Detection Systems	3.1.2-1
3.1.3	Transfer Leak Detection Systems	3.1.3-1
3.1.4	Ventilation Stack CAM Interlock Systems	3.1.4-1
3.1.5	Replacement Cross-Site Transfer System (RCSTS) Pressure Relief Valve (PRV) and Rupture Disk	3.1.5-1
3.1.6	204-AR Backflow Prevention System	3.1.6-1
3.1.7	Supplemental Covers	3.1.7-1
3.2	FLAMMABLE GAS	3.2.1-1
3.2.1	DST and AWF Tank Ventilation Systems	3.2.1-1
3.2.2	SST Ventilation Systems - Active	3.2.2-1
3.2.3	SST Ventilation Systems - Passive	3.2.3-1
3.2.4	DCRT Ventilation Systems	3.2.4-1

(continued)

Table of Contents (continued)

Section			Page
	3.2.5	244-AR TK-002 Ventilation System	3.2.5-1
	3.2.6	Primary Tank Leak Detection Systems	3.2.6-1
3.3	TEMPERATURE		3.3.1-1
	3.3.1	SST WASTE Temperature Controls	3.3.1-1
	3.3.2	DST and AWF Tank WASTE Temperature Controls	3.3.2-1
	3.3.3	Tank 241-AY-102 Annulus Ventilation System	3.3.3-1
	3.3.4	Tank 241-AZ-101 Air Lift Circulators	3.3.4-1
3.4	This Section Reserved for Incorporation of Controls being Transitioned from Retained ISB Controls		3.4-1
Section 4	SURVEILLANCE REQUIREMENTS		4-1
Section 5	ADMINISTRATIVE CONTROLS		5-1
5.0	ADMINISTRATIVE CONTROLS (ACs)		5.1-1
	5.1	Purpose	5.1-1
	5.2	Contractor Responsibility	5.2-1
	5.3	Compliance	5.3-1
	5.4	Technical Safety Requirement VIOLATIONS	5.4-1
	5.5	Occurrence Reporting	5.5-1
	5.6	Organization	5.6-1
	5.7	Nuclear Criticality Safety	5.7-1
	5.8	Source Inventory Controls	5.8-1
	5.9	Flammability Controls	5.9-1
	5.10	Ignition Controls	5.10-1
	5.11	Flammable Gas Monitoring Controls	5.11-1
	5.12	Transfer Controls	5.12-1
	5.13	Encasement Seal Loop Controls	5.13-1
	5.14	Emergency Preparedness	5.14-1
	5.15	Moisture Controls	5.15-1
	5.16	Dome Loading Controls	5.16-1
	5.17	Excavation Controls	5.17-1
	5.18	HEPA Filter Controls	5.18-1
	5.19	Process Instrumentation and Measuring and Test Equipment	5.19-1
	5.20	Transfer Pump Administrative Lock Controls	5.20-1
	5.21	Tank Service Water Intrusion Monitoring Program	5.21-1
	5.22	Transfer System Cover Removal Controls	5.22-1
	5.23	Caustic Transfer Controls	5.23-1
	5.24	Safety Management Programs	5.24-1
	5.25	Ventilation Controls	5.25-1
	5.26	Tank 241-C-106 Waste Temperature Controls	5.26-1
	5.27	This Section Reserved for Incorporation of Controls being Transitioned from Retained ISB Controls	5.27-1

(continued)

Table of Contents (continued)

Section		Page
Section 6	REFERENCES	6-1
Appendix A	BASES	A-1
B 2.0	SAFETY LIMITS (SLs)	A 2.0-1
B 2.1.1	WASTE Temperature	A 2.0-1
B 3.0	LIMITING CONDITIONS FOR OPERATION (LCOs) AND SURVEILLANCE REQUIREMENTS (SRs)	A 3.0-1
B 3.1	CONFINEMENT	A 3.1.1-1
B 3.1.1	Transfer System Covers and Entry Doors	A 3.1.1-1
B 3.1.2	Service Water Pressure Detection Systems	A 3.1.2-1
B 3.1.3	Transfer Leak Detection Systems	A 3.1.3-1
B 3.1.4	Ventilation Stack CAM Interlock Systems	A 3.1.4-1
B 3.1.5	Replacement Cross-Site Transfer System (RCSTS) Pressure Relief Valve (PRV) and Rupture Disk	A 3.1.5-1
B 3.1.6	204-AR Backflow Prevention System	A 3.1.6-1
B 3.1.7	Supplemental Covers	A 3.1.7-1
B 3.2	FLAMMABLE GAS	A 3.2.1-1
B 3.2.1	DST and AWF Tank Ventilation Systems	A 3.2.1-1
B 3.2.2	SST Ventilation Systems - Active	A 3.2.2-1
B 3.2.3	SST Ventilation Systems - Passive	A 3.2.3-1
B 3.2.4	DCRT Ventilation Systems	A 3.2.4-1
B 3.2.5	244-AR TK-002 Ventilation System	A 3.2.5-1
B 3.2.6	Primary Tank Leak Detection Systems	A 3.2.6-1
B 3.3	TEMPERATURE	A 3.3.1-1
B 3.3.1	SST WASTE Temperature Controls	A 3.3.1-1
B 3.3.2	DST and AWF Tank WASTE Temperature Controls	A 3.3.2-1
B 3.3.3	Tank 241-AY-102 Annulus Ventilation System	A 3.3.3-1
B 3.3.4	Tank 241-AZ-101 Air Lift Circulators	A 3.3.4-1
Appendix B	DESIGN FEATURES	B-1
ADDENDUM	TRANSITIONAL REQUIREMENTS	ADDENDUM

List of Tables

Table		Page
1.4-1	Frequencies and Allowable Extensions	1.4-2
5.6-1	TWRS Facilities Minimum Operations Shift Complement	5.6-2
5.7-1	Minimum Neutron Absorber/Plutonium Subcritical Mass Ratios	5.7-2
5.9-1	Flammable Gas Facility Group Assignments	5.9-2
5.10-1	Flammable Gas Ignition Source Control Set Application Requirements	5.10-8
5.11-1	Flammable Gas Monitoring Requirements	5.11-6
5.16-1	Authorized Dome Loads	5.16-2

List of Terms

AC	Administrative Control
ALC	air lift circulator
ASME	American Society of Mechanical Engineers
AWF	aging waste facility
BIO	Basis for Interim Operation
Btu/h	British thermal units per hour
CAM	continuous air monitor
cfh	cubic feet per hour
CFR	Code of Federal Regulations
CGM	combustible gas monitor
cpm	counts per minute
CPS	Criticality Prevention Specification
CSER	Criticality Safety Evaluation Report
CSO	Cognizant Secretarial Officer
DCRT	double-contained receiver tank
dia.	diameter
DOE	U.S. Department of Energy
DST	double-shell tank
ERDA	Energy Research and Development Administration
°F	degrees Fahrenheit
FSAR	Final Safety Analysis Report
ft	foot
g	gram
gal	gallon
GM	Geiger-Mueller (counter)

(continued)

List of Terms (continued)

GRE	gas release event
h	hour
HASP	Health and Safety Plan
HEGA	high-efficiency gas adsorber
HEME	high-efficiency mist eliminator
HEMF	high-efficiency metal filter
HEPA	high-efficiency particulate air (filter)
IMUST	inactive miscellaneous underground storage tank
in.	inch
JCO	Justification for Continued Operation
L	liter
lb	pound
lb/in^2 gauge	pounds per square inch gauge
LCO	Limiting Condition for Operation
LCS	Limiting Control Setting
LDE	leak detection element
LFL	Lower Flammability Limit
mi	mile
mi/h	miles per hour
min	minute
MISF	miscellaneous inactive storage facility
MIT	multi-function instrument tree
mrem	millirem
NFPA	National Fire Protection Association, Inc.
NUREG	U.S. Nuclear Regulatory Guide

(continued)

List of Terms (continued)

OVM	organic vapor monitor
PHMC	Project Hanford Management Contractor
PRV	pressure relief valve
Pu	plutonium
RCRA	Resource Conservation and Recovery Act
RCSTS	replacement cross-site transfer system
rem	roentgen equivalent man
SHMS	Standard Hydrogen Monitoring System
SL	Safety Limit
SR	Surveillance Requirement
SSC	structure, system, and component
SST	single-shell tank
TMACS	Tank Monitoring and Control System
TOC	total organic carbon
TSR	Technical Safety Requirement
TWRS	Tank Waste Remediation System
USQ	Unreviewed Safety Question
WRSS	Waste Retrieval Sluicing System
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
%	percent

SECTION 1

USE AND APPLICATION

Section 1 USE AND APPLICATION

1.1 Definitions

----------NOTE----------

The defined terms of this section are unique definitions. They appear in CAPITALIZED type and are applicable throughout these Technical Safety Requirements (TSRs) and BASES. Some terms in this section refer the user to another section for the definition. This approach will prevent a shortened definition from being supplied and used out of context. Source documents from which the definitions are taken are referenced at the end of each definition. Definitions that have been annotated technically are noted as such.

Term	Definition
ACTIONS	ACTIONS shall be that part of a Limiting Condition for Operation (LCO) that prescribes Required Actions to be taken under designated Conditions within specified Completion Times. (NUREG 1431)
ACTIVE/INACTIVE	The term ACTIVE/INACTIVE applies to transfer pumps and transfer system piping. ACTIVE WASTE transfer systems and pumps are those that are capable of being used for transfers. INACTIVE WASTE transfer systems and pumps are those that have been permanently disabled from use (e.g., permanent piping disconnections or blind flanges/process blanks or power supplies permanently disconnected from WASTE transfer pumps), such that transfers cannot be made without engineering change.
AND	See Section 1.2, "Logical Connectors." (NUREG 1431)
BASES	BASES shall provide statements of the reasons for the Safety Limits, Operating Limits, and associated Surveillance Requirements. The BASES shall show how the numeric values, the Conditions, the ACTIONS statements, and the Surveillances fulfill the purpose derived from the safety documentation (see Appendix A, "BASES"). (DOE 5480.22) - annotated.

(continued)

1.1 Definitions (continued)

CALIBRATION	The adjustment of the instrument loop using a multipoint check of indicated range; required alarm setpoints and/or required interlocks are adjusted to actuate/reset at a specified setpoint.
DESIGN FEATURES	DESIGN FEATURES are those design characteristics, primarily passive in nature, that are of a special importance to maintaining adequate control, shielding, or containment of radiological or toxicological material for which indiscriminate changes are to be prevented. See Appendix B, "DESIGN FEATURES," for DESIGN FEATURES criteria. (DOE 5480.22) - annotated.
DOME INTRUSIVE	A DOME INTRUSIVE region is one that is within the tank between the top of a riser and the surface of the WASTE. It also includes the ventilation ducting up to the first mixing point with flow from another tank. Because the filter housing and connecting ducting extends the riser, the DOME INTRUSIVE region extends to the open-air inlet/outlet of breather filters or active ventilation system inlet filters, or bags/sleeving around an open riser. The DOME INTRUSIVE region includes regions above the riser, such as vapor sample streams that may contain undiluted dome space gases. Salt well pits are considered to be part of the DOME INTRUSIVE region during the operation of salt well pumps. Examples of operations and activities that are performed in the DOME INTRUSIVE region are listed in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities."

(continued)

1.1 Definitions (continued)

EX-TANK INTRUSIVE	An EX-TANK INTRUSIVE region is one that includes all vapor spaces with a direct connection to the tank dome space but does not meet the definition of either DOME INTRUSIVE or WASTE INTRUSIVE. The EX-TANK INTRUSIVE region includes pits (e.g., pump pits, transfer pits) that are not isolated from the tank dome by a seal barrier. The EX-TANK INTRUSIVE region also includes the inside of ventilation system ductwork downstream of the first mixing point with flow from another tank when the ventilation system is shut down. When the ventilation system is operating, the inside of ventilation system ductwork downstream of the first mixing point with flow from another tank is not an INTRUSIVE region because of mixing and dilution provided by flow from other tanks. The EX-TANK INTRUSIVE region also includes the environment outside a tank opening, which is directly connected to the dome space, out to the shortest of the following distances: • 18 opening dia. • 15 ft • The boundary of temporary containment devices. Examples of operations and activities that are performed in the EX-TANK INTRUSIVE region are listed in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities."
FUNCTIONAL TEST	The injection of a simulated or actual signal into the system as close to the sensor as practicable to VERIFY the OPERABILITY of required alarm, interlock, and setpoints. Alarm, interlock, and setpoints that are found to be outside the required range in the LCO shall constitute a Surveillance failure per SR 3.0.1, "SR Met."
INDEPENDENTLY VERIFY/ INDEPENDENT VERIFICATION	The act of checking by qualified personnel at a separate occasion that a given operation conforms to established operational criteria, as well as checking a component position, independently of activities related to establishing the components position.

(continued)

1.1 Definitions (continued)

INTRUSIVE	INTRUSIVE tank regions include EX-TANK INTRUSIVE, DOME INTRUSIVE, and WASTE INTRUSIVE.
MODE	MODES are generally used (1) to determine SL, LCS, LCO, and AC program applicabilities; (2) to distinguish facility operational conditions; (3) to determine minimum staffing requirements; and (4) to provide an instant facility status report. The MODES defined specifically for TWRS facilities (OPERATION and LIMITED) are used to distinguish facility operational conditions and provide an instant facility status report. See also Section 1.6, "MODES." (DOE 5480.22) - annotated.
OPERABLE/OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and (a) setpoints are within limits; (b) operating parameters necessary for OPERABILITY are within limits; and (c) when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication, or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its safety function(s) are also capable of performing their related safety support function(s). (DOE 5480.22) - annotated.
<u>OR</u>	See Section 1.2, "Logical Connectors." (NUREG 1431)
PHYSICALLY CONNECTED	PHYSICALLY CONNECTED refers only to piping, tanks, and structures and their associated instrumentation. 1) PHYSICALLY CONNECTED piping is any piping that is part of or connected to the transfer route. Piping need not be considered connected to the transfer route if it is physically disconnected by a removal of piping (i.e., air gap) or isolated with a blind flange/process blank. Note that closed valves do not physically disconnect piping.

(continued)

1.1 Definitions (continued)

PHYSICALLY CONNECTED (continued)	The East/West cross-site transfer line and replacement cross-site transfer lines are considered PHYSICALLY CONNECTED piping only when cross-site WASTE transfers are in progress. The East/West cross-site transfer line is the piping between 241-UX-154 diversion box and 241-ER-151 diversion box. The replacement cross-site transfer line is the piping between 241-SY-A and 241-SY-B valve pits and the 244-A lift station. An OPERABLE service water pressure detection system is considered to physically disconnect piping on either side of the detection system. An OPERABLE backflow prevention system in the 204-AR Waste Unloading Facility is considered to physically disconnect piping on either side of the backflow preventer. 2) PHYSICALLY CONNECTED structures are those structures through which PHYSICALLY CONNECTED piping runs, or structures that could be subject to leakage from PHYSICALLY CONNECTED piping. 3) PHYSICALLY CONNECTED tanks are those tanks connected to the transfer route, those tanks connected to the PHYSICALLY CONNECTED piping, and those tanks designed to receive leakage from PHYSICALLY CONNECTED piping through a drain path.
UNIT	UNIT can mean any TWRS facility such as a tank farm, tank, WASTE transfer system, or WASTE handling and storage area or facility, as applicable. See Section 1.6.4 for a detailed listing of facilities.
VERIFY/VERIFICATION	A qualitative assessment to confirm or substantiate that specific plant conditions exist. This may include collecting sample data or quantitative data; taking instrument readings; recording data and information on logs, data sheets, or electronic media; and evaluating data and information according to procedures.
VIOLATION	See Section 5.4, "Technical Safety Requirement VIOLATIONS." (DOE 5480.22) - annotated.

(continued)

1.1 Definitions (continued)

WASTE	WASTE includes radiological and toxicological solids and liquids stored in single-shell tanks (SSTs), double-shell tanks (DSTs), aging waste facility (AWF) tanks, double-contained receiver tanks (DCRTs), catch tanks, and miscellaneous inactive storage facilities (MISFs). WASTE also includes radiological and toxicological solids and liquids transferred to or from any tank, chemical processing facilities, WASTE receiving facilities, and related operational UNITs (e.g., receiver vaults, evaporators). Flushing, line drain backs, chemical additions or pressure testing of transfer systems with water is not considered a WASTE transfer.
WASTE DISTURBING	WASTE DISTURBING operations and activities include all work that may result in significant motion under the WASTE surface. WASTE DISTURBING operations and activities include GLOBAL WASTE DISTURBING and LOCAL WASTE DISTURBING defined as follows: • GLOBAL WASTE DISTURBING: Operations and activities that cause a large global disturbance of the WASTE. Examples of GLOBAL WASTE DISTURBING operations and activities are listed in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities." • LOCAL WASTE DISTURBING: Operations and activities that disturb only a small, local portion of the WASTE. Examples of LOCAL WASTE DISTURBING operations and activities are listed in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities."

(continued)

1.1 Definitions (continued)

WASTE-INTRUDING EQUIPMENT	WASTE-INTRUDING EQUIPMENT includes open-ended or breached objects that are inserted below the WASTE surface and create an unvented vapor space where flammable gases retained in the WASTE may accumulate. Examples of WASTE-INTRUDING EQUIPMENT include core sample drill pipes, pump suction legs, and weight factor dip tubes. The vapor space inside equipment, which is inserted below the WASTE surface and properly sealed (e.g., thermocouple trees or liquid observation wells), is not considered WASTE-INTRUDING EQUIPMENT.
WASTE INTRUSIVE	The WASTE INTRUSIVE region is the region below the WASTE surface.

Section 1 USE AND APPLICATION

1.2 Logical Connectors

PURPOSE

The purpose of this section is to explain the meaning of logical connectors with specific examples.

Logical connectors are used in Technical Safety Requirements (TSRs) to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances, and Frequencies. The only logical connectors that appear in TSRs are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

BACKGROUND

Several levels of logic may be used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and by the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentations of the logical connectors.

When logical connectors are used to state a Condition, usually only the first level of logic is used, and the logical connector is left justified with the Condition statement. In a few cases, successive levels of logic are used. This is identified solely by indenting the logical connector, because subparts of a Condition statement are not numbered separately.

When logical connectors are used to state a Completion Time, Surveillance, or Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Completion Time, Surveillance, or Frequency.

(continued)

1.2 Logical Connectors (continued)

EXAMPLES

The following examples illustrate the use of logical connectors.

Example 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	x hours
	AND	
	A.2 Be in _____	y hours

In hypothetical Example 1.2-1 the logical connector AND is used to demonstrate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

(continued)

1.2 Logical Connectors (continued)

EXAMPLES

The following examples illustrate the use of logical connectors.

Example 1.2-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	x hours
	AND	
	A.2 Be in _____	y hours

In hypothetical Example 1.2-1 the logical connector AND is used to demonstrate that when in Condition A, both Required Actions A.1 and A.2 must be completed.

(continued)

1.2 Logical Connectors (continued)

EXAMPLES (continued)

Example 1.2-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	s hours
	OR	
	A.2 Align _____	t hours
	OR	
	A.3.1 VERIFY _____	u hours
	AND	
	A.3.2.1 Reduce _____	v hours
	OR	
	A.3.2.2 Perform _____	w hours

Hypothetical Example 1.2-2 represents a more complicated use of logical connectors. Required Actions A.1, A.2, and A.3 are alternative choices, only one of which must be performed as indicated by the use of the logical connector OR and the left justified placement. Any one of these three Required Actions may be chosen. If A.3.1 is chosen, an additional requirement, indicated by the indented logical connector AND, is imposed. This additional requirement is met by choosing A.3.2.1 or A.3.2.2. The indented position of the logical connector OR indicates that A.3.2.1 and A.3.2.2 are alternate and equal choices, only one of which must be performed.

Section 1 USE AND APPLICATION

1.3 Completion Times

PURPOSE	The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.
BACKGROUND	Limiting Conditions for Operation (LCOs) specify minimum requirements for ensuring safe operation of the facility. The ACTIONS associated with an LCO state Conditions that typically describe the ways in which the requirements of the LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).
IMMEDIATE COMPLETION TIME	In some cases Immediately is used as a special Completion Time. In this case, the Required Action is to be commenced without delay and continuously pursued in a controlled manner until complete. The use of Immediately implies the highest sense of urgency. Implementation of Immediately shall be given top priority over all other activities. Upon entry into the ACTIONS, the prevalent conditions shall be evaluated. A maximum Completion Time shall be established and documented, based on the conditions. A VIOLATION will occur beyond the established Completion Time.

(continued)

1.3 Completion Times (continued)

DESCRIPTION

The Completion Time is the amount of time allowed for completing a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, provided the UNIT is in a MODE or specified condition stated in the Applicability of the LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions must be applied until the Condition no longer exists or the UNIT is not within the LCO Applicability.

If situations are discovered that require entry into more than one Condition at a time within a single LCO (multiple Conditions), the Required Actions for each Condition must be performed within the associated Completion Time. When in multiple Conditions, separate Completion Times are tracked for each Condition starting from the time of discovery of the situation that required entry into the Condition.

Once a Condition has been entered, subsequent systems or variables expressed in the Condition discovered to be inoperable or not within limits, will result in separate entry into the Condition for each discovery. The Required Actions and the associated Completion Times of the Condition then apply to each additional discovery independently.

(continued)

1.3 Completion Times (continued)

EXAMPLES

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

Example 1.3-1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action A.1 and associated Completion Time not met within X hours.	B.1 Stop all transfers to and from affected tank.	6 hours
	AND	
	B.2 Restore WASTE temperature to within limit.	12 hours

In hypothetical Example 1.3-1, Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to stop all transfers to and from affected tank in 6 hours AND restore WASTE temperature to within the limit in 12 hours. A total of 6 hours is allowed to stop transfers and a total of 12 hours (not 18 hours) is allowed to restore WASTE temperature from the time that Condition B was entered. If transfers are stopped in 3 hours, the time allowed to restore WASTE temperature is the next 9 hours because the total time allowed to restore WASTE temperature is 12 hours.

If Condition B is entered while transfers are already stopped, the time allowed to restore WASTE temperature is the next 12 hours.

(continued)

1.3 Completion Times (continued)

EXAMPLES (continued)

Example 1.3-2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more tank isolation valves inoperable.	A.1 Restore valve to OPERABLE status.	4 hours
B. Required Action A.1 and associated Completion Time not met within 4 hours.	B.1 Stop all transfers to and from affected tank. AND B.2 Place valve in its fail-safe position.	6 hours 12 hours

In hypothetical Example 1.3-2, Condition A is entered separately for each inoperable valve and Completion Times tracked on a per valve basis. When a valve is declared inoperable, Condition A is entered and its Completion Time starts. If subsequent valves are declared inoperable, Condition A is entered for each valve and separate Completion Times start and are tracked for each valve.

If the Completion Time associated with a valve in Condition A expires, Condition B is entered for that valve. If the Completion Times associated with subsequent valves in Condition A expire, Condition B is entered separately for each valve and separate Completion Times start and are tracked for each valve. If a valve that caused entry into Condition B is restored to OPERABLE status, Condition B is exited for that valve.

(continued)

1.3 Completion Times (continued)

EXAMPLES (continued)

Example 1.3-3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary tank WASTE level outside limit.	A.1 Perform SR 3.X.X.X.	Once per 2 hours
	OR	
	A.2 Restore primary tank WASTE level to within limit.	7 days
B. Required Action and associated Completion Time for Condition A not met.	B.1 Stop all transfers to and from affected tank.	6 hours

In hypothetical Example 1.3-3, entry into Condition A offers a choice between Required Action A.1 or A.2. Required Action A.1 has a "Once per" Completion Time, which qualifies for the 25% extension per SR 3.0.2, "Frequencies," to each performance after the initial performance. If Required Action A.1 is followed and the Required Action is not met within the Completion Time (including the 25% extension allowed by SR 3.0.2, "Frequencies"), Condition B is entered. If Required Action A.2 is followed and the Completion Time of 7 days is not met, Condition B is entered. The 25% extension is not intended to be used repeatedly as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

If after entry into Condition B, Required Action A.1 or A.2 is met, Condition B is exited and operation may then continue in Condition A.

(continued)

1.3 Completion Times (continued)

EXAMPLES (continued)

Example 1.3-4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Perform SR 3.X.X.X.	2 hours AND Once per 8 hours thereafter
	AND	
	A.2 Restore system to OPERABLE status.	7 days
B. Required Action A.1 and associated Completion Times not met.	B.1 Stop all operations and activities in affected tank.	6 hours
	AND	
	B.2 Restore the system according to an approved recovery plan.	12 hours

(continued)

1.3 Completion Times (continued)

EXAMPLES

Example 1.3-4 (continued)

In hypothetical Example 1.3-4, Required Action A.1 has two Completion Times. The 2-hour Completion Time begins at the time the Condition is entered and each "Once per 8 hours thereafter" interval begins upon performance of Required Action A.1.

If, after Condition A is entered, Required Action A.1 is not met within either the initial 2-hour, or any subsequent 8-hour interval from the previous performance (including the 25% extension allowed by SR 3.0.2, "Frequencies"), Condition B is entered. The Completion Time clock for Condition A does not stop after Condition B is entered, but continues from the time Condition A was initially entered. If Required Action A.1 is met after Condition B is entered, Condition B is exited and operation may continue in accordance with Condition A, provided the Completion Time for Required Action A.2 has not expired.

Section 1 USE AND APPLICATION

1.4 Frequency

PURPOSE

The purpose of this section is to define the proper use and application of Frequency requirements. Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Limiting Condition for Operation (LCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the SR or ACTIONS statement, as applicable.

FREQUENCIES

Table 1.4-1 specifies the Frequencies and allowable 25% extensions as used in Surveillance Requirements (e.g., 365 days) and any Completion Time in an ACTIONS statement that requires the periodic performance of a Required Action on a "once per. . ." interval (e.g., once per 12 hours thereafter).

The 25% extension does not apply to Completion Times (e.g., Immediately, 8 hours, 7 days) in ACTIONS statements, except for those Completion Times that require a "once per. . ." interval discussed above. See Section 1.3, "Completion Times," Examples 1.3-3 and 1.3-4, which show both a Completion Time and a periodic Completion Time in an ACTIONS statement. For some specified Frequencies, the 25% extension may not be allowed if the time duration is very short (e.g., once per hour). Refer to Example 1.4-2, where a Frequency specified as "once," does not qualify for the 25% extension, in accordance with SR 3.0.2, "Frequencies."

See SR 3.0.2, "Frequencies," and the BASES for more discussion of the applications of the 25% extension.

(continued)

1.4 Frequency (continued)

FREQUENCIES
(continued)

Table 1.4-1. Frequencies and Allowable Extensions

NOTATION	FREQUENCY	WITH 25% EXTENSION*
1 hour	At least once per hour	1 hour
2 hours	At least once per 2 hours	2 hours
12 hours	At least once per 12 hours	15 hours
24 hours	At least once per 24 hours	30 hours
72 hours	At least once per 72 hours	90 hours
4 days	At least once per 4 days	5 days
7 days	At least once per 7 days	8 days
10 days	At least once per 10 days	12 days
92 days	At least once per 92 days	115 days
182 days	At least once per 182 days	227 days
365 days	At least once per 365 days	456 days

* When the Frequency is specified in hours, no partial hours are allowed. When the Frequency is specified in days, no partial days are allowed. That is, the 25% extension shall be rounded conservatively (e.g., 1 hour instead of 1.25 hours; 456 days instead of 456.25 days). The allowable 25% extension is not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

EXAMPLES

The following examples illustrate the various ways that Frequencies are specified.

(continued)

1.4 Frequency (continued)

EXAMPLES

Example 1.4-1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Perform VERIFICATION.	24 hours

Hypothetical Example 1.4-1 contains the type of SR most often encountered in the Technical Safety Requirements (TSRs). The Frequency specifies an interval (24 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent 24-hour interval. Although the Frequency is stated as 24 hours, an extension of the time interval to 1.25 times the stated Frequency is allowed by SR 3.0.2, "Frequencies," for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1, "SR Met," (e.g., when the equipment is inoperable, a variable is outside specified limits, or the UNIT is outside the Applicability of the Limiting Condition for Operation). If the interval specified by SR 3.0.2, "Frequencies," is exceeded while the UNIT is in a MODE or other specified condition in the Applicability of the LCO, and the performance of the Surveillance is not otherwise modified (refer to Examples 1.4-3 and 1.4-4), then SR 3.0.3, "Delay of Required Actions," becomes applicable.

If the interval as specified by SR 3.0.2, "Frequencies," is exceeded while the UNIT is not in a MODE or other specified condition in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2, "Frequencies," prior to entry into the MODE or other specified condition. Failure to do so would result in SR 3.0.4, "MODE Changes," not being met. (Note: SR 3.0.4 is not applicable to TWRS facilities at this time.)

Sometimes special conditions dictate when a Surveillance is to be met. These conditions apply to the Surveillance or to the Frequency or both. These are "otherwise stated" conditions allowed by SR 3.0.1, "SR Met." They may be stated as clarifying Notes in the Surveillance, in the Frequency, or both. The remaining examples discuss these special conditions.

(continued)

1.4 Frequency (continued)

EXAMPLES (continued)

Example 1.4-2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
VERIFY temperature is within limits.	Once within 8 hours after start of transfer AND 24 hours thereafter during transfer

Hypothetical Example 1.4-2 has two Frequencies. The first is a one-time performance Frequency, and the second is of the type shown in Example 1.4-1. The logical connector "AND" indicates that both Frequency requirements must be met. The Surveillance must initially be performed within 8 hours after the start of each transfer.

The use of "Once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2, "Frequencies." "Thereafter" indicates future performances must be established per SR 3.0.2, "Frequencies," but only after a specified condition is first met (i.e., the "Once" performance in this example). Once the transfer is complete, the measurement of both intervals stops. New intervals start upon the start of the next transfer.

(continued)

1.4 Frequency (continued)

EXAMPLES (continued)

Example 1.4-3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 8 hours after start of transfer. ----------	
VERIFY temperature is within limits.	24 hours

The Surveillance shown in hypothetical Example 1.4-3 need only be performed during transfers. The interval measurement for the Frequency of this Surveillance continues at all times, as described in Example 1.4-1. If the Surveillance was not performed within the 24-hour interval (including the 25% extension allowed by SR 3.0.2, "Frequencies") but transfers are not occurring, it would not constitute a failure of the SR or failure to meet the LCO. Therefore, SR 3.0.4, "MODE Changes," is not applicable when changing MODES, even with the 24-hour Frequency not met, provided transfers are not occurring. (Note: SR 3.0.4 is not applicable to TWRS facilities at this time.)

Once transfers are occurring, 8 hours would be allowed for completing the Surveillance. If the Surveillance was not performed within this 8-hour interval, there would then be a failure to perform a Surveillance within the specified Frequency; then MODE changes would be restricted in accordance with SR 3.0.4, "MODE Changes," and the provisions of SR 3.0.3, "Delay of Required Actions," apply. (Note: SR 3.0.4 is not applicable to TWRS facilities at this time.)

(continued)

1.4 Frequency (continued)

EXAMPLES (continued)

Example 1.4-4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be met until transfers are occurring. ----------	
VERIFY temperature is within limits.	24 hours

Hypothetical Example 1.4-4 specifies that the requirements of this Surveillance do not have to be met until transfers are occurring. The interval measurement for the Frequency of this Surveillance continues at all times, as described in Example 1.4-1. If the Surveillance was not performed within the 24-hour interval (including the 25% extension of SR 3.0.2, "Frequencies") but the UNIT is not performing transfers, there would be no failure of the SR nor failure to meet the LCO. Therefore, SR 3.0.4, "MODE Changes," is not applicable when changing MODES, even with the 24-hour Frequency not met. Prior to performing transfers, (assuming again that the 24-hour Frequency was not met), the SR must be satisfied. (Note: SR 3.0.4 is not applicable to TWRS facilities at this time.)

This example, specifying when the Surveillance is "required to be met," differs from the other examples, which only specified performance allowances/requirements. When a Surveillance is not required to be "met," the acceptance criteria is not required to be applied to consideration of OPERABILITY. That is, SR 3.0.1, "SR Met," requires "failure to meet a Surveillance, whether such failure is experienced during performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO." Therefore, when the Surveillance is not required to be met, failure does not constitute failure to meet the LCO.

Section 1 USE AND APPLICATION

1.5 Notes

PURPOSE	Notes provide additional clarification in the Limiting Conditions for Operation (LCOs), Applicability, ACTIONS and Surveillance Requirements (SRs). Notes in the LCOs and Applicability are placed after the text they amplify. Notes in the ACTIONS and SRs are placed before the text they amplify. All Notes are preceded by the centered heading "NOTE" in uppercase type.

EXAMPLES

The following examples illustrate the various ways that Notes are specified.

Example 1.5-1

LCO 3.X.X Transfer leak detection systems installed in process pipeline encasements and clean-out boxes (COBs), diversion boxes, valve pits, pump pits, and drain pits shall be OPERABLE.

----------NOTE----------
Transfer leak detection systems may be inoperable for planned work activities (e.g., maintenance):

1. For ≤ 1 hour, or

2. When constant surveillance is provided at the locations where leak detection systems are inoperable, or

3. For process pipeline encasements that drain to pits where leak detection systems are OPERABLE.

In hypothetical Example 1.5-1 the Note is placed after the LCO requirement.

(continued)

1.5 Notes (continued)

EXAMPLES (continued)

Example 1.5-2

MODE
APPLICABILITY: OPERATION and LIMITED.

----------NOTE----------
LCO 3.0.4, "MODE Changes," is not applicable.

In hypothetical Example 1.5-2 the Note is placed after the Applicability.

(continued)

1.5 Notes (continued)

EXAMPLES (continued)

Example 1.5-3

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	X hours
	OR	
	A.2 Provide _____	X hours
	OR	
	--------NOTE------- Transfer system draining and flushing may be performed. ----------	
	A.3 Stop _____	X hours

In hypothetical Example 1.5-3 the Note is placed before Required Action A.3.

(continued)

1.5 Notes (continued)

EXAMPLES (continued)

Example 1.5-4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.X.X.X	----------NOTE---------- Only required to be performed in OPERATION and LIMITED MODES. ---------- VERIFY _____	X days

In hypothetical Example 1.5-4 the Note is placed before the Surveillance Requirement.

Section 1 USE AND APPLICATION

1.6 MODES

1.6.1 The MODES defined for SSTs, DSTs, AWF tanks, DCRTs, catch tanks, and MISFs (encompasses IMUSTs) are:

A MODE is the state of an individual tank at a given time. A particular support system may provide services for several individual tanks, with each tank operating in a different MODE. Under these circumstances, the applicable MODE for the support system is the most restrictive MODE applicable to any of the tanks being provided with supporting services.

OPERATION	WASTE is being stored. WASTE transfers to or from any tank are authorized. Routine operational and maintenance activities may be performed.
LIMITED	WASTE is being stored. WASTE transfers to or from any tank are not authorized except in accordance with an approved recovery plan. Routine operational and maintenance activities may be performed.

(continued)

1.6 MODES (continued)

1.6.2 The MODES defined for the 204-AR Waste Unloading Facility are:

OPERATION	WASTE may be stored in catch tanks temporarily. Receipt, unloading, processing, or transfers of WASTE are authorized. Routine operational and maintenance activities may be performed.
LIMITED	WASTE may be stored in catch tanks temporarily. Receipt, unloading, processing, or transfers of WASTE are not authorized. Routine operational and maintenance activities may be performed.

(continued)

1.6 MODES (continued)

1.6.3 The MODES defined for the 244-AR Vault are:

OPERATION	WASTE may be stored in process tanks temporarily. Interfacility or process-tank-to-process-tank WASTE transfers are authorized. Sump-to-process-tank WASTE transfers are authorized. Routine operational and maintenance activities may be performed.
LIMITED	WASTE may be stored in process tanks temporarily. Interfacility or process-tank-to-process-tank WASTE transfers are not authorized. Sump-to-process-tank WASTE transfers are authorized. Routine operational and maintenance activities may be performed.

(continued)

1.6 MODES (continued)

1.6.4 TWRS facilities (UNITs) are listed as follows:

SST Farms

200 West Area: 241-S, 241-SX, 241-T, 241-TX, 241-TY, and 241-U.
200 East Area: 241-A, 241-AX, 241-B, 241-BX, 241-BY, and 241-C.

SST Farm Tanks

241-A-101, A-102, A-103, A-104, A-105, A-106,

241-AX-101, AX-102, AX-103, AX-104,

241-B-101, B-102, B-103, B-104, B-105, B-106, B-107, B-108, B-109, B-110, B-111, B-112, B-201, B-202, B-203, B-204,

241-BX-101, BX-102, BX-103, BX-104, BX-105, BX-106, BX-107, BX-108, BX-109, BX-110, BX-111, BX-112,

241-BY-101, BY-102, BY-103, BY-104, BY-105, BY-106, BY-107, BY-108, BY-109, BY-110, BY-111, BY-112,

241-C-101, C-102, C-103, C-104, C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-201, C-202, C-203, C-204,

241-S-101, S-102, S-103, S-104, S-105, S-106, S-107 S-108, S-109, S-110, S-111, S-112,

241-SX-101, SX-102, SX-103, SX-104, SX-105, SX-106, SX-107, SX-108, SX-109, SX-110, SX-111, SX-112, SX-113, SX-114, SX-115,

241-T-101, T-102, T-103, T-104, T-105, T-106, T-107, T-108, T-109, T-110, T-111, T-112, T-201, T-202, T-203, T-204,

241-TX-101, TX-102, TX-103, TX-104, TX-105, TX-106, TX-107, TX-108, TX-109, TX-110, TX-111, TX-112, TX-113, TX-114, TX-115, TX-116, TX-117, TX-118,

241-TY-101, TY-102, TY-103, TY-104, TY-105, TY-106,

241-U-101, U-102, U-103, U-104, U-105, U-106, U-107, U-108, U-109, U-110, U-111, U-112, U-201, U-202, U-203, and U-204.

(continued)

1.6 MODES (continued)

DST Farms

200 West Area: 241-SY.
200 East Area: 241-AN, 241-AP, and 241-AW.

DST Farm Tanks

241-AN-101, AN-102, AN-103, AN-104, AN-105, AN-106, AN-107,

241-AP-101, AP-102, AP-103, AP-104, AP-105, AP-106, AP-107, AP-108,

241-AW-101, AW-102, AW-103, AW-104, AW-105, AW-106,

241-SY-101, SY-102, and SY-103.

AWF Tank Farms (DSTs)

200 East Area: 241-AY and 241-AZ.

AWF Tank Farm Tanks (DSTs)

241-AY-101 and AY-102.

241-AZ-101 and AZ-102.

Other Underground Storage Tanks

- Catch Tanks

  200 West Area: 241-S-304, 241-TX-302C, 241-U-301B, and 241-UX-302A.
  200 East Area: 241-A-302A, 241-A-350, 241-A-417, 241-AX-152, 241-AZ-151, 241-AZ-154, and 241-ER-311.
  600 Area: 241-EW-151.

- Double-Contained Receiver Tanks

  200 West Area: 244-S, 244-TX, and 244-U.
  200 East Area: 244-A, 244-BX, and 244-CR TK-003.

(continued)

1.6 MODES (continued)

WASTE Transfer Systems

Encompasses ACTIVE transfer lines, jumpers, and equipment (e.g., diversion boxes, valve pits, pumps) that support the previously listed tanks and tank farms.

Miscellaneous Inactive Storage Facilities

The list of miscellaneous inactive storage facilities (MISFs) encompasses the 36 inactive miscellaneous underground storage tanks (IMUSTs) in TWRS.

200 East Area:	216-BY-201, 241-A-302B, 241-AX-151, 241-B-301B, 241-B-302B, 241-BX-302A, 241-BX-302B, 241-BX-302C, 241-C-301C, 241-ER-311A, 244-BXR-001, 244-BXR-002, 244-BXR-003, and 244-BXR-011.
200 West Area:	213-W-TK-1, 216-TY-201, 231-W-151-001, 231-W-151-002, 240-S-302, 241-S-302A, 241-S-302B, 241-SX-302, 241-T-301, 241-TX-302A, 241-TX-302B, 241-TX-302B(R), 241-TX-302X, 241-TY-302A, 241-TY-302B, 241-Z-8, 242-T-135, 242-TA-R1, 243S-TK-1, 244-TXR-001, 244-TXR-002, 244-TXR-003, and 270-W.

WASTE Handling and Storage Areas or Facilities

204-AR Waste Unloading Facility; 244-AR Vault; 209-E Storage Area; vertical storage units within the tank farm boundaries; 2727-W Sodium Storage Facility (nonnuclear); 213-W Dry Waste Compactor Facility; cribs, ditches, and ponds owned and operated by TWRS; and the 242-S Evaporator ("cold side" only).

Section 1 USE AND APPLICATION

1.7 Safety Limits (SLs)

SLs are limits on process variables (e.g., temperature, pressure) associated with those physical barriers (e.g., tanks, piping), generally passive, that are necessary for the intended facility function. Exceeding SLs could directly cause the failure of one or more of the barriers that prevent the uncontrolled release of radiological and toxicological material. The limits are stated in measurable units such as degrees Fahrenheit and are placed on primary barriers closest to the material source. SLs are reserved for a small set of safety requirements to which the facility is committed to protect the integrity of the primary barriers.

The control selection process is discussed in the Executive Summary and other appropriate sections of HNF-SD-WM-SAR-067. The control level verification process that was used for SLs to ensure compliance with DOE 5480.22 is documented in Funderburke, 1997.

Section 1 USE AND APPLICATION

1.8 Limiting Control Settings (LCSs)

LCSs are setpoints on safety systems that control process variables to prevent exceeding SLs. The specific setpoints are chosen such that, if exceeded, sufficient time is available to automatically or manually correct the condition before exceeding SLs.

The LCSs are combined with their respective LCOs with all setpoints and requirements contained within the LCOs. By combining the LCSs with the LCOs, the LCS setpoint (within limits) becomes part of the OPERABILITY of the system. Furthermore, placing the Applicability, ACTIONS, and SRs for a system in a single location enhances safety and reduces the complexity of the TSR document.

The control selection process is discussed in the Executive Summary and other appropriate sections of HNF-SD-WM-SAR-067. The control level verification process that was used for LCSs to ensure compliance with DOE 5480.22 is documented in Funderburke, 1997.

Section 1 USE AND APPLICATION

1.9 Limiting Conditions for Operation (LCOs)

LCOs are the lowest functional capability or performance level of safety structures, systems, and components (SSCs) (and their support systems) required for normal, safe operation of the facility. LCOs are based on keeping the safety SSCs OPERABLE or on maintaining conditions within specified limits. LCOs are prepared for those safety SSCs that are identified in the accident analyses as preventing or mitigating accidents or transient events that involve the assumed failure of, or present a challenge to, the integrity of a physical barrier that prevents the uncontrolled release of radiological and toxicological material. LCOs are established only for those mitigative safety SSCs that are part of the primary success path of an accident sequence analysis; that is, the assumed sequence of events that leads to the conclusion of an accident for which the risk is judged to be acceptable.

The control selection process is discussed in the Executive Summary and other appropriate sections of HNF-SD-WM-SAR-067. The control level verification process that was used for LCOs to ensure compliance with DOE 5480.22 is documented in Funderburke, 1997.

Section 1 USE AND APPLICATION

1.10 Surveillance Requirements (SRs)

SRs are requirements relating to testing, CALIBRATION, or inspection of safety SSCs or conditions. The purpose of SRs is to confirm the availability, OPERABILITY, and quality of safety SSCs or to VERIFY that specific plant conditions exist that are required to maintain the facility's operations within the SLs, LCSs, and LCOs. SRs ensure that safety SSCs will function when required or that parameters are within limits (e.g., temperature) to preserve the validity of the safety analysis and the resulting safety envelope. If a safety SSC is out of service or is inoperable, it cannot perform its required safety function.

The establishment of SR Frequencies considers (a) equipment operating history, (b) engineering judgement, (c) meantime between failures, (d) equipment degradation, (e) instrument and CALIBRATION accuracies, (f) industrial practice, (g) the manufacturers' recommendations, (h) safety analysis assumptions, (i) 25% extension of SRs, (j) the risk of an inoperable safety SSC or a parameter not within limits, and (i) time to perform an SR.

Section 1 USE AND APPLICATION

1.11 Administrative Controls (ACs)

ACs are the provisions relating to organization and management, procedures, recordkeeping, reviews, audits, and specific program requirements for risk reduction necessary to ensure safe operation of the facility. The TSRs (i.e., SLs, LCSs, LCOs and ACs) establish administrative requirements that ensure TSR requirements are met in the operation of the facility and the procedures that are followed should a TSR not be met. ACs are normally written at the program level and contain program key elements, as applicable. ACs are established (1) if a safety function is best satisfied by a program instead of a hardware system, (2) if control of a condition is not measured in real-time or near to real-time, (3) if control of a condition is not under the immediate control of the operator, (4) if a condition does not require immediate action and sufficient recovery time exists to permit mitigating action, or (5) if a condition requires an evaluation based on prevalent conditions. Details of safety management programs are provided in the programmatic chapters of HNF-SD-WM-SAR-067. ACs do not require ACTIONS statements or SRs. SRs necessary to demonstrate compliance with an AC and the actions taken should an AC requirement not be met are performed according to procedures.

The control selection process is discussed in the Executive Summary and other appropriate sections of HNF-SD-WM-SAR-067. The control level verification process that was used for ACs to ensure compliance with DOE 5480.22 is documented in Funderburke, 1997.

Section 1 USE AND APPLICATION

1.12 Cross References

Cross References direct the TSR user to other SLs, LCSs, LCOs, and ACs that are related to the SLs, LCSs, and LCOs where the Cross Reference section is located. The purpose of the Cross Reference section is to make the TSR user aware that there may be other TSR controls or requirements that apply concurrently when a situation or condition is discovered.

SECTION 2

SAFETY LIMITS

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 WASTE Temperature

SL 2.1.1 The WASTE temperature shall be ≤ 250 °F.

MODE
APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA
APPLICABILITY: 241-C-106, SX-103, SX-107, SX-108, SX-109, SX-110, SX-111, SX-112, SX-114, DSTs, and AWF tanks.

2.2 SL VIOLATIONS

If a VIOLATION of an SL occurs, proceed in accordance with AC 5.4.2, "Response to a Safety Limit VIOLATION."

SECTION 3

OPERATING LIMITS

AND

SURVEILLANCE REQUIREMENTS

3.0 LIMITING CONDITIONS FOR OPERATION (LCOs) APPLICABILITY

Purpose	These General Rules of Applicability provide basic rules to govern the specific LCOs (and LCSs) to ensure uniform application and implementation of the requirements. That is, these basic rules ensure activities are conducted in a consistent manner and responses to conditions and situations are taken in a uniform and predictable way.
LCO 3.0.1 LCO Met	LCOs shall be met during the MODES or other specified conditions in the Applicability, except as provided in LCO 3.0.2, "ACTION Met."
LCO 3.0.2 ACTION Met	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Conditions shall be met. If the LCO is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.
LCO 3.0.3 ACTION Not Met or ACTION Not Provided	**[Note: LCO 3.0.3 is not applicable at this time].** For ACTIONS not met (VIOLATION), proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION." All foreseen Conditions are listed in the ACTIONS statements. Therefore, all ACTIONS are provided for all foreseen Conditions.

LCO 3.0.4 MODE Changes	**[Note: LCO 3.0.4 is not applicable at this time].** When an LCO is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated ACTIONS to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time. This LCO shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. Exceptions to this LCO are stated in the individual LCOs. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow UNIT operation in the MODE or other specified condition in the Applicability only for a limited period of time.
LCO 3.0.5 Return to Service	Equipment removed from service or declared inoperable to comply with ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to LCO 3.0.2, "ACTION Met," for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.
LCO 3.0.6 Support System LCO Not Met	**[Note: LCO 3.0.6 is not applicable at this time].** When a supported system LCO is not met solely due to a support system LCO not being met, the Conditions and Required Actions associated with this supported system are not required to be entered. Only the support system LCO ACTIONS are required to be entered. This is an exception to LCO 3.0.2, "ACTION Met," for the supported system. When a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2, "ACTION Met."

LCO 3.0.7 Emergency Exceptions	If an emergency situation develops that is not treated in the Technical Safety Requirements (TSRs), Operations personnel are expected to use their training and expertise to take actions to correct or mitigate the situation. Operations personnel may take actions that depart from a requirement in the TSRs provided an emergency situation exists and these actions are needed immediately to protect the health and safety of the public and onsite workers. Such actions shall be approved by the Shift Manager. If emergency actions are taken, verbal notifications shall be made to the Manager, U.S. Department of Energy, Richland Operations Office within 2 hours and by written reports to the RL Assistant Manager, Office of Tank Waste Remediation System within 24 hours, in accordance with Section 5.5, "Occurrence Reporting."

3.0 SURVEILLANCE REQUIREMENTS (SRs) APPLICABILITY

Purpose	These General Rules of Applicability provide basic rules to govern the specific SRs to ensure uniform application and implementation of the requirements. That is, these basic rules ensure activities are conducted in a consistent manner and responses to conditions and situations are taken in a uniform and predictable way.
SR 3.0.1 SR Met	SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3, "Delay of Required Actions." If in an ACTIONS statement, performance of SRs required to demonstrate compliance with an LCO is not required.
SR 3.0.2 Frequencies	The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency as measured from the previous performance or as measured from the time a specified condition of the Frequency is met. For Frequencies specified as "once," the above interval extension does not apply. If a Completion Time requires periodic performance on a "once per . . ." basis, the above Frequency extension applies to each performance after the initial performance. Exceptions to this SR are stated in the individual LCOs.

SR 3.0.3 Delay of Required Actions	If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the LCO not met may be delayed from the time of discovery up to 24 hours or up to the limit of the specified Frequency, whichever is less. This delay period is permitted to allow performance of the Surveillance. If the Surveillance is not performed within the delay period, the LCO must immediately be declared not met and the applicable Condition(s) must be entered. The Completion Times of the Required Actions begin immediately upon expiration of the delay period. When the Surveillance is performed within the delay period and the Surveillance is not met, the LCO must immediately be declared not met and the applicable Condition(s) must be entered. The Completion Times of the Required Actions begin immediately upon failure to meet the Surveillance.
SR 3.0.4 MODE Changes	**[Note: SR 3.0.4 is not applicable at this time].** Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent passage through or to MODES or other specified conditions in compliance with Required Actions.

3.1 CONFINEMENT

3.1.1 Transfer System Covers and Entry Doors

LCO 3.1.1 Transfer system covers, replacement cross-site transfer system (RCSTS) entry doors, and RCSTS diversion box and RCSTS vent station structure penetration seals shall be OPERABLE.

a. Entry doors are closed.

b. Emergency pumpout line, air sample line, exhauster hookup, and liner washdown system penetrations are sealed.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: Transfer system covers that are:

- associated with structures that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock; and
- not under the control of AC 5.22, "Transfer System Cover Removal Controls."

RCSTS entry doors, and RCSTS diversion box and RCSTS vent station structure penetration seals that are:

- associated with replacement cross-site transfer diversion box and vent station structures that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock; and
- not under the control of AC 5.22, "Transfer System Cover Removal Controls."

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Cover/RCSTS entry door/RCSTS penetration seal inoperable, or missing, or open.	----------NOTE---------- Transfer system draining and flushing may be performed. ----------	
	A.1 Stop WASTE transfer(s) associated with PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately
	AND	
	A.2 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.1.1.1 VERIFY that covers are OPERABLE.	Once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump AND Once per 10 days thereafter

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.1.1.2	VERIFY that RCSTS entry doors, and RCSTS diversion box and RCSTS vent station penetration seals are OPERABLE.	Once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump AND Once per 10 days thereafter

CROSS REFERENCES

TITLE	NUMBER
1. Transfer Pump Administrative Lock Controls	AC 5.20
2. Transfer System Cover Removal Controls	AC 5.22

3.1 CONFINEMENT

3.1.2 Service Water Pressure Detection Systems

LCO 3.1.2 Service water pressure detection systems shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: Service water pressure detection systems that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock. This LCO does not apply to the 204-AR Waste Unloading Facility.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Service water pressure detection system inoperable or alarming.	----------NOTE---------- Transfer system draining is allowed. ----------	
	A.1 Stop WASTE transfer(s), transfer line flushing, pump priming, and transfer line pressure testing associated with PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately
	AND	
	A.2 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.1.2.1	VERIFY that service water pressure detection systems are OPERABLE.	Once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump
SR	3.1.2.2	Perform FUNCTIONAL TEST on the service water pressure detection systems and VERIFY a setpoint of $\leq$ 20 lb/in^2 gauge on increasing pressure.	365 days

CROSS REFERENCES

	TITLE	NUMBER
1.	Transfer Controls	AC 5.12
2.	Transfer Pump Administrative Lock Controls	AC 5.20
3.	204-AR Backflow Prevention System	LCO 3.1.6

3.1 CONFINEMENT

3.1.3 Transfer Leak Detection Systems

LCO 3.1.3 Transfer leak detection systems shall be OPERABLE.

MODE
APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA
APPLICABILITY: All process pits, diversion boxes, vault pits, and cleanout boxes PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump that is not under administrative lock.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Transfer leak detection system inoperable or alarming.	----------NOTE---------- Transfer system draining and flushing may be performed. ----------	
	A.1 Stop WASTE transfer(s) associated with PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately
	AND	
	A.2.1 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	8 hours
	OR	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)		--------NOTE-------- Upon initial performance of Required Action A.2.2.1, transfers that were in progress may be restarted. ----------	
	A.2.2.1	VERIFY there is no detectable leakage at the leak detection location using an alternate monitoring device.	8 hours AND Once per hour thereafter
		AND	
	A.2.2.2	Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.1.3.1	Perform FUNCTIONAL TEST on conductivity probe transfer leak detection systems.	Once within 92 days prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump AND Once per 92 days thereafter
SR	3.1.3.2	Perform FUNCTIONAL TEST on the weight factor leak detection systems used in AWF leak detection pits.	Once within 182 days prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump AND Once per 182 days thereafter

CROSS REFERENCES

TITLE	NUMBER
1. Transfer Pump Administrative Lock Controls	AC 5.20

3.1 CONFINEMENT

3.1.4 Ventilation Stack Continuous Air Monitor (CAM) Interlock Systems

LCO 3.1.4 The Ventilation Stack CAM Interlock Systems shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: The following stack CAMs when active ventilation is operating:

- Primary tank stack CAMs for DSTs and AWF tanks;
- Stack CAMs for SSTs with active ventilation (C and SX tank farms);
- Stack CAMs for DCRTs;
- The stack CAM for the 204-AR Waste Unloading Facility; and
- Stack CAMs for portable primary tank ventilation systems.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Ventilation Stack CAM interlock system inoperable.	A.1 Stop WASTE transfer(s) through transfer routes PHYSICALLY CONNECTED to the affected tank.	Immediately
	AND	
	A.2 Restore CAM interlock to OPERABLE status.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.3 Place an administrative lock on WASTE transfer pumps PHYSICALLY CONNECTED to the affected tank.	2 hours
	AND	
	A.4 VERIFY interlock actuation is not required using an alternate monitoring method.	Once per 2 hours
	AND	
	A.5 If radiation level > 10,000 cpm, stop the ventilation system on the affected tank.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.1.4.1	Perform a FUNCTIONAL TEST on the ventilation stack CAM interlock and VERIFY that the interlock is OPERABLE with a setpoint ≤ 10,000 cpm.	92 days
SR	3.1.4.2	Perform a CALIBRATION on the ventilation stack CAM interlock loop.	365 days

CROSS REFERENCES

	TITLE	NUMBER
1.	DST and AWF Tank Ventilation Systems	LCO 3.2.1
2.	SST Ventilation Systems - Active	LCO 3.2.2
3.	SST Ventilation Systems - Passive	LCO 3.2.3
4.	DCRT Ventilation Systems	LCO 3.2.4
5.	Transfer Pump Administrative Lock Controls	AC 5.20

3.1 CONFINEMENT

3.1.5 Replacement Cross-Site Transfer System (RCSTS) Pressure Relief Valve (PRV) and Rupture Disk

In accordance with Wagoner, 1997, transfers through the replacement cross-site transfer line WT-SLL-3160 are not authorized. HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Addendum 2, "Safety Analysis for the Replacement Cross-Site Transfer System," Section 5.3.3 documents the basis for LCO 3.1.5, which specifically applies to transfers through this line. LCO 3.1.5 will be added after DOE-RL approval for transfers through line WT-SLL-3160 is granted.

3.1 CONFINEMENT

3.1.6 204-AR Backflow Prevention System

LCO 3.1.6 The 204-AR Waste Unloading Facility backflow prevention system in the Waste Unloading Area shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: The 204-AR Waste Unloading Facility backflow prevention system in the Waste Unloading Area that is PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock. If the WASTE transfer pump is under administrative lock, this LCO is not applicable.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Backflow prevention system inoperable.	----------NOTE---------- Transfer system draining may be performed. ----------	
	A.1 Stop WASTE transfer(s), transfer line flushing, pump priming, and transfer line pressure testing associated with PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately
	AND	
	A.2 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.1.6.1	VERIFY that the 204-AR Waste Unloading Facility backflow prevention system is OPERABLE.	Once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump
SR	3.1.6.2	Perform FUNCTIONAL TEST on the 204-AR backflow prevention system.	365 days

CROSS REFERENCES

	TITLE	NUMBER
1.	Transfer Controls	AC 5.12
2.	Transfer Pump Administrative Lock Controls	AC 5.20
3.	Service Water Pressure Detection System	LCO 3.1.2

3.1 CONFINEMENT

3.1.7 Supplemental Covers

LCO 3.1.7 Supplemental covers shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: Structures that:

- are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock; and
- are not under the control of AC 5.22, "Transfer System Cover Removal Controls"; and
- have a volume $\leq$ 530 ft^3; and
- have an internal volume:

  $V \leq A + B + C$

  Where:

  V = volume of transfer-associated structure in gallons.

  A = volume of transfer-associated structure filled to the leak detector actuation point in gallons.

  B = 600 gallons (maximum leak rate of 20 gal/min x maximum leak time of 30 minutes)

  C = drain back volume in gallons (20% of line hold-up)

  ----------NOTE----------
  A reduced value for B may be substituted if the maximum flow rate of the transfer is VERIFIED to be < 20 gal/min. If flow (F in gal/min) is < 20 gal/min, then B = F x 30 minutes. The maximum values to be applied for flow rate and drain back volume are 20 gal/min and 770 gallons, respectively.

LCO 3.1.7 does not apply to transfer-associated structures specifically evaluated for Waste Retrieval Sluicing System operations (Project W-320).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Supplemental cover inoperable.	----------NOTE---------- Transfer system draining and flushing may be performed. ----------	
	A.1 Stop WASTE transfer(s) associated with PHYSICALLY CONNECTED WASTE transfer pumps.	Immediately not to exceed 30 minutes
	AND	
	A.2 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	8 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.1.7.1	VERIFY supplemental covers are OPERABLE.	Once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump AND Once per 72 hours thereafter

CROSS REFERENCES

TITLE	NUMBER
1. Transfer Controls	AC 5.12
2. Transfer Pump Administrative Lock Controls	AC 5.20
3. Transfer System Cover Removal Controls	AC 5.22

3.2 FLAMMABLE GAS

3.2.1 DST and AWF Tank Ventilation Systems

LCO 3.2.1 An active primary tank ventilation system shall be OPERABLE.

MODE
APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA
APPLICABILITY: DSTs and AWF tanks.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Active primary tank ventilation system is inoperable.	A.1 Stop all WASTE DISTURBING operations and activities in the affected tank.	Immediately
	AND	
	A.2 Restore the active primary tank ventilation system to OPERABLE status.	Immediately
	AND	
	A.3 VERIFY concentration of flammable gas is $\leq$ 25% of the LFL in the affected tank.	Once per 72 hours

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Concentration of flammable gas is > 25% of the LFL.	B.1 Stop manned work per AC 5.11 in the affected tank.	Immediately
OR	AND	
Required Action and associated Completion Time of Condition A not met.	B.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in the ventilation system downstream of the first mixing point with flow from another tank.	Immediately
	AND	
	----------NOTE---------- Activities previously prohibited by a Required Action may be performed according to the approved recovery plan in Required Action B.3. ----------	
	B.3 Restore the active primary tank ventilation system to OPERABLE status according to an approved recovery plan.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.2.1.1	VERIFY that the active primary tank ventilation system is OPERABLE.	24 hours

CROSS REFERENCES

	TITLE	NUMBER
1.	Primary Tank Leak Detection Systems	LCO 3.2.6
2.	DST and AWF Tank WASTE Temperature Controls	LCS/LCO 3.3.2
3.	Flammability Controls	AC 5.9
4.	Ignition Controls	AC 5.10
5.	Flammable Gas Monitoring Controls	AC 5.11
6.	Transfer Controls	AC 5.12
7.	Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.2 FLAMMABLE GAS

3.2.2 SST Ventilation Systems - Active

LCO 3.2.2 An active ventilation system shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: SSTs with active ventilation systems (241-C-105 except during WRSS operations, C-106, SX-101, SX-102, SX-103, SX-104, SX-105, SX-106, SX-107, SX-108, SX-109, SX-110, SX-111, SX-112, and SX-114).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Active ventilation system is inoperable.	A.1 Restore the active ventilation system to OPERABLE status.	Immediately
	AND	
	A.2 VERIFY concentration of flammable gas is ≤ 25% of the LFL in the affected tank.	Once per 7 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Concentration of flammable gas is > 25% of the LFL.	B.1 Stop manned work per AC 5.11 in the affected tank.	Immediately
OR	AND	
Required Action and associated Completion Time of Condition A not met.	B.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank.	Immediately
	AND	
	----------NOTE---------- Activities previously prohibited by a Required Action may be performed according to the approved recovery plan in Required Action B.3. ----------	
	B.3 Restore the active ventilation system to OPERABLE status according to an approved recovery plan.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.2.1 VERIFY that the active ventilation system is OPERABLE.	7 days

CROSS REFERENCES

TITLE	NUMBER
1. SST Ventilation Systems - Passive	LCO 3.2.3
2. SST WASTE Temperature Controls	LCS/LCO 3.3.1
3. Ignition Controls	AC 5.10
4. Flammable Gas Monitoring Controls	AC 5.11
5. Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.2 FLAMMABLE GAS

3.2.3 SST Ventilation Systems - Passive

LCO 3.2.3 The HEPA breather filter isolation valve shall be open and no blank installed.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: SSTs requiring passive ventilation systems (241-A-101, A-102, A-103, A-104, A-105, A-106, AX-101, AX-102, AX-103, AX-104, B-101, B-102, B-103, B-104, B-105, B-106, B-107, B-108, B-109, B-110, B-111, B-112, B-201, B-202, B-203, B-204, BX-101, BX-102, BX-103, BX-104, BX-105, BX-106, BX-107, BX-108, BX-109, BX-110, BX-111, BX-112, BY-101, BY-102, BY-103, BY-104, BY-105, BY-106, BY-107, BY-108, BY-109, BY-110, BY-111, BY-112, C-101, C-102, C-103, C-104, C-105 during WRSS operations, C-107, C-108, C-109, C-110, C-111, C-112, C-201, C-202, C-203, C-204, S-101, S-102, S-103, S-104, S-105, S-106, S-107 S-108, S-109, S-110, S-111, S-112, SX-113, SX-115, T-101, T-102, T-103, T-104, T-105, T-106, T-107, T-108, T-109, T-110, T-111, T-112, T-201, T-202, T-203, T-204, TX-101, TX-102, TX-103, TX-104, TX-105, TX-106, TX-107, TX-108, TX-109, TX-110, TX-111, TX-112, TX-113, TX-114, TX-115, TX-116, TX-117, TX-118, TY-101, TY-102, TY-103, TY-104, TY-105, TY-106, U-101, U-102, U-103, U-104, U-105, U-106, U-107, U-108, U-109, U-110, U-111, U-112, U-201, U-202, U-203, and U-204).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. HEPA breather filter isolation valve is closed.	A.1 Open the HEPA breather filter isolation valve and remove the blank.	7 days
OR	OR	
Blank is installed.	A.2.1 Establish an alternate filtered ventilation path.	7 days
	AND	
	A.2.2 Open the HEPA breather filter isolation valve and remove the blank.	92 days

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time of Condition A not met.	B.1 VERIFY concentration of flammable gas is ≤ 25% of the LFL in the affected tank.	Once per 4 days
C. Concentration of flammable gas is > 25% of the LFL.	C.1 Stop manned work per AC 5.11 in the affected tank.	Immediately
OR	AND	
Required Action and associated Completion Time of Condition B not met.	C.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank.	Immediately
	AND	
	C.3 Open the HEPA breather filter isolation valve and remove the blank.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.2.3.1	VERIFY that the HEPA breather filter isolation valve is open and no blank is installed.	10 days

CROSS REFERENCES

	TITLE	NUMBER
1.	SST Ventilation Systems - Active	LCO 3.2.2
2.	Ignition Controls	AC 5.10
3.	Flammable Gas Monitoring Controls	AC 5.11
4.	Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.2 FLAMMABLE GAS

3.2.4 DCRT Ventilation Systems

LCO 3.2.4 DCRT ventilation systems shall be:

a. The inlet air supply shall be ≥ 3.0 cfh for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U.

AND

The inlet air supply shall be ≥ 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 and Tank 241-SX-105.

b. The active ventilation system shall be OPERABLE for DCRT 244-CR TK-003.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: DCRTs (244-A, 244-BX, 244-S, 244-TX, 244-U, and 244-CR TK-003) containing WASTE.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Inlet air supply < 3.0 cfh for DCRTs 244-A, 244-BX, 244-S, 244-TX or 244-U. OR Inlet air supply < 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 or Tank 241-SX-105.	A.1 Stop all transfers to the affected tank.	Immediately
	AND	
	A.2 Restore required inlet air supply for affected tank.	Immediately
	AND	
	A.3 VERIFY concentration of flammable gas is ≤ 25% of the LFL in the affected tank.	Immediately

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Concentration of flammable gas is > 25% of the LFL for DCRTs 244-A, 244-BX, 244-S, 244-TX or 244-U. OR Required Action and associated Completion Time of Condition A not met.	B.1 Stop manned work per AC 5.11 in the affected tank. AND B.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank. AND B.3 Restore required inlet air supply for affected tank.	Immediately Immediately Immediately
C. Active ventilation system inoperable for DCRT 244-CR TK-003.	C.1 Restore the active ventilation system to OPERABLE status. AND C.2 VERIFY concentration of flammable gas is ≤ 25% of the LFL in the affected tank.	Immediately Immediately

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Concentration of flammable gas is > 25% of the LFL for DCRT 244-CR TK-003.	D.1 Stop manned work per AC 5.11 in the affected tank.	Immediately
	AND	
OR Required Action and associated Completion Time of Condition C not met.	D.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank.	Immediately
	AND	
	----------NOTE---------- Activities previously prohibited by a Required Action may be performed according to the approved recovery plan in Required Action D.3. ----------	
	D.3 Restore the active ventilation system to OPERABLE status according to an approved recovery plan.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.2.4.1	VERIFY that inlet air supply is ≥ 3.0 cfh for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. AND VERIFY that inlet air supply is ≥ 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 and Tank 241-SX-105.	12 hours
SR	3.2.4.2	VERIFY that the active ventilation system is OPERABLE for DCRT 244-CR TK-003.	12 hours

CROSS REFERENCES

	TITLE	NUMBER
1.	Ignition Controls	AC 5.10
2.	Flammable Gas Monitoring Controls	AC 5.11
3.	Transfer Controls	AC 5.12
4.	Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.2 FLAMMABLE GAS

3.2.5 244-AR TK-002 Ventilation System

LCO 3.2.5 The inlet air supply shall be ≥ 3.0 cfh.

MODE
APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA
APPLICABILITY: TK-002 in 244-AR Vault Facility.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Inlet air supply < 3.0 cfh.	A.1 Restore inlet air supply to ≥ 3.0 cfh.	Immediately
	AND	
	A.2 VERIFY concentration of flammable gas is ≤ 25% of the LFL in TK-002.	Once per 72 hours
B. Concentration of flammable gas is > 25% of the LFL.	B.1 Stop manned work per AC 5.11 in the affected tank.	Immediately
OR	AND	
Required Action and associated Completion Time of Condition A not met.	B.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank.	Immediately
	AND	
	B.3 Restore inlet air supply to ≥ 3.0 cfh.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.2.5.1 VERIFY that inlet air supply is $\geq$ 3.0 cfh.	12 hours

CROSS REFERENCES

TITLE	NUMBER
1. Ignition Controls	AC 5.10
2. Flammable Gas Monitoring Controls	AC 5.11
3. Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.2 FLAMMABLE GAS

3.2.6 Primary Tank Leak Detection Systems

LCO 3.2.6 One of the two primary tank leak detection systems listed below shall be OPERABLE:

a. The annulus conductivity probe system.

OR

b. The annulus continuous air monitor (CAM) system.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: DSTs and AWF tanks.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary tank leak detection system inoperable.	A.1 Stop WASTE transfer(s) through transfer routes PHYSICALLY CONNECTED to the annulus.	Immediately
	AND	
	A.2 Place an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps.	12 hours
	AND	
	A.3 Either VERIFY the annulus ventilation system on the affected tank is operating, or VERIFY the concentration of flammable gas in the annulus for the affected tank is ≤ 25% of the LFL.	Once per 12 hours
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.4 Restore the primary tank leak detection system to OPERABLE status.	31 days
B. Concentration of flammable gas is > 25% of the LFL. OR Required Action and associated Completion Time of Condition A not met.	B.1 Stop manned work per AC 5.11 in the affected tank annulus. AND B.2 Deenergize, remove, or stop use of equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank annulus. AND ----------NOTE---------- Activities previously prohibited by a Required Action may be performed according to the approved recovery plan in Required Action B.3. ---------- B.3 Restore the primary tank leak detection system to OPERABLE status per an approved recovery plan.	Immediately Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.2.6.1	Perform FUNCTIONAL TEST on each primary tank leak detection system.	182 days

CROSS REFERENCES

TITLE	NUMBER
1. Ignition Controls	AC 5.10
2. Flammable Gas Monitoring Controls	AC 5.11
3. Process Instrumentation and Measuring and Test Equipment	AC 5.19
4. Transfer Pump Administrative Lock Controls	AC 5.20

3.3 TEMPERATURE

3.3.1 SST WASTE Temperature Controls

LCS/LCO 3.3.1 The WASTE temperature shall be ≤ 205 °F.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: 241-C-106 prior to start of Waste Retrieval Sluicing System operations, SX-103, SX-107, SX-108, SX-109, SX-110, SX-111, SX-112, and SX-114.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. WASTE temperature > 205 °F.	----------NOTE---------- Transfer system draining and flushing may be performed. ----------	
	A.1 Stop all transfers from affected tank.	Immediately
	AND	
	A.2 Stop all activities capable of causing penetration of the WASTE, and water additions in affected tank.	Immediately
	AND	
	A.3 VERIFY cover blocks are installed on pits that are connected to the headspace of the affected tank.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. (continued)	A.4 VERIFY active ventilation system is operating and ventilation flow paths are open for affected tank. AND ----------NOTE---------- Activities previously prohibited may be performed according to the approved recovery plan in Required Action A.5. ---------- A.5 Restore WASTE temperature to ≤ 205 °F according to an approved recovery plan.	Immediately Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
SR 3.3.1.1 VERIFY that the WASTE temperature is ≤ 205 °F.	10 days

CROSS REFERENCES

TITLE	NUMBER
1. Transfer Controls	AC 5.12
2. Process Instrumentation and Measuring and Test Equipment	AC 5.19
3. Tank 241-C-106 WASTE Temperature Controls	AC 5.26

3.3 TEMPERATURE

3.3.2 DST and AWF Tank WASTE Temperature Controls

LCS/LCO 3.3.2 The WASTE temperature shall be either:

a. ≤ 195 °F in all levels of the WASTE.

OR

b. ≤ 195 °F in the top 15 ft of the WASTE

AND

≤ 215 °F in the WASTE below 15 ft.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: All DSTs and AWF tanks.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. WASTE temperature outside limits for applicable level.	----------NOTE---------- Transfer system draining and flushing may be performed. ----------	
	A.1 Stop all transfers to and from affected tank.	Immediately
	AND	
	A.2 Stop all activities capable of causing penetration of the WASTE in affected tank except those activities needed to comply with LCO 3.3.4 during the Tank 241-AZ-101 mixer pump test.	Immediately
	AND	
		(continued)

ACTIONS

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. (continued)	A.3	Shut off all heat-generating equipment within the WASTE except monitoring equipment.	Immediately
	AND		
	A.4	VERIFY cover blocks are installed on pits that are connected to the headspace of the affected tank.	Immediately
	AND		
	A.5	VERIFY primary tank active ventilation system is operating and ventilation flow paths are open for affected tank.	Immediately
	AND		
	A.6	VERIFY annulus ventilation system is operating for Tank 241-AY-102 when it is the affected tank (after 2 ft or greater of sludge have been transferred from Tank 241-C-106).	Immediately
	AND		
		----------NOTE---------- Activities previously prohibited by the actions above, may be performed according to the approved recovery plan in Required Action A.7. ----------	
	A.7	Restore WASTE temperature to within limits according to an approved recovery plan.	Immediately

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.3.2.1	VERIFY that the WASTE temperature is either: a. ≤ 195 °F in all levels of the WASTE. OR b. ≤ 195 °F in the top 15 ft of the WASTE AND ≤ 215 °F in the WASTE below 15 ft.	10 days

CROSS REFERENCES

	TITLE	NUMBER
1.	Transfer Controls	AC 5.12
2.	Process Instrumentation and Measuring and Test Equipment	AC 5.19
3.	Ventilation Controls	AC 5.25
4.	Tank 241-AY-102 Ventilation System Controls	LCO 3.3.3
5.	Tank 241-AZ-101 Air Lift Circulators	LCO 3.3.4

3.3 TEMPERATURE

3.3.3 Tank 241-AY-102 Annulus Ventilation System

LCO 3.3.3 Tank 241-AY-102 annulus ventilation system shall be OPERABLE.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: Tank 241-AY-102 after ≥ 2 ft of sludge from the Tank 241-C-106 has been transferred to the Tank 241-AY-102.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Annulus ventilation system inoperable.	A.1 Restore the annulus ventilation system to OPERABLE status.	Immediately
	AND	
	A.2 Perform SR 3.3.2.1 at the frequency indicated under Completion Time.	Once per 24 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.3.3.1	VERIFY that the Tank 241-AY-102 annulus ventilation system is OPERABLE.	24 hours

CROSS REFERENCES

	TITLE	NUMBER
1.	DST and AWF Tank WASTE Temperature Controls	LCS/LCO 3.3.2
2.	Transfer Controls	AC 5.12
3.	Process Instrumentation and Measuring and Test Equipment	AC 5.19

3.3 TEMPERATURE

3.3.4 Tank 241-AZ-101 Air Lift Circulators

LCO 3.3.4 The air lift circulators (ALCs) in aging waste facility (AWF) Tank 241-AZ-101 shall be OPERABLE at all times and operating when:

a. Average WASTE solution temperature is > 190 °F.

AND

b. WASTE temperature below 20 ft is > 230 °F.

MODE APPLICABILITY: OPERATION and LIMITED.

PROCESS AREA APPLICABILITY: AWF Tank 241-AZ-101 at all times during the Project W-151 mixer pump test.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. ALCs inoperable.	A.1 Stop mixer pump operations.	Immediately
	AND	
	A.2 VERIFY cover blocks are installed on pits that are connected to the headspace of Tank 241-AZ-101.	Immediately
	AND	
	A.3 VERIFY primary tank active ventilation system is operating and ventilation flow paths are open for Tank 241-AZ-101.	Immediately
	AND	
	A.4 Restore ALCs to OPERABLE status.	20 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.3.4.1	VERIFY ALCs are OPERABLE and operating when: a. Average WASTE solution temperature is > 190 °F. AND b. WASTE temperature below 20 ft is > 230 °F.	12 hours
SR	3.3.4.2	Perform FUNCTIONAL TEST on ALCs.	365 days

CROSS REFERENCES

TITLE	NUMBER
1. DST and AWF Tank Ventilation Controls	LCO 3.2.1
2. DST and AWF Tank WASTE Temperature Controls	LCS/LCO 3.3.2

For LCOs Included as Transitional Requirements

Please Refer

to

The Addendum Section 3.0,
"Limiting Conditions for Operation
and Surveillance
Requirements."

SECTION 4

SURVEILLANCE REQUIREMENTS

Section 4 SURVEILLANCE REQUIREMENTS

Limiting Conditions for Operation (LCOs) and their associated Surveillance Requirements (SRs) are integral. Therefore, SRs are found in Section 3, "Operating Limits and Surveillance Requirements." SRs are numbered according to their respective LCOs (i.e., SR 3.1.1.1 is the first SR associated with LCO 3.1.1).

Safety Limits (SLs) do not contain SRs. SRs necessary to maintain operations within the SLs are contained within the LCOs that protect the associated SLs.

SECTION 5

ADMINISTRATIVE CONTROLS

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.1 Purpose

5.1.1 The purpose of the Administrative Controls (ACs) is to state the provisions relating to organization and management, procedures, recordkeeping, reviews, audits, and specific program requirements for risk reduction necessary to ensure safe operation of the Tank Waste Remediation System (TWRS) facilities.

5.1.2 Applicability

Unless otherwise noted, these ACs apply during all MODES (OPERATION and LIMITED) to single-shell tanks (SSTs); double-shell tanks (DSTs); aging waste facility (AWF) tanks; double-contained receiver tanks (DCRTs); catch tanks; miscellaneous inactive storage facilities (MISFs); WASTE transfer systems; 204-AR Waste Unloading Facility; 244-AR Vault; 209-E Storage Area; vertical storage units within the tank farm boundaries; 2727-W Sodium Storage Facility; 213-W Dry Waste Compactor Facility; cribs, ditches, and ponds owned and operated by TWRS; light-duty utility arm; cone penetrometer; instrumentation, WASTE sampling, and surveillance monitoring systems; 242-S Evaporator ("cold side" only); and projects that are analyzed in addenda to the TWRS Final Safety Analysis Report (FSAR).

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.2 Contractor Responsibility

5.2.1 Fluor Daniel Hanford, Inc. is responsible to the U.S. Department of Energy (DOE) for the safe operation of the DOE-owned TWRS facilities in accordance with the Technical Safety Requirements (TSRs) as approved by the Cognizant Secretarial Officer (CSO), or designee, including any modification by the CSO. The contractor shall be responsible for maintaining the current DOE-approved TSRs as a controlled document.

5.2.1.1 Facility Manager

The Project Hanford Management Contractor (PHMC) Director, Tank Farm Operations, shall be responsible for overall TWRS facilities operation and shall delegate in writing the succession to this responsibility, as appropriate.

5.2.1.2 Shift Manager

The Shift Manager shall be responsible for the local command function. During any absence of the Shift Manager from the facility, a designated, qualified individual shall assume the command function.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.3 Compliance

5.3.1 The PHMC Director, Tank Farm Operations, is responsible for ensuring that the requirements of the TWRS facilities TSRs are met. Compliance shall be demonstrated by:

a. Operating within the Safety Limits (SLs), Limiting Control Settings (LCSs), Limiting Conditions for Operation (LCOs), and the associated Surveillance Requirements (SRs) during their Applicability.

b. Operating within the ACTIONS of LCOs when required.

c. Performing all SRs when required.

d. Establishing, implementing, and maintaining the required ACs.

e. Maintaining required DESIGN FEATURES.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.4 Technical Safety Requirement VIOLATIONS

5.4.1 VIOLATION Criteria

VIOLATIONS of the TSRs occur as the result of any of four circumstances:

a. Exceeding an SL.

b. Failure to take the ACTIONS required within the required time limit following:

   1. Exceeding an LCS.

   2. Failure to meet an LCO.

   3. Failure to successfully meet an SR.

c. Failure to perform an SR within the required time limit.

d. Failure to comply with an AC requirement.

----------NOTE----------

1. A VIOLATION relates only to failure to comply with an ACTIONS statement. Exceeding an LCO limit by itself, or failure of an SR by itself (acceptance criteria not met), is not considered a VIOLATION.

2. Failure to perform an SR within the required time limit includes the allowable 25% extension (see SR 3.0.2, "Frequencies"). The extension shall not be used routinely as an operational convenience to extend SR intervals or periodic Completion Time intervals beyond those specified.

3. AC requirements are found in each AC program requirement section. Minimum requirements for each AC program are found in the program key elements section. Failure to comply with an AC program or the intent of an AC program is considered a VIOLATION. A noncompliance within a specific procedure that implements an AC program is not necessarily a VIOLATION.

4. Planned maintenance activities, which render a system inoperable and which are performed within Completion Times specified in ACTIONS statements, do not constitute a VIOLATION.

(continued)

5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.2 Response to a Safety Limit VIOLATION

If a VIOLATION of an SL occurs, proceed as follows:

a. Place the UNIT in the most safe and stable condition attainable Immediately.

b. Notify the DOE of the VIOLATION and prepare an occurrence report in accordance with Section 5.5, "Occurrence Reporting."

c. Perform and document a technical evaluation of the SL VIOLATION to determine if any damage may have occurred and evaluate the capacity of the UNIT to return to an operational MODE.

d. Prepare a recovery plan describing the steps leading to returning the UNIT to an operational MODE.

e. Obtain approval of the recovery plan from the PHMC Director, Tank Farm Operations.

f. Submit the approved recovery plan to the RL-TWRS Director, Waste Storage Division, for information.

g. Obtain approval from the RL Assistant Manager, Office of Tank Waste Remediation System, prior to returning the UNIT to an operational MODE.

(continued)

5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.3 Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION.

If a VIOLATION of an LCO/LCS occurs, proceed as follows:

a. Place the UNIT in a safe and stable condition Immediately.

b. Notify the DOE of the VIOLATION and prepare an occurrence report in accordance with Section 5.5, "Occurrence Reporting."

c. Prepare a recovery plan describing the steps leading to operation in a compliant condition.

d. Obtain approval of the recovery plan from the PHMC Director, Tank Farm Operations.

e. Submit the approved recovery plan to the RL-TWRS Director, Waste Storage Division, for information.

f. Perform and document a technical evaluation of the LCO/LCS VIOLATION to determine if any damage may have occurred.

(continued)

5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.4 Response to a Surveillance Requirement VIOLATION

If a VIOLATION of an SR occurs, proceed as follows:

5.4.4.1 Failure to Implement ACTIONS Upon Failure to Successfully Meet an SR

a. Notify the DOE of the VIOLATION and prepare an occurrence report in accordance with Section 5.5, "Occurrence Reporting."

5.4.4.2 Failure to Perform an SR Within the Required Time Limit

a. Enter SR 3.0.3, "Delay of Required Actions," and perform the SR within 24 hours or up to the limit of the specified Frequency, whichever is less.

   1. If the SR is successfully met (i.e., SR acceptance criteria satisfied), exit SR 3.0.3, "Delay of Required Actions," and continue operation in a compliant condition.

   2. If the SR is not successfully met (i.e., SR acceptance criteria not satisfied), evaluate whether the LCO is met; that is, evaluate whether the LCO is within the MODE Applicability and Process Area Applicability. If the LCO is met, continue operation in a compliant condition. If the LCO is not met, enter the LCO ACTIONS. If the ACTIONS Completion Times are met, continue operation in a compliant condition. If the ACTIONS Completion Times are not met, proceed in accordance with Section 5.4.4.1.

b. Notify the DOE of the VIOLATION and prepare an occurrence report in accordance with Section 5.5, "Occurrence Reporting."

(continued)

5.4 Technical Safety Requirement VIOLATIONS (continued)

5.4.5 Response to an AC VIOLATION

If a VIOLATION of an AC occurs, proceed as follows:

a. Notify the DOE of the VIOLATION and prepare an occurrence report in accordance with Section 5.5, "Occurrence Reporting."

b. Prepare a recovery plan describing the steps leading to compliance with the AC.

c. Obtain approval of the recovery plan from the PHMC Director, Tank Farm Operations.

d. Submit the approved recovery plan to the RL-TWRS Director, Waste Storage Division, for information.

e. Perform and document a technical evaluation, if appropriate, of the AC VIOLATION to determine if any damage may have occurred.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.5 Occurrence Reporting

5.5.1 Requirement for Occurrence Reporting

A program shall be maintained for occurrence reporting of events and conditions, that may involve health and safety. It is the policy of Fluor Daniel Hanford, Inc. to encourage a positive attitude toward reporting occurrences. Consistent reporting of occurrences assures that both DOE and contractor line management are kept fully and currently informed of all events that could have the following results: (1) affect the health and safety of the public or (2) endanger the health and safety of workers.

5.5.2 Program Key Elements

The program key elements include the following:

a. Timely identification, categorization, notification, and reporting to DOE and contractor management of all reportable occurrences at DOE-owned or operated facilities. Occurrence notifications should be made to the RL Assistant Manager, Office of Tank Waste Remediation System, unless otherwise specified.

b. Timely evaluation of and implementation of appropriate corrective actions.

c. Review of reportable occurrences to assess significance, root causes, generic implications, and the basis for any corrective actions taken to prevent recurrence.

5.5.3 TSR VIOLATIONS shall be reported in accordance with DOE occurrence reporting requirements.

5.5.4 Failure of any safety SSC system when it is required to be OPERABLE shall constitute a significant performance degradation and shall be reportable. Process parameters discovered to be outside LCO limits shall also be reportable.

5.5.5 Planned entry into ACTIONS statements to perform surveillance, maintenance, or investigation of operational problems is not reportable.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.6 Organization

5.6.1 Lines of authority, responsibility, and communication shall be established and defined for the highest management levels through intermediate levels to and including all safety and operating organization positions. These relationships shall be documented and updated, as appropriate, in the form of organization charts, functional descriptions of departmental responsibilities and relationships, and job descriptions for key personnel positions, or in equivalent forms of documentation.

The individuals who train the operating staff and those who carry out safety and quality assurance functions may report to the Facility Manager. However, they shall have sufficient organizational freedom to ensure their independence from operating pressures.

5.6.1.1 Facility Manager

The PHMC Director, Tank Farm Operations, shall be responsible for safe operation within the facility. Safe operation shall include, as necessary, interface requirements with other onsite organizations and facilities.

5.6.1.2 Minimum Operations Shift Complement

The number of managers, engineers, operators, and support personnel shall be adequate to operate and support the TWRS facilities safely. Abnormal plant conditions shall be considered in determining staffing assignments. Management shall provide additional personnel, as necessary, to support other activities.

The minimum complement of personnel can be 1 person less than the required number for a period of time not to exceed 4 hours in OPERATION and LIMITED MODES. The minimum complement accommodates unexpected absences, provided immediate action is taken to restore the shift complement to within the minimum requirements specified in Table 5.6-1.

Managers or engineers who are also trained in an approved training program, including facility-specific operating procedures, may be substituted for operators. See also LCO 3.0.7, "Emergency Exceptions."

(continued)

5.6 Organization (continued)

Table 5.6-1. TWRS Facilities* Minimum Operations Shift Complement

	MINIMUM OPERATIONS SHIFT COMPLEMENT	
	OPERATIONAL MODES	
POSITION	OPERATION	LIMITED
Shift Managers/ Operational Engineers**	1	1
Nuclear Operators***	5	5
Radiological Control Technicians***	2	2
Emergency Operations Center	Per Hanford Emergency Response Plan (DOE/RL-94-02)	Per Hanford Emergency Response Plan (DOE/RL-94-02)

* This table applies only to those TWRS facilities within the scope of the FSAR.

** The Shift Manager/Operational Engineer is allowed to be shared with other non FSAR scope TWRS facilities for which facility- or operation-specific training has been received and is not required to be continuously at a specific facility. The Shift Manager/Operational Engineer is required to be Building Emergency Director-qualified.

*** Nuclear Operators and Radiological Control Technicians are allowed to be shared with other non FSAR scope TWRS facilities for which facility- or operation-specific training has been received and are not required to be continuously at a specific facility.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.7 Nuclear Criticality Safety

5.7.1 Requirement for Nuclear Criticality Safety

A program shall be maintained for ensuring WASTE remains subcritical.

5.7.2 Program Key Elements

a. Criticality limits and controls shall be documented in Criticality Safety Evaluation Reports (CSERs) and implemented in Criticality Prevention Specifications (CPSs) and procedures.

b. Procedures shall be established for recovery from a CPS nonconformance.

c. Criticality safety training shall be provided for operations and technical personnel.

d. 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 $\geq$ 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 $\leq$ 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.

e. Activities in MISFs (except for sampling/monitoring) are prohibited without characterization of the WASTE and, if required, preparation of a CSER and CPS.

(continued)

5.7 Nuclear Criticality Safety (continued)

5.7.2 (continued) Program Key Elements (continued)

f. Transfers via the replacement cross-site transfer system that 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.

Table 5.7-1. Minimum Neutron Absorber*/Plutonium Subcritical Mass Ratios

NEUTRON ABSORBER (X)	MINIMUM NEUTRON ABSORBER/PLUTONIUM SUBCRITICAL MASS RATIO (X/Pu)
Chromium (Cr)	135
Iron (Fe)	160
Manganese (Mn)	32
Nickel (Ni)	105
Uranium (U) (natural)	770

* Insoluble neutron absorbers.

(continued)

5.7 Nuclear Criticality Safety (continued)

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, *Criticality Safety Assessment of Tank 241-C-106 Remediation.*

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.8 Source Inventory Controls

5.8.1 Requirement for Source Inventory Controls

A program shall be maintained to ensure that the radiological and toxicological inventories assumed in the accident analyses will not be exceeded without proper analysis.

5.8.2 Program Key Elements

a. VERIFY that new information or planned changes to source inventories are within the bounding applicable concentrations in the following safety analysis report references:

- WHC-SD-WM-SARR-011, *Toxic Chemical Considerations for Tank Farm Releases.*
- WHC-SD-WM-SARR-016, *Tank Waste Compositions and Atmospheric Dispersion Coefficients for Use in Safety Analysis Consequence Assessments.*
- WHC-SD-WM-SARR-037, *Development of Radiological Concentrations and Unit Liter Doses for TWRS FSAR Radiological Consequence Calculations.*

b. VERIFY the following before accepting WASTE at the 204-AR Waste Unloading Facility:

- Tank trailer WASTE receipts from the 222-S Laboratory shall conform to the container, volume, radioactive loading, and administrative control criteria established by WHC-SD-TP-SEP-011, *Safety Evaluation for Packaging for the 222-S Laboratory Cargo Tank,* and in accordance with 49 CFR Parts 173.403, 173.425, and 173.435.
- Rail car WASTE receipts shall conform to the container, volume, radioactive loading, and administrative control criteria established by WHC-SD-RE-SAP-013, *Safety Analysis Report for Packaging, Railroad Liquid Waste Tank Cars.*
- WASTE receipts shall be nonflammable and thermally stable.

(continued)

5.8 Source Inventory Controls (continued)

5.8.3 Applicability

This program applies to SSTs, DSTs, AWF tanks, DCRTs, catch tanks, MISFs, WASTE transfer systems, the 204-AR Waste Unloading Facility, and the 244-AR Vault.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.9 Flammability Controls

5.9.1 Requirement for Flammability Controls

A program shall be maintained to manage flammable gas hazards.

5.9.2 Program Key Elements

a. Tank 241-SY-101 Flammability Controls

- Implement the Level I requirements for Tank 241-SY-101 in LA-UR-92-3196, *A Safety Assessment for Proposed Pump Mixing Operations to Mitigate Episodic Gas Releases in Tank 241-SY-101: Hanford Site, Richland, Washington*, Chapter 6.

- Establish controls for the removal of the mixer pump from Tank 241-SY-101 to minimize the risk of a flammable gas deflagration.

b. Flammable Gas Facility Groups

Flammable gas Facility Group assignments are shown in Table 5.9-1.

5.9.3 Applicability

The Tank 241-SY-101 flammability controls apply to operations in Tank 241-SY-101 and the installed mixer pump.

Table 5.9-1. Flammable Gas Facility Group Assignments

FACILITY GROUP 1	FACILITY GROUP 2	FACILITY GROUP 3	NON-GRE
DSTs: AN-103, 104, 105 AW-101 SY-103	DSTs: AN-101, 102, 106, 107, AP-101, 102, 103, 104, 105, 106, 107, 108; AW-102, 103, 104, 105, 106, AY-101, 102; AZ-101, 102; SY-102. SSTs: A-101, 103; AX-101; B-201, 202; BX-107; BY-101, 102, 103, 105, 106; C-104; S-101, 102, 103, 105, 106, 107, 109, 111, 112; SX-101, 102, 103, 105, 106, 109[1]; T-201, 202, 204; TX-102, 111, 112, 113, 115; U-102, 103, 105, 106, 107, 108, 109, 111. IMUSTs: 216-BY-201, 216-TY-201, 240-S-302, 241-TX-302B, 241-TX-302B(R), 241-SX-302, 241-TX-302X, 241-AX-151, 241-A-302B, 241-B-301B, 241-S-302A, 241-T-301, 241-ER-311A, 243S-TK-1, 241-BX-302C, 242-T-135, 242-TA-R1, 241-C-301C, 241-B-302B, 244-BXR-003, 270-W, and 244-BXR-002	SSTs: A-102, 104,[2] 105, 106; AX-102, 103[2], 104; B-101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 203, 204; BX-101, 102, 103, 104, 105, 106, 108, 109, 110, 111, 112; BY-103, 104, 107, 108, 109, 110, 111, 112; C-101, 102, 103, 105, 106, 107, 108, 109, 110, 111, 112, 201, 202, 203, 204; S-104,[2] 108, 110; SX-104[2], 107, 108, 110, 111, 112, 113, 114, 115; T-101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 203; TX-101, 103, 104, 105, 106, 107, 108, 109, 110, 114, 116, 117, 118; TY-101, 102, 103, 104, 105, 106; U-101, 104, 110, 112, 201, 202, 203, 204 244-AR TK-002 244-CR TKs 001, 002, 003 IMUSTs: 241-TX-302A, 241-TY-302A, 244-TXR-002, 241-BX-302A, 241-BX-302B, 244-TXR-001, 244-BXR-011, 244-BXR-001, 244-TXR-003, 241-Z-8.	DCRTs: 244-A, 244-BX, 244-S, 244-TX, 244-U Catch Tanks: 241-S-304, 241-TX-302C, 241-U-301B, 241-UX-302A, 241-A-302A, 241-A-417, 241-AX-152, 241-AZ-151, 241-AZ-154, 241-ER-311, 241-EW-151, 204-AR-TK-1, 241-A-350, 244-AR TKs 001, 003, and 004 244-CR TK-011 IMUSTs: 231-W-151-001, 231-W-151-002, 241-S-302B, 241-TY-302B.

Notes:

[1]SX-109 passes the GRE evaluation documented in WHC-SD-WM-ER-526, *Evaluation of Hanford Tanks for Trapped Gas*. As such it would be placed in Facility Group 3. However, it is included in Facility Group 2 because a number of tanks in the SX farm are Facility Group 2 tanks and, because of the unique ventilation configuration of the SX Farm, these tanks vent through the headspace of SX-109.

[2]Two tanks (241-SX-104 and 241-AX-103), which are currently on the Flammable Gas Watch List, are placed into Facility Group 3. The inclusion of SSTs into this group is based on the results of the GRE evaluation in WHC-SD-WM-ER-526. The Watch List status for tanks is based on different evaluation methodologies used in the past.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.10 Ignition Controls

5.10.1 Requirement for Ignition Controls

A program shall be maintained to manage potential ignition sources that can initiate a fire or flammable gas deflagration.

5.10.2 Program Key Elements

a. INTRUSIVE Controls

1. Stop operations and activities in INTRUSIVE regions of tanks with a potential flammable gas hazard, organic solvent hazard, or organic salt-nitrate hazard when lightning is identified within a 30-mile radius of the tank farm.

2. Secure equipment in lowest position (e.g., lay down equipment elevated above the tanks and lower the crane boom) if lightning is identified within a 30-mile radius of the tank farm.

3. PHMC President written authorization is required to conduct flame cutting/welding in a tank with a potential organic solvent or organic salt-nitrate hazard. This approval requirement cannot be delegated. If flame cutting/welding is authorized and performed where debris could fall onto the WASTE surface, a barrier or device shall be used to prevent hot metal/slag from falling onto the WASTE surface.

4. When installing equipment (e.g., cameras, videos, lights) with hot filaments in a tank with a potential organic salt-nitrate hazard, a method shall be used to prevent these hot sources from falling onto the WASTE surface.

(continued)

5.10 Ignition Controls (continued)

5.10.2 (continued)

b. Vehicle Controls

1. Vehicle access within the tank farm boundary shall be limited to vehicles whose fuel systems are protected from damage to the integrity of the fuel systems caused by potential collisions with tank structures (e.g., mechanical protection such as a skid plate on the fuel tank or reservoir tanks physically located higher than risers or vehicle axles).

2. Physical barriers (i.e., chain-link fencing, metal interlocking rail systems, concrete or concrete filled piping posts, concrete barriers, or T-posts connected with chain) shall be established around tank structures outside the tank farm boundary to restrict vehicle access in the vicinity of aboveground WASTE tank structures. Access inside the physical barrier is allowed for vehicles with fuel system protection for maintaining the integrity of the fuel system.

3. Establish controls to limit vehicle speeds within the tank farms.

c. Flammable Gas Ignition Controls

Ignition Source Control Set #1

The Ignition Source Control Set #1 is used for equipment that is installed or used during work activities for that portion in a WASTE INTRUSIVE region or inside WASTE-INTRUDING EQUIPMENT.

1. Mechanical tooling, equipment, and materials (including lubricants, adhesives, gaskets, corrosion inhibitors, epoxies, etc.) shall be constructed of spark-resistant material, or shall be rendered incapable of sparking with sufficient energy to combust hydrogen, or shall have been analyzed and evaluated to be incapable of sparking with sufficient energy to combust hydrogen under the applied conditions. Material compatibility shall be evaluated for thermite reaction potential.

(continued)

5.10 Ignition Controls (continued)

5.10.2 (continued) c. Flammable Gas Ignition Controls (continued)

Ignition Source Control Set #1 (continued)

2. Electrostatic ignition sources shall be controlled by providing bonding or grounding according to NFPA 77, *Recommended Practice on Static Electricity*.

3. Exposed polymer materials shall be rendered incapable of electrostatic charge or discharge potential with sufficient energy to combust hydrogen either by design, through acceptable workaround practices, or by evaluation of the applied conditions (NFPA 77).

4. The surface temperatures of heat-generating devices (this includes potential compression heating and open flames) shall not exceed 780 °F. The surface temperature is limited to a maximum of 320 °F if the device can contact the WASTE and cause ignition by triggering exothermic reactions in the WASTE (i.e., organic salt-nitrate reactions). Internal temperatures of heat-generating devices may exceed these temperatures (NFPA 70, *National Electric Code, Articles 500 - Hazardous [Classified] Locations and 501 - Class I Locations*) if the heat source is either isolated (pressurized) from the gas environment, or if the design of the device enclosure meets the requirements for explosion-proof housings.

5. Electrical equipment shall be designed to meet NFPA 70, Class I, Division 1, Group B criteria or provide equivalent safety. As a minimum, this shall be interpreted to mean that no single point failure of energized equipment can result in an arc, spark, or gas burn propagation to the environment external to the source enclosure (NFPA 70). In the case of WASTE-submerged equipment containing potential ignition sources, demonstration by design that the equipment is nonsparking under normal operation and is designed to be isolated from the WASTE environment is an acceptable alternative.

(continued)

5.10 Ignition Controls (continued)

5.10.2 (continued) c. Flammable Gas Ignition Controls (continued)

Ignition Source Control Set #1 (continued)

6. Shutdown of purged and pressurized electrical equipment, and purged and pressurized heat-generating equipment, on loss of protective gas pressure or flow, shall be automatic by design as defined by NFPA 496, *Standard for Purged and Pressurized Enclosures for Electrical Equipment*, Type X pressurization.

7. Interlocked startup of purged and pressurized electrical or purged and pressurized heat-generating equipment shall only be allowed when the system senses preset limits (e.g., adequate protective gas pressure established as defined by NFPA 496). If pressurized enclosures are used to isolate energized components, a minimum of four enclosure volumes shall be purged through the enclosure for energized components, and/or ten volumes shall be purged for enclosed motors before controlled startup of the system components (NFPA 70, NFPA 496).

Ignition Source Control Set #2

The Ignition Source Control Set #2 is applied to vapor space regions (EX-TANK INTRUSIVE and DOME INTRUSIVE) when a gas release event (GRE) is postulated to create flammable conditions.

1. Mechanical tooling, equipment, and materials (including lubricants, adhesives, gaskets, corrosion inhibitors, epoxies, etc.) shall be constructed of spark-resistant material, or shall be rendered incapable of sparking with sufficient energy to combust hydrogen, or shall have been analyzed and evaluated to be incapable of sparking with sufficient energy to combust hydrogen under the applied conditions. Material compatibility shall be evaluated for thermite reaction potential.

2. Electrostatic ignition sources shall be controlled by providing bonding or grounding according to NFPA 77.

(continued)

5.10 Ignition Controls (continued)

5.10.2 (continued) c. Flammable Gas Ignition Controls (continued)

Ignition Source Control Set #2 (continued)

3. Exposed polymer materials shall be rendered incapable of electrostatic charge or discharge potential with sufficient energy to combust hydrogen either by design, through acceptable workaround practices, or by evaluation of the applied conditions (NFPA 77).

4. The surface temperatures of heat-generating devices (this includes potential compression heating and open flames) shall not exceed 780 °F. The surface temperature is limited to a maximum of 320 °F if the device can contact the WASTE and cause ignition by triggering exothermic reactions in the WASTE (i.e., organic salt-nitrate reactions). Internal temperatures of heat-generating devices may exceed these temperatures (NFPA 70) if the heat source is either isolated (pressurized) from the gas environment, or if the design of the device enclosure meets the requirements for explosion-proof housings.

5. Electrical equipment shall be designed to meet NFPA 70, Class I, Division 2, Group B criteria or provide equivalent safety. As a minimum, this shall be interpreted to mean the equipment is nonsparking under normal operation or, if normally sparking, the sparking component(s) shall be continuously isolated (purged and pressurized) from the potentially flammable gas environment, or the design of the device enclosure shall be of sufficient strength (explosion-proof) to prevent propagation of a gas burn to the environment external to the enclosure (NFPA 70).

6. Either automatic shutdown or alarming with manual shutdown is required upon loss of protective gas pressure or flow as defined by NFPA 496 Type Z pressurization. In EX-TANK INTRUSIVE region applications, electrical equipment that does not meet Class I, Division 2, Group B may be used, if it is automatically shutdown by combustible gas detection systems.

(continued)

5.10 Ignition Controls (continued)

5.10.2 (continued) c. Flammable Gas Ignition Controls (continued)

Ignition Source Control Set #2 (continued)

7. Automatic or manual startup controls of purged and pressurized electrical or purged and pressurized heat-generating equipment shall only be allowed on system sensing of preset limits (e.g., adequate protective gas pressure established as defined by NFPA 496). If pressurized enclosures are used to isolate energized components, at least four enclosure volumes shall be purged through the enclosure for energized components, and/or ten volumes shall be purged for enclosed motors before controlled startup of the system components (NFPA 70, NFPA 496). When combustible gas detection shutdown systems are employed, startup of equipment shall only be allowed once measured acceptable flammable gas levels are indicated.

d. Deviations From Ignition Controls

Deviations From Lightning Controls

The lightning controls do not apply to INTRUSIVE activities related to the operation of air lift circulators (ALCs) or mixer pump operation (for all mixer pump operating modes) associated with the 241-AZ-101 Mixer Pump Test, Project W-151. Deviations from lightning controls are listed in HNF-SD-WM-SAR-067, Chapter 3.0, Section 3.4.2.12, "Natural Phenomena."

Deviations From Flammable Gas Ignition Controls

Deviations from Ignition Source Control Sets #1 and #2 are permitted provided the equipment, materials or work practices: (1) provide equivalent ignition source control safety, as approved by the Flammable Gas Equipment Advisory Board or (2) is an approved exception listed in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities."

Deviations from Ignition Source Control Sets #1 and #2, or from the DOE-approved list of exceptions listed in HNF-SD-WM-SAR-067, Appendix K, are subject to the Unreviewed Safety Question (USQ) process.

(continued)

5.10 Ignition Controls (continued)

5.10.3 Applicability

Items 1 and 2 of INTRUSIVE controls (i.e., lightning controls) apply to tanks with a potential flammable gas hazard, organic salt-nitrate reaction hazard, or organic solvent fire hazard, as identified in HNF-SD-WM-SAR-067, Chapter 3.0, Section 3.4.2.12, "Natural Phenomena." For deviations from lightning controls, refer to Section 5.10.2.d.

Items 3 and 4 of INTRUSIVE controls (i.e., flame cutting/welding, equipment installation controls) apply to tanks with a potential organic salt-nitrate reaction hazard or organic solvent fire hazard.

Items 1, 2, and 3 of vehicle controls (i.e., protected fuel systems, physical barriers, speed limits), apply to: (1) operations and activities involving WASTE transfer-associated structures and vehicles/cranes, (2) WASTE tanks with a potential organic solvent fire hazard, (3) WASTE tanks with a potential organic salt-nitrate reaction hazard, and (4) WASTE tanks with an in-tank fuel fire/deflagration hazard.

Tanks with a potential organic solvent fire hazard are identified in HNF-SD-WM-SAR-067, Chapter 3.0, Table 3.4.2.4-10.

Tanks with a potential organic salt-nitrate reaction hazard are those tanks where the WASTE solids have not been VERIFIED to be covered by liquids. See also AC 5.15, "Moisture Controls."

Tanks with a potential in-tank fuel fire/deflagration hazard include SSTs (100 and 200 Series), DSTs and AWF tanks (including annuli), DCRTs, catch tanks, and MISFs.

Flammable gas ignition controls apply to tanks with a potential flammable gas hazard. Tanks with a potential flammable gas hazard include SSTs, DSTs (except Tank 241-SY-101), AWF tanks, DCRTs, catch tanks, IMUSTs, WASTE transfer systems, the 204-AR Waste Unloading Facility (204-AR-TK-1), the 244-AR Vault, and the 244-CR Vault. Controls for Tank 241-SY-101 are included in AC 5.9, "Flammability Controls." The requirements for implementation of Ignition Source Control Sets #1 and #2 are specified in Table 5.10-1. For deviations from flammable gas ignition controls, refer to Section 5.10.2.d.

Table 5.10-1. Flammable Gas Ignition Source Control Set Application Requirements

Tanks	During Non-WASTE DISTURBING Activities		During LOCAL WASTE DISTURBING Activities		During GLOBAL WASTE DISTURBING Activities		WASTE INTRUSIVE or Inside WASTE-INTRUDING EQUIPMENT
	EX-TANK INTRUSIVE	DOME INTRUSIVE	EX-TANK INTRUSIVE	DOME INTRUSIVE	EX-TANK INTRUSIVE	DOME INTRUSIVE	
Facility Group 1	2	2	2	2	2	2	1
Facility Group 2	2B	2	2B	2	2A	2	1
Facility Group 3	2B	2B	2B	2A	2B	2A	1
244-AR TK-002	2B	2B	2B	2A	2B	2A	1
244-CR TKs-001, -002, -003	2B	2B	2B	2A	2B	2A	1
Non-Tank WASTE Transfer System	2B		2B		2B		Non-GRE
DCRT	2B		2B		2B		Non-GRE
244-AR TKs-001, -003, -004	2B		2B		2B		Non-GRE
244-CR TK-011	2B		2B		2B		Non-GRE
Catch Tanks and Catch Tank Pits	2C		2C		2C		Non-GRE
W-151-001, W-151-002, S-302B, TY-302B	2C		2C		2C		Non-GRE

Notes:

1 - Ignition Source Control Set #1 applies at all times.

2 - Ignition Source Control Set #2 applies at all times.

2A - Ignition Source Control Set #2 applies only for the duration of the WASTE disturbance.

2B - Ignition Source Control Set #2 applies to activity-related equipment and materials until work activity entry monitoring requirements (Table 5.11-1) are met. Ignition Source Controls are not required by 2B (ignition source controls during entry monitoring) in the EX-TANK INTRUSIVE region defined as the environment outside of tank openings that are directly connected to the headspace out to a distance of 18 opening diameters; 15 ft; or the boundary of temporary containment devices, whichever is shorter.

2C - Ignition Source Control Set #2 applies to installed equipment, Ignition Source Control Set #2 applies to activity related equipment and materials until work activity entry monitoring requirements (Table 5.11-1) are met.

Non-GRE These are Facility Group Non-GRE because there is little or no WASTE solids, and gas accumulation is not postulated for these facilities. Therefore, ignition source controls are not applicable in WASTE INTRUSIVE regions or inside WASTE-INTRUDING equipment.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.11 Flammable Gas Monitoring Controls

5.11.1 Requirement for Flammable Gas Monitoring Controls

A program shall be maintained to monitor flammable gas concentrations to prevent deflagrations.

5.11.2 Program Key Elements

a. Manned Work Activity Controls

1. Work activity entry monitoring. VERIFY that flammable gas concentrations in INTRUSIVE tank regions are ≤ 25% of the Lower Flammability Limit (LFL) prior to commencing any work. This entry monitoring does not require the monitoring of the portion of the EX-TANK INTRUSIVE region defined as the environment outside of tank openings that are directly connected to the headspace out to a distance of 18 opening diameters; 15 ft; or the boundary of temporary containment devices, whichever is shorter. If flammable gas concentrations are > 25% of the LFL, do not start manned work activities.

   This requirement shall be applied to all manned work activities in WASTE containing vessels (i.e., when the manned work activity is near an opening in the vessel containment) to ensure that flammable conditions in the work space are not present because of steady-state accumulation and/or recent gas release events (GREs).

   For manned activities on tanks, the entry monitoring requirements are:

   a. Monitor at breather filter (passive ventilation) or vent duct (active ventilation) prior to start of activity.

   b. For work in pits, monitor inside of pit prior to start of pit work.

(continued)

5.11 Flammable Gas Monitoring Controls (continued)

5.11.2 (continued)

a. Manned Work Activity Controls (continued)

1. Work activity entry monitoring (continued)

c. Monitor inside riser (passive or active ventilation) or allow for a one minute pause with riser opened (active ventilation only) prior to start of operations and activities in DOME INTRUSIVE regions.

d. For DOME INTRUSIVE work, follow a and c above, plus monitor below bottom of riser (passive or active ventilation) or in vent duct upstream of the first mixing point (active ventilation only) prior to start of activity.

e. For manned activities inside of WASTE-INTRUDING EQUIPMENT, monitor in the vapor space prior to start of activity.

For manned activities in non-tank WASTE transfer system regions, monitor in the vapor space where the activity is to be performed.

2. If flammable gas concentrations are > 25% of the LFL, manned work activities shall be stopped except for gas sampling, taking necessary actions to reduce gas concentrations, and discontinuing use of ignition sources that do not meet AC 5.10, "Ignition Controls." Installed equipment that meets AC 5.10 may continue to be used (not be deenergized) if > 25% of the LFL.

(continued)

5.11 Flammable Gas Monitoring Controls (continued)

5.11.2 (continued)

a. Manned Work Activity Controls (continued)

3. During the performance of manned work activities there is the possibility of flammable conditions developing as a result of a GRE, therefore, work space (EX-TANK INTRUSIVE or DOME INTRUSIVE) flammable gas monitoring is continued as indicated in Table 5.11-1. Continuous monitoring means use of a continuous monitor (e.g., Standard Hydrogen Monitoring System [SHMS]) or use of portable combustible gas monitors (CGMs) that monitor continuously and alarm at ≤ 25% LFL. It is acceptable to disconnect a CGM or similar instrument during continuous monitoring to permit the temporary connection of alternate measurement devices such as organic vapor monitors (OVMs) or Drager tubes.

Continuous monitoring requirement applicability is shown in Table 5.11-1.

Stop manned work activities if flammable gas concentrations are > 25% of the LFL with an exception for gas sampling, necessary actions to reduce gas concentrations, and discontinuing use of ignition sources that do not meet the ignition source controls in AC 5.10.

b. Unmanned Operations Controls

1. Unmanned operations such as WASTE transfers, operation of air lift circulators (ALCs) or mixer pumps in actively ventilated tanks do not require continuous monitoring as the installed equipment must meet Ignition Source Control requirements in AC 5.10 and there are no manned activities that may result in an uncontrolled (errant) spark.

(continued)

5.11 Flammable Gas Monitoring Controls (continued)

5.11.2 (continued)

b. Unmanned Operations Controls (continued)

2. Provide periodic monitoring of flammable gas concentrations during unmanned GLOBAL WASTE DISTURBING operations in passively ventilated tanks. In passively ventilated tanks, flammable gas concentrations from GREs may persist for a significant length of time because of the low ventilation flows. For long duration operations such as salt well pumping, periodic monitoring can be defined as follows:

- Monitor dome space and salt well pit hourly for 5 hours following initiation of pumping, then

- Monitor dome space and salt well pit daily for the next 3 days (or once per 24 nominal hours run time), then

- Monitor once per 7 days (or once per 168 hours nominal run time). Revise sampling period based on the flammable gas concentrations as follows:

  a. Less than 15% of the LFL, sample every 7 days (not to exceed 10 days)

  b. In the range from 15% to $\leq$ 25% of the LFL, sample every 24 hours.

  Stop WASTE DISTURBING operation if the flammable gas concentration is > 25% of the LFL.

c. Non-GRE Facilities

If adequate ventilation is not VERIFIED or OPERABLE, monitoring is required to VERIFY < 25% LFL before use of installed equipment that does not meet Ignition Source Control Set #2 in AC 5.10.

(continued)

5.11 Flammable Gas Monitoring Controls (continued)

5.11.2 (continued)

d. DCRT Ventilation Requirements

Establish and VERIFY that ventilation rates are adequate to maintain double-contained receiver tank (DCRT) flammable gas concentration $\leq$ 25% of the LFL before placing new WASTE types from a new WASTE source in the receiver tank. New WASTE types are defined as WASTE originating from different tanks or WASTE-generating facilities other than those that have been evaluated for flammable gas generation in the DCRTs.

5.11.3 Applicability

The requirements for implementation of flammable gas monitoring controls are specified in Table 5.11-1.

Table 5.11-1. Flammable Gas Monitoring Requirements

Tanks	During Manned* Non-WASTE DISTURBING Activities		During Manned* LOCAL WASTE DISTURBING Activities		During Manned* GLOBAL WASTE DISTURBING Activities		During Unmanned Non-WASTE DISTURBING Activities	During Unmanned LOCAL and GLOBAL WASTE DISTURBING Activities	Inside WASTE-INTRUDING EQUIPMENT
	EX-TANK INTRUSIVE & DOME INTRUSIVE (Riser or Duct only)	DOME INTRUSIVE in Dome Space	EX-TANK INTRUSIVE	DOME INTRUSIVE	EX-TANK INTRUSIVE	DOME INTRUSIVE			
Facility Group 1	A2 or C, A3 for pit work	C	A2 or C	C	A2 or C	C		No applicable activities	E
Facility Group 2	A1	C		C	A2 or C	C		D	E
Facility Group 3	A1	B		C		C		D	E
244-AR TK-002	A1	B		C		C			E
244-CR TKs-001, -002, -003	A1	B		C		C			E
Non-Tank WASTE Transfer System	A1								
DCRT	A1	B							
244-AR TKs-001, -003, -004	A1	B							
244-CR TK-011	A1	B							
Catch Tanks and Catch Tank Pits	A1	B	G		G		G	G	
W-151-001, W-151-002, S-302B, TY-302B	A1	B	F		F		F	F	

Notes:

A1 - 1. Monitor at breather filter (passive ventilation) or vent duct (active ventilation), when present, prior to start of activity.
2. Monitor inside riser (passive or active ventilation) or allow for a one minute pause with riser opened (active ventilation only) prior to start of operations and activities in DOME INTRUSIVE regions. For open pit work, monitor inside pit prior to start of activity. This entry monitoring does not require the monitoring of the EX-TANK INTRUSIVE region defined as the environment outside of tank openings that are directly connected to the headspace out to a distance of 18 opening diameters; 15 ft; or the boundary of temporary containment devices, whichever is shorter.

A2 - Continuous monitoring in EX-TANK INTRUSIVE area during activity (See AC 5.11 for the meaning of continuous).

A3 - Continuous monitoring of pit and dome space prior to and during work with tools listed as exceptions for pit work in HNF-SD-WM-SAR-067, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," for pits connected to a Facility Group 1 DST vapor space.

B - A1 above, plus monitor below bottom of riser (passive or active ventilation) or in vent duct upstream of first mixing point (active ventilation only) prior to start of activity.

C - B above, plus continuous monitoring in DOME INTRUSIVE regions where work is being performed such as below bottom of riser (passive or active ventilation), inside of breather filters, inlet filters or temporary glove bags, or in vent duct upstream of first mixing point (active ventilation only) during activity.

D - 1. No monitoring requirements for DSTs.
2. Monitor per requirements in AC 5.11 Key Element b, item 2 for salt well pumping.

E - Monitor inside WASTE-INTRUDING EQUIPMENT vapor space prior to entry. Monitoring outside of WASTE-INTRUDING EQUIPMENT (e.g., open drill string) is not required.

F - Monitor prior to energizing or using equipment that does not meet Ignition Source Control Set #2 controls in AC 5.10, "Ignition Controls."

G - Monitor tank and pit prior to energizing or using installed equipment that does not meet Ignition Source Control Set #2 controls in AC 5.10, or within 7 days prior to making transfer.

* - Manned refers to personnel performing work related to activity only.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.12 Transfer Controls

5.12.1 Requirement for Transfer Controls

A program shall be maintained to control WASTE transfers through the TWRS WASTE transfer systems.

5.12.2 Program Key Elements

a. Transfer System Configuration Management

- Establish and maintain controlled status of the WASTE transfer systems as-built and jumper configuration.
- Perform WASTE transfer system operations by approved procedures.
- Isolate WASTE transfer paths connected to ACTIVE WASTE transfer pumps not under administrative lock by two closed valves (including 3-way valves), where the valves exist and where this practice is feasible.
- INDEPENDENTLY VERIFY that the planned WASTE transfer route is proper for the intended transfer; piping is in place per configuration status controls; correct and OPERABLE pumps are specified; and valves are properly aligned prior to transfer.
- Prior to WASTE transfer through overground WASTE transfer piping, VERIFY that either vehicle restrictions (i.e., vehicle access limitations to the tank farm) or concrete shielding systems surrounding the overground transfer line portion of the transfer route are in place.
- Single-walled direct buried/bermed WASTE transfer lines outside of the tank farm boundaries shall be identified with permanent aboveground labels. Single-walled direct buried/bermed WASTE transfer lines within the tank farm boundary shall be identified with either (1) permanent aboveground labels, (2) temporary aboveground labels in place during WASTE transfer through the associated lines, or (3) a marker system and status drawing available for operator use.

(continued)

5.12 Transfer Controls (continued)

5.12.2 (continued)

a. Transfer System Configuration Management (continued)

- Open nozzles PHYSICALLY CONNECTED to WASTE transfer lines shall be sealed with caps, process blanks, or equivalent to prevent misroutes of WASTE.

- Newly installed jumpers shall be leak tested prior to use.

- AWF tank WASTE (i.e., AWF tank liquids and AWF tank solids) shall only be transferred through AWF transfer-associated structures.

  (Note: Implementation of this control is deferred until March 30, 2000 in accordance with Allen, 1999.)

- 204-AR Waste Unloading Facility. VERIFY that the west exterior rollup door and the west exterior personnel access door are closed when the 204-AR Waste Unloading Facility is PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock.

b. Operating Requirements

- Material balance monitoring criteria based on planned WASTE transfer rates shall be documented. The transfer shall be stopped if periodic material balance calculations indicate a variance that exceeds the criteria.

- Perform material balance calculations during each WASTE transfer through the WASTE transfer system. Calculations shall be performed at 30 and 60 minutes following WASTE transfer initiation and each 2 hours thereafter until the transfer is complete. This requirement does not apply to Waste Retrieval Sluicing System operations (Project W-320).

(continued)

5.12 Transfer Controls (continued)

5.12.2 (continued) b. Operating Requirements (continued)

- MONITOR for increasing level in all tanks (including catch tanks) PHYSICALLY CONNECTED to the WASTE transfer route, during WASTE transfer through a WASTE transfer system. MONITORING shall be performed at 30 and 60 minutes following WASTE transfer initiation and each 2 hours thereafter until the transfer is complete. This requirement does not apply to Waste Retrieval Sluicing System operations (Project W-320).

- Perform ground-level radiation surveys of any single-walled, direct buried/bermed lines that are part of the WASTE transfer route every 12 hours during salt well pumping (maximum of 4 gal/min), and every 30 minutes during submersible pumping (maximum of 50 gal/min). This requirement does not apply to Waste Retrieval Sluicing System operations (Project W-320).

  Ground-level radiation surveys shall be performed based on baseline criteria. If radiation surveys indicate a variance that exceeds the criteria, actions shall be taken to investigate whether transfer line leakage has occurred. If transfer line leakage is confirmed, response actions shall be taken according to procedures.

  Note: For multiple salt well pumping through a common line, radiation surveys shall be performed at an increased frequency.

#Salt Wells	Maximum Flow	Survey
2	8 gal/min	every 6 hours
3	12 gal/min	every 4 hours
4	16 gal/min	every 3 hours
5	20 gal/min	every 2 hours

- WASTE transfers are prohibited into SSTs. This requirement does not apply to Waste Retrieval Sluicing System operations (Project W-320).

(continued)

5.12 Transfer Controls (continued)

5.12.2 (continued)

b. Operating Requirements (continued)

- VERIFY that PHYSICALLY CONNECTED catch tanks that are not in the direct transfer route are < 50% full prior to WASTE transfer.

- VERIFY that all pit drains associated with the cross-site transfer route have an open flow path to allow drainage prior to a cross-site WASTE transfer.

- Perform WASTE transfers during excavation activities in accordance with AC 5.17, "Excavation Controls."

c. WASTE Compatibility Controls

- 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."

- Chemical Compatibility. Ensure chemical additions are ≥ pH of 8 prior to transfer into tank farms (excluding water additions and drums containing caustic chemicals).

- DST and AWF Tank Time to LFL Determination. VERIFY prior to any planned transfer(s) (including WASTE and other additions) into a DST and AWF tank, that the minimum time to reach 25% of the Lower Flammability Limit (LFL) for the tank vapor space, assuming loss of the primary tank ventilation, will remain ≥ 7 days, using the methodology contained in HNF-SD-WM-CN-117, *Calculations of Hydrogen Release Rate at Steady State for Double-Shell Tanks*.

- DCRT Time to LFL Determination. VERIFY prior to any planned salt well transfer(s) into a DCRT, that the DCRT vapor space will remain ≤ 25% of the LFL using the methodology contained in HNF-SD-WM-CN-118, *Calculation of Flammable Gas Mixtures in Double-Contained Receiver Tanks*.

(continued)

5.12 Transfer Controls (continued)

5.12.2 (continued) d. Waste Retrieval Sluicing System Operations (WRSS) Controls

Note: The following controls apply only when Waste Retrieval Sluicing System operations (WRSS) are being performed.

- Prior to initiation of a WASTE transfer, establish communications between control rooms for Tanks 241-C-106 and 241-AY-102 to ensure immediate shutdown of WASTE transfers when leakage is indicated from mass flow meter monitoring data, waste levels, or other observation.

- Perform WASTE transfers of sludge from Tank 241-C-106 to Tank 241-AY-102 in one foot increments, followed by a hold period to monitor tank and WASTE parameters to ensure that the tank is within analyzed thermal conditions. During the monitoring period, the heat load of the sludge in Tank 241-AY-102 will be determined based on the sludge volume transferred. The sludge volume determination will be made by calculation utilizing the ENRAF densitometer data, sample analysis results and mass flow meter monitoring data.

- Perform material balance calculations following each sluicing batch of 12 hours maximum duration. The material balance shall include (a) total material transferred, (b) heat generation rate, and (c) solids loading calculation.

(continued)

5.12 Transfer Controls (continued)

5.12.3 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, original 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).

WASTE compatibility controls to maintain the minimum time to 25% of the LFL within the bounds of HNF-SD-WM-CN-117 and HNF-SD-WM-CN-118 apply to DSTs and AWF tanks, and DCRTs, respectively. The controls apply only to the DSTs and AWF tanks, and DCRTs listed in the respective calculation notes.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.13 Encasement Seal Loop Controls

5.13.1 Requirement for Encasement Seal Loop Controls

A program shall be maintained to control encasement seal loop drain line isolation valves (hydrostatic test valves).

5.13.2 Program Key Elements

Prior to WASTE transfer through a WASTE transfer system, VERIFY that all encasement seal loop drain line isolation valves associated with PHYSICALLY CONNECTED piping provide an open drain path to the pit. The encasement drain line valve positions shall be as applicable to the valve type.

5.13.3 Applicability

Encasement seal loop drain line isolation valves associated with 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, original Cross-Site Transfer System, 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).

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.14 Emergency Preparedness

5.14.1 Requirement for Emergency Preparedness

A program shall be maintained to ensure that emergency response plans are developed to direct facility actions in the event of an accident.

5.14.2 Program Key Elements

a. The emergency preparedness program shall address the following elements: emergency response organization, notification, emergency event assessment, protective actions, medical support, recovery, emergency equipment, training, drills and exercises, and program administration.

b. Emergency response plans for a seismic event shall include the following:

- Identification of the seismic event detection method used to initiate response procedure actions (e.g., 200 Areas seismic monitor, notification from external source).
- Response procedures based on the magnitude of the seismic event to protect the offsite public, onsite worker, and facility worker (e.g., facility inspections, transfer termination, INTRUSIVE activity termination, ventilation system evaluation of required functionality, site evacuation).
- Recovery plan to address restart of services and equipment.

c. Emergency response plans for a fire shall include response procedures based on the type, location, and size of the fire to protect the offsite public, onsite worker, and facility worker (e.g., firefighting coverage and response, limitations on TWRS activities, site evacuation).

(continued)

5.14 Emergency Preparedness (continued)

5.14.2 (continued) Program Key Elements (continued)

d. Emergency response plans for a WASTE leak shall include response procedures based on the magnitude of the leak to protect the offsite public, onsite worker, and facility worker (e.g., transfer termination, leakage containment and removal, site evacuation). WASTE leakage resulting in a pool requires immediate evacuation of affected personnel. Emergency response plans for WASTE leaks into WASTE transfer system structures (i.e., process pits, diversion boxes, vault pits, cleanout boxes, and catch tanks) shall include ignition control considerations (per AC 5.10, "Ignition Controls") because of the possibility of unfavorable flammable gas conditions within the structure.

e. VERIFY safety structures, systems, and components for degradation of design criteria parameters that are credited in the analyses, following significant, relevant, natural phenomena events (e.g., high winds).

5.14.3 Applicability

This program applies to all TWRS facilities and operations.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.15 Moisture Controls

5.15.1 Requirement for Moisture Controls

A program shall be maintained to prevent removal of moisture that protects WASTES from potential propagating organic salt-nitrate reactions.

5.15.2 Program Key Elements

a. Interim Stabilization

Supernatant pumping of excess liquid above the solid WASTE surfaces is acceptable. Salt well pumping of liquids below the solid WASTE surfaces of Safe, Conditionally Safe, Unsafe or Unassigned tanks (HNF-SD-WM-SAR-067) is prohibited unless sampling and analysis have shown that the post salt well-pumped condition of the remaining WASTE meets the following safety criteria (WHC-SD-WM-CN-058, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reactions Safety Analysis*):

Total organic carbon (TOC)/moisture safety criteria:

- Wt% free $H_2O \geq 20\%$

  OR

- TOC (wt%) $< 4.5 + 0.17$ (wt% free H_2O) when wt% free $H_2O < 20\%$,

  where wt% TOC is the wet basis TOC concentration and wt% free H_2O is the moisture content of the WASTE.

b. Emergency Pumping

Emergency pumping of Safe, Conditionally Safe, Unsafe, or Unassigned tanks in response to tank leaks shall be limited to supernatant pumping of the excess liquid above the solid WASTE surfaces unless the safety criteria in Section 5.15.2.a is met or until DOE approval of a waiver to this requirement is received by Fluor Daniel Hanford, Inc.

(continued)

5.15 Moisture Controls (continued)

5.15.2 (continued)

c. Moisture Monitoring

Periodic VERIFICATIONS by liquid level monitors, visual observation, or other available means shall be performed to ensure that tanks that are classified as Safe or Conditionally Safe (HNF-SD-WM-SAR-067) continue to have sufficient moisture to be classified as Safe or Conditionally Safe, respectively. If moisture cannot be VERIFIED, control of potential ignition sources in the WASTE is required in accordance with AC 5.10, "Ignition Controls," for organic salt-nitrate reactions.

d. Ventilation System Changes

SST ventilation system design or operating changes that could cause increased WASTE moisture loss shall be evaluated for the effect on the organic salt-nitrate reaction risk and controls. The use of portable active ventilation on passively ventilated tanks is allowed up to 672 hours (28 days) of cumulative operation in a 6-month period without evaluation. This assumes a nominal ventilation flow rate of 1,000 ft^3/min (WHC-SD-WM-SARR-033, *Preliminary Safety Criteria For Organic Watch List Tanks at the Hanford Site)*. Use of the portable active ventilation longer than 672 hours in a 6-month period requires an evaluation of the effect on WASTE moisture loss. The time interval was judged to have an insignificant effect on WASTE moisture loss.

5.15.3 Applicability

Interim stabilization controls apply to all SSTs.

Emergency pumping controls apply to all SSTs.

Moisture monitoring controls apply to SSTs that are classified as Safe or Conditionally Safe (HNF-SD-WM-SAR-067).

Ventilation system changes apply to all SSTs.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.16 Dome Loading Controls

5.16.1 Requirement for Dome Loading Controls

A program shall be maintained to limit loads so WASTE is not released from structures in the tank farms from accidental equipment drops or excessive loads leading to upper tank structural failure.

5.16.2 Program Key Elements

a. For mechanical lifts within 20 ft of underground storage tanks, the lower equipment boundary of the lifted item (e.g., bottom of the cover block, thermocouple tree) shall be less than 20 ft above surface grade, or pit floor above a WASTE storage tank (covered or uncovered). Mechanical lifts travelling over a MISF are not allowed.

   This control is applicable for SSTs (100 Series), DSTs, and AWF tanks.

b. Use DOE-RL-92-36, *Hanford Site Hoisting and Rigging Manual*, for lifts.

c. A dome loading program shall be established that manages soil and concentrated load baselines above WASTE storage tanks per Table 5.16-1.

(continued)

5.16 Dome Loading Controls (continued)

Table 5.16-1. Authorized Dome Loads

Tank Type	Additional Allowable Loads Above Baseline*	
	Soil (ft)	Concentrated (ton)
SST (100 Series - 75 ft dia.)	None	100
SST (200 Series - 20 ft dia.)	None	50
DST (SY, AW, AN, AP)	7.5**	100
DST (AWF Tanks - AY, AZ)	8.3**	100
DCRT	None	None***
Catch Tanks	None	None***
MISFs	None	None***

* Baseline corresponds to existing field conditions of average soil height and total existing load above tank.

** Baseline comparison is irrelevant. These numbers represent total allowable soil height as measured from apex of top of tank.

*** Does not include restriction of personnel or equipment carried by personnel.

5.16.3 Applicability

Where facility applicability is not specified in the key element section, this program shall apply to SSTs, DSTs, AWF tanks, DCRTs, catch tanks, and MISFs.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.17 Excavation Controls

5.17.1 Requirement for Excavation Controls

A program shall be maintained to ensure that controls are in place to coordinate excavation activities in areas of WASTE transfers to minimize the potential for WASTE leakage to the surface from an excavation accident. This program also reduces the likelihood of inadvertently intruding into structures potentially containing flammable gas.

5.17.2 Program Key Elements

a. Obtain an excavation permit prior to excavating in areas where underground WASTE transfer lines exist (i.e., 200 East Area, 200 West Area, and right-of-way for the cross-site transfer line). Excavation activities include: (1) movement of earth by mechanical means below existing grade, (2) any hand-digging to a depth greater than approximately 1 ft, or (3) drilling activities (e.g., cone penetrometer, well drilling). The excavation permitting process shall provide for the following:

- Composite map for the planned excavation site indicating approximate horizontal and vertical locations of WASTE transfer piping, piping encasements, and transfer structures.
- Radiological evaluation for the planned excavation activity, including the issuance of a radiological work permit as required.
- Physical marking of the ground surface to identify WASTE transfer lines based on the composite map and a documented subsurface scan.
- Approval of the proposed excavation activity by TWRS cognizant facility engineer and Facility Manager, or delegate.
- All excavations within 15 ft of an ongoing WASTE transfer are prohibited.
- Hand-digging only is allowed within approximately 5 ft of a WASTE transfer line.

(continued)

5.17 Excavation Controls (continued)

5.17.2 (continued) Program Key Elements (continued)

b. Encased pipe (concrete-encased and pipe-in-pipe encased) outside of the tank farm boundaries shall be identified with permanent aboveground labels. Additional aboveground labeling requirements for WASTE transfer lines are provided in AC 5.12 "Transfer Controls."

c. WASTE transfers are prohibited through lines uncovered by excavation activities unless compensatory controls are established (e.g., vehicle access limitations, concrete shielding system installed).

d. WASTE transfers are prohibited through lines within approximately 15 ft of an ongoing excavation activity. This requirement does not restrict WASTE transfers if the excavation activity is stopped (e.g., at night). Ensure this requirement is met as follows:

(1) Once per 24 hours, VERIFY from the excavation supervisor or by a review of approved excavation permits that no WASTE transfers are planned in the vicinity of an excavation activity.

AND

(2) Prior to WASTE transfer and once per 24 hours during a transfer, VERIFY by surveying the WASTE transfer route that no excavation activities are in progress.

e. Prior to initiation of an excavation activity, identify emergency response actions and establish communications between the excavation site and operations personnel to ensure immediate shutdown of WASTE transfers when leakage is indicated.

f. Prior to initiating a slurry transfer through the replacement cross-site transfer line (WT-SLL-3160), VERIFY that the route markers are in place at approximately 150-ft intervals.

(continued)

5.17 Excavation Controls (continued)

5.17.3 Applicability

This program applies to ACTIVE underground WASTE transfer lines and excavation (including drilling) activities.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.18 HEPA Filter Controls

5.18.1 Requirement for HEPA Filter Controls

A program shall be maintained to limit the radioactive material inventories on high-efficiency particulate air (HEPA) filters and prefilters, high-efficiency gas adsorber (HEGA) filters, high-efficiency metal filters (HEMFs), and high-efficiency mist eliminators (HEMEs) to protect the source term assumptions in the accident analyses. The program also ensures the capability of HEPA filters to mitigate the consequences of specific accident scenarios.

5.18.2 Program Key Elements

a. VERIFY periodically that the HEPA filter and prefilter housing radiation level is ≤ 200 mrem/h on contact. Replace the HEPA filters and prefilters before filter housing radiation levels exceed 200 mrem/h.

b. VERIFY periodically that the AWF 241-AZ-702 HEME housing radiation level is ≤ 800 mrem/h on contact. Replace the HEME before housing radiation level exceeds 800 mrem/h.

c. Replace the AWF 241-AZ-702 HEGA filter before the upstream HEPA filter in the associated filter train has been replaced 20 times.

   AND

   Replace the AWF 241-AZ-702 HEGA filter when the upstream HEPA filter in the associated filter train is determined to have a particulate removal efficiency of < 99.95% by performing an aerosol test, or other indication of degraded HEPA filter performance.

d. VERIFY periodically that the radiological dose contribution of the 296-C-006 HEME and HEMF is ≤ 100 mrem/h, as measured from the location of the installed radiation detector that monitors the HEME and HEMF.

   Reduce radiological contamination levels (e.g., by flushing) of the HEME and HEMF before housing radiation level exceeds 100 mrem/h.

(continued)

5.18 HEPA Filter Controls (continued)

5.18.2 (continued) Program Key Elements (continued)

e. VERIFY that the HEPA filter nominal particulate removal efficiency is ≥ 99.95% by performing an aerosol test with the design air flow through the filter, according to the guidance in American Society of Mechanical Engineers (ASME) N510, *Testing of Nuclear Air Treatment Systems*, and Energy Research and Development Administration (ERDA) 76-21, *Nuclear Air Cleaning Handbook*.

Perform the aerosol test after installation and every 12 months thereafter. Also establish controls for replacement of the HEPA filters.

5.18.3 Applicability

To protect the source term assumptions in the accident analysis for HEPA filter releases, VERIFICATION of filter housing radiation levels applies to HEPA filters and prefilters on SSTs, DSTs, AWF tanks, DCRTs, catch tanks, the 204-AR Waste Unloading Facility, 244-AR Vault vessel vent and canyon, diversion box 6241-A, vent station 6241-V, and the 213-W Dry Waste Compactor Building.

To protect the source term assumptions in the accident analysis for HEME and HEMF releases, VERIFICATION of filter radiation levels applies to HEMEs for AWF 241-AZ-702 and 296-C-006 (for Tank 241-C-106), and the HEMF for 296-C-006 (for Tank 241-C-106).

To protect the source term assumptions in the accident analysis for HEGA filter releases, replacement of HEGA filters applies to AWF 241-AZ-702.

To protect the AWF 241-AZ-702 HEGA filter source term assumptions in the accident analysis, VERIFICATION of HEPA filter efficiency applies to the HEPA filter upstream of the HEGA filter in a given train.

To provide mitigation for a pressurized release for an accident initiated by mixing of incompatible WASTE, VERIFICATION of HEPA filter efficiency applies to a minimum of one stage of HEPA filters installed on DCRTs 244-A, 244-S, 244-TX, diversion box 6241-A, and vent station 6241-V.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.19 Process Instrumentation and Measuring and Test Equipment

5.19.1 Requirement for Process Instrumentation and Measuring and Test Equipment

A program shall be maintained to identify and programmatically control process instrumentation and measuring and test equipment used to VERIFY process parameters (e.g., level, temperature, flammable gas concentrations) to comply with the TSRs.

5.19.2 Program Key Elements

a. Identification and traceability of TSR-related instrumentation and equipment shall be maintained.

b. Instrumentation and equipment shall either have a FUNCTIONAL TEST or CALIBRATION as applicable at appropriate intervals to VERIFY required performance.

c. Records shall be maintained to provide evidence that the instrumentation and equipment are within the FUNCTIONAL TEST or CALIBRATION when used.

5.19.3 Applicability

This program applies to installed and portable process instrumentation and measuring and test equipment when used to VERIFY process parameters specified in the TSRs.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.20 Transfer Pump Administrative Lock Controls

5.20.1 Requirement for Transfer Pump Administrative Lock Controls

A program shall be maintained for administrative lock controls on WASTE transfer pumps to minimize the potential for inadvertent pump starts.

5.20.2 Program Key Elements

a. The administrative lock of a WASTE transfer pump is demonstrated by removing and securing the motive force from the pump (e.g., electrical power, steam, water, or air).

b. Transfer system covers and supplemental covers, service water pressure detection systems, and transfer leak detection systems PHYSICALLY CONNECTED to a WASTE transfer route with WASTE transfer pumps locked in accordance with AC 5.20, "Transfer Pump Administrative Lock Controls," shall normally be maintained OPERABLE. OPERABILITY is demonstrated by periodic VERIFICATION that the transfer system covers and supplemental covers are in place, and by periodic performance of a FUNCTIONAL TEST of the service water pressure detection systems and transfer leak detection systems.

   Transfer system covers and supplemental covers, service water pressure detection systems, and transfer leak detection systems may be inoperable, provided they are specifically identified and periodic management reviews are performed to approve their continued inoperability. The frequency of management reviews is based on the number of affected transfer system covers and supplemental covers, service water pressure detection systems, and transfer leak detection systems, and the duration of their inoperability.

(continued)

5.20 Transfer Pump Administrative Lock Controls (continued)

5.20.2 (continued) Program Key Elements (continued)

c. Transfer system covers and supplemental covers, service water pressure detection systems, and transfer leak detection systems PHYSICALLY CONNECTED to a WASTE transfer route with WASTE transfer pumps not locked in accordance with the administrative lock control program are controlled in accordance with LCO 3.1.1, "Transfer System Covers and Entry Doors;" LCO 3.1.7, "Supplemental Covers;" LCO 3.1.2, "Service Water Pressure Detection Systems;" and LCO 3.1.3, "Transfer Leak Detection Systems," respectively.

5.20.3 Applicability

This program applies to ACTIVE WASTE transfer pumps (including electrical, steam jet, water jet, or air-driven transfer pumps) in the TWRS facilities 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, original Cross-Site Transfer System, Replacement Cross-Site Transfer System, 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). It also applies to transfer pumps in process facilities used to transfer WASTE to tank farms.

The program also applies to covers and supplemental covers on WASTE transfer-associated structures; service water pressure detection systems on flushing systems; and transfer leak detection systems in process pits, diversion boxes, vault pits, and cleanout boxes PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump under the transfer pump administrative lock control program.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.21 Tank Service Water Intrusion Monitoring Program

5.21.1 Requirement for Tank Service Water Intrusion Monitoring

A program shall be maintained to monitor for service water leaks that could fill and overflow tanks.

5.21.2 Program Key Elements

a. Monitor service water usage or tank levels every 24 hours to detect leaks. Monitoring service water usage requires reading each tank farm's flow totalizer to VERIFY that there has been no unaccounted service water usage. Local inspection for leakage of the associated service pit or flush pit is also required when monitoring service water usage. Monitoring tank levels requires a VERIFICATION that the WASTE levels in tank farms serviced by the water system are not increasing unexpectedly.

b. Procedures shall identify required operator responses to the detection of a service water leak.

5.21.3 Applicability

This program applies to service water systems that directly supply the tank farms.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.22 Transfer System Cover Removal Controls

5.22.1 Requirement for Transfer System Cover Removal Controls

A program shall be maintained to control transfer system cover removal.

5.22.2 Program Key Elements

a. Obtain management approval prior to removing a transfer system cover in accordance with this AC. Covers associated with structures PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump, not under administrative lock, and not controlled under this AC are required to be OPERABLE in accordance with LCO 3.1.1, "Transfer System Covers and Entry Doors."

b. Provide continuous monitoring for WASTE leaks while covers are removed. Monitoring includes such methods as the use of continuous air monitors or other radiation monitoring devices near potential WASTE leak locations. See AC 5.20, "Transfer Pump Administrative Lock Controls."

c. Establish procedures that identify required operator responses to the detection of a WASTE leak.

5.22.3 Applicability

This program applies to transfer system covers and the associated structure (1) that is PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock and (2) that has at least two closed valves in series between the structure and any ACTIVE transfer routes.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.23 Caustic Transfer Controls

5.23.1 Requirement for Caustic Transfer Controls

A program shall be maintained to control caustic spray leak toxicological hazards.

5.23.2 Program Key Elements

a. Polyethylene (or similar) sleeving around delivery piping.

b. Caustic delivery system pressure shall be $\leq$ 125 lb/in^2 gauge or below the cargo tank's specified maximum allowable operating pressure, whichever is less.

c. Steel pipe shall be Schedule 10 or heavier wall thickness; polyethylene hose or other delivery piping shall be designed for appropriate pressure delivery. Caustic transfer piping shall have a wall thickness of $\geq$ 0.109 in.

d. Vendors shall be required to provide documentation that the cargo tanks used for caustic transfers meet Department of Transportation Specifications 306, 307, 312, 406, 407 or 412 in accordance with 49 CFR Parts 178.345, 178.346, 178.347, or 178.348, as applicable.

e. Traffic barriers shall surround the cargo tank (e.g., traffic cones or stanchions and chains).

5.23.3 Applicability

This program applies to caustic delivery from tanker trucks or 55 gal. drums that connect to tank farm tanks or to WASTE transfer systems during caustic transfers.

This program does not apply to WASTE transfers. This program also does not apply to caustic delivery operations within the 204-AR Waste Unloading Facility (i.e., when caustic solution is mixed within the building and then transferred through designated, permanent piping within the building).

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.24 Safety Management Programs

5.24.1 Requirement for Safety Management Programs

The safety management programs listed below shall be maintained as part of the TWRS safety management system to minimize risks to the public, onsite workers, and facility workers, and to ensure the safe operation of TWRS facilities. Details of the listed safety management programs are provided in the programmatic chapters of HNF-SD-WM-SAR-067.

5.24.2 Program Key Elements

a. Radiation Protection Program

b. Hazardous Material Protection Program including:

- HNF-SD-WM-HSP-002, *Tank Farms Health and Safety Plan* (HASP)
- Chemical hazards
- Industrial hygiene
- Industrial safety

c. Radioactive and Hazardous WASTE Management Program including:

- Effluent controls
- Environmental monitoring

d. Testing, Surveillance, and Maintenance Program including:

- Initial testing, in-service surveillance, and maintenance

e. Fire Protection Program

5.24.3 Applicability

This program applies to all TWRS facilities and operations, including the 242-S Evaporator ("cold side" only).

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.25 Ventilation Controls

5.25.1 Requirement for Ventilation Controls

a. A ventilation control program shall be established, implemented, and maintained to inspect portions of the ventilation ductwork on Tank 241-C-106 to prevent an unfiltered release.

b. A ventilation control program shall be established, implemented, and maintained to confirm cooling capacity in Tank 241-AY-102 complies with LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls," to prevent a tank bump.

5.25.2 Program Key Elements

a. Perform an external visual inspection of the aboveground recirculation ventilation ductwork for Tank 241-C-106 to identify any obvious visual damage every 24 hours during operation of recirculation fan FN 1361. The recirculation ventilation ductwork for Tank 241-C-106 includes the ductwork within Process Building 241-C-91, the inlet duct, and return duct to the tank. Monitor and evaluate ventilation flow data during operation of FN 1361 to determine if any recirculation losses are occurring.

b. Periodically determine the cooling capacity required for Tank 241-AY-102 ventilation system to maintain WASTE temperatures in accordance with the requirements of LCS/LCO 3.3.2. This determination shall be based on a heat balance developed from tank WASTE temperature and liquid level; and ventilation parameters such as flow rate, temperature and humidity, as applicable, including planned activities that could affect the cooling requirements. Provide the necessary cooling capability before each campaign to transfer 2 ft of Tank 241-C-106 sludge to Tank 241-AY-102.

5.25.3 Applicability

The visual inspection applies only to 241-C-91 recirculation system when recirculation fan FN 1361 is operating.

The cooling capacity determination applies to Tank 241-AY-102 only after 2 ft or more of sludge have been transferred from Tank 241-C-106.

5.0 ADMINISTRATIVE CONTROLS (ACs)

5.26 Tank 241-C-106 WASTE Temperature Controls

5.26.1 Requirement for Tank 241-C-106 WASTE Temperature Controls

A program shall be established, implemented, and maintained to maintain the temperature at the bottom of Tank 241-C-106 below the local saturation temperature to prevent a liner breach and steam release event.

5.26.2 Program Key Elements

a. Using the predicted height of the WASTE following each incremental transfer from Tank 241-C-106 to Tank 241-AY-102, predict the saturation temperature at the bottom of Tank 241-C-106. Use this temperature as the limiting temperature throughout the given incremental transfer.

b. Periodically monitor the WASTE temperature to ensure that the limiting temperature for each incremental transfer and long term storage following completion of the WRSS transfer is not exceeded. The monitoring period will be based on the expected rate of waste temperature increase. For example, if the projected time to reach local saturation is 1 day, establish a monitoring frequency of several measurements per day to allow time for corrective action. Establish limiting thermocouple readings based on the predicted saturation temperature (for the given WASTE increment found in key element [a]) and thermal modeling to ensure that the tank bottom temperature does not exceed the local saturation temperature. Available WASTE temperature profiles are used in the thermal modeling to determine specific thermal limits. Develop a recovery plan to be implemented if temperatures are expected to exceed the established limit or if measured temperatures exceed the limit.

c. Before the first two sluicing increments (each nominally 1 ft. of Tank 241-C-106 sludge removal), the liquid level in Tank 241-C-106 will be reduced until only enough liquid WASTE will remain to completely cover the sludge layer. The liquid level established before the start of each sluicing increment must be maintained during the sluicing increment to prevent a steam release as a result of reduced hydraulic head in the tank.

(continued)

5.26 Tank 241-C-106 WASTE Temperature Controls (continued)

5.26.2 (continued) Program Key Elements (continued)

d. Prior to sluicing operations, the WASTE in Tank 241-C-106 shall be chilled to its winter temperature by operation of the Tank 241-C-106 primary ventilation system and the inlet chiller.

e. After transfer is complete the final control temperature will be based on the amount of heat-generating material remaining in the tank.

5.26.3 Applicability

This program applies to Tank 241-C-106 during and after Waste Retrieval Sluicing System operations.

For ACs included as Transitional Requirements

Please Refer

to

The Addendum Section 5.0,
"Administrative Controls."

SECTION 6

REFERENCES

Section 6 REFERENCES

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APPENDIX A

BASES

Appendix A BASES

This Appendix provides summary statements of the reasons for the Safety Limits, Limiting Control Settings, Limiting Conditions for Operation, and the associated Surveillance Requirements. The BASES describe how the limit(s), the Applicability, the Condition(s), and the Surveillance(s) will maintain operation of the facility within the safety envelope. The primary purpose for describing the BASES for these requirements is to provide the operations and engineering staff with the necessary information to maintain operation of the facility within the safety envelope and to ensure that any future changes to these requirements will not affect their original intent or purpose.

B 2.0 SAFETY LIMITS (SLs)

B 2.1.1 WASTE Temperature

BASES

BACKGROUND

The SL on WASTE temperature prevents a potential organic salt-nitrate reaction initiated by a "chemical runaway" reaction that causes bulk heatup of the WASTE. Such elevated WASTE temperatures would occur over a presumed long time period (months), and only during an extended tank ventilation outage.

The primary source of tank heat is the ongoing radioactive decay in the WASTE. Exothermic chemical reactions may also contribute some heat. The temperatures in the tank materials and in the WASTE are related to the magnitude and distribution of the heat-generating components in the WASTE and are controlled by removing heat from the tank.

The primary barriers protected by this SL are selected single-shell tanks (SSTs), double-shell tanks (DSTs), and aging waste facility (AWF) tanks. The tanks are necessary for the intended facility function, which is interim safe storage (confinement) of the WASTE, and to guard against the uncontrolled release of radiological and toxicological material. The tanks are the closest physical barriers to the WASTE (material source). Consequences of exceeding the process variable of WASTE temperature are potential uncontrolled release of radiological and toxicological material to the offsite public and onsite workers, and potential structural failure of the tank.

BASES

APPLICABLE SAFETY ANALYSES

The SL for WASTE temperature is required for one accident scenario: Organic Salt-Nitrate Reaction (postulated "chemical runaway" reaction).

Organic Salt-Nitrate Reaction

Organic salt-nitrate reaction scenarios are analyzed in calculation notes (WHC-SD-WM-CN-058, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reaction Safety Analysis)* and the results of the analysis are presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines. In this postulated accident scenario, tank ventilation (active cooling) is lost and the WASTE temperature increases because of radioactive decay heat until a sufficiently high temperature is reached that initiates a "runaway" chemical reaction. Until this chemical phenomena and its threshold temperature are better understood and defined, this SL on WASTE temperature serves to prevent this postulated accident.

SL

The threshold temperature for significant chemical heating is not known exactly. The WASTE temperature in each tank is required to be $\leq$ 250 °F to prevent the tank WASTE from reaching a "chemical runaway" threshold temperature. The SL limit was conservatively selected and provides a safety margin based on past operating experience where tanks have seen temperatures as high as 300 °F and no "chemical runaway" reaction occurred. The limit is also sufficiently below the bulk organic salt-nitrate reaction temperature of 428 °F (HNF-SD-WM-SAR-067).

The LCSs/LCOs that protect this SL are included in LCS/LCO 3.3.1, "SST WASTE Temperature Controls," and LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls."

MODE APPLICABILITY

SL 2.1.1 applies at all times (i.e., during OPERATION and LIMITED MODES) because exceeding the WASTE temperature is possible in both MODES. Inadequate cooling in either MODE over time could result in temperatures in the stored WASTE outside the limit.

BASES

PROCESS AREA APPLICABILITY

SL 2.1.1 applies to the following nine SSTs, and all DSTs and AWF tanks.

- 241-C-106
- 241-SX-103
- 241-SX-107 through 241-SX-112
- 241-SX-114

These SSTs all have estimated heat loads > 26,000 Btu/h such that temperatures at or above the temperature limit could result from an extended ventilation outage. This SL conservatively applies to tanks 241-C-106 and 241-SX-108, even though the WASTE in these tanks has low organic fuel and is judged to be non-combustible without consideration of WASTE moisture. The tank with the highest heat load (Tank 241-C-106) also receives periodic water additions to help cool it.

The DSTs and AWF tanks all have (or may achieve) estimated heat loads > 26,000 Btu/h such that temperatures at or above the temperature limit could result from an extended ventilation outage. The SL conservatively applies to these tanks even though they have supernatant above the WASTE solids level, which is judged to preclude an organic salt-nitrate reaction.

Past tank farm operating experience and experimental data indicate that significant chemical heating is not occurring in non-ventilated tanks.

BASES

ACTIONS

Exceeding an SL is a VIOLATION. For this situation, proceed in accordance with AC 5.4.2, "Response to a Safety Limit VIOLATION." There are no actions that can be taken to restore the SL and avoid a VIOLATION. Exceeding an SL is indicative of significant multiple breakdown of layered protective measures such as LCSs/LCOs, ACTIONS statements, surveillances, Administrative Controls, and Defense-in-Depth controls.

The actions in response to an SL VIOLATION are derived from DOE requirements. The first action is to place the affected tank in the most safe and stable condition attainable Immediately (see Section 1.3, "Completion Times," for the definition of Immediately). The circumstances leading to an SL VIOLATION and the necessary recovery activities can vary widely. The first action is intended to bring the facility operation back within the SL, if possible, to prevent potential damage to the primary barrier and release to the offsite public and onsite workers. The amount of time needed to complete this action cannot be set beforehand as it is dependent on the conditions and activities that are occurring at the tank at the time of the VIOLATION.

Subsequent actions specified in procedures include notification of DOE and contractor management; occurrence reporting, including the evaluation of root causes and corrective measures to prevent recurrence; and longer term actions to determine if any damage may have occurred before returning the affected tank to an operational MODE.

SURVEILLANCE REQUIREMENTS

SRs are not applicable to SLs. SRs necessary to maintain operations within the SL are contained within LCS/LCO 3.3.1, "SST WASTE Temperature Controls," and LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls." These SRs are part of the layered approach for protection of the SL.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-058, 1996, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reaction Safety Analysis*, Rev. 0-a, Westinghouse Hanford Company, Richland, Washington.

B 3.0 LIMITING CONDITIONS FOR OPERATION (LCOs) AND SURVEILLANCE REQUIREMENTS (SRs)

BASES

LCOs

LCO 3.0.1, "LCO Met," through LCO 3.0.7, "Emergency Exceptions," establish the general requirements applicable to all LCOs and apply at all times, unless otherwise stated.

LCO 3.0.1 - LCO Met

LCO 3.0.1 establishes the Applicability within each individual LCO as the requirements for when the LCO is required to be met (i.e., when the UNIT is in the MODES or other specified conditions of the Applicability of each LCO).

LCO 3.0.2 - ACTION Met

LCO 3.0.2 establishes that upon discovery of a failure to meet an LCO, the associated ACTIONS shall be met. The Completion Time of each Required Action for an ACTIONS Condition is applicable from the point in time that an ACTIONS Condition is entered. The Required Actions establish those remedial measures that must be taken within specified Completion Times when the requirements of an LCO are not met. This LCO establishes that:

a. Completion of the Required Actions within the specified Completion Times constitutes compliance with an LCO; and

b. Completion of the Required Actions is not required when an LCO is met within the specified Completion Time, unless otherwise specified.

There are two basic types of Required Actions. The first type of Required Action specifies a time limit in which the LCO must be met. This time limit is the Completion Time to restore an inoperable system or component to OPERABLE status or to restore variables to within specified limits. If this type of Required Action is not completed within the specified Completion Time, a shutdown may be required to place the UNIT in a MODE or condition in which the LCO is not applicable. (Whether stated as a Required Action or not, correction of the entered Condition is an action that may always be considered upon entering ACTIONS). The second type of Required Action specifies the remedial measures that permit continued

(continued)

BASES

LCOs (continued)

LCO 3.0.2 - ACTION Met (continued)

operation of the UNIT that is not further restricted by the Completion Time. In this case, compliance with the Required Actions provides an acceptable level of safety for continued operation.

Completing the Required Actions is not required when an LCO is met or is no longer applicable within the associated Completion Time, unless otherwise stated in the individual LCOs.

The nature of some Required Actions of some Conditions necessitates that, once the Condition is entered, the Required Actions must be completed even though the associated Conditions are resolved. The individual LCO's ACTIONS specify the Required Actions where this is the case.

The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of Surveillances, preventive maintenance, corrective maintenance, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience. Alternatives that would not result in redundant equipment being inoperable should be used instead. Doing so limits the time both subsystems/trains of a safety function are inoperable and limits the time other conditions exist that result in LCO 3.0.3, "ACTION Not Met or ACTION Not Provided," being entered. Individual LCOs may specify a time limit for performing an SR when equipment is removed from service or bypassed for testing. In this case, the Completion Times of the Required Actions are applicable when this time limit expires if the SR has not been completed.

(continued)

BASES

LCOs (continued)

LCO 3.0.2 - ACTION Met (continued)

When a change in MODE or other specified condition is required to comply with Required Actions, the UNIT may enter a MODE or other specified condition in which a new LCO becomes applicable. In this case, the Completion Times of the associated Required Actions would apply from the point in time that the new LCO becomes applicable, and the ACTIONS Condition(s) are entered.

LCO 3.0.3 - ACTION Not Met or ACTION Not Provided

[Note: LCO 3.0.3 is not applicable at this time].

For ACTIONS not met (VIOLATION), proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

All foreseen Conditions are listed in the ACTIONS statements. Therefore, all ACTIONS are provided for all foreseen Conditions.

LCO 3.0.4 - MODE Changes

[Note: LCO 3.0.4 is not applicable at this time].

LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the UNIT in a different MODE or other specified condition when the following exist:

a. The requirements of an LCO in the MODE or other specified condition to be entered are not met; and

b. Continued noncompliance with these requirements would result in the UNIT being required to be placed in a MODE or other specified condition in which the LCO does not apply to comply with the Required Actions.

(continued)

BASES

LCOs (continued)

LCO 3.0.4 - MODE Changes (continued)

Compliance with Required Actions that permit continued operation of the UNIT for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the UNIT before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this LCO should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before UNIT startup.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS. In addition, the provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that result from a normal shutdown.

Exceptions to LCO 3.0.4 are stated in the individual LCOs. Exceptions may apply to all of the ACTIONS or to a specific Required Action of an LCO.

When changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with LCO 3.0.4, or where an exception to LCO 3.0.4 is stated, the ACTIONS define the remedial measures that apply. Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1, "SR Met." Therefore, a change in MODE or other specified condition in this situation does not cause SR 3.0.1, "SR Met," or SR 3.0.4, "MODE Changes," to be not met for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to demonstrate OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.

(continued)

BASES

LCOs (continued)

LCO 3.0.5 - Return to Service

LCO 3.0.5 establishes the allowance of restoring equipment to service under administrative controls when it has been removed from service or declared inoperable to comply with ACTIONS. The sole purpose of this LCO is to provide an exception to LCO 3.0.2, "ACTION Met," to allow the performance of SRs to demonstrate:

a. The OPERABILITY of the equipment being returned to service; or

b. The OPERABILITY of other equipment.

The administrative controls are to ensure the time that the equipment is returned to service that is in conflict with the requirements of the ACTIONS is limited to the time absolutely necessary to perform the allowed SRs. This LCO does not provide time to perform any other preventive or corrective maintenance.

LCO 3.0.6 - Support System LCO Not Met

[Note: LCO 3.0.6 is not applicable at this time].

LCO 3.0.6 establishes an exception to LCO 3.0.2, "LCO Not Met," for support systems that have an LCO specified in the Technical Safety Requirements (TSRs). This exception is necessary because LCO 3.0.2, "LCO Not Met," would require that the Conditions and Required Actions of the associated inoperable supported system LCO be entered solely due to the inoperability of the support system.

(continued)

BASES

LCOs (continued)

LCO 3.0.6 - Support System LCO Not Met (continued)

This exception is justified because the actions that ensure the UNIT is maintained in a safe condition are specified in the support system LCO's Required Actions. These Required Actions may include entering the supported system's Conditions and Required Actions or may specify other Required Actions.

When a support system is inoperable and there is an LCO specified for it in the TSRs, the supported system(s) are required to be declared inoperable if determined to be inoperable as a result of the support system inoperability. However, it is not necessary to enter into the supported systems' Conditions and Required Actions unless directed to do so by the support system's Required Actions. The confusion and inconsistency of interpretation of requirements related to the entry into multiple LCOs' Conditions and Required Actions are eliminated by providing all the actions that are necessary to ensure the UNIT is maintained in a safe condition in the support system's Required Actions.

However, there are instances where a support system's Required Action may either direct a supported system to be declared inoperable or direct entry into Conditions and Required Actions for the supported system. This may occur immediately or after some specified delay to perform some other Required Action. Regardless of whether it is immediate or after some delay, when a support system's Required Action directs a supported system to be declared inoperable or directs entry into Conditions and Required Actions for a supported system, the applicable Conditions and Required Actions shall be entered in accordance with LCO 3.0.2, "LCO Not Met."

(continued)

BASES

LCOs (continued)

LCO 3.0.7 - Emergency Exceptions

LCO 3.0.7 establishes that in an emergency, if a situation develops that is not addressed by the TSRs, facility operating personnel are expected to utilize their training and expertise in taking actions to correct or mitigate the situation. This LCO applies to both LCOs and ACs.

Operations personnel may take actions that depart from a requirement in the TSRs provided that: (1) an emergency situation exists, (2) these actions are immediately needed to protect the health and safety of the public and onsite workers, and (3) no action consistent with the TSRs can provide adequate or equivalent protection. If emergency actions are taken, verbal notifications shall be made to the Manager, U.S. Department of Energy, Richland Operations Office within 2 hours and by written reports to the Assistant Manager, Office of Tank Waste Remediation System within 24 hours, in accordance with Section 5.5, "Occurrence Reporting."

BASES

SRs

SR 3.0.1, "SR Met," through SR 3.0.4, "MODE Changes," establish the general requirements applicable to all LCOs and apply at all times unless otherwise stated.

SR 3.0.1 - SR Met

SR 3.0.1 establishes the requirement that SRs must be met during the MODES or other specified conditions in the Applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This SR is to ensure that Surveillances are performed to verify the OPERABILITY of systems and components, and that variables are within specified limits. Failure to meet a Surveillance within the specified Frequency, in accordance with SR 3.0.2, "Frequencies," constitutes a failure to meet an LCO.

Systems and components are assumed to be OPERABLE when the associated SRs have been met. Nothing in this SR, however, is to be construed as implying that systems or components are OPERABLE when:

a. The systems or components are known to be inoperable although still meeting the SRs; or

b. The requirements of the Surveillance(s) are known not to be met between required Surveillance performances.

Surveillances do not have to be performed when the UNIT is in a MODE or other specified condition for which the requirements of the associated LCO are not applicable, unless otherwise specified. The SRs associated with a test exception are only applicable when the test exception is used as an allowable exception to the requirements of an LCO.

(continued)

BASES

SRs (continued)

SR 3.0.1 - SR Met (continued)

Surveillances, including Surveillances invoked by Required Actions, do not have to be performed on inoperable equipment because the ACTIONS define the remedial measures that apply. SRs have to be met in accordance with SR 3.0.2, "Frequencies," prior to returning equipment to OPERABLE status.

Upon completion of maintenance, appropriate post-maintenance testing is required to declare equipment OPERABLE. This includes meeting applicable SRs in accordance with SR 3.0.2, "Frequencies." Post-maintenance testing may not be possible in the current MODE or other specified conditions in the Applicability due to the necessary UNIT parameters not having been established. In these situations, the equipment may be considered OPERABLE provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a MODE or other specified condition where other necessary post-maintenance tests can be completed.

SR 3.0.2 - Frequencies

SR 3.0.2 establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per . . ." interval.

SR 3.0.2 permits a 25% extension of the interval specified in the Frequency (see Section 1.4, "Frequency"). This extension facilitates Surveillance scheduling and considers plant operating conditions that may not be suitable for conducting the Surveillance (e.g., transient conditions or other ongoing Surveillance or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the Surveillance at its specified Frequency. This is based on the recognition that the most probable result of any particular Surveillance being performed is the

(continued)

BASES

SRs (continued)

SR 3.0.2 - Frequencies (continued)

verification of conformance with the SRs. The exceptions to SR 3.0.2 are those Surveillances for which the 25% extension of the interval specified in the Frequency does not apply. These exceptions are stated in the individual LCOs. The requirements of regulations take precedence over the TSRs. The TSRs cannot in and of themselves extend a test interval specified in the regulations. Therefore, there would be a Note in the Frequency stating, "SR 3.0.2 is not applicable."

As stated in SR 3.0.2, the 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per . . ." basis. The 25% extension applies to each performance after the initial performance. The initial performance of the Required Action, whether it is a particular Surveillance or some other remedial action, is considered a single action with a single Completion Time. One reason for not allowing the 25% extension to this Completion Time is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the inoperable equipment in an alternative manner.

The provisions of SR 3.0.2 are not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

SR 3.0.3 - Delay of Required Actions

SR 3.0.3 establishes the flexibility to defer declaring affected equipment inoperable or an affected variable outside the specified limits when a Surveillance has not been completed within the specified Frequency. A delay period of up to 24 hours applies from the point in time that it is discovered that the Surveillance has not been performed in accordance with SR 3.0.2, "Frequencies," and not at the time that the specified Frequency was not met.

(continued)

BASES

SRs (continued)

SR 3.0.3 - Delay of Required Actions (continued)

This delay period provides an adequate time limit to complete Surveillances that have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures would be required that may preclude completion of the Surveillance.

The basis for this delay period includes consideration of UNIT conditions, adequate planning, availability of personnel, the time required to perform the Surveillance, the safety significance of the delay in completing the required Surveillance, and the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the SRs.

When a Surveillance with a Frequency based not on time intervals, but upon specified UNIT conditions or operational situations, is discovered not to have been performed when specified, SR 3.0.3 allows the full delay period of 24 hours to perform the Surveillance.

SR 3.0.3 also provides a time limit for completion of Surveillances that become applicable as a consequence of MODE changes imposed by Required Actions.

Failure to comply with specified Frequencies for SRs is expected to be an infrequent occurrence. Use of the delay period established by SR 3.0.3 is a flexibility which is not intended to be used as an operational convenience to extend Surveillance intervals.

If a Surveillance is not completed within the allowed delay period, then the equipment is considered inoperable or the variable is considered outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon expiration of the delay period. If a Surveillance is failed within the delay period, then the equipment is inoperable, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance.

(continued)

BASES

SRs (continued)

SR 3.0.3 - Delay of Required Actions (continued)

Completion of the Surveillance within the delay period allowed by this SR, or within the Completion Time of the ACTIONS, restores compliance with SR 3.0.1, "SR Met."

SR 3.0.4 - MODE Changes

[Note: SR 3.0.4 is not applicable at this time].

SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability.

This SR ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the UNIT. This SR applies to changes in MODES or other specified conditions in the Applicability associated with UNIT shutdown as well as startup.

The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with ACTIONS.

The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific timeframes and conditions necessary for meeting the SRs in accordance with the requirements of SR 3.0.4 are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or other specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance that could not be performed until after entering the LCO Applicability would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. The SRs are annotated consistent with the requirements of Section 1.4, "Frequency."

B 3.1 CONFINEMENT

B 3.1.1 Transfer System Covers and Entry Doors

BASES

BACKGROUND

Liquid WASTES are transferred to and from tank farm storage, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators) through an interconnected network of transfer piping and transfer-associated structures such as pits, cleanout boxes (COBs), and diversion boxes. The structures serve as secondary WASTE confinement for WASTE leaks from the primary piping, pumps, valves, and jumpers.

Covers for the transfer-associated structures are part of the secondary WASTE confinement system. Permanent covers are typically made of reinforced concrete, or steel in the form of plates or lids. Temporary covers are discouraged, but when used, are fabricated based on released engineering documents and meet all the functional requirements required of permanent covers. Most covers contain penetrations which are used as inspection ports, or for insertion of valve handles, television cameras, sampling equipment, or for future installations. The penetrations are covered or plugged when not used. The covers are not designed to be sealed; however, duct tape is often used to prevent water from entering the structures. Covers also provide radiation shielding for worker protection. Special precautions are taken when the covers are not in place. This is to prevent an uncontrolled release of radiological and toxicological material to the environment and to keep worker radiation exposures as low as reasonable achievable. Covers for transfer-associated structures are normally in place, but are removed temporarily for maintenance, WASTE transfer routing changes, surveillances, or other activities.

During WASTE transfer operations, WASTE is pumped under pressure. If a breach of the pressure boundary were to occur in a transfer-associated structure without a cover, a leak could spray outside the transfer-associated structure.

(continued)

BASES

BACKGROUND (continued)

Spray leaks can result from small holes or cracks in transfer piping, improperly installed transfer jumpers, defective or degraded seals or gaskets on pumps, Hanford connectors, and valves, or misroutes through compromised piping or jumpers. Mechanisms such as aging, corrosion, erosion, water hammer, overpressure, freezing, mechanical fatigue, thermal stresses, construction flaws, and human error (misalignments of jumpers or valves) can also lead to these failures. Aerosolization of WASTE from surface leaks can result from splatter and splashing while the WASTE transfer pump is running.

The replacement cross-site transfer system (RCSTS) adds two new structures to the Hanford Site: the diversion box 6241-A (located in the West Tank Farm Area) and vent station 6241-V (located at the high point in the RCSTS). Both structures have additional items that are used to contain potential leaks in the RCSTS. There is an entry door to each structure (required to be sealed), cover blocks (restrictions for cover blocks apply), and penetrations such as emergency pumpout lines (required to have blank flange installed), exhauster hookup (required to have a blank flange installed), air sampling lines (required to have cap installed), and liner washdown system connections (required to have isolation valves closed) in each structure.

BASES

APPLICABLE SAFETY ANALYSES

Transfer system covers and entry doors are required for three accident scenarios: (1) Spray Leak in Structure or From Waste Transfer Lines, (2) Surface Leak Resulting in Pool, and (3) Subsurface Leak Resulting in Pool.

Spray Leak in Structure or From Waste Transfer Lines

Potential aerosolization of WASTE outside of transfer system structures is analyzed for spray leaks in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Similar analyses were performed for the replacement cross-site transfer system. Transfer system covers decrease consequences of the accident below offsite and onsite risk guidelines.

The safety functions of the transfer system covers are to provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and to limit the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation, thus decreasing the consequences of the accident.

The safety function of the RCSTS entry doors and penetrations for diversion box 6241-A and vent station 6241-V is to provide a physical barrier in case of a spray leak during a transfer, and thereby limit the release of aerosols and the subsequent dose to the offsite receptor.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Surface Leak Resulting in Pool

Potential aerosolization of WASTE outside of transfer system structures is analyzed for surface leaks that involve significant splattering and splashing in calculation note WHC-SD-WM-CN-049, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Transfer system covers decrease consequences of the accident below onsite risk guidelines. Similar analyses were performed for the replacement cross-site transfer system in HNF-2542, *Revised Spray Leak Calculations for Project W-058*.

The safety functions of the transfer system covers are to limit the aerosol release generated by WASTE leak splattering and splashing in a WASTE transfer-associated structure, and to limit the shine dose from the WASTE leak, thus decreasing the consequences of the accident.

The safety function of the RCSTS entry doors and penetrations for diversion box 6241-A and vent station 6241-V is to provide a physical barrier to limit the release of aerosols generated by splatter during a pool leak accident, and thereby limit the subsequent dose to the onsite receptor.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Subsurface Leak Resulting in Pool

Potential aerosolization of WASTE outside of transfer system structures is analyzed for surface leaks that involve significant splattering and splashing in calculation note WHC-SD-WM-CN-057, *Calculation Notes for Subsurface Leak Resulting in Pool*, *TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Transfer system covers decrease consequences of the accident below onsite risk guidelines.

The safety functions of the transfer system covers are to limit the aerosol release generated by WASTE leak splattering and splashing in a WASTE transfer-associated structure, and to limit the shine dose from the WASTE leak, thus decreasing the consequences of the accident.

BASES

LCO

Covers for WASTE transfer-associated structures that are PHYSICALLY CONNECTED to the transfer route are required to be OPERABLE at all times to mitigate potential aerosolization events.

An OPERABLE cover is one that is installed on a structure consistent with its design, such that it will prevent the direct release of a spray to the atmosphere and impede the release of aerosols from the structure by providing surface area for impaction and condensation. The relatively stagnant air volume created by covers fosters agglomeration and rainout (deposition) of aerosols within the structures. Covers must fit their supporting structure so that there are no paths for a direct spray leak or stream of leaked WASTE to the atmosphere. Cover plugs and seals must be correctly installed. Covers must also provide shielding from leaked WASTE for facility worker protection.

An OPERABLE entry door/penetration seal for the RCSTS is one that is installed on a structure, consistent with its design, such that it will prevent the direct release of a spray to the atmosphere and impede the release of aerosols from the structure by providing surface area for impaction and condensation. The relatively stagnant air volume created by the entry doors and penetrations fosters agglomeration and rainout (deposition) of aerosols within the structures. Entry doors must fit their frame, be correctly installed, closed, and be able to confine leaks to the inside of the structure. Blank flanges or caps, must also be correctly installed on the emergency pumpout lines, exhauster hookup, and air sampling lines. The isolation valves on the liner washdown system must be closed. Sealing the structure in this manner ensures the aerosol release will pass through the high-efficiency particulate air filter.

Functional requirements for determining the OPERABILITY of covers are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Functional requirements for determining the OPERABILITY of entry doors and penetration seals for the RCSTS are defined in HNF-SD-WM-SAR-067, Addendum 2, "Safety Analysis for the Replacement Cross-Site Transfer System." Detailed functional requirements for determining the OPERABILITY of covers, and RCSTS entry doors and penetration seals may be found in procedures.

BASES

MODE APPLICABILITY	LCO 3.1.1 applies during OPERATION and LIMITED MODES because WASTE is pumped under pressure during transfer operations and WASTE transfers are possible in either of these MODES. Postulated aerosolization events are less likely to occur in OPERATION MODE when WASTE transfers are not occurring, or in LIMITED MODE because of restrictions placed on WASTE transfer activities. However, aerosolization events are still possible because of misroutings or unauthorized transfers.
PROCESS AREA APPLICABILITY	LCO 3.1.1 applies to all transfer system covers, and RCSTS entry doors and RCSTS penetration seals associated with structures that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock and not under the control of AC 5.22, "Transfer System Cover Removal Controls." Structures that are not PHYSICALLY CONNECTED to ACTIVE WASTE transfer pumps that are not under administrative lock do not have the potential to develop spray leaks or surface leaks, because WASTE transfers are not possible through such transfer systems. Structures controlled under AC 5.22, "Transfer System Cover Removal Controls," are not subject to this control, but rely on compensatory measures to allow transfers to be conducted on PHYSICALLY CONNECTED transfer routes when the structure involved is sufficiently secluded from the main transfer path. This requires a minimum of two closed valves in series between the transfer route and the transfer-associated structures, ensuring pressure boundary isolation such that a spray leak event (i.e., sufficient pressurization and development of an actual leak) is not likely at the location. This seclusion, combined with the compensatory measure of continuous monitoring and a heightened management awareness, provides a sufficient level of control in lieu of LCO 3.1.1.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

With an inoperable cover, RCSTS entry door, or RCSTS penetration seal, performance of Required Action A.1 establishes a safe condition for the facility by stopping WASTE transfer(s) associated with PHYSICALLY CONNECTED WASTE transfer pumps Immediately. Stopping the transfer eliminates the potential for both a spray leak and a surface leak with accompanying splatter and splashing. The Completion Time of Immediately emphasizes the importance of bringing the transfer system to an unpressurized condition.

The Note in Required Action A.1 allows for draining and flushing of the transfer system piping after the transfer of WASTE from the generator has been stopped. The transfer system is drained and flushed involving limited quantities of WASTE and flush water, according to procedures.

A.2

Placing an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps will ensure that inadvertent pump starts cannot pressurize the system while the cover, entry door, or penetration seal is inoperable. Performance of this Required Action places the transfer system cover, RCSTS entry door, or RCSTS penetration seal outside the Applicability of this LCO.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.1.1 and SR 3.1.1.2

These Surveillances are required to VERIFY that covers, and RCSTS entry doors and penetration seals are OPERABLE. The Surveillance must be conducted within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump and every 10 days thereafter to ensure that cover blocks, and RCSTS entry doors and penetration seals associated with PHYSICALLY CONNECTED structures are correctly configured and that cover plugs and seals are correctly installed.

The Surveillance Frequency is based on establishing a routine inspection time to heighten the awareness of operating personnel to the status of transfer system covers and RCSTS entry doors and penetration seals on an ACTIVE transfer route PHYSICALLY CONNECTED to WASTE transfer pumps that are not under administrative lock. This awareness aids understanding of the risks during pumping conditions and emphasizes the value of maintaining covers on and RCSTS entry doors closed and penetrations sealed at all times. Transfers routinely last between 7 and 14 days. To ensure that the 10-day Surveillance interval is met, a weekly inspection is performed, which is more than sufficient to cover routine transfers. Salt well pumping transfers may last for several months and the 10-day Frequency is also adequate for review of cover and RCSTS entry door and penetrations status. Some transfers are less than the 10-day Frequency, but this short time is not regarded as significant for needing reinforcement of operating personnel awareness. Normal daily status meetings, shift turnover routines, and job control approval processes for moving covers are satisfactory in this short interval.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-049, 1998, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0-B, Duke Engineering and Services Hanford, Richland, Washington.

WHC-SD-WM-CN-057, 1996, *Calculation Notes for Subsurface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.2 Service Water Pressure Detection Systems

BASES

BACKGROUND

Liquid WASTES are transferred to and from tank farm storage, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators) through an interconnected network of transfer piping and transfer-associated structures such as pits, cleanout boxes (COBs), and diversion boxes. The structures serve as secondary WASTE confinement for WASTE leaks from the primary piping, pumps, valves, and jumpers.

Flushing systems are located adjacent to single-shell tanks (SSTs), double-shell tanks (DSTs), aging waste facility (AWF) tanks, and double-contained receiver tanks (DCRTs) in the tank farms. Raw water is used to flush out pumps and piping after a WASTE transfer, pump priming, and transfer line pressure testing. Raw water is normally supplied through the Hanford Site service water system, which is connected directly to the WASTE transfer system piping. The salt well jet pumping system is supplied by an aboveground water truck or a temporary water tank.

During water supply operations, WASTE transfer pumps PHYSICALLY CONNECTED to the service water supply are placed under administrative lock per AC 5.20, "Transfer Pump Administrative Lock Controls," thus preventing inadvertent WASTE flow into the service water piping. When water supply operations are not being performed, the pressure in the piping connecting the transfer piping and the service water piping is normally negligible.

Pressure detection systems are installed between the service water system and the WASTE transfer system piping. As pressure increases, the service water pressure detection system detects the pressure increase, and actuates either an automatic interlock or an alarm to alert personnel to manually shut down the WASTE transfer pumps. During WASTE transfer operations, this prevents an inadvertent WASTE flow into the service water piping from a misrouting of WASTE, valve leakage, or valve failure.

(continued)

BASES

BACKGROUND (continued)

During WASTE transfer operations, WASTE is pumped under pressure. If WASTE were to backflow into the flushing system and a breach of the pressure boundary were to occur in a transfer-associated structure (i.e., pit) without a cover or in abovegrade flushing system piping, a leak could release material outside of the transfer-associated structure. Leaks can result from small holes or cracks in piping, defective or degraded seals or gaskets on pumps, Hanford connectors, and valves, or misroutes through compromised piping. Mechanisms such as aging, corrosion, erosion, water hammer, overpressure, freezing, mechanical fatigue, thermal stresses, construction flaws, and human error (misalignments of valves) can lead to these failures.

An OPERABLE service water pressure detection system allows for the early detection of pressure increases so that PHYSICALLY CONNECTED WASTE transfer pumps can be shut down before significant pressure is observed between the transfer system piping and the service water piping. An OPERABLE service water pressure detection system is therefore considered to physically disconnect the two piping systems. When the PHYSICALLY CONNECTED WASTE transfer pumps are shut down, leakage of WASTE into the service water piping is precluded. As a result, service pits outside the tank farms that supply service water are not considered PHYSICALLY CONNECTED when protected by an OPERABLE service water pressure detection system and do not require cover blocks or WASTE leak detection systems.

BASES

APPLICABLE SAFETY ANALYSES

Service water pressure detection systems are required for two accident scenarios: (1) Spray Leak in Structure or From Waste Transfer Lines and (2) Surface Leak Resulting in Pool.

Spray Leak in Structure or From Waste Transfer Lines

Potential aerosolization of WASTE outside of transfer system structures is analyzed for spray leaks in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Service water pressure detection systems decrease consequences of the accident below offsite and onsite risk guidelines.

Spray leaks from structures can be caused by backflows of WASTE when accompanied by leaks within flushing systems. Service water pressure detection systems prevent pressurized leaks where covers (as defined for LCO 3.1.1, "Transfer System Covers and Entry Doors") are not practical, to maintain radiological and toxicological consequences below risk guidelines.

The safety function of the pressure switch interlock or alarm systems is to limit the volume of tank WASTE, which could backflow into and leak from the service water piping system, thus decreasing the consequences of the accident.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Surface Leak Resulting in Pool

Potential aerosolization of WASTE outside of transfer system structures is analyzed for surface leaks that involve significant splattering and splashing in calculation note WHC-SD-WM-CN-049, *Calculation Notes for Surface Leak Resulting in Pool*, *TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Service water pressure detection systems decrease consequences of the accident below onsite risk guidelines.

Surface leaks resulting in pools can be caused by backflows of WASTE when accompanied by leaks within flushing systems. Service water pressure detection systems prevent pressurized leaks where covers (as defined for LCO 3.1.1, "Transfer System Covers and Entry Doors") are not practical, to maintain radiological and toxicological consequences below risk guidelines.

The safety function of the pressure switch interlock or alarm systems is to limit the volume of tank WASTE, which could backflow into and leak from the service water piping system, thus decreasing the consequences of the accident.

BASES

LCO

Service water pressure detection systems that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock per AC 5.20, "Transfer Pump Administrative Lock Controls," are required to be OPERABLE at all times to prevent potential pressurized leak events downstream of the pressure detection system. As pressure increases, the systems alert personnel (via an alarm) or actuate (via an interlock) to shut down the WASTE transfer pumps. This eliminates the potential for WASTE to enter the service water system, therefore preventing WASTE leaks in the system.

For a service water pressure detection system to be considered OPERABLE, it must be configured (e.g., valve alignments) such that a rise in pressure in the associated piping can be detected. This pressure setpoint must be $\leq$ 20 lb/in^2 gauge, and must include either failsafe alarms or interlocks to stop PHYSICALLY CONNECTED WASTE transfer pumps from running. For an alarm to be considered OPERABLE, both the alarm location and the WASTE transfer pump shutdown location(s) must be continuously staffed, with a means of direct communication between the two locations. The value of the setpoint accounts for instrument error and will ensure that a loss of pressure boundary integrity will be detected before encountering the maximum operating range value (250 lb/in^2 gauge) and lowest analyzed pressure value (50 lb/in^2 gauge). This minimizes leakage concerns downstream of the service water pressure detection system. A service water pressure detection system in an activated alarm/interlock state is considered inoperable, as it is incapable of detecting future pressure rises through its associated transfer piping. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required.

Functional requirements for determining the OPERABILITY of service water pressure detection systems in flushing systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the service water pressure detection systems may be found in procedures.

BASES

MODE APPLICABILITY	LCO 3.1.2 applies during OPERATION and LIMITED MODES at all times. In OPERATION MODE, pressurized WASTE resulting in a leak within the flushing system could occur if isolation valves leak during a transfer, if WASTE is misrouted, or if a WASTE transfer pump is inadvertently started. This LCO also applies during LIMITED MODE to protect against misroutings from OPERATION MODE tanks conducting transfers where LIMITED and OPERATION MODE tank transfer systems are PHYSICALLY CONNECTED.
PROCESS AREA APPLICABILITY	LCO 3.1.2 applies to those permanently installed service water pressure detection systems that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock. This Applicability is established based on the consideration that WASTE transfers are possible on transfer routes PHYSICALLY CONNECTED to ACTIVE WASTE transfer pumps not under administrative lock, and therefore the potential exists for WASTE to enter the flushing system unless the service water pressure detection system is OPERABLE. Service water pressure detection systems that are not PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump, and those systems that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump that is under administrative lock are not required to be OPERABLE, as transfers are precluded on these routes; and, therefore, leakage into the flushing systems is not possible. LCO 3.1.2 does not apply to the 204-AR Waste Unloading Facility. Refer to LCO 3.1.6, "204-AR Backflow Prevention System," and associated BASES for controls applicable to the 204-AR facility.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

With an inoperable service water pressure detection system, performance of Required Action A.1 establishes a safe condition for the facility by stopping WASTE transfer(s), transfer line flushing, pump priming, and transfer line pressure testing associated with PHYSICALLY CONNECTED WASTE transfer pumps Immediately. This eliminates the potential for leakage to the flushing systems. The Completion Time of Immediately emphasizes the importance of bringing the transfer system to an unpressurized condition. When manual action is required to stop WASTE transfers, the 30 minutes assumed in the Chapter 3.0 analysis to limit consequences are considered adequate to shut down the WASTE transfer pumps. See HNF-SD-WM-SAR-067, Chapter 13.0, "Human Factors," for further discussion.

The Note in Required Action A.1 allows for draining of the transfer system piping. This is allowed because there is insufficient pressure during draining of WASTE in the transfer system to cause leakage to the flushing system. The WASTE transfer pump would be shut down at this time, and the only motive force for draining would be gravity. The transfer system is drained according to procedures.

A.2

Placing an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps ensures that future pressurization of the transfer route from WASTE will not occur while either the service water pressure detection system is inoperable, or the integrity of the pressure boundary protecting the service water system is degraded. The Completion Time of Immediately emphasizes the importance of maintaining the transfer system in an unpressurized condition. Completion of this Required Action will remove the affected service water pressure detection system from the Process Area Applicability.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.2.1

This Surveillance is required to VERIFY that service water pressure detection systems are OPERABLE. The Frequency of once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump ensures that the system is OPERABLE before any transfer operations are initiated. An acceptable means of performing this Surveillance is to VERIFY that the last FUNCTIONAL TEST is valid.

SR 3.1.2.2

This Surveillance requires a FUNCTIONAL TEST to be performed on service water pressure detection systems, with a setpoint of $\leq$ 20 lb/in^2 gauge on increasing pressure. The basis for the value of the setpoint is discussed in the BASES LCO section. The Frequency of 365 days is based on the manufacturers' recommendations and normal industrial practice for environmentally protected instrumentation.

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-049, 1998, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0-B, Duke Engineering and Services Hanford, Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.3 Transfer Leak Detection Systems

BASES

BACKGROUND

The LCO on transfer leak detection systems ensures that leaks from the WASTE transfer system will be detected and the WASTE transfer pump shutdown to mitigate potential radiological and toxicological consequences offsite, onsite, and to facility workers.

Liquid WASTES are transferred to and from tank farm storage, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators) through an interconnected network of transfer piping and transfer-associated structures such as pits, cleanout boxes (COBs), and diversion boxes. The structures serve as secondary WASTE confinement for WASTE leaks from the primary piping, pumps, valves, and jumpers.

These structures are equipped with transfer leak detection systems that include alarms or interlocks with WASTE transfer pumps. Upon detection of WASTE leakage from the primary piping, pumps, valves, or jumpers, these leak detection systems function to alert operators to the presence of the leak so that the associated WASTE transfer pump(s) can be shut down. For some leak detection systems, interlocks that will automatically shut down associated WASTE transfer pump(s) upon detection of leakage are in place.

The typical transfer leak detection system consists of a conductivity probe leak detection element (LDE) and an induction relay circuit connected to interlocks or panel alarms with the alarms repeated on a computerized system. An exception is the level monitoring system used in two Aging Waste Facility leak detection pits that collect leakage from the side-fill line encasements. The level monitoring system consists of weight factor instruments and alarms, with a portable conductivity probe (zip cord) as an alternative level detection method.

BASES

APPLICABLE SAFETY ANALYSES

Transfer leak detection systems are required for three accident scenarios: (1) Surface Leak Resulting in Pool, (2) Subsurface Leak Resulting in Pool, and (3) Subsurface Leak Remaining Subsurface.

Surface Leak Resulting in Pool

Surface leaks are analyzed in calculation note WHC-SD-WM-CN-049, *Calculation Notes for Surface Leak Resulting in Pool*, *TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Transfer leak detection systems decrease consequences of the accident below offsite and onsite risk guidelines.

Detection of leakage into structures associated with transfer operations is assumed within the HNF-SD-WM-SAR-067 accident analysis of surface leaks to mitigate potential radiological and toxicological consequences to offsite, onsite, and facility personnel. Mitigation is provided by the interlock that shuts down the WASTE transfer pump, or by an alarm and associated operator action which will shut down the WASTE transfer pump to minimize the amount of material released.

The safety functions of the transfer leak detection system are to detect the presence of WASTE transfer system leaks in WASTE transfer-associated structures, and to either provide an alarm to alert operators to take mitigative action, or provide an interlock to shut down transfer pump operation, thus limiting the volume of the WASTE leak and decreasing the consequences of the accident.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Subsurface Leak Resulting in Pool

Subsurface leaks are analyzed in calculation note WHC-SD-WM-CN-057, *Calculation Notes for Subsurface Leak Resulting in Pool*, *TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Transfer leak detection systems decrease consequences of the accident below offsite and onsite risk guidelines.

Detection of leakage into structures associated with transfer operations is assumed within the HNF-SD-WM-SAR-067 accident analysis of subsurface leaks to mitigate potential radiological and toxicological consequences to offsite, onsite, and facility personnel. Mitigation is provided by the interlock that shuts down the WASTE transfer pump, or by an alarm and associated operator action which will shut down the WASTE transfer pump, to minimize the amount of material released.

The safety functions of the transfer leak detection system are to detect the presence of WASTE transfer system leaks in WASTE transfer-associated structures, and to either provide an alarm to alert operators to take mitigative action, or provide an interlock to shut down transfer pump operation, thus limiting the volume of the WASTE leak and decreasing the consequences of the accident.

Subsurface Leak Remaining Subsurface

Subsurface leaks are analyzed in calculation note WHC-SD-WM-CN-004, *Calculation Notes That Support Accident Scenario and Consequence Development for the Subsurface Leak Remaining Subsurface Accident*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, significant radiological exposure to the facility worker could result. Transfer leak detection systems provide significant Defense-in-Depth to protect the facility worker.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Detection of leakage into structures associated with transfer operations is assumed within the HNF-SD-WM-SAR-067 accident analysis of subsurface leaks to mitigate potential radiological and toxicological consequences to offsite, onsite, and facility personnel. Mitigation is provided by the interlock that shuts down the WASTE transfer pump or by an alarm and associated operator action that will shut down the WASTE transfer pump to minimize the amount of material released.

The safety functions of the transfer leak detection system are to detect the presence of a leak of tank WASTE in transfer-associated structures, and to either provide an alarm to alert operators to take mitigative action, or to provide an interlock to shut down WASTE transfer pump operation, limiting the volume of the WASTE leak and thus decreasing the consequences of the accident.

LCO

The requirement for transfer leak detection system OPERABILITY has been specified to provide detection capability of leaks from the WASTE transfer system. Transfer leak detection systems provide the first indication of a transfer system leak, and either automatically shut down the WASTE transfer pump (interlock) or alert operators to shut down the WASTE transfer pump (alarm) to limit the potential radiological and toxicological consequences offsite, onsite, and to facility workers.

An OPERABLE transfer leak detection system consists of at least one leak detection system (as described in Background) installed near the structure's floor in a manner that will enable it to detect a leak. The OPERABILITY requirement for permanently installed conductivity probe systems includes either failsafe alarm functions or interlocks associated with the leak detection system. For an alarm to be considered OPERABLE, both the alarm location and the WASTE transfer pump shutdown location(s) must be continuously staffed, with a means of direct communication between the two.

(continued)

BASES

LCO (continued)	Portable conductivity probes (zip cords) may be used as an alternative to weight factor instrumentation and alarms in Aging Waste Facility leak detection pits that collect leakage from the side-fill line encasements. Portable conductivity probes used for this purpose must be included in and meet the requirements of AC 5.19, "Process Instrumentation and Measuring and Test Equipment," and must be field-tested immediately prior to use. For the system to be considered OPERABLE, the readout location and the WASTE transfer pump shutdown location(s) must be continuously staffed, with a means of direct communication between the two. A leak detection system in an activated alarm state is considered inoperable, as it is incapable of providing indication of leakage during future transfers through its associated structure. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required. Functional requirements for determining the OPERABILITY of the transfer leak detection systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the transfer leak detection systems may be found in procedures.
MODE APPLICABILITY	Transfer leak detection systems are required to be OPERABLE during both OPERATION and LIMITED MODES. WASTE transfers are possible in both MODES, making the potential for leakage possible (and therefore requiring the presence of OPERABLE leak detection systems) in both MODES.

BASES

PROCESS AREA APPLICABILITY

Transfer leak detection systems associated with process pits, diversion boxes, vault pits, and cleanout boxes PHYSICALLY CONNECTED to a WASTE transfer pump that is not under administrative lock per AC 5.20, "Transfer Pump Administrative Lock Controls," are required to be OPERABLE. Therefore, this applies not only to transfer leak detection systems associated with structures on the transfer route, but to those structures that are connected to that route as well, regardless of the number of isolation valves intervening between the transfer route and the structure.

As long as any ACTIVE WASTE transfer pump is PHYSICALLY CONNECTED to a transfer route and is not administratively locked per AC 5.20, there is a potential for leakage to any interconnected structure because of an inadvertent pump start. When all pumps PHYSICALLY CONNECTED to a structure are either administratively locked out per AC 5.20 or made INACTIVE, the LCO no longer applies to the leak detection system associated with that structure.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If a transfer leak detection system has been found to be inoperable, whether because of equipment malfunction or being within an alarm state, transfers associated with PHYSICALLY CONNECTED WASTE transfer pumps must be stopped Immediately. This minimizes the potential for any future or additional leakage into the structure. When manual action is required to stop WASTE transfers, the 30 minutes assumed in the Chapter 3.0 analysis to limit consequences are considered adequate to shut down the WASTE transfer pumps. See HNF-SD-WM-SAR-067, Chapter 13.0, "Human Factors," for further discussion.

No further transfers on PHYSICALLY CONNECTED routes may occur until such time as the Conditions are exited or unless further Required Actions specifically allow stopped transfers to be restarted.

The Note allows transfer system draining and flushing to be performed once transfers have been stopped. The transfer system is drained and flushed involving limited quantities of WASTE and flush water, according to procedures.

A.2.1, A.2.2.1, and A.2.2.2

An administrative lock must be placed on PHYSICALLY CONNECTED WASTE transfer pumps per AC 5.20, "Transfer Pump Administrative Lock Controls." In this state no transfers having the potential to leak into the associated structure will be possible.

(continued)

BASES

ACTIONS (continued)

One alternative is to place the administrative lock within 8 hours of entry into Condition A. The Completion Time of 8 hours allows for restoration activities to bring the system to OPERABLE status and exit the LCO ACTIONS in the case where inoperability is caused by small, easily corrected problems. The value of 8 hours is judged to be acceptable because, with WASTE transfers stopped, the risk of a transfer system leak in the affected location during this time interval is small. By placing the administrative lock within 8 hours if restoration cannot be achieved, the leak detection system will be placed outside the Applicability of this LCO.

As an alternative to placing administrative locks on PHYSICALLY CONNECTED WASTE transfer pumps within 8 hours, an alternate set of Required Actions may be performed. If a VERIFICATION that there is no detectable leakage in the affected leak detection location can be made within 8 hours of entry into Condition A, and once per hour thereafter using an alternate means of leak detection, then transfers that were in progress may be continued, provided the appropriate administrative locks are in place within a total of 24 hours from entry into Condition A. This will allow short duration transfers to be completed under controlled conditions. The terminology "no detectable leakage" means that OPERABLE leak detection systems are not in an activated alarming state on respective instrumentation as noted by steady-lit or flashing indicators or notation.

The Note preceding A.2.2.1 states that once the initial VERIFICATION of no detectable leakage has been made, transfers in progress may be restarted. This acknowledges that if a determination can be made that there is no detectable leakage within the structure (i.e., there is no leak present on the transfer route path), and VERIFICATIONS can be made periodically to confirm that this state is maintained, that these temporary, compensatory measures are sufficient to allow short duration transfers to be completed with minimal risk. Acceptable forms of alternate leak detection may include manual conductivity probes (e.g., zip cords), either read manually or wired into an available alarm system, or a video camera positioned within the pit such that its display can detect leakage to the structure's floor.

(continued)

BASES

ACTIONS (continued)

The initial VERIFICATION Completion Time of 8 hours is judged to be acceptable because of the small likelihood of leakage to the structure for this time period when transfers have been stopped. The value also allows time to establish an alternate means of VERIFICATION within the structure.

The Completion Time of once per hour thereafter ensures that a change of conditions within the structure (i.e., leakage) will be detected prior to the structure becoming completely filled and overflowing. The value is based on the time it takes to fill a structure (minimum capacity of 3,300 gal) because of a maximum credible leak (maximum credible leak flow of 20 gal/min). Under the worst conditions, it will take 165 minutes (3,300 gal divided by 20 gal/min) before the pit will overflow (WHC-SD-WM-CN-049). Setting the VERIFICATION at once per hour ensures that leakage is detected well before this occurs.

Even with these compensatory measures, administrative locks must be placed on PHYSICALLY CONNECTED WASTE transfer pumps within 24 hours of entry into Condition A. The purpose of this Required Action is to limit the time that compensatory measures are relied on in place of the designated transfer leak detection system.

The Completion Time of 24 hours recognizes that the likelihood of a leak occurring during this time remains small and that a compensatory transfer leak detection system is available.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.3.1

A FUNCTIONAL TEST on transfer leak detection systems that use permanently installed conductivity probes is performed once within 92 days prior to removing the administrative lock on any PHYSICALLY CONNECTED WASTE transfer pump. After this test, additional FUNCTIONAL TESTS are performed every 92 days, until all PHYSICALLY CONNECTED WASTE transfer pumps are under administrative lock. This FUNCTIONAL TEST Frequency has been established based on operating experience and the maintenance recall system. The FUNCTIONAL TEST includes a VERIFICATION that prior maintenance activities have not affected probe positioning, such that it is capable of detecting a leak in a manner consistent with the assumptions within WHC-SD-WM-CN-049.

SR 3.1.3.2

The FUNCTIONAL TEST for the weight factor instrumentation and alarm system used in AWF leak detection pits is performed in accordance with instrument and alarm calibration procedures once within 182 days prior to removing the administrative lock on any PHYSICALLY CONNECTED WASTE transfer pump. After this test, additional FUNCTIONAL TESTS are performed every 182 days, until all PHYSICALLY CONNECTED WASTE transfer pumps are under administrative lock. This FUNCTIONAL TEST Frequency has been established based on operating experience and the maintenance recall system.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-004, 1996, *Calculation Notes That Support Accident Scenario and Consequence Development for the Subsurface Leak Remaining Subsurface Accident*, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-049, 1998, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0-B, Duke Engineering and Services Hanford, Richland, Washington.

WHC-SD-WM-CN-057, 1996, *Calculation Notes for Subsurface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.4 Ventilation Stack Continuous Air Monitor (CAM) Interlock Systems

BASES

BACKGROUND

Primary tank exhaust stack radiation monitoring systems are provided to detect releases from off-normal or postulated accident events. The exhaust stack monitoring systems each have a continuous air monitor (CAM) and a proportional record sampler. The CAM monitors beta-gamma activity in the particulate emissions from the stack through sampling probes mounted in the stack. Interlocks shut down the exhaust fan when high radiation levels are detected. The exhauster CAMs also have remote alarms that detect the failure of the monitoring equipment.

During WASTE transfers, spray leakage of WASTE could cause aerosol-laden air to eventually saturate the high-efficiency particulate air (HEPA) filters, resulting in their failure. Other sources of HEPA filter failures include exposure to high temperatures or pressures. The CAM detects breakthrough of the ventilation system HEPA filters. The CAM and interlock protects against the continued unfiltered release of radiological and toxicological material following the breach of the filter.

BASES

APPLICABLE SAFETY ANALYSES

Ventilation stack CAM interlock systems are required for three accident scenarios: (1) Spray Leak in Structure or From Waste Transfer Lines, (2) High-Efficiency Particulate Air Filter Failure - Exposure to High Temperature or Pressure (Note: Controls for an unfiltered release are covered by this accident), and (3) Unfiltered Release (Waste Retrieval Sluicing System [WRSS]) operations.

Spray Leak in Structure or From Waste Transfer Lines

Spray leak scenarios are analyzed in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Spray leak scenarios are also analyzed in HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," Chapter 3.0, "Hazard Evaluations and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines. Ventilation stack CAM interlock systems decrease consequences of the accident below offsite and onsite risk guidelines.

The ventilation stack CAM interlock to the ventilation system exhaust fan is credited in the analysis to stop the ventilation system thereby terminating an unfiltered release. This action mitigates the potential consequences of a pressurized spray leak event when transferring WASTE to maintain radiological and toxicological consequences below risk guidelines.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The safety function of the ventilation stack CAM interlock systems is to shut down the exhaust fan when high radionuclide particulate activity is detected by the CAM, limiting radioactive material releases to the atmosphere and thus decreasing the consequences of the accident.

For portable ventilation systems, LCO 3.1.4 applies for this accident only (a) when the portable ventilation system is operating and (b) when the portable ventilation system is installed on tanks whose WASTE transfer system is PHYSICALLY CONNECTED to any ACTIVE WASTE transfer pump that is not under administrative lock.

High-Efficiency Particulate Air Filter Failure - Exposure to High Temperature or Pressure (Note: Controls for an unfiltered release are covered by this accident), or Unfiltered Release (WRSS)

HEPA filter failure scenarios are analyzed in calculation notes (WHC-SD-WM-CN-062, *HEPA Filter Failure By Fire or Heater Overtemperature and Subsequent Unfiltered Release*, WHC-SD-WM-CN-063, *Releases from Failed HEPA Filters Due to an Overpressurization Event*, and HNF-SD-WM-CN-099, *Radiological and Toxicological Analyses of Tank 241-AY-102 and Tank 241-C-106 Ventilation Systems*) and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. HEPA filter failures are also analyzed in WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 1, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines. Ventilation stack CAM interlock systems decrease consequences of the accident below onsite risk guidelines.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The ventilation stack CAM interlock that detects a potential unfiltered release and shuts off the ventilation system exhaust fan within 10 minutes for single-shell tanks (SSTs) with active ventilation (permanent or portable) only, double-shell tanks (DSTs), aging waste facility (AWF) tanks, and the 204-AR Waste Unloading Facility is credited in the analysis to stop the ventilation system thereby terminating an unfiltered release. This action mitigates the potential consequences of an unfiltered release when a HEPA filter fire occurs or a high-pressure event occurs that affects the HEPA filter, to maintain radiological and toxicological consequences below risk guidelines.

The safety function of the ventilation stack CAM interlock systems is to shut down the exhaust fan when high radionuclide particulate activity is detected by the CAM, limiting radioactive material releases to the atmosphere and thus decreasing the consequences of the accident.

BASES

LCO

The ventilation stack CAM interlock to the ventilation system exhaust fan is required to be OPERABLE whenever active ventilation (permanent or portable) is operating. The CAM interlock actuates when the ventilation stack radiation level is greater than 10,000 cpm and is interlocked to shut down the ventilation system exhaust fan. This automatic interlock action stops continued unfiltered discharge of radiological and toxicological material through the ventilation stack following the breach of a filter. The interlock does not prevent a potential spray leak, unfiltered release, high-pressure, or high-temperature event from occurring, but mitigates the potential consequences by terminating further discharges through the ventilation stack.

The accident analysis assumes that the CAM will actuate an interlock on increasing radiation that exceeds a preset level. Because a specific setpoint was not identified in the analysis, a setpoint of 10,000 cpm has been selected based on normal operating practice.

This LCO ensures that the interlock is OPERABLE when active ventilation (permanent or portable) is operating. For a CAM and its associated interlock to be considered OPERABLE, it must measure the radiation level in the sampled flow stream, detect levels in excess of the preset level, and activate an interlock that will shut down the exhauster when the preset level is exceeded. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required.

Functional requirements for determining the OPERABILITY of the ventilation stack CAM interlock are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the CAM interlock may be found in procedures.

MODE APPLICABILITY

LCO 3.1.4 applies during OPERATION and LIMITED MODES because spray leaks, unfiltered releases, high pressures, or high temperatures can occur in both of these MODES. Postulated spray leaks are less likely to occur in LIMITED MODE because of restrictions placed on WASTE transfer activities. However, spray leak events are still possible because of misroutings or unauthorized transfers.

BASES

PROCESS AREA APPLICABILITY

LCO 3.1.4 applies to the CAM interlock associated with the primary tank for DSTs and AWF tanks, SSTs with active ventilation (C and SX tank farms), double-contained receiver tanks (DCRTs), and the 204-AR Waste Unloading Facility when active ventilation is operating. LCO 3.1.4 also applies to the CAM interlock associated with portable tank ventilation systems when the system is operating. When active ventilation is not operating, the events analyzed in the accident analysis are mitigated below risk guidelines (i.e., there is no requirement to shut down the fans when the fans are not already operating).

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

With an inoperable ventilation stack CAM interlock, performance of Required Action A.1 eliminates the potential for a HEPA filter failure because of spray leaks by Immediately stopping WASTE transfer(s) through transfer routes PHYSICALLY CONNECTED to the affected tank(s). This eliminates the potential for a spray leak while the ventilation system exhaust fan may still be capable of dispersing a spray leak to the atmosphere. The Completion Time of Immediately emphasizes the importance of bringing the transfer system to an unpressurized condition.

(continued)

BASES

ACTIONS (continued)

A.2

Restoring the ventilation stack CAM interlock to OPERABLE status Immediately is necessary because with the ventilation system running, a degradation of the HEPA filter could result in unacceptable releases. If the ventilation system is stopped, the LCO is no longer applicable. However, because of flammable gas control requirements it is not feasible to stop the ventilation system so it is essential to restore the CAM interlock.

A.3

Placing an administrative lock on WASTE transfer pumps PHYSICALLY CONNECTED to the affected tank(s) eliminates the potential for an inadvertent pump start and spray leak while the CAM interlock is inoperable. The Completion Time of 2 hours is established to ensure the transfer system remains in an unpressurized condition. The Completion Time also acknowledges that the likelihood of an inadvertent pump start and simultaneous spray leak and HEPA filter failure occurring in this 2-hour interval is small.

A.4 and A.5

VERIFICATION once per 2 hours that interlock actuation is not required using an alternate monitoring method is required. The alternate monitoring method used consists of field checks on the environmental record sampler filter paper by radiological control personnel using a Geiger-Mueller (GM) counter (pancake GM survey meter), which typically uses the same principle of operation as the CAM. This alternate monitoring method provides a relative comparison of the radiation level indicated by the CAM. If a radiation level increase is indicated on the record sampler filter paper, actions are taken to determine the rate of increase and quantify the level according to administrative procedures. The GM counters are CALIBRATED periodically and source checked prior to use. This compensatory measure taken while the ventilation stack CAM interlock is inoperable ensures that discharges of radiological and toxicological material through the stack will not occur for long periods while the interlock is inoperable.

(continued)

BASES

ACTIONS (continued)

It is noted that the analysis with controls does not analyze active ventilation operation of more than 10 minutes under accident conditions of a high pressure or temperature that fails the HEPA filters. However, the consequences associated with a 10-minute duration were significantly below the risk guidelines. The possibility of a HEPA filter failure with unacceptable consequences during this short time span is judged to be sufficiently low to allow ventilation to continue with heightened management awareness while the interlock system is restored. This acknowledges the importance of maintaining ventilation whenever possible because of flammable gas concerns, as covered under LCOs 3.2.1, "DST and AWF Tank Ventilation Systems;" 3.2.2, "SST Ventilation Systems - Active;" 3.2.3, "SST Ventilation Systems - Passive;" and 3.2.4, "DCRT Ventilation Systems." Should radiation in the stack reach levels greater than 10,000 cpm, the ventilation system on the affected tank(s) must be stopped Immediately. At this point, knowledge of the degraded condition of the HEPA filters makes shutting down the ventilation system a necessary action despite flammable gas considerations, as a hazardous situation (i.e., an unfiltered radiological and toxicological material release) actually does exist in the affected tank(s).

Completion of Required Action A.4 places the affected CAM interlock system outside the Applicability of this LCO.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.4.1

This Surveillance requires a FUNCTIONAL TEST to be performed on the ventilation stack CAM interlock. The FUNCTIONAL TEST demonstrates that the ventilation system fan will stop when a setpoint greater than 10,000 cpm is exceeded.

The accident analysis assumes that the CAM will actuate an interlock on increasing radiation that exceeds a preset level. Because a specific setpoint was not identified in the analysis, a setpoint of 10,000 cpm has been selected based on normal operating practice. Actual CAM setpoints are conservatively below 10,000 cpm to meet environmental airborne emission requirements and to allow flexibility in adjustment based on radon decay products.

The Frequency of 92 days is based on the manufacturers' recommendations and normal industrial practice for instrumentation.

SR 3.1.4.2

This Surveillance requires a CALIBRATION to be performed on the ventilation stack CAM interlock loop every 365 days. The CALIBRATION shall document that the CAM interlock responds as required when compared with a known standard by testing from the sensor input to the interlock actuation device. The 365-day Frequency is based on current practice and is considered adequate to monitor adverse trends in instrumentation performance.

BASES

REFERENCES

HNF-SD-WM-CN-099, 1998, *Radiological and Toxicological Analyses of Tank 241-AY-102 and Tank 241-C-106 Ventilation Systems*, Rev. 1E, Fluor Daniel Northwest, Inc., Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-062, 1996, *HEPA Filter Failure by Fire or Heater Overtemperature and Subsequent Unfiltered Release*, Rev. 2, Duke Engineering & Services Hanford, Richland, Washington.

WHC-SD-WM-CN-063, 1996, *Releases from Failed HEPA Filters Due to an Overpressurization Event*, Rev. 2, Duke Engineering & Services Hanford, Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.5 Replacement Cross-Site Transfer System (RCSTS) Pressure Relief Valve (PRV) and Rupture Disk

In accordance with Wagoner, 1997, transfers through the replacement cross-site transfer line WT-SLL-3160 are not authorized. HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Addendum 2, "Safety Analysis for the Replacement Cross-Site Transfer System," Section 5.3.3 documents the basis for LCO 3.1.5, which specifically applies to transfers through this line. The BASES for LCO 3.1.5 will be added after DOE-RL approval for transfers through line WT-SLL-3160 is granted.

REFERENCES:

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

Wagoner, J. D., 1997, *Contract Number DE-AC06-96RL13200 - Approval of Authorization Basis (AB) Amendment Package For Project W-058, Replacement Cross-Site Transfer System* (letter 97-WSD-247 to H. J. Hatch, Fluor Daniel Hanford, Inc., December 15), U.S. Department of Energy, Richland Operations Office, Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.6 204-AR Backflow Prevention System

BASES

BACKGROUND

Liquid WASTES are transferred to and from tank farm storage, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators) through an interconnected network of transfer piping and transfer-associated structures such as pits, cleanout boxes (COBs), and diversion boxes. The structures serve as secondary WASTE confinement for WASTE leaks from the primary piping, pumps, valves, and jumpers.

A raw water system is located in the 204-AR Waste Unloading Facility. Raw water is used to flush out pumps and piping during and after WASTE transfers, pump priming, and transfer line pressure testing. Raw water is normally supplied through the Hanford Site service water system, which is connected directly to the WASTE transfer system piping.

A backflow prevention system is required to be installed between the raw water system or other service systems PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock. An example of a backflow prevention system consists of two check valves to prevent backflow of WASTE. Between the two check valves there is a reduced differential pressure relief valve that drains the interspace during a backflow condition. During WASTE transfer operations, this system prevents an inadvertent WASTE flow into the raw water piping from a misrouting of WASTE, valve leakage, or valve failure.

APPLICABLE SAFETY ANALYSES

The 204-AR Waste Unloading Facility backflow prevention system is required for two accident scenarios: (1) Spray Leak in Structure or From Waste Transfer Lines and (2) Surface Leak Resulting in Pool.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Spray Leak in Structure or From Waste Transfer Lines and Surface Leak Resulting in Pool

During WASTE transfer operations, WASTE is pumped under pressure. If WASTE were to backflow into the raw water system and/or other service systems, and a breach of the pressure boundary were to occur in the 204-AR Waste Unloading Facility, a leak could release material outside of the 204-AR structure. Leaks can result from: small holes or cracks in piping; defective or degraded seals or gaskets on pumps, Hanford connectors, and valves; or misroutes through compromised piping. Mechanisms such as aging, corrosion, erosion, water hammer, overpressure, freezing, mechanical fatigue, thermal stresses, construction flaws, and human error (e.g., misalignment of valves) can lead to these failures.

Potential spray and surface leaks from WASTE transfer system equipment are analyzed in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*. Surface leaks resulting in pools, and spray leaks from piping or structures can be caused by backflow of WASTE when accompanied by leaks within the raw water system. Based on the results of the analyses, an unmitigated release of radiological and toxicological material could exceed onsite and offsite risk guidelines. Backflow prevention systems prevent pressurized leaks where covers (as defined for LCO 3.1.1, "Transfer System Covers and Entry Doors") are not practical, to maintain radiological and toxicological consequences below risk guidelines.

The safety function of the backflow prevention devices located in the 204-AR Waste Unloading Area is to prevent a backflow of WASTE into the raw water or other service systems leading to the Mechanical Equipment Room where a spray leak could occur, thus decreasing the frequency of the Spray Leak in Structure or From Waste Transfer Lines accident.

The safety function of the backflow prevention devices located in the 204-AR Waste Unloading Area is to also prevent a backflow of WASTE into the raw water or other service systems leading to the Mechanical Equipment Room where a leak could form a surface pool, thus decreasing the frequency of the Surface Leak Resulting in Pool accident.

BASES

LCO	The backflow prevention system in 204-AR Waste Unloading Area that is PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock per AC 5.20, "Transfer Pump Administrative Lock Controls," is required to be OPERABLE at all times to prevent potential pressurized leak events downstream of the backflow prevention system. It provides protection against backflow caused by both backpressure and backsiphonage. An example of a backflow preventer that could be used consists of two spring-loaded check valves and a spring-loaded, diaphragm-actuated differential pressure relief valve located in the zone between the check valves. For the backflow prevention system to be considered OPERABLE, it must be installed within the design limits set by the manufacturer. The backflow prevention system must be tested annually. Functional requirements for determining the OPERABILITY of the 204-AR backflow prevention system are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the backflow prevention system may be found in procedures.
MODE APPLICABILITY	LCO 3.1.6 applies during OPERATION and LIMITED MODES at all times. In OPERATION MODE, pressurized WASTE resulting in a leak within the flushing system could occur if isolation valves leak during a transfer, if WASTE is misrouted, or if a WASTE transfer pump is inadvertently started. This LCO also applies during LIMITED MODE to protect from misroutings from OPERATION MODE tanks conducting transfers where LIMITED and OPERATION MODE tank transfer systems are PHYSICALLY CONNECTED.

BASES

PROCESS AREA APPLICABILITY

LCO 3.1.6 applies to the permanently installed 204-AR Waste Unloading Facility backflow prevention system in the Waste Unloading Area that is PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock. This Applicability is established based on the consideration that WASTE transfers are possible on transfer routes PHYSICALLY CONNECTED to ACTIVE WASTE transfer pumps not under administrative lock, and therefore the potential exists for WASTE to enter the raw water or other service systems. The backflow prevention system must be OPERABLE or the system must be physically disconnected from the ACTIVE WASTE transfer pump not under administrative lock. Additionally, if the systems are PHYSICALLY CONNECTED and the pumps are under administrative lock, this LCO does not apply.

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

With an inoperable backflow prevention system (i.e., system fails the FUNCTIONAL TEST), performance of Required Action A.1 establishes a safe condition for the facility by stopping WASTE transfer(s), transfer line flushing, pump priming, and transfer line pressure testing associated with PHYSICALLY CONNECTED WASTE transfer pumps Immediately. This eliminates the potential for leakage to the raw water system. The Completion Time of Immediately emphasizes the importance of bringing the transfer system to an unpressurized condition. When manual action is required to stop WASTE transfers, the 30 minutes assumed in the Chapter 3.0 analysis to limit consequences are considered adequate to shut down the WASTE transfer pumps. See HNF-SD-WM-SAR-067, Chapter 13.0, "Human Factors," for further discussion.

(continued)

BASES

ACTIONS (continued)

The Note in Required Action A.1 allows for draining of the transfer system piping. This is allowed because there is insufficient pressure during draining of WASTE in the transfer system to cause leakage to the raw water system. The WASTE transfer pump would be shut down at this time, and the only motive force for draining would be gravity. The transfer system is drained according to procedures.

A.2

Placing an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps ensures that future pressurization of the transfer route from WASTE will not occur while either the backflow prevention system is inoperable, or the integrity of the pressure boundary protecting the raw water system is degraded. The Completion Time of Immediately emphasizes the importance of maintaining the transfer system in an unpressurized condition.

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.6.1

This Surveillance is required to VERIFY that the 204-AR Waste Unloading Facility backflow prevention system in the Waste Unloading Area is OPERABLE. The Frequency of once within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump ensures that the system is OPERABLE before any transfer operations are initiated. An acceptable means of performing this Surveillance is to VERIFY that the last FUNCTIONAL TEST is valid.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.1.6.2

This Surveillance requires a FUNCTIONAL TEST to be performed on the backflow prevention system. The Frequency of 365 days is based on manufacturer recommendations and normal industrial practice.

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

B 3.1 CONFINEMENT

B 3.1.7 Supplemental Covers

BASES

BACKGROUND

Liquid WASTES are transferred to and from tank farm storage, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators) through an interconnected network of transfer piping and transfer-associated structures such as pits, cleanout boxes (COBs), and diversion boxes. The structures serve as secondary WASTE confinement for WASTE leaks from the primary piping, pumps, valves, and jumpers.

Supplemental covers for applicable WASTE transfer-associated structures are part of the secondary WASTE confinement system, in addition to the covers required by LCO 3.1.1, "Transfer System Covers and Entry Doors." Permanent covers are typically made of reinforced concrete, or steel in the form of plates or lids. Most covers contain penetrations which are used as inspection ports, or for insertion of valve handles, video cameras, sampling equipment, or for future installations. The penetrations are covered or plugged when not used.

During WASTE transfer operations, WASTE is pumped under pressure. If a breach of the pressure boundary were to occur in a transfer-associated structure to which this LCO applies while its supplemental cover is not in place, a leak could spray outside the transfer-associated structure.

Spray leaks can result from small holes or cracks in transfer piping, improperly installed transfer jumpers, defective or degraded seals or gaskets on pumps, Hanford connectors, and valves, or misroutes through compromised piping or jumpers. Mechanisms such as aging, corrosion, erosion, water hammer, overpressure, freezing, mechanical fatigue, thermal stresses, construction flaws, and human error (misalignments of jumpers or valves) can also lead to these failures. Aerosolization of WASTE from surface leaks can result from splatter and splashing while the WASTE transfer pump is running.

BASES

APPLICABLE SAFETY ANALYSES

Supplemental covers are required for one accident scenario: Surface Leak Resulting in Pool.

Surface Leak Resulting in Pool

Surface leaks (transfer-associated structure overflow) are analyzed in calculation note WHC-SD-WM-CN-049, *Calculation Notes for Surface Leak Resulting in Pool*, *TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines. Supplemental covers for transfer-associated structures that meet the LCO Process Area Applicability are credited in the analysis to mitigate aerosolization outside the structure to bring consequences below risk guidelines.

The Surface Leak Resulting in Pool accident was modeled using COBs. However, the scenario and associated controls are required for structures defined in the Process Area Applicability. Initially, the scenario assumes a confined spray inside the structure while it is filling. The spray ceases when the liquid covers the spray leak point. Then, as the structure begins to overflow, another spray is postulated. The supplemental covers are specifically credited to knock down the spray out of the COB to limit aerosolization of particulates.

BASES

LCO	Supplemental covers for applicable WASTE transfer-associated structures that are PHYSICALLY CONNECTED to the transfer route are required to be OPERABLE at all times to mitigate potential aerosolization events. An OPERABLE supplemental cover is one that is installed and operated on the applicable WASTE transfer-associated structure as follows: A supplemental cover (1) is an engineered barrier or structure that is capable of knocking down spray leaks (up to 125 lb/in^2) for up to 30 minutes, (2) shall not be degraded by contact with the WASTE, (3) shall not be liquid or air tight, (4) shall be designed such that a WASTE leak of at least 20 gal/min would be released to the ground, (5) shall be capable of withstanding high winds (90 mi/h), (6) shall be capable of withstanding snow/ash fall (45 lb/ft^2), and (7) shall extend to the ground and allow for maintenance and surveillance activities on the applicable WASTE transfer-associated structure. Functional requirements for determining the OPERABILITY of supplemental covers are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining the OPERABILITY of covers may be found in procedures.
MODE APPLICABILITY	LCO 3.1.7 applies during OPERATION and LIMITED MODES because WASTE is pumped under pressure during transfer operations and WASTE transfers are possible in either of these MODES.

BASES

PROCESS AREA APPLICABILITY

LCO 3.1.7 applies to all WASTE transfer-associated structures that are PHYSICALLY CONNECTED to an ACTIVE WASTE transfer pump not under administrative lock, not under the control of AC 5.22, "Transfer System Cover Removal Controls," and subject to volume limitations.

Structures that are not PHYSICALLY CONNECTED to ACTIVE WASTE transfer pumps do not have the potential to develop spray leaks or surface leaks, since WASTE transfers are not possible through such transfer systems.

Structures controlled under AC 5.22, "Transfer System Cover Removal Controls," are not subject to this control, but rely on compensatory measures to allow transfers to be conducted on PHYSICALLY CONNECTED transfer routes when the structure involved is sufficiently secluded from the main transfer path. This requires a minimum of two closed valves in series between the transfer route and the transfer-associated structures, ensuring pressure boundary isolation such that a spray leak event (i.e., sufficient pressurization and development of an actual leak) is not likely at the location.

Structures whose volume exceeds that of the maximum credible leak cannot spray WASTE or form a WASTE pool outside of the structure.

LCO 3.1.7 does not apply to transfer-associated structures specifically evaluated for Waste Retrieval Sluicing System operations (Project W-320). HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," reevaluated transfer accidents based on differences between the main FSAR analyses and analyses required for Tank 241-C-106 sluicing. Addendum 1 specifically addresses pit overflows for transfer lines associated with sluicing Tank 241-C-106 and presents consequences associated with the spray accident and subsequent pool formation. Therefore, LCO 3.1.7 does not apply to the structures specifically evaluated in Addendum 1.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

With an inoperable supplemental cover, performance of Required Action A.1 establishes a safe condition for the facility by stopping WASTE transfer(s) associated with PHYSICALLY CONNECTED WASTE transfer pumps Immediately, not to exceed 30 minutes. Stopping the transfer eliminates the potential for both a spray leak and a surface leak with accompanying splatter and splashing. The Completion Time of Immediately, not to exceed 30 minutes, emphasizes the importance of bringing the transfer system to an unpressurized condition. When manual action is required to stop WASTE transfers, the 30 minutes assumed in the Chapter 3.0 analysis to limit consequences are considered adequate to shut down the WASTE transfer pumps. See HNF-SD-WM-SAR-067, Chapter 13.0, "Human Factors," for further discussion.

The Note in Required Action A.1 allows for draining and flushing of the transfer system piping after the transfer of WASTE from the generator has been stopped. The transfer system is drained and flushed involving limited quantities of WASTE and flush water, according to procedures.

A.2

Placing an administrative lock on PHYSICALLY CONNECTED WASTE transfer pumps will ensure that inadvertent pump starts cannot pressurize the system while the supplemental cover is inoperable. Performance of this Required Action places the supplemental cover outside the Applicability of this LCO. The Completion Time of 8 hours allows for restoration activities to restore the supplemental cover to OPERABLE status and exit the LCO ACTIONS. The Completion Time of 8 hours is judged to be acceptable since, with WASTE transfers stopped, the risk of a transfer system leak in the affected location during this time interval is small.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.1.7.1

This Surveillance is required to VERIFY that supplemental covers are OPERABLE. The Surveillance must be conducted within 72 hours prior to removing an administrative lock from a PHYSICALLY CONNECTED WASTE transfer pump and every 72 hours thereafter to ensure that supplemental covers associated with PHYSICALLY CONNECTED structures are correctly configured and are correctly installed.

The Surveillance Frequency is based on establishing a routine inspection time to heighten the awareness of operating personnel to the status of transfer system supplemental covers on an ACTIVE transfer route PHYSICALLY CONNECTED to WASTE transfer pumps that are not under administrative lock. This awareness aids understanding of the risks during pumping conditions and emphasizes the value of maintaining supplemental covers on at all times. Unlike permanent covers, which are typically made of concrete or steel, supplemental covers can be made of lightweight construction materials that can be more easily removed or disturbed (e.g., heavy plastic film or geomembrane) than permanent covers. Based on the design requirements, the Frequency of 72 hours is judged to be adequate to detect degradation of the supplemental covers. Salt well pumping transfers may last for several months and the 72-hour Frequency is also adequate for review of supplemental cover status.

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-049, 1998, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0-B, Duke Engineering and Services Hanford, Richland, Washington.

This document was too large to scan as a single document. It has been divided into smaller sections.

Section 2 of 2

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B 3.2 FLAMMABLE GAS

B 3.2.1 DST and AWF Tank Ventilation Systems

BASES

BACKGROUND

Flammable gas has been identified as a hazard within Tank Waste Remediation System (TWRS) facilities. The Justification for Continued Operation (JCO), included in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," presents a control strategy to manage the risk associated with the flammable gas hazards within TWRS. One of the key elements of the flammable gas control strategy is the use of currently installed active ventilation systems on the primary tanks to dilute and remove flammable gases that are continuously released from stored WASTE.

Although the historical requirements related to active ventilation of the primary tanks were not established to control flammable gases, available gas sample results indicate all sampled tanks are less than 5% of the Lower Flammability Limit (LFL). These controls require near constant operation of the exhausters for the primary tank ventilation system for double-shell tanks (DSTs) and aging-waste facility (AWF) tanks. The ventilation system can be VERIFIED to be operating by a variety of methods which include but are not limited to air flow rate, flow monitoring (e.g., constant flow device [floater] position on the inlet to the AW tanks), or primary tank vapor space pressure being < 0 in. water gauge (vacuum). Maintaining a vacuum in the DST and AWF tanks is expected to be the preferred method for VERIFYING that the primary tank active ventilation system is OPERABLE. Therefore, based on the JCO, the current ventilation system operating practices are judged to be adequate for controlling steady-state flammable gas and may be used to support continued operation of these tanks.

(continued)

BASES

BACKGROUND (continued)

The vapor space in the primary tank is normally maintained at a negative pressure, with respect to atmospheric pressure, because the associated exhaust ventilation system is operating. This tank vapor space pressure can be continually monitored, recorded on a strip chart, and also read from a local gauge. As the high limit is approached, alarms are actuated in the field, control rooms, and at the computerized systems. The high-pressure alarm can be used to detect a failure of the exhaust ventilation system.

The primary tank vapor space pressure monitoring and alarm systems or monitoring of the ventilation flow provides timely indication to operators of ventilation system transients that could potentially affect the ability to remove flammable gases from the tank headspace. This timely indication allows for operator action to restore ventilation to acceptable operation before flammable gases accumulate to an unacceptable level.

The LCO 3.2.1 control strategy for steady-state accumulation of flammable gas needs to be validated in the case of significant changes to the hardware, performance or configuration of the ventilation systems. The success criteria for validation has been approved by the U.S. Department of Energy as part of the Authorization Basis and is included in HNF-SD-WM-SAR-067, Chapter 10.0, "Initial Testing, In-Service Surveillance, and Maintenance."

BASES

APPLICABLE SAFETY ANALYSES

DST and AWF tank ventilation systems are required for two accident scenarios: (1) Flammable Gas Deflagrations and (2) Tank Bump (Tank 241-AZ-101 mixer pump test).

Flammable Gas Deflagrations

Flammable gas issues are discussed in HNF-SD-WM-SAR-067, Appendix K, and the results are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines and offsite radiological risk guidelines in some cases.

The safety function of the DST and AWF primary tank ventilation systems is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the likelihood of the accident.

In addition to providing protection against the postulated Flammable Gas Deflagrations accident, this TSR also provides Defense-in-Depth protection against a postulated "chemical runaway" accident identified in HNF-SD-WM-SAR-067, Chapter 3.0. In this postulated accident scenario, tank ventilation (active cooling) is lost and the WASTE temperature is allowed to increase because of radioactive decay heat until a sufficiently high temperature that initiates a "runaway" chemical reaction is reached. Past tank farm operating experience and experimental data indicate that significant chemical heating would not occur until temperatures significantly above the WASTE saturation temperature are reached. Until this chemical phenomena and its threshold temperature are better understood and defined, this TSR control on DST and AWF Tank Ventilation Systems, together with the TSR control on DST and AWF Tank WASTE Temperature Controls also serve to prevent this postulated accident.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Tank Bump

Tank bump scenarios are analyzed in calculation notes (WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, WHC-SD-WM-CN-043, *Tank Bump Consequence Analysis*, and Sathyanarayana, 1997, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 4, "Mixer Pump Test (241-AZ-101) Safety Analysis," Chapter 3.0, "Hazard and Accident Analysis." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines.

The ventilation system for Tank 241-AZ-101 is credited in the analysis as a cooling mechanism to remove the heat input due to the Project W-151 mixer pump test, providing one source of protection against exceeding temperatures at which tank bumps or steam release events are postulated to occur.

BASES

LCO

The requirement for DST and AWF primary tank ventilation system OPERABILITY has been specified to provide a method to minimize the accumulation of flammable gas, and heat buildup during the Project W-151 mixer pump test in Tank 241-AZ-101, by providing air flow through the tank vapor space. This can be demonstrated by a variety of methods which include but are not limited to air flow rate, flow monitoring (e.g., constant flow device [floater] position on the inlet to the AW tanks), or primary tank vapor space pressure being < 0 in. water gauge (vacuum). Maintaining a vacuum in the DSTs and AWF tanks relative to atmospheric pressure is expected to be the preferred method for VERIFYING that the primary tank active ventilation system is OPERABLE. The DST and AWF primary tank ventilation systems are demonstrated to be OPERABLE in accordance with the Surveillance Requirements. LCO 3.2.1 requires active ventilation for the primary tank only and does not require any controls for the annulus ventilation system. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required.

Functional requirements for determining the OPERABILITY of the DST and AWF primary tank ventilation systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the ventilation systems may be found in administrative procedures.

MODE APPLICABILITY

LCO 3.2.1 applies in OPERATION and LIMITED tank MODES because WASTE stored in the tanks is capable of generating flammable gas sufficient to reach the LFL. Therefore, primary tank ventilation for the DSTs and AWF tanks is required at all times to remove the accumulation of flammable gases from the tank headspace.

In addition, LCO 3.2.1 applies in OPERATION and LIMITED tank MODES for Tank 241-AZ-101 during the Project W-151 mixer pump test, providing one source of protection against heat buildup to prevent the tank bump accident analyzed in Addendum 4 of HNF-SD-WM-SAR-067.

BASES

PROCESS AREA APPLICABILITY

LCO 3.2.1 applies to all DSTs and AWF tanks. These tanks contain WASTE and active primary tank ventilation is required to remove the accumulation of flammable gases produced in the primary tanks. The LCO applies to permanent and portable ventilation systems.

In addition, LCO 3.2.1 applies to Tank 241-AZ-101 during the Project W-151 mixer pump test, providing one source of protection against heat buildup to prevent the tank bump accident analyzed in Addendum 4 of HNF-SD-WM-SAR-067.

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If the active primary tank ventilation system is inoperable, all WASTE DISTURBING operations and activities, including transfers to and from the affected tank, must be stopped Immediately. The Completion Time of Immediately emphasizes the importance of stopping operations and activities that may affect the flammable gas generation and removal rate.

A.2

The active primary tank ventilation system must be restored to OPERABLE status Immediately. The generation of flammable gas continues and it is essential that the ventilation system be restored to minimize an accumulation approaching the LFL.

In addition, an extended ventilation outage could result in tank WASTE conditions conducive to a tank bump during the Project W-151 mixer pump test in Tank 241-AZ-101. This scenario is not likely because of the existing ventilation system backups.

(continued)

BASES

ACTIONS (continued)

A.3

The concentration of flammable gas shall be VERIFIED to be ≤ 25% of the LFL in the affected tank. With the active primary tank ventilation system inoperable, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of once per 72 hours allows time to restore the active primary tank ventilation system before the initial VERIFICATION of flammable gas concentration is required. The Completion Time of once per 72 hours is also adequate for identifying any increase in the accumulation of flammable gas so additional actions can be initiated before exceeding 25% of the LFL for DSTs and AWF tanks as analyzed in the calculation note (HNF-SD-WM-CN-117, *Calculations of Hydrogen Release Rate at Steady State for Double-Shell Tanks*).

B.1

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," shall be stopped Immediately. Stopping manned work activities Immediately in the affected tank provides protection for the workers and minimizes activities that can produce an ignition source.

For AWF tanks, the concentration of flammable gas in the annulus should also be VERIFIED as a prudent operating practice, because of the interconnection of the annulus with the primary tank. If the concentration of flammable gas is > 25% of the LFL in the annulus, entry into Condition B of LCO 3.2.6, "Primary Tank Leak Detection Systems," is required. For this situation, Condition B of LCO 3.2.6 applies even if the annulus conductivity probe system and the annulus continuous air monitor (CAM) system are OPERABLE.

(continued)

BASES

ACTIONS (continued)

B.2

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in the ventilation system downstream of the first mixing point with flow from another tank when the ventilation is shut down provides protection for the workers and minimizes activities that can produce an ignition source. When the ventilation system is shut down, the region downstream of the first mixing point with flow from another tank is an EX-TANK INTRUSIVE region. When the ventilation system is operating, this is a nonintrusive region. Other INTRUSIVE regions of the tank also meet Ignition Source Control Set #2 when the ventilation system is shut down.

B.3

Required Action B.3 requires the tank be restored to a safe condition by restoring the active primary tank ventilation system Immediately according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the tank and identify the necessary actions to restore the primary tank ventilation system because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist. The actions necessary to restore the primary tank ventilation system depend on many variables based on the existing tank conditions.

Previous Required Actions established as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented.

The Note for Required Action B.3 permits activities (i.e., transfers, INTRUSIVE activities, energizing equipment, and manned work activities) according to a contractor-approved recovery plan that were prohibited by other Required Actions provided the recovery plan determines these activities are essential to safe restoration.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.1.1

The active primary tank ventilation system on each DST and AWF primary tank shall be VERIFIED to be OPERABLE every 24 hours. The active ventilation system must be OPERABLE on DST and AWF primary tanks to prevent the accumulation of flammable gas > 25% of the LFL. In addition, the active ventilation system must be OPERABLE in Tank 241-AZ-101 during the Project W-151 mixer pump test. VERIFICATION that the active primary tank ventilation system is OPERABLE consists of VERIFYING that the ventilation system is operating and may be performed by a variety of methods which include but are not limited to air flow rate, flow monitoring (e.g., constant flow device [floater] position on the inlet to the AW tanks), or primary tank vapor space pressure being < 0 in. water gauge (vacuum). Maintaining a vacuum in the DSTs and AWF tanks is expected to be the preferred method for VERIFYING that the active primary tank ventilation system is OPERABLE. The Frequency of 24 hours allows time to identify a failure of the active ventilation systems and initiate corrective actions based on the flammable gas generation rates for DST and AWF tanks, and calculated tank heatup rates for Tank 241-AZ-101 during the Project W-151 mixer pump test.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

The minimum time to reach 25% of the LFL for any of the DSTs and AWF tanks is 7 days, based on the calculation note HNF-SD-WM-CN-117. Performance of SR 3.2.1.1 would identify a failure of the active ventilation system within 24 hours, which would require entry into Condition A. Required Action A.3 ensures that the concentration of flammable gas is determined within 72 hours. Based on the elapsed time of 4 days (24 hours + 72 hours), this establishes a conservative margin to the predicted 7 days required to reach 25% of the LFL as analyzed in the calculation note. This margin allows time to detect and respond to an increase in the flammable gas concentration before reaching 25% of the LFL. It should also be noted that a flammable gas deflagration is not postulated to occur until 100% of the LFL is reached and an ignition source is present. The time interval to reach 100% of the LFL is considerably longer than the time to reach 25% of the LFL, resulting in even further conservatism relative to the detection and response requirements in this LCO.

In addition, the calculated time for WASTE temperatures to reach saturation with the ventilation system off in Tank 241-AZ-101 during the Project W-151 mixer pump test is 53 hours. Therefore, the Frequency of 24 hours provides sufficient safety margin.

BASES

REFERENCES

HNF-SD-WM-CN-117, 1997, *Calculations of Hydrogen Release Rate at Steady State for Double-Shell Tanks*, Rev. 0-A, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

Sathyanarayana, K., 1997, *Thermal Analysis in Support of Project W-151 Tank AZ-101 Mixer Pump Test* (internal memo 8C453-97-KS-002 to J. P. Harris and M. F. Pascal, Numatec Hanford Corporation, May 29), Numatec Hanford Corporation, Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-043, 1996, *Tank Bump Consequence Analysis*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

B 3.2 FLAMMABLE GAS

B 3.2.2 SST Ventilation Systems - Active

BASES

BACKGROUND

Flammable gas has been identified as a hazard within Tank Waste Remediation System (TWRS) facilities. The Justification for Continued Operation (JCO), included in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," presents a control strategy to manage the risk associated with the flammable gas hazards within TWRS. One of the key elements of the flammable gas control strategy is the use of currently installed active ventilation systems to dilute and remove flammable gases that are continuously released from stored WASTE.

Although the historical requirements related to active ventilation were not established to control flammable gases, available gas sample results indicate all sampled tanks are less than 5% of the Lower Flammability Limit (LFL). These controls require near constant operation of the exhausters for single-shell tanks (SSTs) with active ventilation. The ventilation system can be VERIFIED to be operating by a variety of methods which include but are not limited to absence of ventilation alarms, exhaust fan operating lights on, indication of differential pressure or vacuum being maintained, or fan energized. Maintaining a vacuum in the SSTs is expected to be the preferred method for VERIFYING that the active ventilation system is OPERABLE. Therefore, based on the JCO, the current ventilation system operating practices are judged to be adequate for controlling steady-state flammable gas and may be used to support continued operation of these tanks.

Monitoring the ventilation system operation provides timely indication to operators of ventilation system transients that could potentially affect the ability to remove flammable gases from the tank headspace. This timely indication allows for operator action to restore ventilation to acceptable operation before flammable gases accumulate to an unacceptable level.

BASES

APPLICABLE SAFETY ANALYSES

SST active ventilation systems are required for one accident scenario: Flammable Gas Deflagrations.

Flammable Gas Deflagrations

Flammable gas issues are discussed in HNF-SD-WM-SAR-067, Appendix K, and the results are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines. Waste Retrieval Sluicing System (WRSS) operations are analyzed in HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," and the results of the analysis are presented in Chapter 3.0, "Hazard Evaluations and Accident Analyses," of the Addendum. The analysis in Addendum 1 verified the applicability of the flammable gas control strategy for WRSS operations.

The safety function of the SST active ventilation systems is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the likelihood of the accident.

In addition to providing protection against the postulated Flammable Gas Deflagrations accident, this TSR also provides Defense-in-Depth protection against a postulated "chemical runaway "accident identified in HNF-SD-WM-SAR-067, Chapter 3.0. In this postulated accident scenario, tank ventilation (active cooling) is lost and the WASTE temperature is allowed to increase because of radioactive decay heat until a sufficiently high temperature that initiates a "runaway" chemical reaction is reached. Past tank farm operating experience and experimental data indicate that significant chemical heating would not occur until temperatures significantly above the WASTE saturation temperature are reached. Until this chemical phenomena and its threshold temperature are better understood and defined, this TSR control on SST Ventilation Systems, together with the TSR control on SST WASTE Temperature Controls also serve to prevent this postulated accident.

BASES

LCO	The requirement for SST ventilation system OPERABILITY has been specified to provide a method to minimize the accumulation of flammable gas by providing air flow through the tank vapor space. This can be demonstrated by a variety of methods which include but are not limited to absence of ventilation alarms, exhaust fan operating lights on, indication of differential pressure or vacuum being maintained, or fan energized. Maintaining a vacuum in the SSTs relative to atmospheric pressure is expected to be the preferred method for VERIFYING that the primary tank active ventilation system is OPERABLE. The SST ventilation systems are demonstrated to be OPERABLE in accordance with the Surveillance Requirements. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required. Functional requirements for determining the OPERABILITY of the SST active ventilation systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the ventilation systems may be found in administrative procedures.
MODE APPLICABILITY	LCO 3.2.2 applies in OPERATION and LIMITED tank MODES because WASTE stored in the tanks is capable of generating flammable gas sufficient to reach the LFL. Therefore, the SST ventilation on those SST with active ventilation is required at all times to remove the accumulation of flammable gases from the tank headspace.

BASES

PROCESS AREA APPLICABILITY

LCO 3.2.2 applies to SSTs with an active ventilation system. These tanks contain WASTE and active ventilation is required to remove the accumulation of flammable gases produced in these tanks. The LCO applies to permanent and portable ventilation systems.

LCO 3.2.2 does not apply to Tank 241-C-105 during WRSS operations (sluicing retrieval of WASTE from Tank 241-C-106). Tank 241-C-105 and Tank 241-C-106 are normally connected to a common ventilation system (296-P-16) which will not be operated during WRSS operations. A dedicated system (296-C-06) will be operating on Tank 241-C-106 during WRSS operations. Continued ventilation is provided to Tank 241-C-105 by a cascade line between the two tanks and the inlet high-efficiency particulate air (HEPA) filter system normally used during active ventilation. During WRSS operations, LCO 3.2.3, "SST Ventilation Systems - Active," will apply to Tank 241-C-105. Tank 241-C-105 will be returned to active ventilation following WRSS operations.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If the active ventilation system is inoperable, it must be restored to OPERABLE status Immediately. The generation of flammable gas continues and it is essential that the ventilation system be restored to minimize an accumulation approaching the LFL.

A.2

The concentration of flammable gas shall be VERIFIED to be $\leq$ 25% of the LFL in the affected tank. With the ventilation system inoperable, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of once per 7 days allows time to restore the ventilation system before the initial VERIFICATION of flammable gas concentration is required. The Completion Time of once per 7 days is also adequate for identifying any increase in the accumulation of flammable gas so additional actions can be initiated before exceeding 25% of the LFL for SSTs with active ventilation systems as analyzed in the calculation note (HNF-SD-WM-CN-116, *Calculation Note: Hydrogen Generation Rates at Steady-State Flammable Gas Concentrations for Single-Shell Tanks.*

(continued)

BASES

ACTIONS
(continued)

B.1

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," shall be stopped Immediately. Stopping manned work activities Immediately in the affected tank provides protection for the workers and minimizes activities that can produce an ignition source.

B.2

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet AC 5.10 provides protection for the workers and minimizes activities that can produce an ignition source.

B.3

Required Action B.3 requires the tank be restored to a safe condition by restoring the active ventilation system Immediately according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the tank and identify the necessary actions to restore the ventilation system because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist. The actions necessary to restore the ventilation depend on many variables based on the existing tank conditions.

Previous Required Actions established as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented.

The Note for Required Action B.3 permits activities (i.e., transfers, INTRUSIVE activities, energizing equipment, and manned work activities) according to a contractor-approved recovery plan that were prohibited by other Required Actions provided the recovery plan determines these activities are essential to safe restoration.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.2.1

The active ventilation system on each SST with active ventilation shall be VERIFIED to be OPERABLE every 7 days. The active ventilation system must be OPERABLE on SSTs to prevent the accumulation of flammable gas > 25% of the LFL. VERIFICATION that the active ventilation system is OPERABLE consists of VERIFYING that the ventilation system is operating and may be performed by a variety of methods which include but are not limited to absence of ventilation alarms, exhaust fan operating lights on, indication of differential pressure or vacuum being maintained, or fan energized. Maintaining a vacuum in the SSTs is expected to be the preferred method for VERIFYING that the active ventilation system is OPERABLE. The Frequency of 7 days allows time to identify a failure of the active ventilation systems and initiate corrective actions based on the flammable gas generation rates.

The minimum time to reach 25% of the LFL for any of the SSTs with active ventilation systems is 17 days, based on the calculation note HNF-SD-WM-CN-116. Performance of SR 3.2.2.1 would identify a failure of the active ventilation system within 7 days, which would require entry into Condition A. Required Action A.2 ensures that the concentration of flammable gas is determined within 7 days. Based on the elapsed time of 14 days (7 days + 7 days), this establishes a conservative margin to the predicted 17 days required to reach 25% of the LFL as analyzed in the calculation note. This margin allows time to detect and respond to an increase in the flammable gas concentration before reaching 25% of the LFL. It should

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

also be noted that a flammable gas deflagration is not postulated to occur until 100% of the LFL is reached and an ignition source is present. The time interval to reach 100% of the LFL is considerably longer than the time to reach 25% of the LFL, resulting in even further conservatism relative to the detection and response requirements in this LCO.

REFERENCES

HNF-SD-WM-CN-116, 1997, *Calculation Note: Hydrogen Generation Rates at Steady-State Flammable Gas Concentrations for Single-Shell Tanks*, Rev. 0-A, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

B 3.2 FLAMMABLE GAS

B 3.2.3 SST Ventilation Systems - Passive

BASES

BACKGROUND

Flammable gas has been identified as a hazard within Tank Waste Remediation System (TWRS) facilities. The Justification for Continued Operation (JCO), included in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," presents a control strategy to manage the risk associated with the flammable gas hazards within TWRS. One of the key elements of the flammable gas control strategy is the use of currently installed passive ventilation systems to dilute and remove flammable gases that are continuously released from stored WASTE.

For passively ventilated tanks the breather filter isolation valves are VERIFIED to be open and that no blanks are installed every 10 days. Therefore, based on the JCO, the current ventilation system operating practices are judged to be adequate for controlling steady-state flammable gas and may be used to support continued operation of these tanks.

BASES

APPLICABLE SAFETY ANALYSES

SST passive ventilation systems are required for one accident scenario: Flammable Gas Deflagrations.

Flammable Gas Deflagrations

Flammable gas issues are discussed in HNF-SD-WM-SAR-067, Appendix K, and the results are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines. Waste Retrieval Sluicing System (WRSS) operations are analyzed in HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," and the results of the analysis are presented in Chapter 3.0, "Hazard Evaluations and Accident Analyses," of the Addendum. The analysis in Addendum 1 verified the applicability of the flammable gas control strategy for WRSS operations.

The safety function of the SST passive ventilation systems is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the likelihood of the accident.

LCO

The requirement for the high-efficiency particulate air (HEPA) breather isolation valve to be open and no blank installed on passively ventilated SSTs has been specified to provide a method to minimize the accumulation of flammable gas. The SST ventilation systems are demonstrated to be OPERABLE in accordance with the Surveillance Requirements.

Functional requirements for determining the OPERABILITY of the SST passive ventilation systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY of the ventilation systems may be found in administrative procedures.

BASES

MODE APPLICABILITY	LCO 3.2.3 applies in OPERATION and LIMITED tank MODES because WASTE stored in the tanks is capable of generating flammable gas sufficient to reach the LFL. Therefore, passive ventilation is required at all times for those SSTs that do not have an active ventilation system to remove the accumulation of flammable gases from the tank headspace.
PROCESS AREA APPLICABILITY	LCO 3.2.3 applies to SSTs that do not have an active ventilation system and are only passively ventilated. These tanks contain WASTE and passive ventilation is required to remove the accumulation of flammable gases produced in these tanks. SSTs with portable exhauster systems are still considered passively ventilated tanks for Applicability of this control. LCO 3.2.3 applies to Tank 241-C-105 during WRSS operations. Tank 241-C-105 and Tank 241-C-106 are normally connected to a common active ventilation system (296-P-16) which will not be operated during WRSS operations. A dedicated system (296-C-06) will be operating on Tank 241-C-106 during WRSS operations. Continued ventilation is provided to Tank 241-C-105 by a cascade line between the two tanks and the inlet HEPA filter system normally used during active ventilation. Tank 241-C-105 will be returned to active ventilation following WRSS operations.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If a HEPA breather filter isolation valve is closed or a blank is installed, it must be opened or removed within 7 days. The Completion Time is based on providing adequate time to perform the actions necessary to restore the passive ventilation system to the proper configuration, while limiting the duration when the passive ventilation capability may be unavailable. This action must also be intentionally entered to replace the HEPA filter. The Completion Time of 7 days also permits sufficient time to replace the HEPAs while minimizing the time that flammable gas may be accumulating without the passive ventilation flow path available as analyzed in the calculation note (HNF-SD-WM-CN-116, *Calculation Note: Hydrogen Generation Rates at Steady-State Flammable Gas Concentrations for Single-Shell Tanks.*

A.2

The HEPA breather filter isolation valve shall either be opened and the blank removed within 7 days per Required Action A.1 or an alternate filtered ventilation path shall be established within 7 days. If an alternate filtered ventilation path is established, then the HEPA breather filter isolation valve shall be opened and the blank removed within 92 days. Establishing an alternate filtered ventilation path minimizes the accumulation of flammable gas.

(continued)

BASES

ACTIONS
(continued)

B.1

The concentration of flammable gas shall be VERIFIED to be ≤ 25% of the LFL in the affected tank. With the ventilation system inoperable, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of once per 4 days allows time to restore the passive ventilation system before the initial VERIFICATION of flammable gas concentration is required. The Completion Time of once per 4 days is also adequate for identifying any increase in the accumulation of flammable gas so additional actions can be initiated before exceeding 25% of the LFL for SSTs as analyzed in the calculation note HNF-SD-WM-CN-116.

C.1

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition B is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," shall be stopped Immediately. Stopping manned work activities Immediately provides protection for the workers and minimizes activities that can produce an ignition source.

C.2

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition B is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet AC 5.10 provides protection for the workers and minimizes activities that can produce an ignition source.

C.3

Required Action C.3 requires the tank be restored to a safe condition Immediately by continuing efforts to open the HEPA breather filter isolation valve and remove the blank because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.3.1

The HEPA breather filter isolation valve is VERIFIED to be open and no blank installed every 10 days. The HEPA breather filter isolation valve is required to be open and no blank installed to establish the passive ventilation flow path for SSTs without active ventilation. The passive ventilation flow path prevents the accumulation of flammable gas > 25% of the LFL in those SSTs without active ventilation. The Frequency of 10 days is based on the gas generation rates and the time to reach 25% of the LFL in the passively ventilated SSTs as analyzed in the calculation note HNF-SD-WM-CN-116 and the time required to replace a HEPA filter.

The minimum time (based on barometric breathing rate only) to reach 25% of the LFL for any of the SSTs with passive ventilation systems is 24 days, based on the calculation note HNF-SD-WM-CN-116. The minimum time to reach 25% of the LFL for Tank 241-C-105 with barometric breathing is 35 days (HNF-SD-WM-CN-116). This indicates that the gas generation rate of Tank 241-C-105, which will be in a passively ventilated configuration during WRSS operations, is within the range of that normally encountered in passively ventilated SSTs.

Performance of SR 3.2.3.1 would identify a closed HEPA breather filter isolation valve or an installed blank within 10 days, which would require entry into Condition A. Required Actions A.1 or A.2 require restoration of passive ventilation within 7 days. If this is not accomplished, Required Action B.1 ensures that the concentration of flammable gas is determined within 4 days. Based on the elapsed time of 21 days (10 days + 7 days + 4 days), this establishes a conservative margin

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

to the predicted 24 days required to reach 25% of the LFL as analyzed in the calculation note. This margin allows time to detect and respond to an increase in the flammable gas concentration before reaching 25% of the LFL. It should also be noted that a flammable gas deflagration is not postulated to occur until 100% of the LFL is reached and an ignition source is present. The time interval to reach 100% of the LFL is considerably longer than the time to reach 25% of the LFL, resulting in even further conservatism relative to the detection and response requirements in this LCO.

REFERENCES

HNF-SD-WM-CN-116, 1997, *Calculation Note: Hydrogen Generation Rates at Steady-State Flammable Gas Concentrations for Single-Shell Tanks*, Rev. 0-A, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

B 3.2 FLAMMABLE GAS

B 3.2.4 DCRT Ventilation Systems

BASES

BACKGROUND

Flammable gas has been identified as a hazard within Tank Waste Remediation System (TWRS) facilities. The Justification for Continued Operation (JCO), included in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," presents a control strategy to manage the risk associated with the flammable gas hazards within TWRS. One of the key elements of the flammable gas control strategy is the use of currently installed double-contained receiver tank (DCRT) ventilation systems to dilute and remove flammable gases that are continuously released from stored WASTE.

Providing an inlet air supply $\geq$ 3.0 cfh for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U containing WASTE, and $\geq$ 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 and Tank 241-SX-105, ensures sufficient ventilation to the DCRTs. For DCRT 244-CR TK-003 containing WASTE, operating the vault ventilation system ensures sufficient ventilation to 244-CR TK-003. Therefore, based on the JCO, the current ventilation system operating practices are judged to be adequate for controlling steady-state flammable gas and may be used to support continued operation of these tanks.

When transferring WASTE from a tank to a DCRT, flammable gas is released to the DCRT dome vapor space from the dissolution of dissolved gas because of WASTE transfer, radiolysis, thermal degradation of organic material, and from corrosion of the tank materials. Flammable gas concentrations are controlled through the DCRT ventilation requirements of this LCO in conjunction with the requirement that the DCRT vapor space remain $\leq$ 25% of the LFL using the methodology contained in the calculation note (HNF-SD-WM-CN-118, *Calculation of Flammable Gas Mixtures in Double-Contained Receiver Tanks*) as required by AC 5.12, "Transfer Controls."

BASES

APPLICABLE SAFETY ANALYSES

DCRT ventilation systems are required for one accident scenario: Flammable Gas Deflagrations.

Flammable Gas Deflagrations

Flammable gas issues are discussed in HNF-SD-WM-SAR-067, Appendix K, and the results are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines.

The safety function of the DCRT ventilation systems (DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U, and 244-CR TK-003) is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the likelihood of the accident.

BASES

LCO

DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U

The requirement of ≥ 3.0 cfh for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U inlet air supply, and ≥ 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 and Tank 241-SX-105 through DCRT 244-S has been specified to provide a method to minimize the accumulation of flammable gas. The DCRTs are equipped with three level dip tubes that provide a positive inlet flow to each tank. A minimum of 1.5 cfh is normally available from each of the three dip tubes (if not plugged). The DCRT inlet air supply is VERIFIED using the dip tube flow indicators in accordance with the Surveillance Requirements. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required. The compressed air system (support system) provides instrument air to the dip tubes.

DCRT 244-CR TK-003

The requirement for maintaining the active ventilation system OPERABLE has been specified to provide a method to minimize the accumulation of flammable gas. The active ventilation system is demonstrated to be OPERABLE in accordance with the Surveillance Requirements. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required.

Functional requirements of the DCRT ventilation systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for the DCRT ventilation systems may be found in administrative procedures.

MODE APPLICABILITY

LCO 3.2.4 applies in OPERATION and LIMITED tank MODES because WASTE stored in the DCRTs is capable of generating flammable gas sufficient to reach the LFL. Therefore, an inlet air supply is required at all times for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U, and ventilation flow is required at all times for DCRT 244-CR TK-003 to remove the accumulation of flammable gases from the tank headspace.

BASES

PROCESS AREA APPLICABILITY

LCO 3.2.4 applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, 244-U, and 244-CR TK-003 containing WASTE. When a DCRT contains WASTE, ventilation is required to remove the accumulation of flammable gases produced in these tanks. For LCO 3.2.4 item b, which requires OPERABILITY of the active ventilation system for DCRT 244-CR TK-003, the LCO applies to permanent and portable ventilation systems.

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

Required Action A.1 applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. If the inlet air supply is < 3.0 cfh or < 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 or Tank 241-SX-105 through DCRT 244-S, transfers to the affected tank must be stopped Immediately. The Completion Time of Immediately emphasizes the importance of stopping activities that may affect the flammable gas generation and removal rate.

A.2

Required Action A.2 also applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. The inlet air supply must be restored Immediately. The generation of flammable gas continues and it is essential that the inlet air supply be restored to minimize an accumulation of flammable gas approaching the LFL.

(continued)

BASES

ACTIONS
(continued)

A.3

Required Action A.3 also applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. The concentration of flammable gas shall be VERIFIED to be ≤ 25% of the LFL in the affected tank. With less than the minimum required inlet air supply, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of Immediately emphasizes the importance of determining the present conditions for flammable gas concentration in the DCRT such that the inlet air supply can be restored before exceeding 25% of the LFL. If it is determined that the flammable gas concentration is > 25% of the LFL, then Condition B is entered which ensures additional actions are initiated well before 100% of the LFL is reached.

B.1

Required Action B.1 applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," shall be stopped Immediately. Stopping manned work activities Immediately in the affected tank provides protection for the workers and minimizes activities that can produce an ignition source.

B.2

Required Action B.2 also applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank, provides protection for the workers and minimizes activities that can produce an ignition source.

(continued)

BASES

ACTIONS (continued)

B.3

Required Action B.3 also applies to DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U. If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, Required Action B.3 requires the DCRT be restored to a safe condition Immediately by continuing efforts to restore the inlet air supply because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist.

C.1

Required Action C.1 applies to DCRT 244-CR TK-003. The ventilation system must be restored Immediately. The generation of flammable gas continues and it is essential that the active ventilation system be restored to OPERABLE status to minimize an accumulation of flammable gas approaching the LFL.

C.2

Required Action C.2 also applies to DCRT 244-CR TK-003. The concentration of flammable gas shall be VERIFIED to be ≤ 25% of the LFL in the affected tank. With the ventilation system inoperable, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of Immediately emphasizes the importance of determining the present conditions for flammable gas concentration in DCRT 244-CR TK-003 such that the ventilation system can be restored before exceeding 25% of the LFL. If it is determined that the flammable gas concentration is > 25% of the LFL, then Condition D is entered which ensures additional actions are initiated well before 100% of the LFL is reached.

(continued)

BASES

ACTIONS (continued)

D.1

Required Action D.1 applies to DCRT 244-CR TK-003. If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition C is not met, manned work activities per AC 5.11 shall be stopped Immediately. Stopping manned work activities Immediately in the affected tank provides protection for the workers and minimizes activities that can produce an ignition source.

D.2

Required Action D.2 also applies to DCRT 244-CR TK-003. If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition C is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10. Immediately deenergizing, removing or not using equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank, provides protection for the workers and minimizes activities that can produce an ignition source.

D.3

Required Action D.3 also applies to DCRT 244-CR TK-003. Required Action D.3 requires 244-CR TK-003 be restored to a safe condition by restoring the active ventilation system Immediately according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the tank and identify the necessary actions to restore the active ventilation system because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist. The actions necessary to restore the active ventilation system depend on many variables based on the existing tank conditions.

Previous Required Actions established as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented. The Note for Required Action D.3 permits activities (i.e., transfers, INTRUSIVE activities, energizing equipment, and manned work activities) according to a contractor-approved recovery plan that were prohibited by other Required Actions provided the recovery plan determines these activities are essential to safe restoration.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.4.1

The inlet air supply is VERIFIED to be ≥ 3.0 cfh every 12 hours for DCRTs 244-A, 244-BX, 244-S, 244-TX, and 244-U, and ≥ 5.0 cfh for DCRT 244-S during WASTE transfers from Tank 241-SX-104 and Tank 241-SX-105 through DCRT 244-S. The inlet air supply is required to establish the ventilation flow path for DCRTs containing WASTE. The ventilation flow path prevents the accumulation of flammable gas > 25% of the LFL. The Frequency of 12 hours is based on the gas generation rates in DCRTs containing WASTE.

Performance of SR 3.2.4.1 would identify an insufficient inlet air supply within 12 hours, which would require entry into Condition A. Required Action A.3 ensures that the concentration of flammable gases is determined Immediately. For a DCRT the time to 25% of the LFL depends on several parameters including the DCRT inlet air supply flow rate, the level of WASTE in the DCRT, and the transfer flow rate into the DCRT. These parameters are determined for each planned transfer and the time to 25% of the LFL is determined in accordance with the methodology contained in the calculation note HNF-SD-WM-CN-118. Immediately establishes a very conservative margin to the predicted time required to reach DCRT conditions where 25% of the LFL can be reached. This margin allows time to detect and respond to an increase in the flammable gas concentration before reaching 25% of the LFL.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

It should also be noted that a flammable gas deflagration is not postulated to occur until 100% of the LFL is reached and an ignition source is present. The time interval to reach 100% of the LFL is considerably longer than the time to reach 25% of the LFL, resulting in even further conservatism relative to the detection and response requirements in this LCO.

SR 3.2.4.2

The active ventilation system is VERIFIED to be OPERABLE every 12 hours. The active ventilation system is required to establish the ventilation flow path. The ventilation flow path prevents the accumulation of flammable gas > 25% of the LFL. The Frequency of 12 hours is based on the gas generation rates in 244-CR TK-003 WASTE.

REFERENCES

HNF-SD-WM-CN-118, 1997, *Calculation of Flammable Gas Mixtures in Double-Contained Receiver Tanks*, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

B 3.2 FLAMMABLE GAS

B 3.2.5 244-AR TK-002 Ventilation System

BASES

BACKGROUND

Flammable gas has been identified as a hazard within Tank Waste Remediation System (TWRS) facilities. The Justification for Continued Operation (JCO), included in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Appendix K, "Flammable Gas Hazards and Controls in Hanford Waste Storage Tanks and Waste Transfer Facilities," presents a control strategy to manage the risk associated with the flammable gas hazards within TWRS. One of the key elements of the flammable gas control strategy is the use of currently installed ventilation systems to dilute and remove flammable gases that are continuously released from stored WASTE.

For 244-AR TK-002, providing an inlet air supply $\geq$ 3.0 cfh ensures sufficient ventilation to the tank. Therefore, based on the JCO, the current ventilation system operating practices are judged to be adequate for controlling steady-state flammable gas and may be used to support continued operation of these tanks.

APPLICABLE SAFETY ANALYSES

The 244-AR TK-002 ventilation system is required for one accident scenario: Flammable Gas Deflagrations.

Flammable Gas Deflagrations

Flammable gas issues are discussed in HNF-SD-WM-SAR-067, Appendix K, and the results are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines.

The safety function of the 244-AR TK-002 ventilation system is to prevent the accumulation of flammable gases due to steady-state releases, thus decreasing the likelihood of the accident.

BASES

LCO	The requirement of ≥ 3.0 cfh for the 244-AR TK-002 inlet air supply has been specified to provide a method to minimize the accumulation of flammable gas. 244-AR TK-002 is equipped with three level dip tubes that provide a positive inlet flow to the tank. A minimum of 1.5 cfh is normally available from each of the three dip tubes (if not plugged). The inlet air supply is VERIFIED using the dip tube flow indicators in accordance with the Surveillance Requirements. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system. Continuous electrical power is not required. The compressed air system (support system) provides instrument air to the dip tubes. Functional requirements of the ventilation systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for the ventilation systems may be found in administrative procedures.
MODE APPLICABILITY	LCO 3.2.5 applies in OPERATION and LIMITED tank MODES because WASTE stored in 244-AR TK-002 is capable of generating flammable gas sufficient to reach the LFL. Therefore, an inlet air supply is required at all times for 244-AR TK-002 to remove the accumulation of flammable gases from the tank headspace.
PROCESS AREA APPLICABILITY	LCO 3.2.5 applies to 244-AR TK-002. This tank contains WASTE and ventilation is required to remove the accumulation of flammable gases produced in the tank.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If the inlet air supply is < 3.0 cfh, the air supply shall be restored Immediately. The Completion Time of Immediately emphasizes the importance of restoring the ventilation to minimize the effect from the continued accumulation of flammable gas.

A.2

With the dip tube air supply not available, the concentration of flammable gas shall be VERIFIED to be ≤ 25% of the LFL. With the ventilation system inoperable, monitoring the flammable gas concentration allows additional actions to be taken to minimize the potential for a deflagration if a concentration > 25% of the LFL is reached. The Completion Time of once per 72 hours allows time to restore the ventilation system before the initial VERIFICATION of flammable gas concentration is required. The Completion Time of once per 72 hours is also adequate for identifying any increase in the accumulation of flammable gas so additional actions can be initiated before exceeding 25% of the LFL.

(continued)

BASES

ACTIONS (continued)

B.1

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," shall be stopped Immediately. Stopping manned work activities Immediately provides protection for the workers and minimizes activities that can produce an ignition source.

B.2

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, equipment that can be a potential ignition source shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank, provides protection for the workers and minimizes activities that can produce an ignition source.

B.3

Required Action B.3 requires 244-AR TK-002 be restored to a safe condition Immediately by continuing efforts to restore the inlet air supply because there is no MODE that the affected tank can enter where the flammable gas hazard does not exist.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.5.1

The inlet air supply is VERIFIED to be ≥ 3.0 cfh every 12 hours. The inlet air supply is required to establish the ventilation flow path for 244-AR TK-002. The ventilation flow path prevents the accumulation of flammable gas > 25% of the LFL. The Frequency of 12 hours is based on the gas generation rates in 244-AR TK-002.

The minimum time to reach 25% of the LFL for 244-AR TK-002 is 312 days, based on the calculations in Noorani, 1997. Performance of SR 3.2.5.1 would identify an inlet air supply < 3.0 cfh within 12 hours, which would require entry into Condition A. Required Action A.2 ensures that the concentration of flammable gas is determined within 72 hours. Based on the elapsed time of 3.5 days (12 hours + 72 hours), this establishes a conservative margin to the predicted time required to reach 25% of the LFL. This margin allows time to detect and respond to an increase in the flammable gas concentration before reaching 25% of the LFL.

It should also be noted that a flammable gas deflagration is not postulated to occur until 100% of the LFL is reached and an ignition source is present. The time interval to reach 100% of the LFL is considerably longer than the time to reach 25% of the LFL, resulting in even further conservatism relative to the detection and response requirements in this LCO.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

Noorani, Y. G., 1997, *Calculations of Hydrogen Release Rate at Steady State and Evaluation of Time to Reach 25% of the Lower Flammability Limit (LFL) for the 244-AR Vault Tank TK-002* (internal memo 2N170-YGN-97004 to file, July 22), DE&S Hanford, Inc., Richland, Washington.

B 3.2 FLAMMABLE GAS

B 3.2.6 Primary Tank Leak Detection Systems

BASES

BACKGROUND

The primary tank leak detection systems consists of either a continuous air monitor (CAM) that detects the presence of airborne radionuclides in the annulus ventilation exhaust stream or a conductivity probe leak detection system installed in the annulus between the primary and secondary tanks on double-shell tanks (DSTs) and aging waste facility (AWF) tanks. The primary tank leak detection system will detect primary tank leakage as well as a WASTE transfer misrouting to the annulus.

The free-standing primary tank rests on a layer of insulating concrete. Slots are cut in the insulating pad to allow liquid leaking from the primary tank to drain to leak detectors in the annulus area. Leak detection conductivity probes extend through the annulus riser to a position slightly above the annulus bottom. Liquid is detected when it contacts the leak detection element (probe tip) on the bottom of the leak detector indicator tape and thus shorts the element, completing the electrical circuit to ground.

Each DST is equipped with reel mounted Flake type adjustable conductivity probes installed in the annulus risers. Detection of liquid in the tank annulus activates an audible alarm and an annunciator panel light.

Each AWF tank annulus is equipped with three leak detection probes with multiple conductivity elements located at various elevations in the annulus. The alarm sounds in the control building.

The annulus ventilation system exhaust stack of each DST and AWF tank is equipped with a CAM. A vacuum pump extracts an air sample from the exhaust flowstream upstream of the high-efficiency particulate air (HEPA) filter and the CAM scans the sample for radionuclide particles. If a leak from the primary tank were to occur, the CAM would detect an increase in radioactive particulate activity and upon exceeding the setpoint an alarm would actuate.

BASES

APPLICABLE SAFETY ANALYSES

The primary tank leak detection systems are required for two accident scenarios: (1) Flammable Gas Deflagrations and (2) Surface Leak Resulting in Pool.

Flammable Gas Deflagrations

Flammable gas accumulation in the annulus is discussed in Kummerer, 1995, and the results of flammable gas deflagrations are presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines and offsite radiological risk guidelines in some cases.

The safety function of the primary tank leak detection systems is to provide an alarm of tank WASTE from misroutes or other system leaks into the tank annulus to alert operators to take action to prevent a flammable gas deflagration in the DST or AWF tank annulus, thus decreasing the likelihood of the accident.

Flammable gases of concern (e.g., hydrogen, ammonia, methane) are produced in the tank WASTE by three principal means: radiolysis, organic decomposition, and corrosion. Nitrous oxide, an oxidizer, is also produced by radiolysis. Modeling indicates that retention mechanisms exist in the WASTE tanks that are capable of storing flammable gases and then suddenly releasing them into the headspace. These releases can occur naturally or as a result of operations and activities that are performed in the WASTE INTRUSIVE region of the tank. If flammable gases are released in sufficient quantity to raise their concentration above the Lower Flammability Limit (LFL), and an ignition source is present, a deflagration can occur. Structural damage will occur to the tank if the pressure pulse is larger than the design pressure of the tank. Structural damage may cause cracking or tearing of the dome.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Surface Leak Resulting in Pool

Surface leaks resulting in pools are analyzed in calculation note WHC-SD-WM-CN-049, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological material could exceed offsite risk guidelines, and the release of radiological and toxicological material could exceed onsite risk guidelines.

The safety function of the primary tank leak detection systems is to provide an alarm of tank WASTE from misroutes or other system leaks into the tank annulus to alert operators to take action to stop the transfer of WASTE into the DST or AWF tank annulus, thus decreasing the consequences of the accident. This allows termination of the transfer before the annulus overflows resulting in a surface pool.

BASES

LCO

The LCO requires that one of the two primary tank leak detection systems (conductivity probe[s] or CAM) be OPERABLE. This provides indication to the operators of potential leakage so corrective actions can be taken to prevent or mitigate the accumulation of flammable gases and leakage to the surface.

An OPERABLE primary tank leak detection system consists of at least one conductivity probe (as described in the Background) installed at a location that enables it to detect a leak (i.e., within 1.0 in. from the bottom of the annulus) or a CAM system that operates continuously while the annulus ventilation system is operating. The OPERABILITY requirement for both the conductivity probe and CAM includes an alarm function, either upon the conductivity probe detecting liquid or for the CAM when radiation levels exceed the setpoint. For the alarm to be considered OPERABLE, the alarm location must be continuously staffed or a check of the alarm status performed at least once every 12 hours. A leak detection system in an activated alarm state is considered inoperable, as it is incapable of providing indication of leakage during future transfers through its associated structure.

The probes or CAM and alarms are credited with alerting operators to a leak, spill, or transfer error into the annulus of a DST or AWF tank. The operator is then able to take action to prevent a significant accumulation of flammable gases or a surface release. Although multiple conductivity probes may be available in a tank and an audible and visual alarm is available, this LCO only requires one conductivity probe be OPERABLE at a location within 1.0 in. of the bottom of the annulus, or one CAM be OPERABLE. However, any conductivity probe or CAM that meets OPERABILITY requirements when it enters an activated alarm state requires that the primary tank leak detection system be declared inoperable. If a future determination can be made that the instrumentation has malfunctioned, and the remaining instrumentation meets system minimum OPERABILITY requirements (i.e., at least one other conductivity probe or CAM is OPERABLE), then the equipment that has malfunctioned may be declared out of service, and the primary tank leak detection system declared OPERABLE once again.

(continued)

BASES

LCO (continued)	The primary tank leak detection system is performing the intended function when liquid accumulation in a DST or AWF tank annulus can be identified to the associated alarm location such that appropriate action can be taken to evaluate the situation (e.g., confirm leakage, identify failed conductivity probe) and, if necessary take actions to mitigate the consequences of any leakage. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the systems. Continuous electrical power is not required. The annulus ventilation system (support system) is also required as part of OPERABILITY of the CAM. Functional requirements for determining the OPERABILITY of the primary tank leak detection systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements for determining OPERABILITY may be found in administrative procedures.
MODE APPLICABILITY	LCO 3.2.6 applies in OPERATION and LIMITED tank MODES. WASTE stored in the tanks in these MODES could leak to the annulus. Also WASTE transfers are possible in both MODES, and a transfer error could result in the accumulation of WASTE in the annulus that can result in the accumulation of flammable gas or lead to an overfilling event. Therefore, the primary tank leak detection system is required at all times because a leak, spill, or transfer error can occur at any time.
PROCESS AREA APPLICABILITY	LCO 3.2.6 applies to DSTs and AWF tanks because these are the only tanks with an annulus between a primary and secondary tank where WASTE can accumulate and have the potential for a flammable gas deflagration or surface leak resulting in a pool.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1

If the primary tank leak detection system is inoperable, whether because of equipment malfunction or the activation of a leak detection alarm, WASTE or other liquid transfers that are occurring on routes PHYSICALLY CONNECTED to the affected leak detection location must be stopped Immediately. Performing this Required Action Immediately minimizes the potential for material leakage to the affected annulus. This reduces the risk of overflowing the annulus or accumulating sufficient material such that the flammable gas can approach the LFL. When manual action is required to stop WASTE transfers, the 30 minutes assumed in the Chapter 3.0 analysis to limit consequences are considered adequate to shut down the WASTE transfer pumps. See HNF-SD-WM-SAR-067, Chapter 13.0, "Human Factors," for further discussion.

No further transfers on PHYSICALLY CONNECTED routes may occur until the primary tank leak detection system is restored to OPERABLE status.

A.2

An administrative lock must be placed on PHYSICALLY CONNECTED transfer pumps within 12 hours of entering Condition A. This ensures that the annulus will not become completely filled and overflow because of a future inadvertent pump start.

(continued)

BASES

ACTIONS (continued)

The Completion Time of 12 hours allows time to perform the actions necessary to determine the cause of inoperability and restore the system to OPERABLE status. Because transfers have already been stopped in accordance with Required Action A.1, the potential for continued or new leakage is minimized. The value is based on the time it takes to fill the annulus volume of approximately 150,000 gal assuming an inadvertent pump start with a maximum WASTE transfer system flow rate of 200 gal/min. Based on these conditions, it will take slightly over 12 hours before the annulus could overflow.

A.3

Because the possibility exists of WASTE leakage to the annulus, one of two alternative actions shall be performed to mitigate potential flammable gas hazards. Either VERIFY that the annulus ventilation system on the affected tank is operating once per 12 hours or VERIFY that the concentration of flammable gas in the annulus of the affected tank is $\leq$ 25% of the LFL once every 12 hours.

If leakage is detected, flammable gases may be accumulating in the annulus. VERIFYING that the annulus ventilation system on the affected tank is operating and starting it if it is not currently running ensures that accumulations of flammable gas are removed from the annulus by the ventilation flow. The annulus ventilation system changes the annulus air approximately every 4 hours, thereby sweeping flammable gases from the annulus before the LFL can be reached.

An alternative to VERIFYING that the annulus ventilation system is operating is to monitor the concentration of flammable gas. This may be a preferred action if it is not possible to start the annulus ventilation system (e.g., primary tank leakage blocks the annulus ventilation system suction line). This will provide information on the accumulation rate of flammable gas in the annulus and may direct the actions taken in accordance with the approved recovery plan per Required Action B.3.

(continued)

BASES

ACTIONS (continued)

The Completion Time of once per 12 hours is based on taking regular, periodic actions to minimize the potential for the accumulation of flammable gas approaching the LFL. The 12-hour VERIFICATION provides regular confirmation that the ventilation system is still running or that the concentration of flammable gases remain at or below 25% of the LFL. The Completion Time of once per 12 hours allows time to restore the primary tank leak detection system before the initial VERIFICATION is required.

A.4

The primary tank leak detection system must be restored to OPERABLE status within 31 days of entry into Condition A. The 31-day Completion Time allows sufficient time to restore the system to OPERABLE status, without allowing the reliance of compensatory measures for extended periods of time. The Completion Time takes into consideration that the potential for a leak or misroute during this time interval is small due to the compensatory measures taken, and that if the flammable gas concentration approaches a level of concern due to loss of ventilation, it would be detected by the alternate VERIFICATION provided within Required Action A.3.

B.1

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, manned work activities per AC 5.11, "Flammable Gas Monitoring Controls," in the affected tank annulus shall be stopped Immediately. Stopping manned work activities Immediately in the affected tank annulus provides protection for the workers and minimizes activities that can produce an ignition source.

(continued)

BASES

ACTIONS
(continued)

B.2

If the concentration of flammable gas is > 25% of the LFL or if the Required Action and associated Completion Time of Condition A is not met, equipment that can be a potential ignition source within the affected tank annulus shall be deenergized, removed, or not used if it does not meet AC 5.10, "Ignition Controls." Immediately deenergizing, removing or not using equipment that does not meet Ignition Source Control Set #2 in AC 5.10 in INTRUSIVE regions of the affected tank provides protection for the workers and minimizes activities that can produce an ignition source.

B.3

Required Action B.3 requires the primary tank leak detection system to be restored to OPERABLE status Immediately according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the annulus and tank and identify the necessary actions to restore because there is no MODE that the affected tank can enter to stop the generation of flammable gas or stop leakage from the primary tank to the annulus. In addition, the actions necessary to restore depend on many variables based on the existing tank conditions.

Previous Required Actions established as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented.

The activities allowed by the recovery plan are evaluated using the Unreviewed Safety Question (USQ) process prior to performance. The recovery plan may be revised to address new issues as they are identified during the restoration process. If approved emergency or abnormal administrative procedures exist that address the operations permitted for the existing tank conditions, including the initial conditions and precautions necessary to perform the operations in a safe manner, preparation of a separate recovery plan is not necessary.

(continued)

BASES

ACTIONS (continued)

The Note for Required Action B.3 permits activities (i.e., transfers, energizing equipment, and manned work activities) to be conducted according to the approved recovery plan that were prohibited by other Required Actions, provided the recovery plan determines these activities are essential to safe restoration.

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.2.6.1

A FUNCTIONAL TEST on each primary tank leak detection system is required every 182 days. This requires a FUNCTIONAL TEST of either the conductivity probe or the CAM system for each DST and AWF tank, depending on which is being used as the primary tank leak detection system. The Frequency of 182 days is based on operating experience and the maintenance recall system. The FUNCTIONAL TEST for the conductivity probe includes a VERIFICATION that no prior maintenance activities have adjusted the conductivity probe's placement. This ensures the probe is installed properly, such that it is capable of detecting a leak in a manner consistent with the assumptions in the calculation note WHC-SD-WM-CN-049. The FUNCTIONAL TEST also VERIFIES the alarm OPERABILITY for the conductivity probe or the CAM, whichever system is being used for the primary tank leak detection system.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

Kummerer, M., 1995, *Calculation of Flammable Gas Accumulation in DST Annulus From a Primary Tank Leak* (internal memo MK-8M400-95-001 to R. J. Van Vleet, Westinghouse Hanford Company, April 13), Westinghouse Hanford Company, Richland Washington.

WHC-SD-WM-CN-049, 1998, *Calculation Notes for Surface Leak Resulting in Pool, TWRS FSAR Accident Analysis*, Rev. 0-B, Duke Engineering and Services Hanford, Richland, Washington.

B 3.3 TEMPERATURE

B 3.3.1 SST WASTE Temperature Controls

BASES

BACKGROUND

Temperature controls in single-shell tanks (SSTs) consist of WASTE temperature limits and monitoring to ensure that temperatures necessary for potential tank bumps (including steam release events) and organic salt-nitrate reactions to occur are not exceeded. The primary source of tank heat is the ongoing radioactive decay in the WASTE. Exothermic chemical reactions may also contribute some heat. The temperatures in the tank materials and in the WASTE are related to the magnitude and distribution of the heat-generating components in the WASTE and are controlled by removing heat from the tank. None of the SSTs has received WASTE since 1980. Generally, the WASTE composition changes with time because of both radiolysis and other chemical reactions. The WASTE fuel energy content is therefore continuously decreasing with time because no new additions of WASTE or chemicals are taking place. The WASTE is aging to an overall less energetic state which means it is currently less likely to support a tank bump or an organic salt-nitrate reaction than the WASTE originally deposited in the tank.

The SST temperature monitoring systems that are available to provide information on WASTE temperatures each consist of a temperature sensing device (thermocouple) and a temperature display system. The electrical distribution system (support system) provides power to the transmitters and display systems. Continuous electrical power is not required. Electrical power is not required if a hand held battery operated temperature monitoring instrument is used.

A thermocouple consists of two wires of dissimilar metals welded together into a sensing junction. At the other end of the signal wires is another junction called the reference junction. Heating the sensing junction generates a thermoelectric voltage that is proportional to the temperature differences between the two junctions. This millivolt signal when compensated for the known temperature of the reference junction, indicates the temperature in the WASTE at the point where the sensing junction is located.

(continued)

BASES

BACKGROUND (continued)

Thermocouples used in the tank farms are designated as type J, K, or L depending on the materials used to create the dissimilar metal junctions. Each SST covered by this LCS/LCO contains one or more thermocouple trees. Each thermocouple tree is equipped with four to 18 thermocouples per tree. The thermocouples are placed at various levels within the tank, with the first one usually about 4 in. (some are about 10 in.) from the bottom of the tank and the others at about 2-ft intervals.

The temperature display system consists of a device that performs reference junction temperature correction and converts the analog millivolt signal from the thermocouple element to a digital value for display. The three basic types of temperature display systems used in the tank farms include (1) Temperature Monitoring and Control System (TMACS), (2) hand-held temperature display system, and (3) panel-mounted temperature display system.

The TMACS temperature display system consists of a microprocessor-based system that receives and displays remote digital temperature signals sent via modem from field located analog to digital convertors (ACROMAGS). The TMACS continuously monitors WASTE temperatures and provides real time graphics depicting the status of the WASTE temperatures. The hand-held temperature display system consists of a hand-held monitor which can be plugged directly into the thermocouple signal wires in the field and displays the temperature reading. The panel-mounted temperature display system consists of a digital temperature display system permanently mounted on instrument panels near or in the tank farm. Any one of these three temperature display systems can be used to VERIFY WASTE temperatures.

The temperature monitoring systems are also described in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 2.0, "Facility and Process Description." Controls to ensure the availability and capability of instrumentation and equipment to provide reliable VERIFICATION of process parameters are included in AC 5.19, "Process Instrumentation and Measuring and Test Equipment."

BASES

APPLICABLE SAFETY ANALYSES

SST WASTE temperature controls are required for three accident scenarios: (1) Tank Bump, (2) Organic Salt-Nitrate Reaction, and (3) Unfiltered Release (Waste Retrieval Sluicing System operations).

Tank Bump

Tank bump scenarios are analyzed in calculation notes (WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code* and WHC-SD-WM-CN-043, *Tank Bump Consequence Analysis*) and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines.

For Waste Retrieval Sluicing System (WRSS) operations, tank bump scenarios are analyzed in calculation note HNF-SD-WM-CN-098, *Consequences of a Postulated Tank Bump Related to Project W-320*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," Chapter 3.0, "Hazard Evaluations and Accident Analyses." Based on the results of the WRSS analysis, the unmitigated release of radiological material could exceed offsite and onsite risk guidelines and onsite toxicological risk guidelines.

The safety function of the temperature monitoring systems is to provide tank WASTE temperature information for operator monitoring, enabling operators to take actions necessary to prevent exceeding temperatures at which significant tank bumps or steam release events could occur, thus decreasing the likelihood of the accident.

A tank bump is a rapid steam pressurization of the WASTE tank headspace resulting in the release of radiological and toxicological material. Tank bumps (WASTE thermal rollovers) could occur in SSTs, double-shell tanks (DSTs), and aging waste facility (AWF) tanks that contain sludge (mostly a mixture of solid WASTE and interstitial liquid) with sufficient heat load to allow the sludge or solids to heat up above the local saturation temperature of the liquid WASTE. In addition, sufficient hydrostatic head exists to promote storage of thermal energy in the sludge.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

A steam release is a pressurization of a lesser magnitude than a tank bump and is bounded by the analyzed tank bump accident. Both result in a pressurization in the WASTE; however, a steam release involves localized interstitial liquid that heats up and releases a smaller aerosol fraction of the WASTE, whereas a tank bump involves the entire WASTE (thermal rollover). In a postulated steam release scenario, there is less hydrostatic head (i.e., pressure caused by the weight of the liquid over the solids). Therefore, with less hydrostatic head, there is less pressure and energy involved in the release. A steam release can also result because of the sudden boiling of cold liquid added to a tank with hot solid WASTE.

Temperature controls to prevent a tank bump in SSTs are the subject of this LCS/LCO. Temperature controls to prevent a tank bump in DSTs and AWF tanks are included in LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls." WASTE compatibility evaluations to ensure that controls are applied to the final state of pumped and receiving tanks prior to transfers are included in AC 5.12, "Transfer Controls."

Organic Salt-Nitrate Reaction

In addition to providing protection against the postulated tank bump accident, this LCS/LCO also provides protection against a postulated "chemical runaway" accident. Organic salt-nitrate reaction scenarios are analyzed in calculation note WHC-SD-WM-CN-058, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reaction Safety Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines.

The safety function of the temperature monitoring systems is to provide tank WASTE temperature information for operator monitoring, enabling operators to take actions necessary to prevent exceeding temperatures at which organic salt-nitrate reactions could proceed, thus decreasing the likelihood of the accident.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

In this postulated accident scenario, tank ventilation (active cooling) is lost and the WASTE temperature is allowed to increase because of radioactive decay heat until a sufficiently high temperature that initiates a "runaway" chemical reaction is reached. Past tank farm operating experience and experimental data indicate that significant chemical heating would not occur until temperatures significantly above the WASTE saturation temperature (discussed above for tank bump) are reached. Until this chemical phenomena and its threshold temperature are better understood and defined, this LCS/LCO serves to prevent this postulated accident. Active ventilation provides additional Defense-in-Depth to prevent this accident.

Temperature controls to prevent a "chemical runaway" reaction in SSTs are the subject of this LCS/LCO. Temperature controls to prevent a "chemical runaway" reaction in DSTs and AWF tanks are included in LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls. Ignition controls to prevent localized heating of the WASTE are included in AC 5.10, "Ignition Controls." Emergency response controls are included in AC 5.14, "Emergency Preparedness." Controls to prevent removal of moisture in the WASTE are included in AC 5.15, "Moisture Controls." Controls to reduce the consequences from a potential HEPA filter failure are included in AC 5.18, "HEPA Filter Controls." WASTE compatibility evaluations to ensure that controls are applied to the final state of pumped and receiving tanks prior to transfers are included in AC 5.12, "Transfer Controls."

<u>Unfiltered Release</u> (Waste Retrieval Sluicing System operations)

Unfiltered release scenarios for various failures of the WRSS existing (296-P-16) or new (296-C-06) ventilation systems are analyzed in HNF-SD-WM-SAR-067, Addendum 1, and the results of the analysis are presented in Chapter 3.0 of the Addendum. Based on the results of the overheating scenarios the unmitigated release of radiological material could exceed onsite risk guidelines. Temperature controls are credited in the analysis to prevent the overheating scenarios. For WRSS operations, controls for the Tank 241-C-106 ventilation system are included in AC 5.25, "Ventilation Controls."

BASES

LCS/LCO

Tank Bump, Organic Salt-Nitrate Reaction, and Unfiltered Release (Waste Retrieval Sluicing System operations)

The WASTE temperature in each tank is required to be ≤ 205 °F to prevent a tank bump, which also protects SL 2.1.1, "WASTE Temperature," to prevent an organic salt-nitrate reaction initiated by a "chemical runaway" reaction. For the organic reaction, the LCS/LCO limit of ≤ 205 °F is not required by the analysis to automatically actuate a protective action to protect the SL limit of ≤ 250 °F, because exceedence of the LCS/LCO limit leaves the operator sufficient time to take manual protective actions to prevent exceeding the SL.

The LCS/LCO limit represents the instrument (measured) value and provides a safety margin to the actual saturation temperature of the liquid WASTE at atmospheric pressure, which is between 220 °F and 230 °F, based on the dissolved salt content of the WASTE. The saturation temperature is the temperature that represents the onset of tank bump conditions (i.e., the generation of steam).

The LCS/LCO limit of ≤ 205 °F has been adjusted by a total of 15 °F. The adjustment includes a 5 °F margin to allow time to detect and respond to a temperature increase before the WASTE reaches the temperature at which a tank bump can occur and a 10 °F margin to account for instrument and calibration accuracies and potential thermocouple degradation.

The LCS/LCO limit of ≤ 205 °F was also selected to minimize the effect on normal operating conditions because temperatures as high as 200 °F have been observed in at least one of the SSTs covered by this LCS/LCO.

To provide information on WASTE temperatures, the thermocouple tree must be properly installed for the intended service. The LCS/LCO limit of ≤ 205 °F applies to every available functional thermocouple throughout the WASTE. At least one functional thermocouple located in the range of 2-5 ft from the bottom of the tank is judged to be sufficient to provide operators with information to VERIFY WASTE temperature.

(continued)

BASES

LCS/LCO (continued)

It is recognized that there is a radial temperature distribution in the tank. The position of the thermocouple tree within the tank is not significant to temperature measurement because of the conservative assumptions in the accident analysis. The bounding accident consequences were based on the entire sludge volume being saturated with steam and being released in total through the entire supernatant volume, which was assumed to be at or near the saturation temperature (WHC-SD-WM-CN-022). These assumptions allowed calculation of the bounding event but are very conservative. If portions of the tank not covered by a thermocouple element have localized heating, any potential steam release would be significantly below the bounding consequences because of the smaller volumes. Also, consequences would be reduced from any small localized heating because the small steam releases would minimize solids carryover into the air stream, which contributed to the majority of the dose consequences. Lastly, the majority of the SST topography (see Process Area Applicability) is not considered wet enough nor having sufficient confinement phenomena (e.g., supernatant head, thickened sludge) to match the assumed accident of total sludge saturation.

Functional requirements of the temperature monitoring systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements of the temperature monitoring systems may be found in administrative procedures. Programmatic controls for the systems used to VERIFY WASTE temperature are included in AC 5.19, "Process Instrumentation and Measuring and Test Equipment."

MODE APPLICABILITY

LCS/LCO 3.3.1 applies at all times (i.e., during OPERATION and LIMITED MODES) because exceeding the WASTE temperature is possible in both MODES. Inadequate cooling in either MODE over time could result in temperatures in the stored WASTE outside the limit.

BASES

PROCESS AREA APPLICABILITY

Tank Bump

LCS/LCO 3.3.1 applies to the following nine SSTs for the analyzed tank bump accident:

- 241-C-106, prior to start of WRSS operations
- 241-SX-103
- 241-SX-107 through 241-SX-112
- 241-SX-114

These SSTs all contain sludge and have estimated heat loads > 26,000 Btu/h such that temperatures at or above the local saturation temperature could result from an extended ventilation outage. Therefore, they contain the initial conditions for a tank bump. The tanks in the SX and C tank farms contain less water on top of the WASTE than double-shell tanks (DSTs) and are less likely to generate the large volumes of steam required for a large tank bump. However, they could still generate and release significant quantities of steam.

Temperature controls for Tank 241-C-106 during and after WRSS operations to prevent tank bump and liner breach accidents are included in AC 5.26, "Tank 241-C-106 WASTE Temperature Controls."

Organic Salt-Nitrate Reaction

LCS/LCO 3.3.1 applies to the same nine SSTs above for the tank bump accident. These SSTs all have estimated heat loads > 26,000 Btu/h such that temperatures at or above the temperature limit could result from an extended ventilation outage. This LCS/LCO conservatively applies to tanks 241-C-106 and 241-SX-108, even though the WASTE in these tanks has low organic fuel and is judged to be non-combustible without consideration of WASTE moisture. The tank with the highest heat load (Tank 241-C-106) also receives periodic water additions to help cool it.

Past tank farm operating experience and experimental data indicate that significant chemical heating is not occurring in non-ventilated tanks.

(continued)

BASES

PROCESS AREA APPLICABILITY (continued)

Unfiltered Release (Waste Retrieval Sluicing System operations)

LCS/LCO 3.3.1 applies to Tank 241-C-106 prior to start of WRSS operations to prevent an unfiltered release. Temperature controls for Tank 241-C-106 during and after WRSS operations to prevent an unfiltered release are included in AC 5.26, "Tank 241-C-106 WASTE Temperature Controls."

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCS/LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1, A.2, A.3, and A.4

If the WASTE temperature is > 205 °F, conditions for a tank bump or an organic salt-nitrate reaction could be developing. Heat removal methods have not been successful in keeping the temperature within the limit. Performance of Required Actions A.1, A.2, A.3, and A.4 establishes a safe condition for the affected tank Immediately to minimize the potential for a tank bump or an organic reaction and provides some mitigation if an event did occur.

Required Action A.1 requires all transfers from the affected tank to be stopped Immediately to minimize further WASTE temperature increases (i.e., water reduction, pump heat). The Note for Required Action A.1 allows for transfer system draining and flushing after the transfer of WASTE has been stopped. Transfer system draining and flushing are performed according to administrative procedures and involve limited quantities of WASTE and flush water (about 100 gal). These activities are insignificant contributors to the hydrostatic head (less than 1 in.) and energetics of a tank bump.

(continued)

BASES

ACTIONS (continued)

Required Action A.2 requires all activities capable of causing penetration of the WASTE and water additions be stopped Immediately (except transfer system draining and flushing discussed in A.1). The SSTs covered by this LCS/LCO contain mostly sludge and have little or no supernatant (mostly liquid) floating on the surface of the WASTE, except in Tank 241-C-106, which has normal, periodic water additions. Therefore, any activity that penetrates the WASTE is assumed to penetrate the sludge. Stopping activities that could penetrate the sludge removes the physical mechanisms that could lead to a tank bump (i.e., provide the stored steam with a release path or aid in the buoyancy of the sludge).

Stopping water additions minimizes the potential for sudden boiling caused by adding cold water to hot WASTE. Normal water additions currently are permitted only to Tank 241-C-106 and can be a significant contributor to the hydrostatic head (about 11 in.). When there is enough hydrostatic head, the sludge or solids can heat up above the local saturation temperature of the liquid WASTE.

Required Action A.3 requires a VERIFICATION that cover blocks are installed on pits that are connected to the headspace of the affected tank. The pits provide a leakage path when the cover blocks are not in place. Cover blocks are normally in place, but are removed for maintenance, WASTE transfer routing changes, surveillances, or other activities. The cover blocks provide Defense-in-Depth by mitigating the potential release of radiological and toxicological material during a tank overpressurization event.

Required Action A.4 requires a VERIFICATION that the active ventilation system is operating and that ventilation flow paths are open for the affected tank. If the ventilation system is not operating, actions are necessary to start the system. The active ventilation system removes heat from the tank headspace. The VERIFICATION ensures that ventilation dampers are open and that inlet filters are not blocked by VERIFYING differential pressure readings from available gauges.

(continued)

BASES

ACTIONS (continued)

A.5

Required Action A.5 requires the tank to be restored to a safe condition by restoring WASTE temperature to ≤ 205 °F Immediately, according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the tank and to identify the necessary actions for restoring the temperature limit. There is no MODE that the affected tank can enter to exit the temperature requirements of the LCS/LCO, and the actions necessary to restore the temperature depend on many variables based on the existing tank conditions.

With the WASTE temperature > 205 °F, a tank bump or an organic salt-nitrate reaction could occur. Required Actions A.1, A.2, A.3, and A.4 establish as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented.

The Note for Required Action A.5 permits activities (e.g., transfers, water additions, cover block removal) according to a contractor-approved recovery plan that were prohibited by other Required Actions provided the recovery plan determines these activities are essential to the safe restoration of the tank temperature. For example, the recovery plan may determine that water additions to Tank 241-C-106 (stopped by Required Action A.2) is now necessary to restore temperature.

This is acceptable because previous Required Actions established as safe and stable a condition as possible until the appropriate restoration actions were determined for the existing tank conditions and could be implemented. Water additions to Tank 241-C-106 may be the most effective way to reduce temperature, and the recovery plan controls the method of addition to minimize the potential for sudden boiling caused by adding cold liquid to hot WASTE.

(continued)

BASES

ACTIONS (continued)	The activities allowed by the recovery plan are evaluated using the Unreviewed Safety Question (USQ) process prior to performance. The recovery plan may be revised to address new issues as they are identified during the restoration process. If approved emergency or abnormal administrative procedures that address the operations permitted for the existing tank conditions exist, including the initial conditions and precautions necessary to perform the operations in a safe manner, preparation of a separate recovery plan is not necessary.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCS/LCO. For this situation, entry into the LCS/LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.3.1.1

This Surveillance is required to VERIFY that the WASTE temperature is ≤ 205 °F. The Surveillance collects information on WASTE temperatures and provides indication of the status of the temperature monitoring systems (e.g., the thermocouples are sensing temperatures and are reporting to a display system). The Surveillance also includes an evaluation of the displayed temperature data. The collected and analyzed temperature data provides information on WASTE temperature profiles and trends within a tank and can identify an accumulation of solids or "hot spots."

The Frequency of 10 days to VERIFY temperature is based on the rate of temperature rise for the most limiting SST covered by this LCS/LCO, which is 0.33 °F/day for Tank 241-C-106 (WHC-WM-SD-CN-043) and the 5 °F margin included between the LCS/LCO temperature limit (205 °F) and the temperature at which a tank bump event could occur (210 °F adjusted for instrument uncertainties). Therefore, with an assumed beginning temperature of 205 °F, it would take more than 15 days to reach 210 °F, based on the bounding rate of temperature rise of 0.33 °F/day (5 °F ÷ 0.33 °F/day = 15.2 days). The Frequency of 10 days establishes a conservative margin to the more than 15 days required to reach the LCS/LCO temperature limit, and allows operators the time to detect and respond to a temperature increase before reaching the temperature at which a tank bump could occur.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

Generally, temperatures change slowly upon the loss of active ventilation. When the active ventilation system for Tank 241-C-106 was inoperable for about 5 months at the beginning of 1992, the peak temperature rose from 155 °F to 197 °F. In fact, the rate of temperature increase is expected to decrease with time, approaching equilibrium with the surrounding environment as the tank system approaches steady state. This is because the tank would eject more heat to the surroundings as its temperature increases.

Normally the WASTE temperature in each tank fluctuates throughout the year (typically highest during October and lowest during April), which can result in a seasonal variation not expected to exceed 10 °F. At 191.1 °F, Tank 241-SX-108 has the highest estimated operating temperature of the SSTs covered by this LCS/LCO (WHC-SD-WM-SARR-010, *Heat Removal Characteristics of Waste Storage Tanks*). Temperatures have been observed to be as high as 200 °F because of seasonal variation. Therefore, with an assumed beginning temperature of 200 °F, it would take about 29 days to reach 205 °F with no active ventilation, based on a rate of temperature rise of 0.17 °F/day for Tank 241-SX-108 (WHC-SD-WM-CN-043). Tank 241-C-106 has a normal operating temperature of 153.5 °F with active ventilation (WHC-SD-WM-SARR-010). Therefore, with an assumed beginning temperature of 163.5 °F because of seasonal variation, and based on the Tank 241-C-106 rate of temperature rise of 0.33 °F/day (WHC-SD-WM-CN-043), it would take about 126 days to reach 205 °F if ventilation were lost. Based on normal operating temperatures and the slow temperature rises, it is expected the increasing temperature trend would be detected within the 10-day Surveillance Frequency interval and be corrected well before the LCS/LCO temperature limit would be approached.

BASES

REFERENCES

HNF-SD-WM-CN-098, 1997, *Consequences of a Postulated Tank Bump Related to Project W-320*, Rev. 0, Fluor Daniel Northwest, Inc., Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-043, 1996, *Tank Bump Consequence Analysis*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-058, 1996, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reactions Safety Analysis*, Rev. 0-a, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-SARR-010, 1995, *Heat Removal Characteristics of Waste Storage Tanks*, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

B 3.3 TEMPERATURE

B 3.3.2 DST and AWF Tank WASTE Temperature Controls

BASES

BACKGROUND

Temperature controls in double-shell tanks (DSTs) and aging waste facility (AWF) tanks consist of WASTE temperature limits and monitoring to ensure that temperatures necessary for potential tank bumps (including steam release events) and organic salt-nitrate reactions to occur are not exceeded. The primary source of tank heat is the ongoing radioactive decay in the WASTE. Exothermic chemical reactions may also contribute some heat. Other heat sources include installed energy-generating devices or transfers of high-temperature WASTE into the tank. WASTE transfers are routinely made to and from tank farm storage tanks, chemical processing facilities, and related operational UNITs (e.g., receiver vaults, evaporators). Insufficient mixing associated with WASTE transfers can lead to thermal layering in the tanks and temperature gradients between layers. The temperatures in the tank materials and in the WASTE are related to the magnitude and distribution of the heat-generating components in the WASTE and are controlled by removing heat from the tank.

The DST and AWF tank temperature monitoring systems that are available to provide information on WASTE temperatures each consist of a temperature sensing device (thermocouple) and a temperature display system. The electrical distribution system (support system) provides power to the transmitters and display systems. Continuous electrical power is not required. Electrical power is not required if a hand held battery operated temperature monitoring instrument is used.

A thermocouple consists of two wires of dissimilar metals welded together into a sensing junction. At the other end of the signal wires is another junction called the reference junction. Heating the sensing junction generates a thermoelectric voltage that is proportional to the temperature differences between the two junctions. This millivolt signal when compensated for the known temperature of the reference junction, indicates the temperature in the WASTE at the point where the sensing junction is located.

(continued)

BASES

BACKGROUND (continued)

Thermocouples used in the tank farms are designated as type J, K, or L depending on the materials used to create the dissimilar metal junctions. Each DST and AWF tank covered by this LCS/LCO contains one or more thermocouple trees. Each thermocouple tree is equipped with four to 18 thermocouples per tree. The thermocouples are placed at various levels within the tank, with the first one usually about 4 in. (some are about 10 in.) from the bottom of the tank and the others at about 2-ft intervals.

Temperature monitoring systems in some DST and AWF tanks also include multi-function instrument trees (MITs). The MIT includes thermocouples and vapor probe chambers for vapor sampling. The MIT contains 27 thermocouples evenly spaced at different heights, from the bottom of the tank up into the tank headspace.

The temperature display system consists of a device that performs reference junction temperature correction and converts the analog millivolt signal from the thermocouple element to a digital value for display. The three basic types of temperature display systems used in the tank farms include (1) Temperature Monitoring and Control System (TMACS), (2) hand-held temperature display system, and (3) panel-mounted temperature display system.

The TMACS temperature display system consists of a microprocessor-based system that receives and displays remote digital temperature signals sent via modem from field located analog to digital convertors (ACROMAGS). The TMACS continuously monitors WASTE temperatures and provides real time graphics depicting the status of the WASTE temperatures. The hand-held temperature display system consists of a hand-held monitor which can be plugged directly into the thermocouple signal wires in the field and displays the temperature reading. The panel-mounted temperature display system consists of a digital temperature display system permanently mounted on instrument panels near or in the tank farm. Any one of these three temperature display systems can be used to VERIFY WASTE temperatures.

(continued)

BASES

BACKGROUND (continued)	The temperature monitoring systems are also described in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 2.0, "Facility and Process Description." Controls to ensure the availability and capability of instrumentation and equipment to provide reliable VERIFICATION of process parameters are included in AC 5.19, "Process Instrumentation and Measuring and Test Equipment."

BASES

APPLICABLE SAFETY ANALYSES

DST and AWF tank WASTE temperature controls are required for three accident scenarios: (1) Tank Bump, (2) Organic Salt-Nitrate Reaction, and (3) Unfiltered Release (Waste Retrieval Sluicing System operations).

Tank Bump

Tank bump scenarios are analyzed in calculation notes (WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code* and WHC-SD-WM-CN-043, *Tank Bump Consequence Analysis*) and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines.

For Waste Retrieval Sluicing System (WRSS) operations, tank bump scenarios are analyzed in calculation note HNF-SD-WM-CN-098, *Consequences of a Postulated Tank Bump Related to Project W-320*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," Chapter 3.0, "Hazard Evaluations and Accident Analyses." Based on the results of the WRSS analysis, the unmitigated release of radiological material could exceed offsite and onsite risk guidelines and onsite toxicological risk guidelines.

The safety function of the temperature monitoring systems is to provide tank WASTE temperature information for operator monitoring, enabling operators to take actions necessary to prevent exceeding temperatures at which significant tank bumps or steam release events could occur, thus decreasing the likelihood of the accident.

A tank bump is a rapid steam pressurization of the WASTE tank headspace resulting in the release of radiological and toxicological material. Tank bumps (WASTE thermal rollovers) could occur in SSTs, double-shell tanks (DSTs), and aging waste facility (AWF) tanks that contain sludge (mostly a mixture of solid WASTE and interstitial liquid) with sufficient heat load to allow the sludge or solids to heat up above the local saturation temperature of the liquid WASTE. In addition, sufficient hydrostatic head exists to promote storage of thermal energy in the sludge.

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BASES

APPLICABLE SAFETY ANALYSES (continued)

A steam release is a pressurization of a lesser magnitude than a tank bump and is bounded by the analyzed tank bump accident. Both result in a pressurization in the WASTE; however, a steam release involves localized interstitial liquid that heats up and releases a smaller aerosol fraction of the WASTE, whereas a tank bump involves the entire WASTE (thermal rollover). In a postulated steam release scenario, there is less hydrostatic head (i.e., pressure caused by the weight of the liquid over the solids). Therefore, with less hydrostatic head, there is less pressure and energy involved in the release. A steam release can also result because of the sudden boiling of cold liquid added to a tank with hot solid WASTE and because of air agitation of a hot solids/sludge layer.

Temperature controls to prevent a tank bump in DSTs and AWF tanks are the subject of this LCS/LCO. Temperature controls to prevent a tank bump in SSTs are included in LCS/LCO 3.3.1, "SST WASTE Temperature Controls." WASTE compatibility evaluations to ensure that controls are applied to the final state of pumped and receiving tanks prior to transfers are included in AC 5.12, "Transfer Controls." For WRSS operations, controls for the annulus ventilation system in Tank 241-AY-102 are included in AC 5.25, "Ventilation Controls" and LCO 3.3.3 "Tank 241-AY-102 Annulus Ventilation System."

Organic Salt-Nitrate Reaction

In addition to providing protection against the postulated tank bump accident, this LCS/LCO also provides protection against a postulated "chemical runaway" accident. Organic salt-nitrate reaction scenarios are analyzed in calculation note WHC-SD-WM-CN-058, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reaction Safety Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines.

The safety function of the temperature monitoring systems is to provide tank WASTE temperature information for operator monitoring, enabling operators to take actions necessary to prevent exceeding temperatures at which organic salt-nitrate reactions could proceed, thus decreasing the likelihood of the accident.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

In this postulated accident scenario, tank ventilation (active cooling) is lost and the WASTE temperature is allowed to increase because of radioactive decay heat until a sufficiently high temperature that initiates a "runaway" chemical reaction is reached. Past tank farm operating experience and experimental data indicate that significant chemical heating would not occur until temperatures significantly above the WASTE saturation temperature (discussed above for tank bump) are reached. Until this chemical phenomena and its threshold temperature are better understood and defined, this LCS/LCO serves to prevent this postulated accident. Active ventilation provides additional Defense-in-Depth to prevent this accident.

Temperature controls to prevent a "chemical runaway" reaction in DSTs and AWF tanks are the subject of this LCS/LCO. Temperature controls to prevent a "chemical runaway" reaction in SSTs are included in LCS/LCO 3.3.1, "SST WASTE Temperature Controls. Ignition controls to prevent localized heating of the WASTE are included in AC 5.10, "Ignition Controls." Emergency response controls are included in AC 5.14, "Emergency Preparedness." Controls to prevent removal of moisture in the WASTE are included in AC 5.15, "Moisture Controls." Controls to reduce the consequences from a potential HEPA filter failure are included in AC 5.18, "HEPA Filter Controls." WASTE compatibility evaluations to ensure that controls are applied to the final state of pumped and receiving tanks prior to transfers are included in AC 5.12, "Transfer Controls."

<u>Unfiltered Release</u> (Waste Retrieval Sluicing System operations)

Unfiltered release scenarios for various failures of the WRSS existing (296-P-16) or new (296-C-06) ventilation systems are analyzed in HNF-SD-WM-SAR-067, Addendum 1, and the results of the analysis are presented in Chapter 3.0 of the Addendum. Based on the results of the overheating scenarios the unmitigated release of radiological material could exceed onsite risk guidelines. Temperature controls are credited in the analysis to prevent the overheating scenarios.

BASES

LCS/LCO

Tank Bump, Organic Salt-Nitrate Reaction, and Unfiltered Release (Waste Retrieval Sluicing System operations)

The WASTE temperature in each tank is required to be either ≤ 195 °F in all levels of the WASTE, or ≤ 195 °F in the top 15 ft of the WASTE and ≤ 215 °F in the WASTE below 15 ft to prevent a tank bump, which also protects SL 2.1.1, "WASTE Temperature," to prevent an organic salt-nitrate reaction initiated by a "chemical runaway" reaction. For the organic reaction, the LCS/LCO limits are not required by the analysis to automatically actuate a protective action to protect the SL limit of ≤ 250 °F, because exceedence of the LCS/LCO limits leaves the operator sufficient time to take manual protective actions to prevent exceeding the SL. The LCS/LCO limit of ≤ 195 °F in all levels of the WASTE is an optional LCS/LCO requirement for tanks with less than 15 ft of WASTE and/or where WASTE temperatures are expected to remain well below 200 °F. The other optional LCS/LCO requirement based on WASTE level considers that most DSTs have a large hydrostatic head and that higher saturation temperatures can be assumed at WASTE depths greater than 15 ft (WHC-SD-WM-CN-043).

The LCS/LCO limits represent the instrument (measured) values and provide a safety margin to the actual saturation temperatures of the liquid WASTE (220 °F at atmospheric pressure for the supernatant, based on the dissolved salt content of the WASTE). The saturation temperature is the temperature that represents the onset of tank bump conditions (i.e., the generation of steam).

The LCS/LCO limit of ≤ 195 °F has been adjusted by a total of 25 °F. The adjustment includes a 15 °F margin to allow time to detect and respond to a temperature increase before the WASTE reaches the temperature at which a tank bump can occur and a 10 °F margin to account for instrument and calibration accuracies and potential thermocouple degradation. The 15 °F margin allows operations adequate time (about 16 days) to detect and respond to a temperature increase because of the bounding assumed heatup rate of 0.9 °F/day for Tank 241-AZ-101 (WHC-SD-WM-CN-043).

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BASES

LCS/LCO (continued)

The LCS/LCO limit of ≤ 215 °F has also been adjusted by a total of 25 °F for the same reasons discussed above. Additionally, the LCS/LCO limit of ≤ 215 °F was selected to minimize the effect on normal operating conditions because temperatures as high as 210 °F are anticipated for future WASTE transfers into AWF tanks.

To provide information on WASTE temperatures, the thermocouple tree or MIT must be properly installed for the intended service. The LCS/LCO limits of ≤ 195 °F and ≤ 215 °F apply to every available functional thermocouple in the applicable level of WASTE. If WASTE temperature is VERIFIED per LCS/LCO 3.3.2a, then at least one functional thermocouple located in the range of 2-5 ft from the bottom of the tank is judged to be sufficient to provide operators with information to VERIFY WASTE temperature. If WASTE temperature is VERIFIED per LCS/LCO 3.3.2b, at least one functional thermocouple located in the top level of the WASTE and one located in the WASTE in the range of 2-5 ft from the bottom of the tank is judged to be sufficient to provide operators with information to VERIFY WASTE temperature.

It is recognized that there is a radial temperature distribution in the tank. The position of the thermocouple tree within the tank is not significant to temperature measurement because of the conservative assumptions in the accident analysis. The bounding accident consequences were based on the entire sludge volume being saturated with steam and being released in total through the entire supernatant volume, which was assumed to be at or near the saturation temperature (WHC-SD-WM-CN-022). These assumptions allowed calculation of the bounding event but are very conservative. If portions of the tank not covered by a thermocouple element have localized heating, any potential steam release would be significantly below the bounding consequences because of the smaller volumes. Also, consequences would be reduced from any small localized heating because the small steam releases would minimize solids carryover into the air stream, which contributed to the majority of the dose consequences. One additional conservatism is that most DST and AWF tanks have liquid levels over the

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BASES

LCS/LCO (continued)

solids/sludge layers. Steam releases within the solids/sludge layers would be condensed by the overlaying liquid until all of the liquid is at or near the boiling temperature. Therefore, there would be no steam releases until the tank was at or near boiling (WHC-SD-WM-CN-022). For WRSS operations, condensation in the overlaying liquid layer was conservatively neglected for Tank 241-AY-102 (HNF-SD-WM-CN-098).

Functional requirements of the temperature monitoring systems are also defined in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components." Detailed functional requirements of the temperature monitoring systems may be found in administrative procedures. Programmatic controls for the systems used to VERIFY WASTE temperature and level are included in AC 5.19, "Process Instrumentation and Measuring and Test Equipment."

MODE APPLICABILITY

LCS/LCO 3.3.2 applies at all times (i.e., during OPERATION and LIMITED MODES) because exceeding the WASTE temperature is possible in both MODES. Inadequate cooling in either MODE over time could result in temperatures in the stored WASTE outside the limits.

PROCESS AREA APPLICABILITY

Tank Bump

LCS/LCO 3.3.2 applies to all DSTs and AWF tanks for the analyzed tank bump accident. These tanks all contain (or may receive) sludge and have (or may achieve) estimated heat loads > 26,000 Btu/h such that temperatures at or above the local saturation temperature could result from an extended ventilation outage. Therefore, they could contain the initial conditions for a tank bump.

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BASES

PROCESS AREA APPLICABILITY (continued)

Organic Salt-Nitrate Reaction

LCS/LCO 3.3.2 applies to all DSTs and AWF tanks for the analyzed organic salt-nitrate reaction accident. The DSTs and AWF tanks all have (or may achieve) estimated heat loads > 26,000 Btu/h such that temperatures at or above the temperature limits could result from an extended ventilation outage. The LCS/LCO conservatively applies to these tanks even though they have supernatant above the WASTE solids level, which is judged to preclude an organic salt-nitrate reaction.

Past tank farm operating experience and experimental data indicate that significant chemical heating is not occurring in non-ventilated tanks.

Unfiltered Release (Waste Retrieval Sluicing System operations)

LCS/LCO 3.3.2 applies to Tank 241-AY-102 during and after WRSS operations.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCS/LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1, A.2, A.3, A.4, and A.5

If the WASTE temperature is outside limits for the applicable level, conditions for a tank bump or an organic salt-nitrate reaction could be developing. Heat removal methods have not been successful in keeping the temperature within limits. Performance of Required Actions A.1, A.2, A.3, A.4, and A.5 establishes a safe condition for the affected tank Immediately to minimize the potential for a tank bump or an organic reaction and provides some mitigation if an event did occur.

Required Action A.1 requires all transfers to and from the affected tank to be stopped Immediately to minimize further WASTE temperature increases (i.e., transfers of high-temperature WASTE into the tank, pump heat). The Note for Required Action A.1 allows for transfer system draining and flushing after the transfer of WASTE has been stopped. Transfer system draining and flushing are performed according to administrative procedures and involve limited quantities of WASTE and flush water (about 100 gal). These activities are insignificant contributors to the hydrostatic head (less than 1 in.) and energetics of a tank bump.

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BASES

ACTIONS (continued)

Required Action A.2 requires all activities capable of causing penetration of the WASTE be stopped Immediately (except transfer system draining and flushing discussed in A.1). Stopping activities that could penetrate the sludge removes the physical mechanisms which could lead to a tank bump (i.e., provide the stored steam with a release path or aid in the buoyancy of the sludge). Use of air lift circulators (with a slow, controlled startup) has been proven to mitigate tank bumps, and this control (LCO 3.3.4, "Tank 241-AZ-101 Air Lift Circulators") provides the additional prevention necessary to compensate for the added heat resulting from the Tank 241-AZ-101 mixer pump test. Therefore, use of the air lift circulators per LCO 3.3.4 during the Tank 241-AZ-101 mixer pump test is excepted from Required Action A.2.

Required Action A.3 requires shutting off all significant heat-generating equipment within the WASTE except equipment used to monitor tank and WASTE conditions. Significant heat-generating equipment not associated with monitoring includes mixer pumps (air lift circulators are insignificant heat contributors). It should be noted that a tank bump could be induced upon "startup" of mixer pumps or air lift circulators, if conditions are conducive to a tank bump. Startup of WASTE mixing equipment is controlled by administrative procedures to prevent abrupt heatup of the entire WASTE to the local saturation temperature.

Monitoring equipment includes WASTE temperature and level measurement devices, TV cameras, and in-situ lighting. These equipment have low power electrical circuits and are also insignificant heat contributors.

Required Action A.4 requires a VERIFICATION that cover blocks are installed on pits that are connected to the headspace of the affected tank. The pits provide a leakage path when the cover blocks are not in place. Cover blocks are normally in place, but are removed for maintenance, WASTE transfer routing changes, surveillances, or other activities. The cover blocks provide Defense-in-Depth by mitigating the potential release of radiological and toxicological material during a tank overpressurization event.

(continued)

BASES

ACTIONS (continued)

Required Action A.5 requires a VERIFICATION that the primary tank active ventilation system is operating and that ventilation flow paths are open for the affected tank. If the ventilation system is not operating, actions are necessary to start the system. The primary tank active ventilation system removes heat from the tank headspace. The VERIFICATION ensures that the ventilation system is operating by checking tank pressures and high-efficiency particulate air (HEPA) filter differential pressure readings.

A.6

Required Action A.6 requires a VERIFICATION that the annulus ventilation system is operating for Tank 241-AY-102 when it is the affected tank. If the annulus ventilation system is not operating, actions are necessary to start the system. The annulus ventilation system is the primary method for heat removal for Tank 241-AY-102 after more than 2 ft of sludge have been transferred from Tank 241-C-106 (removes heat from the sides and bottom of the tank). The VERIFICATION ensures that the annulus ventilation system is operating by performing SR 3.3.3.1 immediately.

A.7

Required Action A.7 requires the tank to be restored to a safe condition by restoring WASTE temperature to within limits Immediately, according to a contractor-approved recovery plan. A recovery plan is necessary to evaluate the current status of the tank and to identify the necessary actions for restoring the temperature limit. There is no MODE that the affected tank can enter to exit the temperature requirements of the LCS/LCO, and the actions necessary to restore the temperature depend on many variables based on the existing tank conditions.

With the WASTE temperature outside limits, a tank bump or an organic salt-nitrate reaction could occur. Required Actions A.1, A.2, A.3, A.4, A.5, and A.6 establish as safe and stable a condition in the tank as possible until the appropriate restoration actions can be identified and implemented.

(continued)

BASES

ACTIONS (continued)

The Note for Required Action A.7 permits activities (e.g., transfers, cover block removal) according to a contractor-approved recovery plan that were prohibited by other Required Actions provided the recovery plan determines these activities are essential to the safe restoration of the tank temperature. For example, the recovery plan may determine that supplemental heat removal capability is necessary to restore temperature, which may require cover block removal (installed by Required Action A.4).

The activities allowed by the recovery plan are evaluated using the Unreviewed Safety Question (USQ) process prior to performance. The recovery plan may be revised to address new issues as they are identified during the restoration process. If approved emergency or abnormal administrative procedures that address the operations permitted for the existing tank conditions exist, including the initial conditions and precautions necessary to perform the operations in a safe manner, preparation of a separate recovery plan is not necessary.

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCS/LCO. For this situation, entry into the LCS/LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.3.2.1

This Surveillance is required to VERIFY that the WASTE temperature is within applicable limits (195 °F and 215 °F). The Surveillance collects information on WASTE temperatures and provides indication of the status of the temperature monitoring systems (e.g., the thermocouples are sensing temperatures and are reporting to a display system). The Surveillance also includes an evaluation of the displayed temperature data. The collected and analyzed temperature data provides information on WASTE temperature profiles and trends within a tank and can identify an accumulation of solids or "hot spots."

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BASES

SURVEILLANCE REQUIREMENTS (continued)

The Frequency of 10 days to VERIFY temperature is based on the rate of temperature rise for the most limiting DST and AWF tank covered by this LCS/LCO, which is 0.9 °F/day for Tank 241-AZ-101 (WHC-WM-SD-CN-043) and the 15 °F margin included between the LCS/LCO temperature limits (195 °F and 215 °F) and the temperature at which a tank bump event could occur (210 °F and 230 °F adjusted for instrument uncertainties). Therefore, with an assumed beginning temperature of 195 °F or 215 °F, it would take about 16 days to reach 210 °F or 230 °F, based on the bounding rate of temperature rise of 0.9 °F/day (15 °F ÷ 0.9 °F/day = 16.7 days). The Frequency of 10 days establishes a conservative margin to the more than 16 days required to reach the LCS/LCO temperature limit, and allows operators the time to detect and respond to a temperature increase before reaching the temperature at which a tank bump could occur.

For WRSS operations, the Frequency of 10 days for Tank 241-AY-102 also establishes a conservative margin to the time required to reach the saturation temperature. Upon the loss of active ventilation, the time to reach saturation for a 6 ft transfer of WASTE from Tank 241-C-106 to Tank 241-AY-102 is about 25 days (HNF-SD-W320-ER-004, *Project W-320 SAR and Process Control Thermal Analysis)*.

Generally, temperatures in DSTs and AWF tanks are below 200 °F and change slowly upon the loss of active ventilation. In fact, the rate of temperature increase is expected to decrease with time, approaching equilibrium with the surrounding environment as the tank system approaches steady state. This is because the tank would eject more heat to the surroundings as its temperature increases.

Normally the WASTE temperature in each tank fluctuates throughout the year (typically highest during October and lowest during April), which can result in a seasonal variation not expected to exceed 10 °F. At about 185 °F (as measured at one thermocouple located 4 in. from the bottom of the tank), Tank 241-AZ-102 has the highest average operating temperature of the DSTs and AWF tanks covered by this LCS/LCO, based on historical data.

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BASES

SURVEILLANCE REQUIREMENTS (continued)

Temperatures could be as high as 195 °F because of seasonal variation. Therefore, with an assumed beginning temperature of 195 °F, it would take about 16 days to reach 210 °F or 230 °F with no active ventilation, based on a rate of temperature rise of 0.9 °F/day for Tank 241-AZ-101 (WHC-SD-WM-CN-043). Based on normal operating temperatures and the slow temperature rises, it is expected the increasing temperature trend would be detected within the 10-day Surveillance Frequency interval and be corrected well before the LCS/LCO temperature limit would be approached.

REFERENCES

HNF-SD-WM-CN-098, 1997, *Consequences of a Postulated Tank Bump Related to Project W-320*, Rev. 0, Fluor Daniel Northwest, Inc., Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

HNF-SD-W320-ER-004, 1998, *Project W-320 SAR and Process Control Thermal Analyses*, Rev. 1, Numatec Hanford Company, Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-043, 1996, *Tank Bump Consequence Analysis*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-058, 1996, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reactions Safety Analysis*, Rev. 0-a, Westinghouse Hanford Company, Richland, Washington.

B 3.3 TEMPERATURE

B 3.3.3 Tank 241-AY-102 Annulus Ventilation System

BASES

BACKGROUND

The LCO on Tank 241-AY-102 annulus ventilation system ensures that WASTE temperature limits in Tank 241-AY-102 are not exceeded for the potential tank bump (including steam release), organic salt-nitrate reaction, and unfiltered release events, after at least 2 ft of sludge is transferred from the Tank 241-C-106 to Tank 241-AY-102. The operation of the Tank 241-AY-102 annulus ventilation system provides adequate cooling capacity to keep the Tank 241-AY-102 WASTE temperature below the requirements of LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls."

The Tank 241-AY-102 annulus ventilation system provides filtered air to the annulus area to remove a major portion of heat generated in the primary tank to maintain the primary tank WASTE temperature per requirements of LCS/LCO 3.3.2. If required for additional cooling capacity, the 241-AY-102 ventilation system will be modified, with the addition of blowers or a combination of blowers and chillers. A detailed system description of the Tank 241-AY-102 annulus ventilation system is presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Addendum 1, "Tank 241-C-106 Sluicing Safety Analysis," Chapter 2.0, "Facility Description."

BASES

APPLICABLE SAFETY ANALYSES

The Tank 241-AY-102 annulus ventilation system is required to control WASTE temperature for three accident scenarios: (1) Tank Bump, (2) Organic Salt-Nitrate Reaction, and (3) Unfiltered Release, as described in HNF-SD-WM-SAR-067, Addendum 1, Chapter 3.0, "Hazard Evaluations and Accident Analyses."

Tank Bump

Tank bump scenarios are analyzed in calculation notes (WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code* and WHC-SD-WM-CN-043, *Tank Bump Consequence Analysis*) and the results of the analysis are presented in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 3.0, "Hazard and Accident Analyses." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines.

For Waste Retrieval Sluicing System (WRSS) operations, tank bump scenarios are analyzed in calculation note HNF-SD-WM-CN-098, *Consequences of a Postulated Tank Bump Related to Project W-320*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 1. Based on the results of the WRSS analysis, the unmitigated release of radiological material could exceed offsite and onsite risk guidelines and onsite toxicological risk guidelines.

Temperature controls (WASTE temperature and monitoring) in Tank 241-AY-102 ensure that temperatures necessary for potential tank bumps (including steam release events) to occur are not exceeded. Continuous operation of the Tank 241-AY-102 annulus ventilation system provides adequate cooling capacity to prevent Tank 241-AY-102 WASTE temperature from exceeding temperatures at which tank bumps or steam release events are postulated to occur.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Organic Salt-Nitrate Reaction

In addition to providing protection against the postulated tank bump accident, this LCO also provides protection against a postulated "chemical runaway" accident. Organic salt-nitrate reaction scenarios are analyzed in calculation note WHC-SD-WM-CN-058, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reaction Safety Analysis*, and the results of the analysis are presented in HNF-SD-WM-SAR-067, Chapter 3.0. Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed offsite and onsite risk guidelines.

Temperature controls (WASTE temperature and monitoring) in Tank 241-AY-102 ensure that temperatures necessary for potential organic salt-nitrate reactions to occur are not exceeded. Continuous operation of the Tank 241-AY-102 annulus ventilation system provides adequate cooling capacity to prevent Tank 241-AY-102 bulk WASTE dryout and heatup below the self-ignition temperature for organic salt-nitrate reactions.

Unfiltered Release (Waste Retrieval Sluicing System operations)

Unfiltered release scenarios for various failures of the WRSS existing (296-P-16) or new (296-C-06) ventilation systems are analyzed in HNF-SD-WM-SAR-067, Addendum 1, and the results of the analysis are presented in Chapter 3.0 of the Addendum. Based on the results of the overheating scenarios the unmitigated release of radiological material could exceed onsite risk guidelines. Temperature controls are credited in the analysis to prevent the overheating scenarios. Therefore, continuous operation of the Tank 241-AY-102 annulus ventilation system provides adequate cooling capacity to prevent WASTE overheating scenarios.

BASES

LCO	The Tank 241-AY-102 annulus ventilation system shall be OPERABLE after ≥ 2 ft of sludge has been transferred from the Tank 241-C-106 due to WRSS operations. An OPERABLE Tank 241-AY-102 annulus ventilation system is one that is functioning consistent with its design and continuously operating, such that it provides active ventilation to the tank annulus with filtered air. The electrical distribution system (support system) is required to provide electrical power as part of OPERABILITY of the system.
MODE APPLICABILITY	LCO 3.3.3 applies at all times in OPERATION and LIMITED tank MODES to Tank 241-AY-102 after ≥ 2 ft of sludge from Tank 241-C-106 has been transferred to Tank 241-AY-102. Inadequate cooling in either MODE over time could result in temperatures in the stored WASTE outside the limits defined in LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls."
PROCESS AREA APPLICABILITY	LCO 3.3.3 applies to the Tank 241-AY-102 after ≥ 2 ft of sludge from Tank 241-C-106 has been transferred to Tank 241-AY-102.
ACTIONS	Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION." See Section 1.3, "Completion Times," for the definition of Immediately. <u>A.1</u> The annulus ventilation system must be restored to OPERABLE status Immediately. Heat removal from the primary tank is essential to maintaining WASTE temperature below LCS/LCO 3.3.2 requirements. <u>A.2</u> Perform SR 3.3.3.1 once per 24 hours.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.3.3.1

The annulus ventilation system for Tank 241-AY-102 shall be VERIFIED to be OPERABLE every 24 hours. VERIFICATION that the annulus ventilation system is OPERABLE consists of VERIFYING that the ventilation system is operating as determined by flow monitoring. The Frequency of 24 hours allows time to identify a failure of the active ventilation systems and initiate corrective actions based on the heat generation rate of WASTE after at least 2 ft of sludge has been transferred from Tank 241-C-106.

REFERENCES

HNF-SD-WM-CN-098, 1997, *Consequences of a Postulated Tank Bump Related to Project W-320*, Rev. 0, Fluor Daniel Northwest, Inc., Richland, Washington.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-043, 1996, *Tank Bump Consequence Analysis*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-058, 1996, *Compilation of Calculation Notes in Support of Organic Salt-Nitrate Reactions Safety Analysis*, Rev. 0-a, Westinghouse Hanford Company, Richland, Washington.

B 3.3 TEMPERATURE

B 3.3.4 Tank 241-AZ-101 Air Lift Circulators

BASES

BACKGROUND

The air lift circulators (ALCs) are used to provide a gentle agitation of the WASTE solution in the aging waste facility (AWF) tanks, preventing excessive temperature gradients, which in turn could lead to the release of radiological and toxicological material due to excessive boil-off rates or tank bumps.

The tank bump issue has been under consideration since 1953. Tank bumps have occurred in the past, the earliest being 1954 and the latest being 1968. The tank bump occurs when solids are mixed with cooler fluid either by operation of the ALCs (by a rapid startup) or by natural means such as rollover. The hot solids rapidly transfer heat to the liquid, some of which quickly vaporizes. The sudden pressurization caused by vapor generation is called a "bump." Historically, tank bumps have occurred only in tanks containing WASTE with a very large heat load rate (about 10^6 Btu/h). For a tank bump to occur, WASTE temperatures must be at or above the local boiling temperature. When solids (WASTE below 20 ft as measured from the WASTE level), are below the boiling temperatures, the liquid cannot be vaporized initiating a bump condition. In addition, if supernatant temperatures are not at or above the boiling point, the steam generated will be quenched. The local boiling point in the solids and solution is 258 °F and 230 °F respectively (Sathyanarayana, 1997). An average solution temperature at 190 °F is chosen to be conservative in quenching any steam that may be generated. Similarly, a solids temperature of 230 °F will not initiate the vaporization of liquid.

The process air system is a support system for the ALCs and must be OPERABLE when the ALCs are OPERABLE and operating when required. The process air system meets the requirements of the ALCs if it can supply sufficient air to operate the ALCs when they are required to be OPERABLE and operating. The process air system provides compressed air for the ALCs. The process air system consists of two

(continued)

BASES

BACKGROUND (continued)

motor-driven air compressors with approximately 440 scfm capacity (each) at 150 lb/in^2 gauge. A portable diesel-driven air compressor with a capacity of 600 scfm is also available. One of the motor-driven air compressors has sufficient capacity to supply compressed air to the Tank 241-AZ-101 ALCs.

The minimum process air flow rate is 2 scfm per ALC and the normal flow rate per ALC is 7 scfm. ALC operation is required when the temperature in Tank 241-AZ-101 exceeds the average WASTE temperature of 190 °F or 230 °F in the WASTE below 20 ft (as measured from the WASTE level).

The air WASTE mixture rises in a large vertical cylinder which starts at 2.5 ft above the tank bottom and terminates at an elevation of 19.5 ft or 24.5 ft above the tank bottom. The injected air absorbs heat from the liquid and transports it to the liquid surface and is exhausted by the ventilation system. There are 22 ALCs in Tank 241-AZ-101 consisting of five 17-ft long ALCs and seventeen 22-ft long ALCs. The ALCs are arranged in two concentric rings with one 17-ft long circulator located in the center of the tank. The inner ring lies on a 14.5-ft radius and contains seven 22-ft long ALCs. The outer ring lies on a 27-ft radius and contains ten 22-ft long and four 17-ft long ALCs.

If the ALCs are out of service, the heat-generating solids will settle out on the bottom of the tank and may become a tightly packed concentrated heat source generating temperatures significantly above the boiling temperature of the solution. The existence of this hot concentrated mass of sludge in the tank may lead to a tank bump. The tank bump occurs when the latent heat stored in the sludge is rapidly transferred to the solution, resulting in rapid steam formation and a pressure surge in the tank. The current conditions in the tank suggest that under normal storage mode, Tank 241-AZ-101 will not experience a tank bump. This information is a result of the performance of a process test in 1993 (WHC-SD-WM-PTR-012, *Tank 241-AZ-101 Steam Bumping and Settling Process Test*). This process test turned off both the ALCs and the annulus ventilation system with only a total temperature rise of 5.2 °F. As a result of this process test, the ALCs were allowed to be turned off.

(continued)

BASES

BACKGROUND (continued)

This LCO provides the additional prevention necessary to compensate for the added heat resulting from the Project W-151 mixer pump test in Tank 241-AZ-101. Sathyanarayana, 1997, postulates a scenario where the added mixer pump heat along with a "fluffy" layer of solids on top of undisturbed solids may permit the solids temperature to exceed the local saturation temperature. Use of the air lift circulators permits the temperatures to equilibrate. This along with some cooling afforded from the process air system provides the additional prevention needed during the Project W-151 Tank 241-AZ-101 mixer pump test.

Reports by Pacific Northwest Laboratories contained in SD-WM-TI-140, *Aging Waste Tank Air-Lift Circulator Reports*, show that the AWF tanks were first modeled by pie-shaped pieces of 1/7 of a tank. The studies in SD-WM-TI-140 and SD-WM-TI-046, *Modeling of Airlift Circulators*, determined that up to two adjacent ALCs could be inoperable and other circulators would be able to maintain adequate fluid velocity to suspend solids and promote heat transfer. This establishes that at least one ALC could be inoperable in each of the 7 pie-shaped segments of the tank without significant effect to solids suspension or heat transfer.

The maximum number of 8 inoperable ALCs is based on the model of every other ALC in the outer ring being inoperable (7) and the center ALC being inoperable, for a total of 8 ALCs being inoperable at one time (i.e., 14 ALCs OPERABLE). Other combinations of inoperable ALCs may be acceptable as long as the tank never has more than 2 adjacent ALCs inoperable.

During the Project W-151 mixer pump test, the ALCs will be left off as much as possible to determine the effectiveness of the mixer pumps. For operational flexibility however, it may be necessary to operate the ALCs while the mixer pumps are operating.

(continued)

BASES

BACKGROUND (continued)

The ALCs are also described in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Addendum 4, "Mixer Pump Test (241-AZ-101) Safety Analysis," Chapter 2.0, "Facility Description."

This LCO has been converted, with modifications, from the Interim Operational Safety Requirement (IOSR) LCO 3.4.4, "Air Lift Circulators," as an Authorization Basis control. The IOSR control was very effective in preventing tank bumps.

BASES

APPLICABLE SAFETY ANALYSES

The Tank 241-AZ-101 air lift circulators are required for one accident scenario: Tank Bump.

Tank Bump

Tank bump scenarios are analyzed in calculation notes (WHC-SD-WM-CN-022, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, WHC-SD-WM-CN-043, *Tank Bump Consequence Analysis*, and Sathyanarayana, 1997) and the results of the analysis are presented in HNF-SD-WM-SAR-067, Addendum 4, Chapter 3.0, "Hazard and Accident Analysis." Based on the results of the analysis, the unmitigated release of radiological and toxicological material could exceed onsite risk guidelines.

The ALCs are credited in the analysis to control potential temperature increases to prevent exceeding temperatures at which tank bumps or steam release events are postulated to occur.

A tank bump is a rapid steam pressurization of the WASTE tank headspace resulting in the release of radiological and toxicological material. Tank bumps (WASTE thermal rollovers) could occur in single-shell tanks (SSTs), double-shell tanks (DSTs), and aging waste facility (AWF) tanks that contain sludge (mostly a mixture of solid WASTE and interstitial liquid) with sufficient heat load to allow the sludge or solids to heat up above the local saturation temperature of the liquid WASTE. In addition, sufficient hydrostatic head exists to promote storage of thermal energy in the sludge.

A steam release is a pressurization of a lesser magnitude than a tank bump and is bounded by the analyzed tank bump accident. Both result in a pressurization in the WASTE; however, a steam release involves localized interstitial liquid that heats up and releases a smaller aerosol fraction of the WASTE, whereas a tank bump involves the entire WASTE (thermal rollover). In a postulated steam release scenario, there is less hydrostatic head (i.e., pressure caused by the weight of the liquid over the solids). Therefore, with less hydrostatic head, there is less pressure and energy involved in the release. A steam release can also result because of the sudden boiling of cold liquid added to a tank with hot solid WASTE and because of air agitation of a hot solids/sludge layer.

BASES

APPLICABLE SAFETY ANALYSES (continued)	ALC controls to prevent a tank bump in Tank 241-AZ-101 during the Project W-151 mixer pump test are the subject of this LCO. Temperature controls to also prevent a tank bump and provide protection against an organic salt-nitrate reaction (postulated "chemical runaway" accident) in DSTs and AWF tanks are included in LCS/LCO 3.3.2, "DST and AWF Tank WASTE Temperature Controls."
LCO	At least 14 ALCs in AWF tank 241-AZ-101 are required to be OPERABLE with no more than 2 adjacent ALCs inoperable at all times during the Project W-151 mixer pump test. The ALCs are required to be operating when the average WASTE solution temperature is > 190 °F and the WASTE temperature below 20 ft is > 230 °F in order to ensure that the initial conditions for a tank bump are precluded. An average WASTE solution temperature is the sum of the temperature readings given by OPERABLE thermocouples submerged in WASTE solution divided by the number of those thermocouples. The WASTE temperature limit of > 230 °F below 20 ft is reached if <u>any</u> of the sludge thermocouples registers a temperature above 230 °F. OPERABLE is defined as a minimum process air flow rate of 2 scfm per ALC and the WASTE level maintained above 246 in. This is the minimum level for ALC operation. After the ALCs have been started or operating, WASTE level must be periodically checked to assure that the effects of evaporation and entrainment did not lower the level to below 246 in. OPERABLE is also defined as adequate flow through the cylinders should an alternate method be made available (such as a camera in the tank headspace). A rapid startup of the ALCs following an extended shutdown can initiate a tank bump (as well as thermally stress the AWF tank). To prevent this problem, a 5-hour startup should provide reasonable time for safe ALC system startup. This is the same time frame which has proven successful in the past, and was used in AWF IOSR 3.4.4. Shutdown of the ALCs is required when the primary tank ventilation system is removed from service. However, the ventilation system should be restored to OPERABLE status per LCO 3.2.1, "DST and AWF Tank Ventilation Systems," and the ALCs restored to OPERABLE status within the Completion Times of this LCO.

BASES

MODE APPLICABILITY	LCO 3.3.4 applies during OPERATION and LIMITED MODES at all times during the Project W-151 mixer pump test to ensure ALCs are ready to operate when WASTE temperatures require their operation.
PROCESS AREA APPLICABILITY	LCO 3.3.4 applies to Tank 241-AZ-101 at all times during the Project W-151 mixer pump test for the analyzed tank bump accident. This tank has an estimated heat load of 241,600 Btu/h (HNF-SD-WM-SAR-067, Addendum 4), without the mixer pumps, such that WASTE temperatures at or above the local saturation temperature could result from an extended ventilation outage. Therefore, Tank 241-AZ-101 contains the initial conditions for a tank bump.

BASES

ACTIONS

Failure to take the ACTIONS required within the required time limit following failure to meet the LCO is a VIOLATION. For this situation, proceed in accordance with AC 5.4.3, "Response to a Limiting Condition for Operation and Limiting Control Setting VIOLATION."

See Section 1.3, "Completion Times," for the definition of Immediately.

A.1, A.2, A.3, and A.4

If the ALCs are inoperable or not operating when required, conditions for a tank bump could be developing. Performance of Required Actions A.1, A.2, A.3, and A.4 establishes a safe condition for Tank 241-AZ-101 to minimize the potential for a tank bump and provides some mitigation if an event did occur.

Required Action A.1 requires mixer pump operations to be stopped Immediately. The Completion Time of Immediately emphasizes the importance of stopping mixer pump operations to stop addition of heat to the tank.

Required Action A.2 requires a VERIFICATION that cover blocks are installed on pits that are connected to the headspace of Tank 241-AZ-101. The pits provide a leakage path when the cover blocks are not in place. Cover blocks are normally in place, but are removed for maintenance, WASTE transfer routing changes, surveillances, or other activities. The cover blocks provide Defense-in-Depth by mitigating the potential release of radiological and toxicological material during a tank overpressurization event.

(continued)

BASES

ACTIONS (continued)

Required Action A.3 requires a VERIFICATION that the primary tank active ventilation system is operating and that ventilation flow paths are open for Tank 241-AZ-101. If the ventilation system is not operating, actions are necessary to start the system. The Project W-151 mixer pump test was analyzed to cover the use of the 241-A-702 ventilation system or the ventilation system upgrade provided by Project W-030 (241-AZ-702). Either ventilation system can effectively remove heat from the tank headspace. The VERIFICATION ensures that the ventilation system is operating by checking tank pressures and high-efficiency particulate air (HEPA) filter differential pressure readings.

Required Action A.4 requires the ALCs to be restored to OPERABLE status within 20 hours if the ALCs are found to be inoperable. The Completion Time of 20 hours is based on prior contractor internal engineering evaluations that support 20 hours as a reasonable down time for the ALCs, and includes a 5-hour ALC power ramp-up time. The 20 hours has also been retained from IOSR LCO 3.4.4, "Air Lift Circulators," as an Authorization Basis control.

BASES

SURVEILLANCE REQUIREMENTS

Failure to successfully meet the SR (i.e., SR acceptance criteria not satisfied) during the Surveillance or between performances of the Surveillance is a failure to meet the LCO. For this situation, entry into the LCO ACTIONS is required. Failure to perform the Surveillance within the specified Frequency (including the allowable 25% extension) is a VIOLATION. For this situation, proceed in accordance with AC 5.4.4.2, "Failure to Perform an SR Within the Required Time Limit."

SR 3.3.4.1

This Surveillance is required to VERIFY that the ALCs are operating when WASTE temperatures require their operation. The Frequency of 12 hours is based on engineering judgement and has been shown to be acceptable through operating experience and the maintenance recall system. The Frequency of 12 hours has also been retained from IOSR LCO 3.4.4, "Air Lift Circulators," as an Authorization Basis control. An ALC is determined to be operating correctly if its rotameter flow is 2 scfm or more and if tank liquid level is 246 in. or more, or by any other method that shows adequate flow through the cylinders.

SR 3.3.4.2

This Surveillance requires a FUNCTIONAL TEST to be performed on the ALCs to ensure their OPERABILITY at all times during the Project W-151 mixer pump test. The Frequency of 365 days is based on engineering judgement and has also been retained from IOSR LCO 3.4.4, "Air Lift Circulators," as an Authorization Basis control.

BASES

REFERENCES

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

Sathyanarayana, K., 1997, *Thermal Analysis in Support of Project W-151 Tank AZ-101 Mixer Pump Test* (internal memo 8C453-97-KS-002 to J. P. Harris and M. F. Pascal, Numatec Hanford Corporation, May 29), Numatec Hanford Corporation, Richland, Washington.

SD-WM-TI-046, 1982, *Modeling of Airlift Circulators*, Rockwell Hanford Operations, Richland, Washington.

SD-WM-TI-140, 1984, *Aging Waste Tank Air-Lift Circulator Reports*, Rev. 0, Rockwell Hanford Operations, Richland, Washington.

WHC-SD-WM-CN-022, 1996, *Evaluation of Potential and Consequences of Steam Bump in High Heat Waste Tanks and Assessment and Validation of GOTH Computer Code*, Rev. 0B, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-CN-043, 1996, *Tank Bump Consequence Analysis*, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-PTR-012, 1995, *Tank 241-AZ-101 Steam Bumping and Settling Process Test Report*, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

APPENDIX B

DESIGN FEATURES

Appendix B DESIGN FEATURES

DESIGN FEATURES are those features not covered elsewhere in the TSRs and that, if altered or modified, would have a significant effect on safety. DESIGN FEATURES are normally permanently built-in features that do not require, or infrequently require, maintenance or surveillance and are normally not subject to change by operations personnel. The categories of DESIGN FEATURES to be addressed in accordance with DOE 5480.22, *Technical Safety Requirements*, include the following:

a. Vital passive components such as piping, vessels, supports, confinement structures, and containers.

b. Configuration and physical arrangement of the facility where safety is a concern including site characteristics such as the locations of public access roads, collocated facilities, facility area boundaries, site boundaries, and distances to the nearest residences.

c. Building materials, if the safe operation of the facility depends on any component being constructed of a particular material.

Changes to DESIGN FEATURES are considered significant modifications. The Unreviewed Safety Question (USQ) process required by DOE 5480.21, *Unreviewed Safety Questions*, ensures that changes to DESIGN FEATURES are appropriately analyzed and controlled so that they do not adversely affect safe operation of Tank Waste Remediation System (TWRS) facilities. The DESIGN FEATURES for TWRS facilities that, if altered or modified, would have a significant effect on safe operation are listed below for each TWRS facility type. Descriptions of these DESIGN FEATURES are provided in HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*, Chapter 2.0, "Facility Description." The safety functions of the passive DESIGN FEATURES for applicable analyzed accidents are provided in HNF-SD-WM-SAR-067, Chapter 4.0, "Safety Structures, Systems, and Components," and in the addenda for specific projects.

Single-Shell Tanks

DESIGN FEATURES for single-shell tanks (SSTs) include the following:

- The SSTs maintain gross tank structural integrity, which averts tank collapse and limits the release of WASTE during a tank vacuum or overpressurization event, and during and after the evaluation basis earthquake. The tanks also withstand penetration from load drops, and maintain structural integrity for uniform and concentrated loads, and degradation.

- The SSTs are buried belowground. Earth cover provides shielding from the radioactive WASTES for worker protection.

(continued)

Appendix B DESIGN FEATURES (continued)

- Unused risers have metal covers or shielding plugs in them to preclude radiation streaming for worker protection.

- Process pits and diversion boxes associated with SSTs are buried belowground. Cleanout boxes (COBs) are abovegrade with their associated transfer lines belowgrade. Concrete cover blocks provide shielding from the radioactive WASTES for worker protection. Cover blocks also provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and limits the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. Cover blocks also limit the release of aerosols generated by WASTE leak splattering and splashing. Temporary covers are allowed for pits, COBs, and diversion boxes and meet the functional requirements of permanent covers.

Double-Shell Tanks

DESIGN FEATURES for double-shell tanks (DSTs) include the following:

- The DST design provides secondary confinement (tank within a tank) to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- The DSTs maintain gross tank structural integrity, which averts tank collapse and limits the release of WASTE during a tank vacuum or overpressurization event, and during and after the evaluation basis earthquake. The tanks also withstand penetration from load drops, and maintain structural integrity for uniform and concentrated loads, and degradation.

- The DSTs are buried belowground. Earth cover provides shielding from the radioactive WASTES for worker protection.

- Unused risers have metal covers or shielding plugs in them to preclude radiation streaming for worker protection.

(continued)

Appendix B DESIGN FEATURES (continued)

- Process pits and diversion boxes associated with DSTs are buried belowground. COBs are abovegrade with their associated transfer lines belowgrade. Concrete cover blocks provide shielding from the radioactive WASTES for worker protection. Cover blocks also provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and limits the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. Cover blocks also limit the release of aerosols generated by WASTE leak splattering and splashing. Temporary covers are allowed for pits, COBs, and diversion boxes and meet the functional requirements of permanent covers.

- Shielding is provided for some primary tank ventilation system components for worker protection. In the AP tank farm, the deentrainers, demister, preheater, and filter assembly are shielded. In the AN and AW tank farms, only the deentrainers are shielded. In the aging waste facility tank farm, 241-A-702 ventilation system, the deentrainers are in caissons that are partially belowground and shielded with earth cover. The 241-A-702 condensers are belowground and shielded with concrete cover blocks. The 241-A-702 ventilation system has deentrainers and condensers shielded inside concrete structures.

Double-Contained Receiver Tanks

DESIGN FEATURES for double-contained receiver tanks (DCRTs) include the following:

- The DCRTs are buried belowground. Concrete cover blocks provide shielding from the radioactive WASTES for worker protection. Cover blocks also provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and limits the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. Cover blocks also limit the release of aerosols generated by WASTE leak splattering and splashing. Temporary covers are allowed for pits, COBs, and diversion boxes and meet the functional requirements of permanent covers.

- The DCRT design provides secondary confinement (tank within a vault) to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- Some risers are designed such that when unused, shielding plugs can be placed in them to preclude radiation streaming for worker protection.

(continued)

Appendix B DESIGN FEATURES (continued)

Catch Tanks

DESIGN FEATURES for catch tanks include the following:

- The catch tanks are buried belowground. Catch tank designs are (1) direct buried, concrete; (2) direct buried, steel; (3) steel tanks contained in a vault or pit; and (4) concrete vaults with a steel liner. Concrete cover blocks for vaults and pits provide shielding from the radioactive WASTES for worker protection. Cover blocks also provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and limits the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. Cover blocks also limit the release of aerosols generated by WASTE leak splattering and splashing. Temporary covers are allowed for vaults and pits and meet the functional requirements of permanent covers.

- Some catch tank designs provide secondary confinement (tank within a vault or pit) to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- Unused risers have metal covers or shielding plugs in them to preclude radiation streaming for worker protection.

Miscellaneous Inactive Storage Facilities

DESIGN FEATURES for miscellaneous inactive storage facilities include the following:

- Some contaminated miscellaneous inactive storage facility designs provide secondary confinement (tank within a vault) to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

Transfer Systems

DESIGN FEATURES for WASTE transfer systems include the following:

- Primary piping (encased with outer piping or concrete) provides confinement of WASTE during underground and overground WASTE transfers to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

(continued)

Appendix B DESIGN FEATURES (continued)

- Direct buried piping provides confinement of WASTE when used as drain lines or for temporary pumping operations (use for normal operations is being discontinued) to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- Ethylene-propylenediene monomer (EPDM) hose serves as the primary WASTE transfer pipe inside the encasement pipe of an overground transfer system to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- Underground and overground WASTE transfer system encased piping designs (concrete encasement or pipe-in-pipe encasement) and connections confine leaks from the primary piping, and direct the flow of leaked WASTE from the primary piping to a WASTE transfer-associated structure for detection.

- The overground transfer concrete shielding system is installed over the encasement and connections to protect the integrity of the primary and encasement pipe from external events (e.g., vehicle collisions).

- Earth cover on buried or bermed sections of transfer piping provides shielding from the radioactive WASTE for worker protection and mitigation for potential pressurized spray leak events.

- Miscellaneous transfer-associated components and structures such as pits, COBs, and diversion boxes provide secondary confinement to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- Permanent covers for transfer-associated components and structures such as pits, COBs, and diversion boxes provide shielding from the radioactive WASTES for worker protection. Cover blocks also provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and limits the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. Cover blocks also limit the release of aerosols generated by WASTE leak splattering and splashing. Temporary covers are allowed for pits, COBs, and diversion boxes and meet the functional requirements of permanent covers.

(continued)

Appendix B DESIGN FEATURES (continued)

- Abovegrade portions of process pits, diversion boxes (including RCSTS diversion box 6241-A and vent station 6241-V), vault pits, and cleanout boxes provide shielding from the radioactive WASTES for worker protection, provide an impaction surface that prevents a WASTE leak from jetting directly into the atmosphere, and provide secondary confinement to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

WASTE Storage and Handling Areas or Facilities

DESIGN FEATURES for the 204-AR Waste Unloading Facility include the following:

- A stainless steel pit provides secondary confinement for Catch Tank 204-AR-TK-1 to minimize the potential for leakage of radiological and toxicological WASTE to the environment.

- The 204-AR steel building structure (including doors) provides impaction surfaces that prevent a WASTE leak from jetting directly into the atmosphere, and limit the release of WASTE aerosols to the atmosphere by means of tortuous air passages between adjacent surfaces that promote impingement and condensation. The structure also limits the release of aerosols generated by WASTE leak splattering and splashing, and limits the radiological shine dose from the WASTE leak for worker protection.

- Concrete walls and a high-density lead glass viewing window provide shielding from the radioactive WASTES for worker protection.

DESIGN FEATURES for the 244-AR Vault include the following:

- Process cells provide secondary confinement for process vessels to minimize the potential for leakage of radiological and toxicological WASTE to the environment. The 244-AR reinforced-concrete building structure provides tertiary confinement.

- Concrete cover blocks on process cells and on the failed equipment storage area provide shielding from the radioactive WASTES for worker protection. Shielded personnel access doors and shielded motor-driven equipment access doors are also provided for worker protection.

- The 291-AR Filter Vault Building is belowground. A concrete roof and shielding walls provide shielding from the radioactive WASTES for worker protection.

(continued)

DESIGN FEATURES for the 2727-W Sodium Storage Facility (nonnuclear facility) include the following:

- The 2727-W Building structural design (wind loading of 20 lb/ft^2) protects the Sodium Storage Facility from structural failure that could lead to a sodium fire. The building is inspected annually for structural degradation from the configuration shown on design drawings.

- The 2727-W Building structural design protects the stored sodium tanks from vehicle collisions that could lead to a sodium fire. The building foundation height is inspected annually for structural degradation from the configuration shown on design drawings.

- The 2727-W Building roof integrity protects the stored sodium tanks by precluding rainwater intrusion into the building for Defense-in-Depth.

Waste Retrieval Sluicing System

DESIGN FEATURES for the Waste Retrieval Sluicing System include the following:

- Positive mechanical stops are provided on the remotely operated, hydraulically controlled sluicer in Tank 241-C-106 to limit nozzle travel to 115 ° vertically (0 ° reference is the nozzle pointed straight down). This prevents the sluice stream from impinging on an area above the tank liner and leaking into the liner from the top of the liner.

- Syphon protection (holes) is provided on the slurry distributor and the submersible sluice pump discharge lines within Tank 241-AY-102 to prevent a syphon when the slurry pumps or sluice pumps are shut down.

- The sluicer hose in Tank 241-C-106 is engineered to maintain structural integrity to prevent the hose from breaking off and causing a liner breach.

- The WASTE transfer pipe-in-pipe encasement confines leaks from the primary piping and channels WASTE leaked from the primary pipe to a transfer-associated structure where the leak can be detected. The encasement also provides outside protection against corrosion of the inside pipe.

(continued)

Appendix B DESIGN FEATURES (continued)

- The weight of the removable plugs in cover blocks for the sluice and slurry line flush connection pits on Tank 241-AY-102 exceeds the maximum lifting force caused by WASTE discharged from the open flush nozzle.

AWF 241-AZ-702 Ventilation System

DESIGN FEATURES for the AWF 241-AZ-702 ventilation system include the following:

- The two primary ventilation filter trains of the AWF 241-AZ-702 are separated by the facility structure that has been constructed to the standards of a 2-hr fire rating.

Appendix B DESIGN FEATURES REFERENCES

References for Appendix B:

DOE 5480.21, 1991, *Unreviewed Safety Questions*, U.S. Department of Energy, Washington, D.C.

DOE 5480.22, 1992, *Technical Safety Requirements*, Change 1 (1992), and Change 2 (1996), U.S. Department of Energy, Washington, D.C.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

TANK WASTE REMEDIATION SYSTEM
TECHNICAL SAFETY REQUIREMENTS

ADDENDUM

TRANSITIONAL REQUIREMENTS

TRANSITIONAL REQUIREMENTS

PREFACE

The U.S. Department of Energy, Richland Operations office (RL) directed in Wagoner, 1997, that certain controls from the previous *Hanford Site Tank Farm Facilities Interim Safety Basis* (ISB), WHC-SD-WM-ISB-001, Authorization Basis (AB) documents be retained in the current *Tank Waste Remediation System Basis for Interim Operation* (BIO), HNF-SD-WM-BIO-001, Authorization Basis. This Addendum has been prepared as a means for retaining and transitioning those controls from two identified ISB AB documents into the current BIO AB documents. The ISB document which contained the AB controls to be retained is: *Single Shell Tank Interim Operational Safety Requirements*, WHC-SD-WM-OSR-005.

In order to satisfy the DOE-RL Management Assessment (MA) item number 29, those controls identified for retention from WHC-SD-WM-OSR-005 have been incorporated with editorial changes in this Addendum to *Tank Waste Remediation System Technical Safety Requirements*, HNF-SD-WM-TSR-006. In addition, this Addendum includes other appropriate sections from the two ISB documents to capture basis, intent, and application of the identified controls. The additional sections are from the Section 1, "Use and Application", Section 3, "Limiting Conditions for Operation and Surveillance Requirements", Section 4, "Surveillance Requirements", Section 5, "Administrative Controls", Section 6, "References", and Appendix B, "Bases", of the ISB AB documents.

The retention of these ISB controls in this Addendum is a temporary measure which allows the individual controls from WHC-SD-WM-OSR-005 to be removed from the Unreviewed Safety Question (USQ) Authorization Basis list, without losing the safety benefits of the controls, while they are rewritten into the current TSR format. Once the controls are rewritten and approved, this Addendum will be removed from HNF-SD-WM-TSR-006 by an Engineering Change Notice (ECN).

The Addendum includes the following Interim Operational Safety Requirements (IOSRs):

WHC-SD-WM-OSR-005

1. Administrative Control (AC) 5.31.1, Rotary Mode Core Sampling - Control Applicability.

2. AC 5.31.2, Rotary Mode Core Sampling - Ignition and Envelope Testing.

3. AC 5.31.5, Rotary Mode Core Sampling - Gas Leak Paths.

4. AC 5.31.8, Rotary Mode Core Sampling - Tank Loading.

5. AC 5.31.10, Rotary Mode Core Sampling - Portable Inlet Stack.

6. AC 5.31.11, Rotary Mode Core Sampling - Drill Bit, Core Barrel, and Core Rods.

7. AC 5.31.12, Rotary Mode Core Sampling - RMCS Operations.

8. LCO 3.7.3. Rotary Mode Core Sampling - Exhauster Induced Tank Pressure.

9. SR 3.7.3.1, Rotary Mode Core Sampling - Exhauster Induced Tank Pressure.

10. SR 3.7.3.2, Rotary Mode Core Sampling - Exhauster Induced Tank Pressure.

11. SR 3.7.3.3, Rotary Mode Core Sampling - Exhauster Induced Tank Pressure.

12. LCO 3.7.4, Rotary Mode Core Sampling - Nitrogen Purge System.

13. SR 3.7.4.1, Rotary Mode Core Sampling - Nitrogen Purge System.

14. SR 3.7.4.2, Rotary Mode Core Sampling - Nitrogen Purge System.

15. SR 3.7.4.3, Rotary Mode Core Sampling - Nitrogen Purge System.

16. LCO 3.7.5, Rotary Mode Core Sampling - Rotary Drilling Parameters.

17. SR 3.7.5.1, Rotary Mode Core Sampling - Rotary Drilling Parameters.

In the process of applying these controls certain cautions and clarifications must be noted. The organizations implementing these controls need to be aware that certain modes of operation and reporting requirements differ from the TSR format and their use for these control are defined in this Addendum. Unless otherwise noted, all references to ACs, LCOs, and SRs point to controls included in this Addendum.

The changes made to the ISB controls include editorial, references update, and applicability clarification per Wagoner 1997. Responsibilities assigned to previous Hanford Management and Operations (M&O) contractors, including Westinghouse Hanford Company (WHC) and Rockwell Hanford Operations (RHO), have been updated to apply to the Project Hanford Management Contractors (PHMC). Changes to document references are as follows:

Added references to WHC-SD-WM-OSR-004 and WHC-SD-WM-OSR-005 where necessary to fully identify cited controls.

Updated WHC-SD-WM-SAD-035 references from Rev. 0-a to Rev. 0-b.

Updated Section 5.31 reference to the FSAR (HNF-SD-WM-SAR-067, *Tank Waste Remediation System Final Safety Analysis Report*) for consistency with reference used for development of the control.

In the Basis for AC 5.31-8, changed OSD-T-151-00013 to WHC-SD-WM-OSR-005 as the location of IOSR dome loading requirements for SSTs.

Added note to reference to DOE Order 5000.3b, stating that compliance with this canceled order is required until directed otherwise by the Contracting Officer.

The changes made to the retained ISB controls included in this Addendum do not alter intent, basis, and application of the identified controls.

REFERENCES

Wagoner, J. D., RL, 1997, Letter to H. J. Hatch, FDH, "Contract Number DE-AC06-96RL13200 - Approval of Tank Waste Remediation System (TWRS) Basis for Interim Operation (BIO) Readiness and Revised Authorization Basis (AB)," 97-SCD-024, Attachment 1, *Management Assessment Determination of Readiness to Implement Tank Waste Remediation System Basis for Interim Operation*, dated September 12, 1997.

HNF-SD-WM-SAR-067, 1999, *Tank Waste Remediation System Final Safety Analysis Report*, Rev. 1, Fluor Daniel Hanford, Inc., Richland, Washington.

WHC-SD-WM-ISB-001, 1996, *Hanford Site Tank Farm Facilities Interim Safety Basis*, Rev. 0-M, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-OSR-005, 1997, *Single Shell Tank Interim Operational Safety Requirements*, Rev. 0-G, Westinghouse Hanford Company, Richland, Washington.

WHC-SD-WM-SAD-035, 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks, Hanford Site, Washington*, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland, Washington.

TABLE OF CONTENTS

PREFACE ii
TABLE OF CONTENTS vi
LIST OF TERMS viii

Section 1 USE AND APPLICATION 1-1

1.1 DEFINITIONS 1-2
1.2 MODES 1-5
1.3 FREQUENCY 1-6
1.4 SAFETY LIMITS (SLs) 1-12
1.5 LIMITING CONTROL SETTINGS (LCSs) 1-13
1.6 LIMITING CONDITIONS FOR OPERATION (LCOs) 1-14
1.7 SURVEILLANCE REQUIREMENTS (SRs) 1-15
1.8 LOGICAL CONNECTIONS 1-16
1.9 NOTES 1-19
1.10 COMPLETION TIMES 1-20

Section 2 SAFETY LIMITS (SLs) (Not required) 2-1

Section 3 LIMITING CONDITIONS FOR OPERATIONS AND SURVEILLANCE REQUIREMENTS 3-1

3.0 APPLICABILITY 3-3
3.1 Not Used 3-7
3.2 Not Used 3-7
3.3 Not Used 3-7
3.5 Not Used 3-8
3.6 Not Used 3-8
3.7 ROTARY MODE CORE SAMPLING 3-8

Section 4 SURVEILLANCE REQUIREMENTS 4-1

Section 5 ADMINISTRATIVE CONTROLS 5-1

5.1 PURPOSE 5-2
5.2 RESPONSIBILITY 5-2
5.3 IMPLEMENTATION 5-2
5.4 OPERATIONAL SAFETY REQUIREMENT VIOLATIONS 5-3
5.5 REPORTING REQUIREMENTS 5-4
5.6 REVISIONS TO THE OPERATIONAL SAFETY REQUIREMENTS 5-5
5.7 WAIVER TO THE OPERATIONAL SAFETY REQUIREMENTS 5-5

TABLE OF CONTENTS (continued)

5.8 ORGANIZATION 5-5
5.8.7 MODE Changes 5-5
5.9-5.30 Not Used 5-6
5.31 ROTARY MODE CORE SAMPLING 5-7
5.31.1 Control Applicability 5-7
5.31.2 Ignition and Envelope Testing 5-7
5.31.3 Not Used 5-7
5.31.4 Not Used 5-7
5.31.5 Gas Leak Paths 5-7
5.31.6 Not Used 5-7
5.31.7 Not Used 5-8
5.31.8 Tank Loading 5-8
5.31.9 Not Used 5-8
5.31.10 Portable Inlet Stack 5-8
5.31.11 Drill Bit, Core Barrel, Core Sampler and Drill Rods 5-8
5.31.12 RMCS Operations 5-8

Section 6 REFERENCES 6-1

Appendix A DESIGN FEATURES (Not required) A-1

Appendix B BASES B-1

LIST OF TERMS

AC	Administrative Control
ALC	air lift circulators
ARM	Area Radiation Monitor
AWF	Aging Waste Facility
BTU/hr	British Thermal Units per hour
CAM	continuous air monitor
CFM	cubic feet per minute
CFR	Code of Federal Regulations
COB	Clean Out Box
CPS	Criticality Prevention Specification
CSAR	Criticality Safety Analysis Report
DBA	Design Basis Accident
DBE	Design Basis Earthquake
DCG	Derived Concentration Guide
DCRT	Double Contained Receiver Tank
DOE	U.S. Department of Energy
DST	Double Shell Tank
DSTF	Double Shell Tank Farm (Facility)
ECW	Emergency Cooling Water
°F	degrees Fahrenheit
°F/ft	degrees Fahrenheit per foot
ft^2	square feet
ft^3/d	cubic feet per day
ft^3/min	cubic feet per minute
gram/gal	grams per gallon(s)
g/L	grams per liter
g/ft^2	grams per square foot
HEPA	High Efficiency Particulate Air (Filter)
ISB	Interim Safety Bases
JCO	Justification for Continued Operation
lb/ft^2	pounds per square foot
LCO	Limiting Condition for Operation
LCS	Limiting Control Setting
LFL	Lower Flammability Limit
LIT	Liquid Indicator Transmitter
LOW	Liquid Observation Well
mrem/hr	milliroentgen equivalent man (1/1000 Rem) per hour
mil/y	1/1000 inch per year
NA	Not Applicable
NFPA	National Fire Protection Association
NPH	Normal Paraffin Hydrocarbon
NRC	U.S. Nuclear Regulatory Commission

LIST OF TERMS (continued)

OSR	Operational Safety Requirement
OT	Outlet Temperature
PA	Process Air
%	percent
pH	scale used to measure acidity or alkalinity
PM	Program Manager
PNL	Pacific Northwest Laboratory
ppm	parts per million
PRC	Plant Review Committee
RW	Raw Water
SAR	Safety Analysis Report
SC	Safety Class
SCFM	standard cubic feet per minute
SD	Supporting Document
SL	Safety Limit
SpG	Specific Gravity
SR	Surveillance Requirement
SST	Single Shell Tank
SSTF	Single Shell Tank Facility
std	standard
TBP	Tributyl Phosphate
TSR	Technical Safety Requirement
UBC	Uniform Building Code
USQ	Unreviewed Safety Question
vol%	percent by volume
wt%	percent by weight
WHC	Westinghouse Hanford Company
y	year(s)
>	greater than
≥	greater than or equal to
<	less than
≤	less than or equal to
+	addition or positive
-	subtraction or negative
x	multiplication
=	equals

SECTION 1

USE AND APPLICATION

Section 1 USE AND APPLICATION

1.1 DEFINITIONS

----------NOTE----------
The defined terms of this section are unique definitions. They appear in CAPITALIZED type and are applicable throughout these Operational Safety Requirements and BASES. Some terms in this section refer the user to another section for the definition. This has been done to prevent a shortened definition from being supplied and used out of context.

Term	Definition
ACTIONS	That part of a Safety Limit or Limiting Condition for Operation that prescribes Required Actions to be taken under designated Conditions within specified Completion Times.
AGING WASTE	WASTE that has a heat load of $\geq$ 0.1 BTU/hr/gal and is further characterized in WHC-SD-WM-EV-053, "Double Shell Tank Waste Analysis Document," (WHC-1996).
AND	See Section 1.8, Logical Connectors.
BASES	Pertinent information and details supporting Operational Safety Requirement elements and specific values or characteristics (See Appendix B, BASES).
BUMP	Pressurization above atmospheric pressure of the Aging Waste Facility (AWF) tank dome vapor space due to the generation and rapid expansion of steam in the WASTE.
DESIGN FEATURES	See Appendix A, DESIGN FEATURES.
FUNCTIONAL TEST	The injection of a simulated or actual signal into the system as close to the sensor as practicable to VERIFY the OPERABILITY of required alarm, interlock, and actuation points. The FUNCTIONAL TEST shall include adjustments, as necessary, of the required alarm, interlock, and actuation points so that the actuation points are within the required range and accuracy. This adjustment of the instrumentation may be performed by any series of sequential or overlapping steps and shall include calibration, as necessary, of the sensor. Alarm, interlock and actuation points that are not found to be within the required range shall constitute a Surveillance failure.

Term	Definition
HIGH HEAT TANK	Single-Shell Tanks with > 40,000 BTU/hr heat generated within WASTE.
MODE	See Section 1.2, MODES.
OPERABLE/OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s), and: a) actuation points are within limits, and b) when all necessary attendant equipment, instrumentation, controls, electrical power sources, cooling water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified function(s) are also capable of performing their related support function(s). A system such as leak detection or radiation monitoring is OPERABLE when capable of performing its specified detection or monitoring function. It is OPERABLE and operating when performing an action such as activating an alarm or interlock.
OPERATIONAL SAFETY REQUIREMENTS RECOVERY PLAN	A document that is issued to DOE after placing the tank in RESTRICTED MODE. The document includes a preliminary assessment of interim restrictions, Surveillances and specific actions to be taken.
OR	See Section 1.8, Logical Connectors.
SLUDGE, for AWF only	A mixture of insoluble metal hydroxide WASTE that accumulates and forms a sedimentary layer on the bottom of the tank.
VERIFY/VERIFIED/ VERIFICATION	A qualitative assessment to confirm or substantiate that specific plant conditions exist, and if not in this condition, ensure that a response is taken to satisfy the requirements. This may include collecting sample data, quantitative data, taking instrument readings, recording data and information on logs, data sheets or electronic media, and evaluating data and information in accordance with approved procedures.
VIOLATION	See Section 5.4, Operational Safety Requirement VIOLATIONS.

Term	Definition
WASTE	Radioactive solids and liquids transferred to, stored in, or transferred from Double Shell Tanks (DSTs) and AWF Tanks. Radioactive solids and liquids, contained in or transferred from Single Shell Tanks (SSTs).
WATCH LIST TANK	A single shell or double shell high-level nuclear WASTE tank at the Hanford Nuclear Reservation, Richland, Washington, that in accordance with Public Law 101-510, Section 3137, "Safety Measures for WASTE Tanks at Hanford Nuclear Reservation," has been identified by the Secretary of Energy as having a serious potential for release of high level WASTE due to uncontrolled increase of temperature or pressure. No additional high-level WASTE (except for small amounts removed and returned to a tank for analysis) may be added to a WATCH LIST TANK unless the Secretary determines that, (1) no safer alternative than adding such WASTE to the tank currently exists, or (2) that the tank does not pose a serious potential for release of high-level nuclear WASTE.

1.2 MODES

A MODE is the state of an individual tank at a given time.

A particular support system may provide services for several individual tanks, with each tank operating in a different MODE. Under these circumstances, the applicable MODE for the support system is the most restrictive MODE applicable to any of the tanks being provided with supporting services.

The MODES defined for DSTs, AWF tanks and SSTs are:

OPERATION MODE	-	WASTE is being stored. WASTE transfers to AWF tanks or DSTs, or from any tank are authorized and may be occurring.
STANDBY MODE	-	WASTE is being stored. WASTE transfers to AWF tanks or DSTs, or from any tank are not authorized.
REPAIR MODE	-	WASTE is being stored. The opening of confinement barriers to the environs via crane manipulation is authorized. Transfers to or from the tank are not able to be performed and are not authorized.
RESTRICTED MODE	-	WASTE is being stored. An abnormal condition where only certain restricted activities may be performed. The tank was placed in the RESTRICTED MODE as directed by following the requirements of LCO 3.0.3, ACTION Not Met or ACTION Not Provided. Placement of a tank in RESTRICTED MODE is reportable to DOE per the requirements of DOE Order 5000.3B (DOE 1993) and requires writing and approving a formal OSR RECOVERY PLAN that is provided to DOE.

Documentation of MODE status is to be maintained current as required in Section 5.8.7, MODE Changes.

1.3 FREQUENCY

1.3.1 Purpose

The purpose of this section is to define the proper use and application of Frequency requirements. Each Surveillance Requirement (SR) has a specified Frequency in which the Surveillance must be met in order to meet the associated Limiting Condition for Operation (LCO). An understanding of the correct application of the specified Frequency is necessary for compliance with the SR.

In most cases, Surveillances are listed separately in each OSR. However, a Surveillance may also be stipulated as a Required Action in the ACTIONS table. In this case, the Frequency requirements are provided under Completion Time. General rules for Surveillance Frequency apply equally when a Surveillance is stipulated as a Required Action.

1.3.2 Examples

The following examples illustrate the various ways that Frequencies are specified in each table of Surveillance Requirements. If a Surveillance is stipulated as a Required Action, the Frequency requirements are formulated the same way and provided under Completion Time. In these examples, the Applicability of the LCO (LCO not shown) is OPERATION, STANDBY, REPAIR and RESTRICTED tank MODES.

Example 1.3.2.1

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
Perform VERIFICATION.	24 hours

Hypothetical Example 1.3.2.1 contains the type of SR most often encountered in the Operational Safety Requirements. The Frequency specifies an interval (24 hours) during which the associated Surveillance must be performed at least one time. Performance of the Surveillance initiates the subsequent interval. Although the Frequency is stated as 24 hours, an extension of the time interval (including the first performance) up to 1.25 times the stated Frequency is allowed by SR 3.0.2, Frequencies, for operational flexibility. The measurement of this interval continues at all times, even when the SR is not required to be met per SR 3.0.1, Performance, (such as when the equipment is inoperable, a variable is outside specified limits, or the facility is outside the Applicability of the LCO). If the interval specified by SR 3.0.2, Frequencies, is exceeded while the facility is in a MODE or other specified condition in the Applicability of the LCO, and the performance of the Surveillance is not otherwise modified (refer to Examples 1.3.2.3 and 1.3.2.4), then SR 3.0.3, Delay of Required Actions, becomes applicable.

If the interval as specified by SR 3.0.2, Frequencies, is exceeded while the facility is not in a MODE or other specified condition in the Applicability of the LCO for which performance of the SR is required, the Surveillance must be performed within the Frequency requirements of SR 3.0.2, Frequencies, prior to entry into the MODE or other specified condition. Failure to do so would result in SR 3.0.4, MODE Changes, not being met.

Sometimes special conditions dictate when a Surveillance is to be met. These conditions apply to the Surveillance or to the Frequency or both. They are "otherwise stated" conditions allowed by SR 3.0.1, Performance. They may be stated as clarifying Notes in the Surveillance, in the Frequency, or both. The remaining examples discuss these special conditions.

Example 1.3.2.2

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
VERIFY temperature is within limits.	Once within 8 hours during transfer AND each 24 hours thereafter

Hypothetical Example 1.3.2.2 has two Frequencies. The first is a one-time performance Frequency, and the second is of the type shown in Example 1.3.2.1. The logical connector "AND" indicates that both Frequency requirements must be met. The Surveillance must be performed within 8 hours after each start of a transfer.

The use of "once" indicates a single performance will satisfy the specified Frequency (assuming no other Frequencies are connected by "AND"). This type of Frequency does not qualify for the 25% extension allowed by SR 3.0.2, Frequencies. "Thereafter" indicates future performances must be established per SR 3.0.2, Frequencies, but only after a specified condition is first met (i.e., the "once" performance in this example). Therefore, the 25% extension applies to the second part of the Surveillance and includes the first performance, i.e., the first 24 hours may have an extension of 25%. Once the transfer is complete, the measurement of both intervals stops. New intervals start upon the start of a transfer.

Example 1.3.2.3

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be performed until 8 hours during transfer. ----------	
VERIFY temperature is within limits.	24 hours

The Surveillance shown in hypothetical Example 1.3.2.3 need only be performed during transfers. The interval measurement for the Frequency of this Surveillance continues at all times, as described in Example 1.3.2.1. If the Surveillance was not performed within the 24 hour (including the 25% extension allowed by SR 3.0.2, Frequencies) interval, but transfers are not occurring, it would not constitute a failure of the SR or failure to meet the LCO. Therefore, SR 3.0.4, MODE Changes, is not applicable when changing MODES, or specified condition even with the 24 hour Frequency not met, provided transfers are not occurring.

Once transfers are occurring, 8 hours would be allowed for completing the Surveillance. If the Surveillance were not performed within this 8 hour interval, there would then be a failure to perform the Surveillance within the specified Frequency and the provisions of SR 3.0.3, Delay of Required Actions, apply.

Example 1.3.2.4

SURVEILLANCE REQUIREMENTS

SURVEILLANCE	FREQUENCY
----------NOTE---------- Not required to be met until transfers are occurring. ----------	
VERIFY temperature is within limits.	24 hours

Hypothetical Example 1.3.2.4 specifies that the requirements of this Surveillance do not have to be met until transfers are occurring. The interval measurement for the Frequency of this Surveillance continues at all times, as described in Example 1.3.2.1. If the Surveillance was not performed within the 24 hour (including the 25% extension of SR 3.0.2, Frequencies) interval, but the facility is not performing transfers, there would be no failure of the SR nor failure to meet the LCO. Also, no violation of SR 3.0.4, MODE Changes, occurs when changing MODES, even with the 24 hour Frequency not met, provided no transfers are occurring. Prior to performing transfers, (assuming again that the 24 hour Frequency was not met), the SR must be satisfied.

This example, specifying when the Surveillance is "required to be met," differs from the other examples, which only specified performance allowances/requirements. When a Surveillance is not required to be "met," the acceptance criteria is not required to be applied to consideration of OPERABILITY. That is, SR 3.0.1, Performance, requires "failure to meet a Surveillance, whether such failure is experienced during performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO." Therefore, when the Surveillance is not required to be met, failure does not constitute failure to meet the LCO.

1.3.3 Frequencies

The Frequencies and allowable extensions, as used in Surveillance Requirements and elsewhere, are specified as follows. See SR 3.0.2, Frequencies, for application of the 25% extension.

FREQUENCY	WITH 25% EXTENSION*
At least once per 2 hours	2 hours and 30 minutes
At least once per 8 hours	10 hours
At least once per 12 hours	15 hours
At least once per 24 hours	30 hours
At least once per 36 hours	45 hours
At least once per 72 hours	90 hours
At least once per 7 days	8 days
At least once per 31 days	38 days
At least once per 92 days	115 days
At least once per 184 days	230 days
At least once per 365 days	456 days

* No partial days. The allowable extension provisions are not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

1.4 SAFETY LIMITS (SLs)

SLs 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.

Selection Criteria:

1.4.1 Applies to the protection of the physical barriers required for the protection of the public, onsite personnel and the environment from radiological consequences.

1.4.2 The limit is set to the extent of the knowledge base (e.g., design criteria, operating history, industry practice, prudent engineering judgement, tests and analyses).

1.4.3 The limit is placed on observable and measurable process variables that directly relate to the performance and integrity of the physical barriers.

1.5 LIMITING CONTROL SETTINGS (LCSs)

LCSs are settings on safety systems that control process variables to prevent exceeding Safety Limits (SLs).

Selection Criteria:

1.5.1 Applies to actuation points for instrumentation and systems which protect SLs from being exceeded and are required for the protection of the public, onsite personnel and the environment from radiological consequences.

1.5.2 The selected values shall be set sufficiently below the SL, to allow for alarms and for subsequent corrective action (by automatic controls or procedures) to return the situation to normal, or to shut the process down before the SL is exceeded.

1.6 LIMITING CONDITIONS FOR OPERATION (LCOs)

LCOs are the lowest functional capability or performance level of safety-related structures, systems, components and their support systems required for normal safe operation of the facility.

LCOs shall be based upon maintaining the systems and structures OPERABLE which are required for the protection of the public, onsite personnel and the environment from radiological consequences.

Selection Criteria:

1.6.1 Installed instrumentation that is used to detect, and indicate in the control room or other control location, a significant degradation of the physical barriers or systems which prevent the uncontrolled release of radioactive materials.

1.6.2 A structure, system or component which functions or actuates to mitigate accidents or transients that either involve the assumed failure of, or present a challenge to, the integrity of a physical barrier or system which prevents the uncontrolled release of radioactive materials.

1.6.3 A process variable that is an initial condition for those Design Basis Accidents or transient analyses that involve the assumed failure of, or present a challenge to, the integrity of a radioactive material physical barrier or system.

1.7 SURVEILLANCE REQUIREMENTS (SRs)

SRs are requirements relating to testing, FUNCTIONAL TESTS, 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. It should be noted that a Surveillance may be stipulated as a Required Action in the ACTIONS table.

Selection Criteria:

1.7.1 SRs which can include VERIFICATION and FUNCTIONAL TESTS, shall be based upon providing appropriate means to demonstrate the OPERABILITY of the associated systems, components and support systems.

1.7.2 The Frequency of the SRs shall be based on the safety impact which results from the associated systems, components or support systems being inoperable. The reliability of the associated equipment, based on manufacturers data and maintenance history records, is to be used to determine Surveillance Frequency.

1.8 LOGICAL CONNECTORS

1.8.1 Purpose

The purpose of this section is to explain the meaning of logical connectors with specific examples.

Logical connectors are used in Operational Safety Requirements to discriminate between, and yet connect, discrete Conditions, Required Actions, Completion Times, Surveillances and Frequencies. The only logical connectors which appear in the Limiting Conditions for Operation (LCOs) and Surveillance Requirements (SRs) are AND and OR. The physical arrangement of these connectors constitutes logical conventions with specific meanings.

1.8.2 Background

Separate levels of logic are used to state Required Actions. These levels are identified by the placement (or nesting) of the logical connectors and the number assigned to each Required Action. The first level of logic is identified by the first digit of the number assigned to a Required Action and the placement of the logical connector in the first level of nesting (i.e., left justified with the number of the Required Action). The successive levels of logic are identified by additional digits of the Required Action number and by successive indentions of the logical connectors.

When logical connectors are used to state a Condition, Completion Time, Surveillance, or a Frequency, only the first level of logic is used, and the logical connector is left justified with the statement of the Condition, Completion Time, Surveillance or Frequency.

When two or more requirements are joined by OR, at least one of the requirements must be satisfied. However, there is no prohibition on satisfying additional requirements joined by OR (the examples do not discuss satisfying additional requirements, only the minimum requirements).

When two or more requirements are joined by AND, all of the requirements must be satisfied.

1.8.3 Examples

The following examples illustrate the use of logical connectors.

Example 1.8.3.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	x hours
	AND	
	A.2 Be in _____	y hours

Hypothetical Example 1.8.3.1 demonstrates that for Condition A both Required Actions A.1 and A.2 must be completed. In this case the logical connector AND is left justified.

Example 1.8.3.2

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. System inoperable.	A.1 Restore _____	s hours
	OR	
	A.2 Align _____	t hours
	OR	
	A.3.1 VERIFY _____	u hours
	AND	
	A.3.2.1 Reduce _____	v hours
	OR	
	A.3.2.2 Perform _____	w hours

Hypothetical Example 1.8.3.2 is a more complicated use of logical connectors. In this example, Required Action A.1, Required Action A.2 and Required Action A.3.1 are alternative choices. Only one of these alternative choices must be performed as indicated by the use of logical connector OR and since the ORs are left justified. Any one of these three ACTIONS may be chosen. If A.3.1 is chosen, an additional requirement, indicated by the indented logical connector AND, is imposed. This additional requirement is met by choosing A.3.2.1 or A.3.2.2. The indented position of the logical connector OR indicates that A.3.2.1 and A.3.2.2 are alternate and equal choices, only one of which must be performed.

In addition to the position of the logical connectors, the alphanumeric system is also used to provide the proper interpretation of Required Actions. In Example 1.8.3.2 the letter A identifies that all of these Required Actions apply to Condition A. The first number after the letter A (in this case 1 or 2 or 3) indicates a group of equal alternate actions for Condition A. In the same manner, A.3.1 and A.3.2 are two Required Actions in the same group connected by a logical connector.

Required Actions in the same group are indicated by the same first digit and sequential second digits. Required Actions A.3.2.1 and A.3.2.2 are in the same group because they have the same second digit and sequential third digits. Because they also have the same first digit as A.3.1, these Required Actions are also a part of the A.3 group.

1.9 NOTES

Notes are used to modify the basic requirements specified in the Safety Limits (SL), Limiting Conditions for Operation (LCOs), Applicability, ACTIONS and Surveillance Requirements (SRs). Notes may provide limited exceptions to the basic requirement, provide clarification of the basic requirement, specify additional, but limited, requirements, or specify other special modifications. The basic requirement plus the Note(s) are the requirement. For example, if a Note permits an exception, then the requirement is met when the exception is applicable.

Notes in the SLs, LCOs and Applicability are placed after the text they modify. Notes in the ACTIONS and SRs are placed before the text they modify. All Notes are preceded by the centered heading "NOTE" in uppercase type.

1.10 COMPLETION TIMES

1.10.1 Purpose

The purpose of this section is to establish the Completion Time convention and to provide guidance for its use.

Safety Limits (SLs) and Limiting Conditions for Operation (LCOs) specify minimum requirements for assuring safe operation of the facility. The ACTIONS associated with an SL or LCO state Conditions that typically describe the ways in which the requirements of the SL or LCO can fail to be met. Specified with each stated Condition are Required Action(s) and Completion Time(s).

1.10.2 Completion Time

The Completion Time is the amount of time allowed to complete a Required Action. It is referenced to the time of discovery of a situation (e.g., inoperable equipment or variable not within limits) that requires entering an ACTIONS Condition unless otherwise specified, provided the tank is in a MODE or specified Condition stated in the Applicability of the SL or LCO. Required Actions must be completed prior to the expiration of the specified Completion Time. An ACTIONS Condition remains in effect and the Required Actions must be applied until the Condition no longer exists or the tank, system or variable is not within the LCO Applicability.

If situations are discovered which require entry into more than one Condition at a time within a single LCO (multiple Conditions), the Required Actions for each Condition must be performed within the associated Completion Time. When in multiple Conditions, separate Completion Times are tracked for each Condition starting from the time of discovery of the situation which required entry into the Condition.

The Tank Farm Interim Operational Safety Requirements were developed to allow separate Condition entry for each tank, system or variable addressed by the associated LCO. Once a Condition has been entered, subsequent tanks, systems or variables expressed in the Condition discovered to be inoperable or not within limits will result in separate entry into the Condition for each discovery. The Required Actions and the associated Completion Times of the Condition then apply to each additional discovery independently.

When a Surveillance is stipulated as a Required Action, the associated Surveillance Frequency is provided under Completion Time. If the Required Action provides a numerical reference to an available Surveillance, the Frequency information under Completion

Time may be different from that which normally applies to this particular Surveillance.

1.10.3 Examples

The following examples illustrate the use of Completion Times with different types of Conditions and changing Conditions.

Example 1.10.3.1

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Required Action and associated Completion Time not met.	B.1 Be in STANDBY MODE.	6 hours
	AND	
	B.2 Be in REPAIR MODE.	12 hours

In hypothetical Example 1.10.3.1, Condition B has two Required Actions. Each Required Action has its own separate Completion Time. Each Completion Time is referenced to the time that Condition B is entered.

The Required Actions of Condition B are to be in STANDBY MODE in six hours AND in REPAIR MODE in 12 hours. A total of six hours is allowed to reach STANDBY MODE and a total of 12 hours (not 18 hours) is allowed to reach REPAIR MODE from the time that Condition B was entered. If STANDBY MODE is reached in three hours, the time allowed to reach REPAIR MODE is the next 9 hours because the total time allowed to reach REPAIR MODE is 12 hours.

If Condition B is entered while in STANDBY MODE, the time allowed to reach REPAIR MODE is the next 12 hours.

Example 1.10.3.2

ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	One or more valves inoperable.	A.1	Restore valve to OPERABLE status.	4 hours
B.	Required Action and associated Completion Time not met.	B.1	Be in STANDBY MODE.	6 hours
		AND		
		B.2	Be in REPAIR MODE.	12 hours

In hypothetical Example 1.10.3.2, this example, Condition A should be entered separately for each inoperable valve and Completion Times tracked on a per valve basis. When a valve is declared inoperable, Condition A is entered and its Completion Time starts. If subsequent valves are declared inoperable, Condition A is entered for each valve and separate Completion Times start and are tracked for each valve.

If the Completion Time associated with a valve in Condition A expires, Condition B is entered for that valve. If the Completion Times associated with subsequent valves in Condition A expire, Condition B is entered separately for each valve and separate Completion Times start and are tracked for each valve. If a valve which caused entry into Condition B is restored to OPERABLE status, Condition B is exited for that valve.

Example 1.10.3.3

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Primary tank WASTE level outside limit.	A.1 Perform SR 3.X.X.X.	Once per 2 hours
	OR	
	A.2 Restore primary tank WASTE level to within limit.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in STANDBY MODE.	6 hours

In hypothetical Example 1.10.3.3, Entry into Condition A offers a choice between Required Action A.1 or A.2. Required Action A.1 has a "Once per" type Completion Time which qualifies for the 25% extension of SR 3.0.2, Frequencies, to each performance after the initial performance. If Required Action A.1 is followed, and the Required Action is not met within the Completion Time (including the 25% extension of SR 3.0.2, Frequencies), Condition B is entered. If Required Action A.2 is followed and the Completion Time of 7 days is not met, Condition B is entered.

If after entry into Condition B, Required Action A.1 or A.2 is met, Condition B is exited and operation may then continue in Condition A.

Example 1.10.3.4

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One system inoperable.	A.1 Perform SR 3.X.X.X	2 hours AND each 8 hours thereafter
	AND	
	A.2 Restore system to OPERABLE status.	7 days
B. Required Action and associated Completion Time not met.	B.1 Be in STANDBY MODE.	6 hours
	AND	
	B.2 Be in REPAIR MODE.	12 hours

In hypothetical Example 1.10.3.4, Required Action A.1 has two Completion Times. The 2 hour Completion Time begins at the time the Condition is entered and "each 8 hours thereafter" interval begins upon performance of Required Action A.1.

If after Condition A is entered, Required Action A.1 is not met within either the initial 2 hour, or any subsequent 8 hour (including the 25% extension of SR 3.0.2, Frequencies), interval from the previous performance, Condition B is entered. The Completion Time clock for Condition A does not stop after Condition B is entered, but continues to be tracked from the time Condition A was initially entered. If after Condition B is entered, Required Action A.1 is met, Condition B is exited and operation may continue in accordance with Condition A, provided the Completion Time for Required Action A.2 has not expired.

1.10.4 Immediate Completion Time

In some cases Immediately is used as a special Completion Time. In this case, the Required Action is to be commenced without delay, and continuously pursued in a controlled manner until complete. The use of Immediately implies the highest sense of urgency. Implementation of Immediately shall be given top priority over all other activities.

Upon entry into the ACTIONS, the prevalent conditions shall be evaluated. A maximum Completion Time shall be established and documented, based on the conditions. A VIOLATION will occur beyond the established Completion Time.

SECTION 2

SAFETY LIMITS

NOT USED

SECTION 3

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

LIMITING CONTROL SETTINGS (LCSs)

The LCSs have been combined with their respective Limiting Conditions for Operation (LCOs) with all actuation points and requirements contained within the LCO. Combining the LCS with the LCO recognizes that an LCS actuation point within limits is a part of the OPERABILITY of the system. Furthermore, it enhances safety by placing the Applicability, ACTIONS and Surveillance Requirements (SRs) for a system in a single location and reduces the complexity of the Operational Safety Requirement (OSR) document.

When an LCS actuation point is discovered to be nonconservative with respect to the Allowable Value during the performance of Surveillance Requirements, the system is considered inoperable and entry into the ACTIONS is required.

3.0 APPLICABILITY

3.0 Limiting Conditions for Operation (LCOs) - Applicability

The following LCOs provide general rules for application of LCOs.

LCO 3.0.1 LCO Met	Compliance with the LCO is required for the MODES specified; except that upon failure to meet the LCO, the associated ACTION requirements shall be met.
LCO 3.0.2 ACTION Met	Upon discovery of a failure to meet an LCO, the Required Actions of the associated Condition shall be met. If the LCO is met or no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Actions is not required unless otherwise stated.
LCO 3.0.3 ACTION Not Met or ACTION Not Provided	When an LCO is not met, and the associated ACTIONS are initiated but cannot be completed in the specified time, or an associated ACTION is not provided, a VIOLATION shall be declared and the tank shall be placed in a MODE or other specified condition in which the LCO is not applicable or actions shall be initiated within 1 hour to place the tank in RESTRICTED MODE within 24 hours. If the action to place the tank(s) in the RESTRICTED MODE is initiated, DOE shall be notified per the requirements of DOE Order 5000.3B. An OSR RECOVERY PLAN shall be issued to DOE after placing the tank in RESTRICTED MODE. The plan should include interim restrictions, Surveillances and specific actions to be taken. Where corrective measures are completed that permit operation in accordance with the LCO or ACTIONS, completion of the actions required by LCO 3.0.3 are not required. Exceptions to this LCO are stated in the individual LCOs.
LCO 3.0.4 MODE Changes	When an LCO is not met, entry into a different MODE in the Applicability statement shall not be made except when the associated ACTIONS permit operation in the new MODE for an unlimited period of time. This LCO shall not prevent changes in MODES or other specified conditions in the Applicability statement that are required to comply with ACTIONS. (continued)

LCO 3.0.4 MODE Changes (continued)	Exceptions to this LCO are stated in the individual LCOs. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated ACTIONS to be entered allow tank operation in the MODE or other specified condition for only a limited period of time.
LCO 3.0.5 Emergency Exceptions	If an emergency situation develops that is not treated in the OSR, Operations personnel are expected to use their training and expertise to take ACTIONS to correct or mitigate the situation. Operations personnel may take actions that depart from a requirement in the OSR provided an emergency situation exists and these actions are needed immediately to protect the public health and safety. Such actions shall be approved, at a minimum, by an operator and Manager/Supervisor certified on that system through a PHMC-approved training program. If emergency actions are taken, verbal notifications shall be made to the Head of the Field Element (RL) within 2 hours and by written reports to the Program Manager (PM) within 24 hours, in accordance with AC 5.5, Reporting Requirements.
LCO 3.0.6 Support System LCO Not Met	The design or operational characteristics of a support system may warrant inclusion in an OSR. This may be accomplished either in a separate OSR or by incorporation into an OSR for a supported system. In the case of a dedicated and separate OSR for the support system, when the supported system LCO is not met solely due to the support system LCO not being met, the Conditions and Required Actions associated with the supported system are generally not required to be entered, unless directed by the support system's Required Actions. Only the support system LCO, ACTIONS, are required to be entered. This is an exception to LCO 3.0.2, ACTION Met, for the supported system.

3.0 APPLICABILITY

3.0 Surveillance Requirements (SRs) - Applicability

The following SRs provide general rules for application of SRs.

SR 3.0.1 Performance	SRs shall be met during the MODES or other specified conditions in the Applicability for individual LCOs, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the LCO. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the LCO except as provided in SR 3.0.3, Delay of Required Actions. Surveillances do not normally have to be performed on inoperable equipment or variables outside specified limits. Each OSR provides the SRs in a specific table. However, an SR may also be used as a Required Action when a specific Condition has been entered. In this case, the Frequency requirements are provided under Completion Time.
SR 3.0.2 Frequencies	Each Surveillance Requirement shall be performed within the specified interval, with a maximum extension of 25 percent of the interval between any two consecutive Surveillances. The 25 percent extension is intended to provide operational flexibility both for scheduling and for performing Surveillances. It should not be relied upon as a routine extension of the specified interval. In general, whenever a periodic performance of a Surveillance is specified, the 25% Frequency extension applies. In order to exclude the 25% extension from the initial performance of a periodic Surveillance, the Frequency requirements are introduced with "once per ---". In this case, the Frequency extension applies to each performance after the initial performance. All requirements and rules for Surveillance Frequencies apply equally when a Surveillance is stipulated as a Required Action. Exceptions to this requirement are stated in the individual LCOs.

SR 3.0.3 Delay of Required Actions	If it is discovered that a Surveillance was not performed within its specified Frequency (including the 1.25 Frequency extension allowed by 3.0.2) then compliance with the requirement to declare the LCO not met and enter the Required Actions may be delayed from the time of discovery up to the limit of the Surveillance interval Frequency or 24 hours, whichever is less. This delay period is permitted to allow performance of the Surveillance. The applicable LCO Required Actions must be entered: a. If the Surveillance is not performed within the delay period, or, b. If the Surveillance is performed within the delay period and the Surveillance is not met. The Completion Times of the Required Actions begin immediately upon expiration of the delay period for case a. and immediately upon failure to meet an SR for case b. SR 3.0.3 shall not be used to extend the scheduled Surveillance interval. Failure to complete the Surveillance within the specified time interval (including case by case application of the 1.25 extensions) is a VIOLATION.
SR 3.0.4 MODE Changes	Entry into a MODE or other specified condition in the Applicability of an LCO shall not be made unless the LCO's Surveillances have been met within their specified Frequency. This provision shall not prevent passage through or to MODES or other specified conditions in compliance with Required Actions.

3.1 Not Used

3.2 Not Used

3.3 Not Used

3.4.1 Not Used

3.4.2 Not Used

3.4.3 Not Used

3.5 Not Used

3.6 Not Used

3.7 ROTARY MODE CORE SAMPLING SYSTEM

3.7.1 Not Used

3.7.2 Not Used

3.7 ROTARY MODE CORE SAMPLING SYSTEM

3.7.3 Exhauster Induced Tank Pressure

LCO 3.7.3 Exhauster shall be operable and shall maintain tank pressure less than atmospheric pressure and greater or equal to a negative 3 in. w.g.

APPLICABILITY: OPERATION (one hour prior, during, and sixteen hours following waste intrusive operations in Flammable Gas Watch List (FGWL) Tanks or those tanks recommended by the contractor to be included on the FGWL).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Tank pressure exceeds limits.	A.1 Restore pressure to acceptable limits. If pressure cannot be restored, shut down drill rig engine.	Immediately
B. Exhauster shutdown due to automatic trip.	B.1 Cease RMCS operations.	Immediately
	AND	
	B.2 A 10 min minimum waiting period is required prior to resuming operations.	> 10 min
C. Exhauster inoperable.	C.1 Stop RMCS Waste Intrusive Operations.	Immediately
	AND	
	C.2 Restore Exhauster operability.	Prior to resuming RMCS waste intrusive operations

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.7.3.1	The exhauster pressure switch shall be calibrated periodically.	6 months
SR	3.7.3.2	Prior to initiating RMCS operations and periodically during exhauster operations, the pressure shall be verified to be in limits.	Prior to initiating operations and then once every 24 hours.
SR	3.7.3.3	All exhauster shutdown indication elements shall be calibrated with independent verification and tested with indication of all failures.	6 months

3.7 ROTARY MODE CORE SAMPLING SYSTEM

3.7.4 Nitrogen Purge System

LCO 3.7.4 The Nitrogen Purge System shall be operable and able to:

a. supply the drill string at a rate of ≥ 30 scfm.

b. supply nitrogen to the drill string at a temperature > 10°F and < 140°F.

APPLICABILITY: OPERATION (RMCS waste intrusive operations in Flammable Gas Watch List (FGWL) Tanks or those tanks recommended by the contractor to be included on the FGWL).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Automatic trip occurs.	A.1 Cease RMCS operations.	Immediately
	AND	
	A.2 A 10 min minimum waiting period is required prior to resuming operations.	> 10 min
B. Nitrogen temperature out of range alarm.	B.1 Stop drill rig engine.	Immediately
	AND	
	B.2 Continue nitrogen purge.	Immediately
	AND	
	B.3 Do not resume drilling until temperature is within normal range.	> 10 min
C. Nitrogen purge system inoperable.	C.1 Stop RMCS waste intrusive operations.	Immediately
	AND	
	C.2 Restore Nitrogen Purge System Operability	Prior to resuming RMCS operating

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Nitrogen temperature monitor inoperable.	D.1 Stop RMCS waste intrusive operations.	Immediately
	AND	
	D.2 Restore Nitrogen temperature monitor operability.	Prior to resuming RMCS operating

SURVEILLANCE REQUIREMENTS

SURVEILLANCE			FREQUENCY
SR	3.7.4.1	The purge system shall be tested for bypass leakage periodically. Testing shall be independently verified with indication of failures. Leak rate shall be limited to the uncertainty of the system or less than 2% of the required flow.	6 months
SR	3.7.4.2	Flow monitoring and automatic shutdown system will be calibrated periodically and verified as capable of automatically sending a shutdown signal to the drill rig engine immediately upon receipt of a valid shutdown signal of detecting nitrogen flow less than the required flow (2 of 3 control channels).	6 months
SR	3.7.4.3	Temperature indicator and alarm shall be calibrated periodically.	6 months

3.7 ROTARY MODE CORE SAMPLING SYSTEM

3.7.5 Rotary Drilling Parameters

LCO 3.7.5 The RMCS equipment shall be operable and shall:

a. not be operated with a down force on the drill bit > 750 lbf.

b. not operate at a drill string rotation > 55 rpm.

c. not be operated when the penetration rate is <0.75 in/min for a cumulative time of 60 sec in any 3 min period.

APPLICABILITY: OPERATION (RMCS waste intrusive operations in Flammable Gas Watch List (FGWL) Tanks or those tanks recommended by the contractor to be included on the FGWL).

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Automatic trip.	A.1 A minimum 10 min waiting period shall be imposed following an automatic trip due to down force, rpm, or penetration rate prior to resumption of RMCS operations.	> 10 min
B. Walkdown Function, hydraulic bottom detector, Down Force, Rotary RPM Measurement, or penetration rate system inoperable.	B.1 Stop RMCS waste intrusive operations. AND B.2 Restore system operability.	Immediately Prior to resuming RMCS operations
C. Grapple load exceeds 250 lb.	C.1 Stop electric motor driving the grapple hoist (or verify automatic stop).	Immediately

SURVEILLANCE REQUIREMENTS

		SURVEILLANCE	FREQUENCY
SR	3.7.5.1	RPM measurement and alarm trip equipment shall be calibrated and functionally tested on the stated frequency.	6 months
		There shall be dual RPM measurement sensors, both of which shall be operable when rotating the drill bit below the waste surface. The drill string rotation and penetration shall cease upon alarm or failure of either sensor circuits.	
		Penetration rate measurement system and alarm trip equipment shall be calibrated and functionally tested on the stated frequency.	6 months
		Down force measurement system and alarm trip equipment shall be calibrated and functionally tested on the stated frequency.	6 months
		Down force and alarm trip equipment shall be operable when rotating the drill bit below the waste surface.	
		Upon a valid high RPM, high penetration rate or high down force alarm, the system shall be capable of ceasing drill string rotation and penetration immediately.	
		The walkdown function and hydraulic bottom detector shall be verified operational.	6 months
		The walkdown function shall be operable for all samples except the last, when the hydraulic bottom detector shall be used.	
		Grapple hoist cable shall be inspected periodically.	6 months
		Grapple load cell shall be calibrated.	6 months

SECTION 4

SURVEILLANCE REQUIREMENTS

Section 4 SURVEILLANCE REQUIREMENTS

Limiting Conditions for Operation (LCO) and their associated Surveillance Requirements (SR) are integral. Therefore, SRs are found in Chapter 3, Limiting Conditions for Operation and Surveillance Requirements. Surveillance Requirements are numbered in accordance with their respective LCOs (i.e., SR 3.1.1.1 is the first SR associated with LCO 3.1.1).

The SRs may be listed separately or stipulated as Required Actions under ACTIONS. Regardless of whether an SR is listed separately or stipulated as a Required Action under ACTIONS, all rules for SRs and SR Frequency apply.

SECTION 5

ADMINISTRATIVE CONTROLS

Section 5 ADMINISTRATIVE CONTROLS (ACs)

5.1 PURPOSE

The purpose of the ACs is to state the provisions relating to organization and management, procedures, record keeping, review and audit, and reporting necessary to ensure operation of the Tank Farms in a safe manner.

Except as noted below, these ACs are applicable for all tanks in the Aging Waste Facility (AWF), Double Shell Tank Farms (DSTFs), and Single Shell Tank Farms (SSTFs) during all MODES (OPERATION, STANDBY, REPAIR and RESTRICTED MODES).

5.2 RESPONSIBILITY

The Project Hanford Management Contractor (PHMC) is responsible to the Department of Energy (DOE) for the safe operation of the DOE-owned AWF, DSTFs, and SSTFs at the Hanford Site.

5.3 IMPLEMENTATION

The contractor is responsible for ensuring that the requirements of the Operational Safety Requirements (OSRs) are met. Compliance shall be demonstrated by:

a. Operating within the Safety Limits (SLs),

b. Operating within the Limiting Conditions for Operation (LCOs), Limiting Control Settings (LCSs) and the associated Surveillance Requirements (SRs) during their Applicability,

c. Operating within the ACTIONS of LCOs and LCSs when required,

d. Performing all SRs as required,

e. Establishing and maintaining the required ACs, and

f. Maintaining required DESIGN FEATURES.

5.4 OPERATIONAL SAFETY REQUIREMENT VIOLATIONS

5.4.1 Violation Criteria

A VIOLATION of the OSR occurs as a result of any of four circumstances:

a. An SL is exceeded.

b. Failure to take the ACTIONS required (i.e., Required Action) within the required time limits (i.e., Completion Time) following:

(1) Exceeding an LCS.

(2) Failure to meet an LCO.

(3) Failure to successfully meet an SR.

----------NOTE----------
A VIOLATION relates only to failure to comply with an ACTION statement. Exceeding the LCS or LCO limit by itself, or failure of an SR by itself, is not considered a VIOLATION.
---

c. Failure to perform a Surveillance Requirement within the required time limit.

d. Failure to comply with an Administrative Control requirement.

----------NOTE----------
Failure to comply with a specific safety requirement within an AC or the intent of an AC is considered a VIOLATION. A noncompliance within a specific AC procedure or program is not necessarily a VIOLATION.

5.4.2 Response to Safety Limit Violation

If a VIOLATION of an SL occurs, proceed as follows:

a. Place the affected tank(s) in a safe and stable condition.

b. Notify the DOE of the VIOLATION in accordance with DOE Order 5000.3B (DOE 1993).

c. Prepare an Occurrence Report in accordance with DOE Order 5000.3B (DOE 1993).

d. Perform and document a technical evaluation of the SL VIOLATION to determine if any damage may have occurred and evaluate the capacity of the affected tank(s) to restart.

e. Prepare an OSR RECOVERY PLAN.

f. Obtain DOE Program Manager (PM) or designated representative approval prior to returning the affected tank(s) to the OPERATION MODE.

5.4.3 Response to Limiting Conditions for Operation, Surveillance Requirement and Administrative Control Violation

If a VIOLATION of an LCO/LCS, SR or AC occurs, proceed as follows:

a. Place the affected tank(s) in a safe and stable condition.

b. Initiate actions within 1 hour to place the tank(s) in RESTRICTED MODE within 24 hours.

c. Notify the DOE of the VIOLATION in accordance with DOE Order 5000.3B (DOE 1993).

d. Prepare an Occurrence Report in accordance with DOE Order 5000.3B (DOE 1993).

e. Perform and document a technical evaluation, if applicable, of the LCO VIOLATION to determine if any damage may have occurred and evaluate the capacity of the affected tank(s) to be returned to OPERATION MODE.

f. Prepare an OSR RECOVERY PLAN.

g. Advise DOE of the status of the corrective actions and the results of the technical evaluation, if applicable, prior to returning the tank to the OPERATION MODE.

5.5 REPORTING REQUIREMENTS

A program shall be established to implement the DOE reporting requirements. The program shall include requirements to report the following:

5.5.1 Reports Required in Accordance with DOE Order 5000.3B (DOE 1993)

a. Any deviation from the OSRs authorized pursuant to LCO 3.0.5, Emergency Exceptions, is reportable.

b. OSR VIOLATIONS (SL, LCS, LCO, SR, and AC) are reportable.

c. Unplanned entry into the ACTIONS statements is reportable. Planned entry into the ACTIONS statements to perform

Surveillances, maintenance or investigation of operational problems is not reportable.

5.6 REVISIONS TO THE OPERATIONAL SAFETY REQUIREMENTS

All proposed revisions to the OSRs shall be submitted to the DOE for approval prior to implementation of the revision. Such submittals shall include the bases for the proposed revision.

5.7 WAIVER TO THE OPERATIONAL SAFETY REQUIREMENTS

Waivers may be granted to suspend various portions of the OSR when necessary for performance of special activities such as acceptance testing or process testing. Waivers shall be for an explicit activity and defined time. Waivers shall be approved by the same process as a revision to the OSRs (see Section 5.6, Revisions to the Operational Safety Requirements).

5.8 ORGANIZATION

Sections 5.8.1 through 5.8.6 Not Used

5.8.7 MODE Changes

A program shall be established that requires the MODE status of each Tank Farm to be documented and maintained current. When OSR-required equipment is determined to be inoperable, the time of discovery shall be recorded to track compliance with the ACTIONS Completion Times.

If entry into the RESTRICTED MODE was performed via the ACTIONS of LCOs or LCO 3.0.3, Action Not Met or Action Not Provided, a tank may be removed from RESTRICTED MODE only when the tank complies with the requirements of OPERATION, STANDBY or REPAIR MODE. If the tank is on the WATCH LIST, DOE approval is required prior to removing the tank from RESTRICTED MODE.

Sections 5.9 through 5.30 Not Used

5.31 ROTARY MODE CORE SAMPLING

5.31.1 Control Applicability

For flammable gas single-shell tanks (SSTs), an evaluation checklist shall be completed per Section 7.0 of LMHC 1997.

Checklist items will include:

(1) Tank Specific Hazards / Other Watch lists
(2) Flammable Gas Composition
(3) Toxic Gas Composition
(4) Waste Temperature
(5) Waste Energetics
(6) Likelihood of Gas Release Event (GRE)

Successful completion of the checklist is required for RMCS operations to proceed. This means that no adverse items remain unresolved.

5.31.2 Ignition and Envelope Testing

Ignition and envelope test requirements and acceptance criteria shall be used to verify drill bit and material performance. Required testing has been completed.

5.31.3 Not Used

5.31.4 Not Used

5.31.5 Gas Leak Paths

A formal tank walkdown procedure shall be developed and implemented prior to waste-intrusive activities that:

- assesses the general condition of risers,
- identifies observable leaks,
- as a minimum, documents identified leaks $\geq$ 1 in. (equivalent diameter), and,
- as a minimum, seals or adds deflectors to identified leaks with an equivalent leak diameter $\geq$ 1 in. (equivalent diameter).

5.31.6 Not Used

5.31.7 Not Used

5.31.8 Tank Loading

Loading on each tank shall comply with IOSR requirements for simultaneous static and dynamic loading for each specific FG/RMCS tank.

5.31.9 Not Used

5.31.10 Portable Inlet Stack

Prior to waste-intrusive activities, it shall be verified the inlet breather filter effluent (in the event of tank pressurization) is directed vertically to a height of at least 15 ft. above ground level.

5.31.11 Drill Bit, Core Barrel, Core Sampler, and Drill Rods

The FG/RMCS drill bit, core barrel, core sampler, and drill rods shall be of the configuration and material tested by the Bureau of Mines and performance evaluated in LMHC 1997.

5.31.12 RMCS Operations

It shall be verified that the exhauster is fully operational:

- 1 hr before the nitrogen purge flow to the Drill String is established ≥ 30 scfm,
- the flammable gas concentration in the tank vapor space shall be <1000 ppm before starting RMCS operations to obtain the initial segment in any core in a given riser,
- during all rotary drilling operations, and
- for a cumulative 16 hrs following termination of nitrogen purge flow to the Drill String.

When rotary drilling operations are resumed within any 16-hr waiting period, a new 16-hr period will be initiated following termination of Drill String nitrogen purge flow of ≥ 30 scfm.

SECTION 6

REFERENCES

Section 6 REFERENCES

These references are for Sections 1, 3 and 5, of this Addendum. The references for Appendix B is contained within the appendix.

DOE 1993, *Occurrence Reporting and Processing of Operations Information*, DOE Order 5000.3B, U.S. Department of Energy, Washington, D.C.*

LMHC 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks, Hanford site, Washington*, WHC-SD-WM-SAD-035, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland, Washington.

Public Law 101-510, 1990 *National Defense Authorization Act for Fiscal year 1991*, Section 3137, "Safety Measures for Waste Tanks at Hanford Nuclear Reservation."

WHC 1996, *Double Shell Tank Waste Analysis Document*, WHC-SD-WM-EV-053, Rev. 4, Westinghouse Hanford Company, Richland, Washington.

* This order has been canceled by DOE O 232.1, but compliance is required until the Contracting Officer directs otherwise.

APPENDIX A

DESIGN FEATURES

Not Used

APPENDIX B

BASES

Appendix B BASES

This appendix provides summary statements of the reasons for the Safety Limits, Limiting Conditions for Operation, the associated Surveillance Requirements and Administrative Controls. The BASES describe how the limit(s), the Applicability, the Condition(s) and the Surveillance(s) will maintain operation of the Tank Farms within the safety envelope. The primary purpose for describing the BASES for these requirements is to provide the operations and engineering staff with the necessary information to maintain operation of the Tank Farms within the safety envelope and to ensure that any future changes to these requirements will not affect their original intent or purpose.

B 2.0 SAFETY LIMITS

Not Used

B 3.0 APPLICABILITY

B 3.0 Limiting Conditions For Operation (LCOs) - Applicability

BASES

GENERAL	LCOs 3.0.1, LCO Met, through 3.0.6, Support System LCO Not Met, establish the general rules applicable to all LCOs and apply at all times, unless otherwise stated.
LCO 3.0.1 LCO Met	LCO 3.0.1 establishes the Applicability statement within each individual LCO as the requirements for when the LCO is required to be met (i.e., when the tank is in the MODES or other specified conditions of the Applicability statement of each LCO).
LCO 3.0.2 ACTION Met	LCO 3.0.2 establishes that upon discovery of a failure to meet an LCO, the associated ACTIONS shall be met. The Completion Time of each Required Action for an ACTIONS Condition is applicable from the point in time that an ACTIONS Condition is entered. The Required Actions establish those remedial measures that must be taken within specified Completion Times when the requirements of an LCO are not met. This rule establishes that: (1) Completion of the Required Actions within the specified Completion Times constitutes the LCO met, and (2) Completion of the Required Actions is not required when an LCO is met within the specified Completion Time, unless otherwise specified. (continued)

BASES

LCO 3.0.2 ACTION Met (continued)

There are two basic types of Required Actions. The first type of Required Action specifies a time limit in which the LCO must be met. This time limit is the Completion Time to restore an inoperable system or component to OPERABLE status or to restore variables to within specified limits. If this type of Required Action is not completed within the specified Completion Time, and no other condition applies, LCO 3.0.3, ACTION Not Met or ACTION Not Provided, is applicable. (Whether stated as a Required Action or not, correction of the entered Condition is an action which may always be considered upon entering ACTIONS unless otherwise stated.)

The second type of Required Action specifies the remedial measures that permit continued operation of the tank that is not further restricted by the Completion Time. In this case, conformance to the Required Actions provides an acceptable level of safety for continued operation.

All requirements and rules for Surveillance Frequencies apply equally when a Surveillance is stipulated as a Required Action.

Completing the performance of the Required Actions is not required when an LCO is met or is no longer applicable within the associated Completion Time, unless otherwise stated in the individual LCOs.

The nature of some Required Actions of some Conditions necessitates that, once the Condition is entered, the Required Actions must be completed even though the associated Conditions are resolved. The individual LCOs ACTIONS specify the Required Actions where this is the case.

(continued)

BASES

LCO 3.0.2 ACTION Met (continued)	The Completion Times of the Required Actions are also applicable when a system or component is removed from service intentionally. The reasons for intentionally relying on the ACTIONS include, but are not limited to, performance of Surveillances, preventive maintenance, corrective maintenance, or investigation of operational problems. Entering ACTIONS for these reasons must be done in a manner that does not compromise safety. Intentional entry into ACTIONS should not be made for operational convenience. Alternatives that would not result in redundant equipment being inoperable should be used instead. Doing so limits the time both subsystems/trains of a safety function are inoperable and limits the time other conditions exist which result in LCO 3.0.3, ACTION Not Met or ACTION Not Provided, being entered. Individual LCOs may specify a time limit for performing an SR when equipment is removed from service or bypassed for testing. In this case, the Completion Times of the Required Actions are applicable when this time limit expires, if the SR has not been completed. When a change in MODE or other specified Condition is required to comply with Required Actions, the tank may enter a MODE or other specified condition in which a new LCO becomes applicable. In this case, the Completion Times of the associated Required Actions would apply from the point in time that the new LCO becomes applicable, and the ACTIONS Condition(s) are entered.

BASES

LCO 3.0.3 ACTION Not Met or ACTION Not Provided

LCO 3.0.3 establishes the actions that must be implemented when an LCO is not met and:

a. An associated Required Action and Completion Time is not met and no other Condition applies; or

b. The Condition of the tank is not specifically addressed by the associated ACTIONS. This means that no combination of Conditions stated in the ACTIONS can be made that exactly corresponds to the actual condition of the tank. Sometimes, possible combinations of Conditions are such that entering LCO 3.0.3 is warranted; in such cases, the ACTIONS specifically state a Condition corresponding to such combinations and also that LCO 3.0.3 be entered immediately.

This LCO delineates the time limits for placing the tank in a safe MODE or other specified condition when operation cannot be maintained within the limits for safe operation as defined by the LCO and its ACTIONS. It is not intended to be used as an operational convenience that permits routine voluntary removal of redundant systems or components from service in lieu of other alternatives that would not result in redundant systems or components being inoperable.

Upon entry into LCO 3.0.3, one hour is allowed to prepare for an orderly change in tank conditions. This time permits the operator to coordinate the termination of process and transfer activities in a prescribed and systematic way. The 24 hour time limit specified to place the tank in RESTRICTED MODE was chosen as a reasonable time to permit the activities to proceed in a controlled and orderly manner. This reduces the potential for a radioactive material handling accident that could challenge systems under conditions for which this LCO applies. The use and interpretation of specified times to complete the actions of LCO 3.0.3 shall be consistent with the discussion of Section 1.10, Completion Times.

A tank MODE change required in accordance with LCO 3.0.3 may be terminated and LCO 3.0.3 exited, if any of the following occurs:

(continued)

BASES

LCO 3.0.3 ACTION Not Met or ACTION Not Provided (continued)	a.	The LCO is not met.
	b.	A Condition exists for which the Required Actions have now been performed.
	c.	ACTIONS exist which do not have expired Completion Times. These Completion Times are applicable from the point in time that the LCO Condition is initially entered and not from the time LCO 3.0.3 is exited.

The time limits of LCO 3.0.3 allow 25 hours for the tank to be placed in the lower MODE (RESTRICTED MODE) during operation in either the OPERATION, STANDBY or REPAIR MODES. If remedial measures are completed that would permit a return to either the OPERATION, STANDBY or REPAIR MODE, a penalty is not incurred by having to reach the RESTRICTED MODE in less time than the total time allowed (25 hours).

In OPERATION, STANDBY and REPAIR MODES, LCO 3.0.3 provides actions for Conditions not covered in other LCOs. The requirements of LCO 3.0.3 do not apply in the RESTRICTED MODE because the tank is already in the most restrictive Condition required by LCO 3.0.3. The requirements of LCO 3.0.3 do not apply in other specified conditions of the Applicability (unless in OPERATION, STANDBY or REPAIR MODES) because the ACTIONS of individual LCOs sufficiently define the remedial measures to be taken.

The exceptions to LCO 3.0.3 are provided in instances where requiring a tank MODE change to RESTRICTED MODE, in accordance with LCO 3.0.3, would not provide appropriate remedial measures for the associated condition of the tank. These exceptions are addressed in the individual LCOs.

BASES

LCO 3.0.4
MODE Changes

LCO 3.0.4 establishes limitations on changes in MODES or other specified conditions in the Applicability when an LCO is not met. It precludes placing the tank in a different MODE or other specified condition when the following exist:

a. The requirements of an LCO in the MODE or other specified condition to be entered are not met, and

b. Continued operation in the MODE to be entered is not permitted for an unlimited period of time.

Compliance with Required Actions that permit continued operation of the tank for an unlimited period of time in a MODE or other specified condition provides an acceptable level of safety for continued operation. This is without regard to the status of the tank before or after the MODE change. Therefore, in such cases, entry into a MODE or other specified condition in the Applicability may be made in accordance with the provisions of the Required Actions. The provisions of this requirement should not be interpreted as endorsing the failure to exercise the good practice of restoring systems or components to OPERABLE status before tank startup.

The provisions of LCO 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability which are required to comply with ACTIONS.

Exceptions to LCO 3.0.4 are stated in the individual LCOs. Exceptions may apply to all of the ACTIONS or to a specific Required Action of an LCO.

(continued)

BASES

LCO 3.0.4 MODE Changes (continued)	When changing MODES or other specified conditions while in an ACTIONS Condition, in compliance with LCO 3.0.4 or where an exception to LCO 3.0.4 is stated, the ACTIONS define the remedial measures that apply. Surveillances do not have to be performed on the associated inoperable equipment (or on variables outside the specified limits), as permitted by SR 3.0.1, Performance. Therefore, a MODE change in this situation does not cause SR 3.0.1, Performance, or SR 3.0.4, MODE Changes, to be not met for those Surveillances that do not have to be performed due to the associated inoperable equipment. However, SRs must be met to demonstrate OPERABILITY prior to declaring the associated equipment OPERABLE (or variable within limits) and restoring compliance with the affected LCO.
LCO 3.0.5 Emergency Exceptions	LCO 3.0.5 establishes that in an emergency, if a situation develops that is not addressed by the Operational Safety Requirement (OSR), facility operating personnel are expected to utilize their training and expertise in taking actions to correct or mitigate the situation. This rule applies to both LCOs and ACs. A shift manager/supervisor may take actions that depart from a requirement in the OSR provided that: 1) an emergency situation exists, 2) these actions are immediately needed to protect the health and safety of the public, and 3) no action consistent with the OSR can provide adequate or equivalent protection. If emergency actions are taken, verbal notifications shall be made to the Head of the Field Element within two hours and written reports to the Program Manager (PM) within 24 hours in accordance with AC 5.5, Reporting Requirements.

BASES

LCO 3.0.6 Support System LCO Not Met	A system that provides services for other systems (supported systems) is designated a support system. Typically, systems such as power systems and cooling water systems provide services to one or more other systems and are, henceforth, identified as support systems. When it has been decided that design or operational parameters of a particular support system must be addressed in an OSR, a separate OSR may be prepared for the support system or the parameter conditions may be incorporated directly in the Required Actions of the OSR for the supported system. A separate OSR for the support system is preferred in those cases in which the support system services several supported systems. If, however, the support system services only one supported system, it may be simpler to include the requirements as a Required Action in the OSR for the single supported system. Practicality and OSR effectiveness are key considerations in deciding whether a separate OSR should be prepared for the support system. When a separate OSR is prepared for the support system, LCO 3.0.6 establishes an exception to LCO 3.0.2, LCO Not Met. This exception is necessary because LCO 3.0.2, LCO Not Met, would require that the Conditions and Required Actions of the associated supported system(s) LCO(s) be entered solely due to the inoperability of the support system. This exception is justified because the actions that ensure that the unit is maintained in a safe condition are specified in the support system LCO's Required Actions. It is therefore not necessary to enter into the supported systems's Conditions and Required Actions unless directed to do so by the support system's Required Actions. Possible confusion and inconsistency of interpretation due to the entry into multiple LCO's Conditions and Required Actions are eliminated by providing all the actions in support system's Required Actions.

B 3.0 APPLICABILITY

B 3.0 Surveillance Requirements (SRs) - Applicability

BASES	
GENERAL	SR 3.0.1, Performance, through 3.0.4, MODE Changes, establish the general requirements applicable to all LCO and apply at all times unless otherwise stated. SRs are requirements relating to testing, FUNCTIONAL TEST, 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 tank are maintained. In general, applicable SRs are listed separately under Surveillance Requirements. However, some OSRs require the performance of an SR as a Required Action when entering a specified condition. The requirements for the SR may be directly stated under Required Actions or a numerical reference may be made to an available and applicable SR. The referenced SR may be in the particular OSR or in any other OSR that is part of the OSRs for the particular tank farm. The Frequency that in general is applicable to the referenced SR, may be modified with a statement in the column on Completion Time. Whenever an SR is used as a Required Action, all general rules for SRs apply. This includes the rule that can provide for a 25% extension to the specified Frequency. In order to be able to recognize an SR under Required Actions, specific terminology is used to specify the SR. Additionally, the Bases identify the Required Action as an SR.

BASES

SR 3.0.1 PERFORMANCE

SR 3.0.1 establishes the requirement that SRs must be met during the MODES or other specified conditions in the Applicability for which the requirements of the LCO apply, unless otherwise specified in the individual SRs. This SR is to ensure that Surveillances are performed to VERIFY the OPERABILITY of structures, systems and components, and that variables are within specified limits. Failure to meet a Surveillance within the specified Frequency, in accordance with SR 3.0.2, Frequencies, constitutes a failure to meet the LCO.

Systems and components are assumed to be OPERABLE when the associated SRs have been met. Nothing in this LCO, however, is to be construed as implying that systems or components are OPERABLE when:

a. The systems or components are known to be inoperable, although still meeting SRs; or

b. The requirements of the Surveillance(s) are known not to be met between required Surveillance performances.

Surveillances do not have to be performed when the tank is in a MODE or other specified condition for which the requirements of the associated LCO are not applicable, unless otherwise specified.

Surveillances, including Surveillances invoked by Required Actions, do not have to be performed on inoperable equipment because the ACTIONS define the remedial measures that apply. SRs have to be met in accordance with SR 3.0.2, Frequencies, prior to returning equipment to OPERABLE status.

Upon completion of maintenance, appropriate post maintenance testing is required to declare equipment OPERABLE. This includes meeting applicable SRs in accordance with SR 3.0.2, Frequencies. Post maintenance testing may not be possible in the current MODE or other specified conditions in the Applicability due to the necessary tank parameters not having been established.

(continued)

BASES

SR 3.0.1 PERFORMANCE (continued)	In these situations, the equipment may be considered OPERABLE provided testing has been satisfactorily completed to the extent possible and the equipment is not otherwise believed to be incapable of performing its function. This will allow operation to proceed to a MODE or other specified condition where other necessary post maintenance tests can be completed.
SR 3.0.2 FREQUENCIES	SR 3.0.2 establishes the requirements for meeting the specified Frequency for Surveillances and any Required Action with a Completion Time that requires the periodic performance of the Required Action on a "once per..." interval. SR 3.0.2 permits a 25% extension of the interval specified in the Frequency (see Section 1.3, Frequency). This facilitates Surveillance scheduling and considers plant operating Conditions that may not be suitable for conducting the Surveillance (e.g., transient conditions or other ongoing Surveillance or maintenance activities). The intent of the 25% extension allowance is not to change the regularly scheduled Surveillance times. The 25% extension does not significantly degrade the reliability which results from performing the Surveillance at its specified Frequency. This is based on the recognition that the most probable result of any particular Surveillance being performed is the verification of conformance with the SRs. The exceptions to SR 3.0.2 are those Surveillances for which the 25% extension of the interval specified in the Frequency does not apply. These exceptions are stated in the individual LCOs. An example of where SR 3.0.2 does not apply is a Surveillance with a Frequency of "in accordance with 10 CFR 50, Appendix J, and as modified by approved exemptions". The requirements of regulations take precedence over the Operational Safety Requirements (OSRs). The OSRs cannot in and of themselves extend a test interval specified in the regulations. Therefore, there would be a Note in the Frequency stating, "Provisions of SR 3.0.2 are not applicable". (continued)

BASES

SR 3.0.2 FREQUENCIES (continued)	For a Surveillance that requires periodic performance on a "once per ..." basis, the Frequency extension applies to each performance after the initial performance. One reason for not allowing the 25% extension to the initial performance of the Surveillance is that such an action usually verifies that no loss of function has occurred by checking the status of redundant or diverse components or accomplishes the function of the inoperable equipment in an alternative manner. All requirements and rules for Surveillance Frequencies apply equally when a Surveillance is stipulated as a Required Action. The provisions of SR 3.0.2 are not intended to be used repeatedly merely as an operational convenience to extend Surveillance intervals or periodic Completion Time intervals beyond those specified.

BASES

SR 3.0.3 DELAY OF REQUIRED ACTIONS

SR 3.0.3 establishes the flexibility to defer declaring affected equipment inoperable or an affected variable outside the specified limits when a Surveillance has not been completed within the specified Frequency. A delay period of up to 24 hours applies from the point in time that it is discovered that the Surveillance has not been performed, in accordance with SR 3.0.2, Frequencies, and not at the time that the specified Frequency was not met.

This delay period provides an adequate time limit to complete Surveillances that have been missed. This delay period permits the completion of a Surveillance before complying with Required Actions or other remedial measures that might preclude completion of the Surveillance.

The basis for this delay period includes consideration of tank conditions, adequate planning, availability of personnel, the time required to perform the Surveillance, the safety significance of the delay in completing the required Surveillance, and the recognition that the most probable result of any particular Surveillance being performed is the VERIFICATION of conformance with the SRs.

The provisions of SR 3.0.3 also provides a time limit for completion of Surveillances that become Applicable as a consequence of MODE changes imposed by Required Actions.

Failure to meet specified Frequencies for SRs is expected to be an infrequent occurrence. Use of the delay period established by SR 3.0.3 is a flexibility which is not intended to be used as an operational convenience to extend Surveillance intervals.

(continued)

BASES

SR 3.0.3 DELAY OF REQUIRED ACTIONS (continued)	If a Surveillance is not completed within the allowed delay period, then the equipment is considered inoperable or the variable is considered outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon expiration of the delay period. If a Surveillance is failed within the delay period, then the equipment is inoperable, or the variable is outside the specified limits and the Completion Times of the Required Actions for the applicable LCO Conditions begin immediately upon the failure of the Surveillance. Completion of the Surveillance within the delay period allowed by this Specification, or within the Completion Time of the ACTIONS, restores SR 3.0.1, Performance, to be met.

BASES

SR 3.0.4 MODE CHANGES	SR 3.0.4 establishes the requirement that all applicable SRs must be met before entry into a MODE or other specified condition in the Applicability. This Specification ensures that system and component OPERABILITY requirements and variable limits are met before entry into MODES or other specified conditions in the Applicability for which these systems and components ensure safe operation of the tank. This specification applies to changes in MODES or other specified conditions in the Applicability. The provisions of SR 3.0.4 shall not prevent changes in MODES or other specified conditions in the Applicability that are required to meet ACTIONS. The precise requirements for performance of SRs are specified such that exceptions to SR 3.0.4 are not necessary. The specific time frames and conditions necessary for meeting the SRs in accordance with the requirements of SR 3.0.4 are specified in the Frequency, in the Surveillance, or both. This allows performance of Surveillances when the prerequisite condition(s) specified in a Surveillance procedure require entry into the MODE or specified condition in the Applicability of the associated LCO prior to the performance or completion of a Surveillance. A Surveillance which could not be performed until after entering a MODE of the LCO Applicability, would have its Frequency specified such that it is not "due" until the specific conditions needed are met. Alternately, the Surveillance may be stated in the form of a Note as not required (to be met or performed) until a particular event, condition, or time has been reached. The SRs are annotated consistent with the requirements of Section 1.3, Frequency.

B 3.1	**Not Used**
B 3.2	**Not Used**
B 3.3	**Not Used**
B 3.4.1	**Not Used**
B 3.4.2	**Not Used**
B 3.4.3	**Not Used**

B 3.5 **Not Used**

B 3.6 **Not Used**

B 3.7 **ROTARY MODE CORE SAMPLING**

B 3.7.1 **Not Used**

B 3.7.2 **Not Used**

B 3.7 ROTARY MODE CORE SAMPLING

B 3.7.3 Exhauster Induced Tank Pressure

BASES

BACKGROUND	Excessive vacuum in the dome is another accident identified in Reference 1 as a result of exhauster operations. The exhauster design prevents the occurrence of excessive vacuum because the shutoff head is -14 in. w.g. A dome collapse would not occur until -15 in. w.g. Also, the inlet high-efficiency particulate air (HEPA) filter has a vacuum breaker to mitigate excessive negative tank pressure. The vacuum breaker is set at about -4 in. w.g.
APPLICABLE SAFETY ANALYSES	The analysis was performed in Section 4.6.1 of Reference 1.
LCO	The range established by the LCO assures that tank pressure is less than atmospheric and greater than that which would open the vacuum breaker or collapse the tank dome.
APPLICABILITY	OPERATION (RMCS waste intrusive operations in Flammable Gas Tanks).

BASES

ACTIONS	A.1 Pressure change during exhauster operation is relatively slow. In any case cessation of RMCS operations will restore a serious negative pressure condition. B.1 RMCS operations are not allowed without the exhauster in operation. B.2 The minimum 10 min waiting period upon an exhauster automatic trip is required to ensure adequate cool down time for the drill bit and associated waste. C.1 RMCS waste intrusive operations are not allowed without an operable exhauster. C.2 Exhauster operability must be restored prior to resuming RMCS waste intrusive operations.
SURVEILLANCE REQUIREMENTS	SR 3.7.3.1 A 6-month system test and calibration will assure that the exhauster is performing as designed and meeting the requirements assumed in the safety assessment.
SURVEILLANCE REQUIREMENTS	SR 3.7.3.2 The pressure switch requires periodic surveillance to ensure that pressure requirements are met.
SURVEILLANCE REQUIREMENTS	SR 3.7.3.3 A test of all exhauster shutdown system elements ensures system reliability.
REFERENCES	1. LMHC, 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas single Shell Tanks, Hanford Site, Washington*, WHC-SD-WM-SAD-035, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland, Washington.

B 3.7 ROTARY MODE CORE SAMPLING SYSTEM

B 3.7.4 Nitrogen Purge System

BASES	
BACKGROUND	Nitrogen is supplied for five different functions during RMCS operations: (1) the Drill String purge gas system used during RMCS drilling; (2) the purge through the riser sleeve annulus, (3) the hydrostatic head in the drill string and (4) in the shielded receiver, and (5) the Z-purge (NFPA 496) in the SR weather cover. The systems provide: (1) drill bit cooling and cleaning during rotary drilling, (2) help prevent waste flooding in the drill string, and (3) prevent gas accumulation.
APPLICABLE SAFETY ANALYSES	Through use of the purge system, drill bit overheating and waste ignition is prevented. Control prevents local exothermic chemical reactions as well as a possible ignition of flammable gas in the waste. Analyses to establish this LCO were performed in Sections 4.4.1, 4.4.4, and 4.6.3 of Reference 1.

BASES

LCO	Envelope testing determined that 30 scfm was the minimum flow which, in combination with other parameters, would provide adequate cooling when coupled with a limit on nitrogen inlet temperature. The two-second requirement for a trip to occur is based on the safety assessment assumption that the determination of a valid alarm signal requires approximately 2 seconds. Immediately is used as a special completion time. In this case, the Required Action is to be commenced without delay and continuously pursued in a controlled manner until complete. While the minimum purge flow must be greater than 30 scfm; however, it is possible that necessary cooling to the drill bit would not be provided if there were a leak from the nitrogen purge system between the flow measurement location and the drill bit. WHC determined that the leak from the truck is within the uncertainty range of instrumentation. As indicated in Table 4.12 of Reference 1, the leak rate from the nitrogen system must be measured once every 6 months. This control requires that the leak rate must be within the uncertainty range of instrumentation or < 2% of the nominal flow.
APPLICABILITY	OPERATION (RMCS waste intrusive operations in Flammable Gas Tanks).

BASES

ACTIONS

A.1

RMCS operations are not allowed without an Nitrogen Purge System in operation.

A.2

Provided that the drill string rotation is not re-started for a minimum period of 10 min, it is possible to resume RMCS operations. This is the minimum time to allow drill bit and waste cooling.

B.1

RMCS operations are not allowed with the Nitrogen temperature out of range.

B.2

A continued purge is required to assist drill bit cool down.

B.3

A temperature outside the bounds of the safety assessment must be corrected prior to resuming operations.

C.1

RMCS waste intrusive operations are not allowed without an operable nitrogen purge system.

C.2

Nitrogen purge system must be restored prior to resuming RMCS waste intrusive operations.

(continued)

BASES

ACTIONS (continued)	D.1 RMCS waste intrusive operations are not allowed without an operable nitrogen temperature monitor. D.2 Nitrogen temperature monitor must be restored prior to resuming RMCS operations.
SURVEILLANCE REQUIREMENTS	SR 3.7.4.1 The 6-month testing and calibration requirement was established in Reference 1 to ensure equipment reliability and operability.
SURVEILLANCE REQUIREMENTS	SR 3.7.4.2 The 6-month testing and calibration requirement was established in Reference 1 to ensure equipment reliability and operability. A channel is considered to be the sensor and associated circuitry and components up to the input to the alarm and trip circuit. Two of the three channels must alarm in order for the trip to occur. If one channel is taken out of service then it shall be tripped and one more channel alarm will cause a trip condition.
SURVEILLANCE REQUIREMENTS	SR 3.7.4.3 Temperature sensor calibration and alarm test assures proper operator response to out of normal condition.
REFERENCES	1. LMHC, 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks, Hanford Site, Washington*, WHC-SD-WM-SAD-035, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland, Washington.

B 3.7 ROTARY MODE CORE SAMPLING SYSTEM

B 3.7.5 Rotary Drilling Parameters

BASES

BACKGROUND	Behavior of the drill string and, in particular the drill bit, was a high focus area in the safety assessment (Reference 1). Many accident scenarios were analyzed to determine performance requirements. All the requirements established were to limit the heat generating capacity of the drilling operation.
APPLICABLE SAFETY ANALYSES	Wastes including mixtures of sodium nitrate and sodium nitrite with organic compounds can produce violent exothermic reactions (Appendix G Reference 1). Increasing the temperature of the waste in the vicinity of the drill bit can cause a thermal runaway. There are several hazards that are associated with a local thermal runaway, and they are discussed in Appendix G of Reference 1. Two major important hazards are the ignition of the flammable gas and the ignition of a self-propagating exothermic reaction in the waste. Reactions in mixtures containing relatively small amounts of organic compounds can result in temperatures greater than the auto-ignition temperature of hydrogen mixtures, so the ignition of flammable gases is the more limiting condition.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Because the possibility of flammable-gas mixture cannot be eliminated, the approach used is to take all practical measures to eliminate ignition sources. A local runaway reaction is a potential ignition source, so the requirement that there be no local runaway reaction is consistent with the philosophy used. Preventing a local thermal runaway is also protection against a propagating exothermic reaction, and it eliminates the possibility of generating additional flammable gas as a result of elevated temperatures. Appendix G of Reference 1 discusses runaway reactions and waste ignition in great detail. Basic conclusions of Appendix G of Reference 1 are that local runaway reactions can be prevented by establishing waste temperature limits. The following temperature limits are established:

- The temperature of small waste fragments produced at the drill tip must not exceed 180°C.
- The temperature of the drill bit and the average temperature of the waste affected by drilling must not exceed 160°C for more than 10 min.

New envelope testing has been performed by WHC to determine the operating parameters, rotational speed, down forces, and nitrogen purge flow to comply with the safety criteria given above. Appendix F of Reference 1 discusses the details of testing and the results obtained.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)	As a summary, results of envelope testing and their analysis showed that the drill bit surface temperature and the waste substrate temperature can be kept below 160°C, including an uncertainty of 10°C, if the following limits are applied: Down force < 750 lbf, rotational speed < 55 rpm, minimum nitrogen flow > 30 scfm, and penetration rate > 0.75 in./min. The chip temperatures under these conditions are also limited to 180°C as required. If a trip is initiated when one of the set points for these four parameters is exceeded, drilling must be stopped. After a shutdown there must be a waiting period of 10 min before drilling can continue. The waiting period of 10 min is based on the experimentally determined cooling time. The testing and the analysis included plugged holes on the drill bit. The drill bit shall be replaced if drilling is shut down four times consecutively as a result of low penetration rate and if the cumulative penetration is < 0.3 in. for the last three attempts.
LCO	The requirements of 3.7.5 (a), (b), and (c) were established by envelope testing documented in Reference 1. The time requirement in the action statement is based on the approximate time it takes to establish a valid trip signal determination.
APPLICABILITY	OPERATION (RMCS waste intrusive operations in Flammable Gas Tanks).

BASES

ACTIONS	A.1 The minimum 10 min waiting period is to provide adequate drill bit and associated waste cool down. B.1 RMCS waste intrusive operations are not allowed without an operable Down Force, Rotary RPM Measurement, penetration rate system, walkdown function, and hydraulic bottom detector. B.2 Operability must be restored prior to resuming RMCS waste intrusive operations. C.1 Action statement prevents load exceeding those specified in Reference 1.
SURVEILLANCE REQUIREMENTS	SR 3.7.5.1 A 6-month test and calibration was required by Reference 1 to ensure system reliability and performance. Controlled loads on the grapple hoist prevent grapple drop consequences and potential for fire (Sections 4.3.2 and 4.3.6 of Reference 1).
REFERENCES	1. LMHC, 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks, Hanford Site, Washington*, WHC-SD-WM-SAD-035, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland, Washington.

B 4.0 Not Used

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.1 Through B 5.30 Not Used

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31 Rotary Mode Core Sampling

BASES

BACKGROUND	Reference 1 addresses each of the required elements associated with the installation, operation, and removal of a rotary-mode core sampling (RMCS) device in flammable-gas single-shell tanks (SSTs). The RMCS operations are needed in order to retrieve waste samples from SSTs with hard layers of waste for which push-mode sampling is not adequate for sampling. In Reference 1, potential hazards associated with the proposed action were identified and evaluated systematically. Several potential accident cases that could result in radiological or toxicological gas releases were identified and analyzed and their consequences assessed. Administrative controls, procedures and design changes required to eliminate or reduce the potential of hazards were identified.
APPLICABLE SAFETY ANALYSES	Results of the safety assessment performed in Reference 1 have been incorporated into this document. Specific analyses are as follows: (1) B 5.31.1 Control Applicability (2) B 5.31.2 Ignition and Envelope Testing (3) B 5.31.3 Not Used (4) B 5.31.4 Not Used (5) B 5.31.5 Gas Leak Paths (6) B 5.31.6 Not Used (7) B 5.31.7 Not Used (8) B 5.31.8 Tank Loading (9) B 5.31.9 Not Used (10) B 5.31.10 Portable Inlet Stack (11) B 5.31.11 Drill Bit, Core Barrel, and Drill Rods (12) B 5.31.12 RMCS Operations

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.1 Control Applicability

BASES	
BACKGROUND	The Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks; Hanford Site, Richland, Washington, WHC-SD-WM-SAD-035, Rev. 0-b, August 8, 1997, hereafter designated as Reference 1 was developed using bounding assumptions. However, these assumptions are not verified against each one of the existing or potential flammable gas tanks (see Section 1 of Reference 1). Thereafter the following applies to RMCS waste intrusive operations in flammable gas tanks (FGT's).

BASES

APPLICABLE SAFETY ANALYSES

The following assumptions must be verified before RMCS waste intrusive operations in any FGT.

CHECKLIST ITEMS

Tank Specific Hazards / Other Watch lists

If a given tank has a specific hazard or accident initiator that is not analyzed in Sections 3 and 4 of Reference 1, the analysis must be supplemented to cover the tank specific conditions. For instance, Reference 1 does not address ferrocyanide issues.

Flammable Gas Composition

Although the Checklist includes gas composition, the basis for evaluation of flammable gas hazards has been replaced by that in the SO/JCO/FSAR as successive authorization basis documents (Ref. 2 and 3).

Toxic Gas Composition

For toxic effects, the gas composition in a given GRE is assumed to be 60% ammonia or 75% nitrous oxide. If any evidence before the FG/RMCS operation exists to indicate that these values (especially the ammonia fraction) may be exceeded in one of the SSTs as a result of new analysis or data, or if they are not conservative, the consequence that these values (especially the ammonia fraction) may be exceeded in one of the SSTs as a result of new analysis or data, or if they are not conservative, the consequence analysis must be re-evaluated.

Also, the results of vapor space sampling program were reviewed. Major toxic gases that are found in the dome

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

space of the presently defined flammable-gas tanks are ammonia and nitrous oxide. Other gases are found in trace quantities and do not pose a concern. However, it was recognized that the existing data are limited and all tanks of interest are not covered. Thus, if new data reveal that toxic gases in excess of the hazardous limits are detected in a given tank, the consequence analysis must be reevaluated. The reevaluation may be done by simply scaling the toxic gas fraction and the guidelines against the ammonia fraction and the associated RGs.

Waste Temperature

The best available tank temperature data must show that the peak waste temperature (considering uncertainties) must be < 90°C. If the peak waste temperature is ≥ 90°C, the envelope testing results discussed in Appendix F of Reference 1 must be re-evaluated.

Waste Energetics

The Safety Assessment assumption in regard to tank specific parameters such as gas and waste composition, gas release probability etc. may become non-conservative by a new analysis or data for a specific tank considered to be sampled by RMCS prior operations.

See Section 7.0 and Appendix G of Reference 1.

Likelihood of Gas Release Events

Although the Checklist includes likelihood of gas release events, the basis for evaluation of flammable gas hazards has been replaced by that in the SO/JCO/FSAR as successive authorization basis documents (Ref. 2 and 3).

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.2 Ignition and Envelope Testing

BASES	
BACKGROUND	Fire hazards, a significant part of the safety assessment, are considered to be beyond an extremely unlikely event based on ignition testing.
APPLICABLE SAFETY ANALYSES	
	Appendix F "Thermal Analysis of Rotary Drilling", Appendix G "Waste and Crust Ignition", and Appendix T "Bureau of Mines Ignition Test Program Functional Requirements and Acceptance Criteria, all located in Reference 1 shall be used to verify drill bit and material performance. The material cited above provides a safety basis for RMCS operations. The summary report required by Appendix T must be reviewed and approved by the PRC and verification of same must be acknowledged as a prerequisite to RMCS operations. Any subsequent change in drill bit or material would require revalidation per Appendix T requirements.

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.3 Not Used

B 5.31.4 Not Used

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.5 Gas Leak Paths

BASES	
BACKGROUND	The potential for above ground fires that could propagate into the dome are managed and reduced by documenting and sealing or adding deflectors to identified leaks from the tank dome space ≥ 1 inch equivalent diameter that could be exposed to potentially spark inducing equipment on the tank dome. This mitigates unacceptable offsite consequences resulting from a dome collapse.
APPLICABLE SAFETY ANALYSES	
	Preventing flammable-gas exposure to this equipment is managed by inspection of the tank top for leaks and the documenting and sealing or deflecting all leaks with an effective diameter of ≥ 1 in. It is assumed that inspection of tank top penetrations for potential leak paths will find leak paths with nominal leak diameters > 1 in. It is assumed that undetected leak paths with a nominal 1-in. Diameter could go undetected. Therefore, the top of the tank must be examined to identify leaks, and when identified, the leaks must be ≤ 1 in equivalent diameter (reference paragraph 4.1.2.1 of WHC-SD-WM-SAD-035, revision 0-a). The flammable-gas release could occur from other unused risers if they have undetected leak paths. The control requiring the examination of risers before operations reduces the probability of having an unknown open path. It is assumed that leaks from threaded junctions, flanges, and cover plates could be identified with an equivalent leak diameter > 1 in.

B 5.31.6 Not Used

B 5.31.7 Not Used

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.8 Tank Loading

BASES	
BACKGROUND	An administrative limit on tank dome loading can prevent collapse. This mitigates unacceptable offsite consequences resulting from a dome collapse.
APPLICABLE SAFETY ANALYSES	
	The static load capacity of the tank dome is monitored carefully and an overload state that could collapse the dome must be avoided. The equipment required on the surface of the tank to support FG/RMCS sampling operations qualifies as a live load (see Appendix N of Reference 1). The tank loads study permits a 50-ton live load on the tank dome. Even though the weight of all FG/RMCS equipment exceeds 50 tons, not all of the equipment is placed on the tank dome at one time. Therefore, the dome loading must be controlled by the dome loading limits for SSTs as specified in WHC-SD-WM-OSR-005 (Reference 4). The dome would be subjected to dynamic dome loads if a truck were to fall from the hydraulic jack or from a platform. Appendix N considers this scenario and analyzes the consequences of the dynamic loading caused by dropping the truck. It is concluded that the dome could withstand the impact force of the 30,000-lb truck dropping on it from the 3-ft-high platform.

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.9 Not Used

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.10 Portable Inlet Stack

BASES	
BACKGROUND	Directing the breather inlet HEPA effluent 15 ft vertically: · allows atmospheric dispersion coefficients to decrease so that toxicological acceptance guidelines at the onsite boundary can be met.
APPLICABLE SAFETY ANALYSES	
	A portable stack over the breather inlet HEPA system will be used during waste-intrusive FGCS operations. The portable stack is at least 15 ft tall, has an upper 4-in. diameter, is sealed at the ground level. The purpose of using a portable stack over the breather inlet is: · The gas release would be released through stack, resulting in increased atmospheric dilution and reducing the toxicological consequences of a GRE.

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.11 Drill Bit, Core Barrel, and Drill Rods

BASES

BACKGROUND

Results from envelope testing and ignition testing are only valid for equipment of the design tested.

This mitigates unacceptable offsite consequences resulting from a dome collapse.

APPLICABLE SAFETY ANALYSES

One of the safety concerns of sampling with the rotary-mode drill frictional sparks by the drill bit. The condition of waste in terms of hardness is not known before the operation. A possibility of penetrating a very hard waste layer in a tank exists. In addition, there may be some metal debris lost or dropped from the riser in the past. Hard materials such as rocks or metals can also exist in the waste. Thus, it is likely that the drill bit may strike against metal and other hard objects during drilling.

Ignition caused by frictional sparks is evaluated by performing ignition testing in bounding conditions. Appendix T (Reference 1) discusses the ignition testing requirements and acceptance criteria. The objective of the tests is to demonstrate that the operation of rotary core drilling in a bounding frictional environment with bounding gas composition does not cause an ignition. Testing has been performed by the WHC and BOM personnel.

The conditional frequencies of a fire accident resulting from exceeding the rotational speed and down force are estimated as 1.4E-5 and 9.4E-5/yr as indicated in Table 4.12. Controls are established to trip the drilling operation when the rotational speed and down force exceed 55 rpm and 750 lbf. There is no delay time for the trip except the delay time from the data acquisition system. If needed, the alarm points will be set at lower values. However, drilling must stop when the trip value is reached. The RMCS operations must use only the drill-bit type tested according to the requirements listed in Appendix T (Reference 1).

B 5.0 ADMINISTRATIVE CONTROLS (ACs) - GENERAL

B 5.31.12 RMCS Operations

BASES	
BACKGROUND	Flammable gas concentrations are mixed, dispersed, and reduced with exhauster preparation. Accumulation of aerosols, particulates, and flammable gases following waste intrusive activities must be minimized. This mitigates unacceptable offsite consequences resulting from a dome collapse.
APPLICABLE SAFETY ANALYSES	Wastes including mixtures of sodium nitrate and sodium nitrite with organic compounds can produce violent exothermic reactions. Increasing the temperature of the waste in the vicinity of the drill bit can cause a thermal runaway. There are several hazards that are associated with a local thermal runaway, and they are discussed in Appendix G (Reference 1). Two major important hazards are in ignition of the flammable gas and the initiation of a self-propagating exothermic reaction in the waste. Reactions in mixtures containing relatively small amounts of organic compounds can result in temperatures greater than the auto-ignition temperature of hydrogen mixtures, so the ignition of flammable gases is the more limiting condition. However, a self-propagating reaction would produce very high temperatures, which would cause structural damage to the tank. The consequences of a self-propagating reaction could be severe. (continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Because the possibility of flammable-gas mixture cannot be eliminated, the approach used is to take all practical measures to eliminate ignition sources. A local runaway reaction is a potential ignition source, so the requirement that there be no local runaway reaction is consistent. Preventing a local thermal runaway is also protection against a propagating exothermic reaction, and it eliminates the possibility of generating additional flammable gas as a result of elevated temperatures. Appendix G of Reference 1 discusses runaway reactions and waste ignition in great detail. Basic conclusions of Appendix G are that local runaway reactions can be prevented by establishing waste temperature limits. The following temperature limits are established:

- The temperature of small waste fragments produced at the drill tip must not exceed 180°C.
- The temperature of the drill bit and the average temperature of the waste affected by drilling must not exceed 160°C for more than 10 min.

Because the consequences of a propagating exothermic reaction are severe, FG/RMCS should not be performed in tanks in which a propagating exothermic reaction may occur.

New envelope testing has been performed by WHC to determine the operating parameters, rotational speed, down force, and nitrogen purge flow to comply with the safety criteria given above. Appendix F (Reference 1) discusses the details of testing and the results obtained.

As a summary, results of envelope testing and their analysis showed that the drill bit surface temperature correspondingly the waste substrate temperature can be kept below 160°C, including an uncertainty of 10°C, if the following limits are applied: Down force < 750 lbf, rotational speed < 55 rpm, minimum nitrogen flow > 30 scfm, and penetration rate > 0.75 in./min. (continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The chip temperatures under these conditions are also limited to 180°C as required. If a trip is initiated when one of the set points for these four parameters is exceeded, drilling must be stopped. After a shutdown there must be a waiting period of 10 min before drilling can continue. The waiting period of 10 min. is based on the experimentally determined cooling time. The testing and the analysis included plugged holes on the drill bit.

The minimum purge flow must be > 30 scfm; however, it is possible that necessary cooling to the drill bit would not be provided if there were a leak from the nitrogen purge system between the flow measurement location and the drill bit. WHC determined that the leak from the truck is within the uncertainty range of instrumentation. This control requires that the leak rate must be within the uncertainty range of instrumentation or < 2% of the nominal flow.

Drill rods are threaded to each other. An O-ring is used to provide a seal. The leaks are possible if the O-rings are left out. WHC determined the possible leak rates could not be higher than 0.3 scfm when the O-rings are not used. This is < 1% of a nominal flow of 30 scfm and negligible. With the use of O-rings, the leak rate also was measured and was shown to be negligible. Therefore, O-rings on the drill rod are not required, and the nitrogen purge flow for drill bit cooling is sufficient when set to a minimum of 30 scfm.

There is one event that would include an unknown leak path as a result of failure of the drill string during drilling. If the drill bit or string becomes embedded in the waste momentarily because of debris in the waste, torque could continue to be applied to the drill string at a constant rate. If such a condition occurs, there is a possibility that the drill string could partially fail. Continuing to operate with a partially failed drill string could result in nitrogen flow bypass through the failed area. This concern is assessed below.

Appendix N (Reference 1) examines the possibility of over-torquing the drill string. The drill string is considered as having torque applied from the upper end, but the rotation of the lower end is not allowed. (continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

Appendix N presents two methods to determine the time necessary to break the drill string. Linear elastic methods are applied as a first approximation to obtain the lower bound failure estimate. Second, strain-energy methods are used to determine an upper bound by assuming that the ultimate shear strain in the drill rod is proportional to the shear modules. It is estimated that failure would occur in less than 15 sec for all rotational speeds. Note that Appendix N did not take any credit for the threaded drill rods. Experience shows that the drill string always fails at the threaded sections. The real failure time is expected to be in a few seconds because of the stress concentration factor for threaded sections. Therefore, it is concluded that a drill string tear without a break is very unlikely.

Envelope testing measured the rate of increase in the drill-bit surface temperature when nitrogen flow is terminated at steady-state operating conditions. The test results are summarized in Appendix F (Reference 1). Results showed that an average heat-up rate of 2°C/s is observed in the time period of 0 to 20 sec after the nitrogen flow is shut down. This rate corresponds to a temperature increase of 30°C in 15 sec in which the drill string would be broken when overtorqued. Envelope testing established the operating parameters so that the drill bit and waste temperature is less than 150°C. Considering a 30°C heat-up of the drill bit for this accident, the drill bit/waste temperature would be 180°C. Appendix G (Reference 1) argues that the waste temperature would be allowed to be at the minimum exothermic-reaction temperature of 180°C for a short period of time because the induction time of reaction is expected to be much larger than 10 to 20 sec. Therefore, it is concluded that if the drill fails because it is over-torqued, it would fail in a time period in which the waste in the vicinity of the drill bit would not experience runaway reactions.

- Evacuation is necessary if a gas release occurs.

BASES

REFERENCES

1. Fluor Daniel Hanford, Inc., 1999, *Tank Waste Remediation System Final Safety Analysis Report*, HNF-SD-WM-SAR-067, Rev. 1, Richland, Washington.

2. LMHC, 1997, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks, Hanford Site*, WHC-SD-WM-SAD-035, Rev. 0-b, Lockheed Martin Hanford Corporation, Richland.

3. Lockheed Martin Hanford Corporation, "Compensatory Actions for Open Discovery Unreviewed Safety Questions (USQs)," East and West Tank Farms Standing Order 97-01, Rev. 2, dated May 1997.

4. Westinghouse Hanford Company, "Single Shell Tank Interim Operational Safety Requirements," WHC-SD-WM-OSR-005, Rev. 0-G, dated August 1997.