9613428.0909

START

Rockwell Hanford Operations

0043992

36
40

SUPPORTING DOCUMENT

Number	Rev. No.	Page A of 165 Total Pages
SD– HS-SAR-010	2	

PROGRAM: Waste Management

Document Title:

Aging Waste Facility Safety Analysis Report

Baseline Document ☐ Yes ☒ No

WBS No. or Work Package No.

WB25

Key Words:

Aging Waste, Double-Shell Tanks, PUREX, Safety Analysis, Tank Bump, Tank Leak

Prepared by (Name, Dept. No. and Signature)

D. J. Squires 12723 D J Squires

See reverse side for additional approvals

THIS DOCUMENT IS FOR USE IN PERFORMANCE OF WORK UNDER CONTRACTS WITH THE U.S. DEPARTMENT OF ENERGY BY PERSONS OR FOR PURPOSES WITHIN THE SCOPE OF THESE CONTRACTS. DISSEMINATION OF ITS CONTENTS FOR ANY OTHER USE OR PURPOSE IS EXPRESSLY FORBIDDEN.

Abstract

This Safety Analysis Report addresses accidents that might occur during management of neutralized high level liquid waste (NHW) generated during initial (1983-1987) fuel dissolution campaigns undertaken following restart of the PUREX facility. Postulated accidents were based on the design and operation of the Aging-Waste Facility, characteristics of the waste, and past experience with management of high level liquid waste.

The "worst case" accident was a tank bump examined in detail. Analysis of this accident indicated that, based on the calculated offsite radiation doses to the maximum individual, the accident should be classed as a low hazard (first year dose ≤4 rem). The calculated first-year radiation doses to workers at the accident scene (≤75 rem) indicated that the accident should be classed as a moderate to high hazard. Based on the low accident probability (10^{-5}/yr), the risk was classed as "acceptable."

THIS IS A PAGE CHANGE DOCUMENT AND SHALL BE INCORPORATED/ATTACHED TO THE FRONT OF THE LATEST COMPLETE RELEASED DOCUMENT.

APPROVED FOR PUBLIC RELEASE

1-4-91

3-29-91

Release Stamp

MAY 2000 RECEIVED EDMC

OFFICIALLY RELEASED

1997 FEB -2 PM 1:31

*	Distribution Name	Mail Address
	U.S. Department of Energy Richland Operations Office	
*	E. A. Bracken	Fed/700
*	C. E. Collantes	Fed/700
*	D. M. Smith	Fed/700
*	J. D. White	Fed/700
	Rockwell Hanford Operations	
*	J. F. Albaugh	2750E/200E
*	B. N. Anderson	2750E/200E
*	D. E. Ball	TCPS/1100
	D. A. Berg	2750E/200E
	D. E. Bowers	2750E/200E
*	K. G. Carothers	2750E/200E
*	G. M. Christensen	2750E/200E
	J. L. Deichman	2101M/200E
*	J. F. Dickman	2750E/200E
*	G. T. Dukelow	2750E/200E
*	G. L. Dunford	2750E/200E
*	D. R. Ellingson	2750E/200E
*	M. R. Fox	1201 Jad/1100
*	R. B. Gelman	M0407/200E
*	J. T. Gregor	2753E/200E
*	T. G. Hanson	2750E/200E
	D. J. Hart	234-5/200W
*	S. R. Johnson	2750E/200E
*	S. J. Joncus	2750E/200E
*	G. L. Jones	2751E/200E
*	W. D. Kittinger	2751E/200E
*	J. H. Lawler	2750E/200E
	D. W. Lindsey	2750E/200E
*	R. M. Marusich	2751E/200E
	J. K. McClusky	M0047/200E
	G. C. Owens	2751E/200E
	W. J. Powell	2750E/200E
	R. E. Preston	271B/200E
	R. H. Rieck	271B/200E
	R. C. Roal	TCPC/1100
*	L. W. Roberts	2750E/200E

(Continued on reverse side)

*COMPLETE DOCUMENT
(No asterisk, title page/summary of revision page only)

Rockwell Hanford Operations

Page	Number
B	SD- HS-SAR-010

SUPPORTING DOCUMENT

Approvals

- [X] J. C. Womack — Program Office
- [X] D. W. Lindsey — Research and Engineering
- [X] W. H. Trott — Plant Operations
- [X] J. F. Albaugh — Safety/Quality Assurance
- [ ]
- [X] J. H. Roecker — Waste Management Safety Committee Approval Authority; Defense Waste Management and Decontamination/Decommissioning, Director
- [ ]
- [ ]
- [ ]
- [ ]
- [X] S. R. Johnson — Safety
- [ ]
- [X] G. L. Jones — Approval Authority

*	Distribution Name	Mail Address
	L. H. Rodgers	234-5/200W
*	J. H. Roecker	2750E/200E
	J. B. Shannon	271T/200W
	H. Spanheimer	TCPC/1100
*	D. J. Squires	2751E/200E
*	R. C. Stupka	2750E/200E
*	C. P. Sutter	2753E/200E
*	C. E. Swift	222B/200E
	S. R. Tifft	202A/200E
	W. H. Trott	2750E/200E
	G. E. Wilbur	234-5/200E
	D. W. Wright	2753E/200E
	L. L. Zahn, Jr.	2750E/200E
	R. A. Zinsli	2750E/200E
*	Safety Analysis Files (3)	2751E/200E
	Pacific Northwest Laboratory	
*	J. K. Soldat, 2400 Stevens/3000	

mary of Revision

iplete Revision _____ Page Change X

DESCRIPTION OF CHANGE

Revision 2 of this document incorporates SD-SQA-AR-001, "Operational Safety Requirements" (OSR), criteria into Chapter 11 OSR. Changes include format revision and deletion of OSR that are not of controlling importance to safety that are adequately controlled by other policies and procedures.

These deleted OSR are identified by a "VOID" stamp and will be removed at the next document revision.

CONTENTS

1.0 Introduction 1-1
1.1 References 1-1

2.0 Summary Safety Analysis 2-1

3.0 Site Characteristics 3-1
3.1 Geography and Demography 3-1
3.2 Nearby Industrial, Transportation, and Military Facilities 3-1
3.3 Climatology and Meteorology 3-1
3.4 Geology and Hydrology 3-1
3.5 Seismology 3-4
3.6 References 3-4

4.0 Principal Design Criteria 4-1
4.1 Structural 4-1
4.2 Control 4-3
4.3 Administrative 4-4
4.4 References 4-5

5.0 Facility Description 5-1
5.1 Introduction 5-1
5.2 Waste Transfer Piping 5-1
5.2.1 Primary Piping 5-1
5.2.2 Backup Piping 5-5
5.2.3 Intertank Piping 5-6
5.3 Tanks 5-6
5.3.1 Primary Tank 5-11
5.3.2 Secondary Steel Tank 5-11
5.3.3 Insulating Slab 5-11
5.3.4 Welding and Stress-Relief 5-12
5.3.5 Reinforced Concrete Tank 5-12
5.4 Pump Pit and Sluice Pits 5-12
5.5 Tank Equipment 5-13
5.5.1 Process Air System 5-13
5.5.2 Heating Coil 5-18
5.6 Tank Instrumentation 5-18
5.6.1 Liquid Level 5-18
5.6.2 Sludge Level 5-19
5.6.3 Specific Gravity and Mass 5-19
5.6.4 Temperature Monitoring 5-19
5.6.5 Leak Detection 5-20
5.6.6 Pressure 5-21
5.6.7 Area Radiation Alarm Systems 5-21

5.7 Ventilation 5-21
5.7.1 702-A Primary Tank Ventilation System 5-21
5.7.2 702-A Backup Ventilation System 5-26
5.7.3 TK-241-AY-101 Annulus Exhaust System and Ventilation System 5-27
5.7.4 Combined TK-241-AZ-101 and -102 Annuli Ventilation System 5-27
5.8 Utilities and Services 5-28
5.8.1 Electrical System 5-28
5.8.2 Steam Supply and Distribution System 5-29
5.8.3 Water Supply Systems 5-29
5.8.4 Air Supply Systems 5-29
5.8.5 Communications and Alarm Systems 5-30
5.8.6 Fire Protection Systems 5-30
5.9 Site Surveillance Monitoring Systems 5-30
5.10 Comparison of Current Configuration with Current Criteria 5-30
5.11 References 5-32

6.0 Process Systems 6-1
6.1 Introduction 6-1
6.2 Waste Characterization 6-1
6.2.1 Fission Products Concentration 6-1
6.2.2 Plutonium Concentration 6-3
6.2.3 Other Transuranics Concentration 6-3
6.2.4 Hydrogen Formation and Accumulation 6-3
6.2.5 Heat Generation 6-7
6.2.6 Salt Concentration 6-7
6.2.7 NH_3 Concentration 6-10
6.2.8 Organics 6-10
6.2.9 Physical Properties 6-10
6.2.10 Vapor Phase Fission Product Content 6-10
6.3 Storage Tank Process 6-10
6.3.1 Storage Tank Operations 6-12
6.3.2 Storage Tank Process Equipment 6-12
6.4 Ventilation 6-13
6.4.1 Primary Ventilation System 6-13
6.4.2 Annulus Ventilation System 6-13
6.5 Process Effluents 6-14
6.5.1 Gaseous 6-14
6.5.2 Liquids 6-14
6.6 Discussion of Current Criteria 6-14
6.7 References 6-14

7.0 Waste Management and Confinement 7-1
7.1 Nonradioactive Wastes 7-1
7.2 Radioactive Wastes 7-1
7.2.1 Airborne Effluents 7-2
7.2.2 Liquid Effluents 7-5
7.2.3 Solid Effluents 7-6

7.3 Evaluation 7-6
7.3.1 Releases and Acceptability 7-6
7.3.2 Monitoring and Sampling Systems 7-6
7.3.3 Confinement Assurance 7-7
7.4 References 7-7

8.0 Radiation Protection 8-1
8.1 Occupational Radiation Exposures 8-1
8.1.1 Policy 8-1
8.1.2 Design 8-1
8.1.3 Operational Considerations 8-2
8.2 Onsite Administrative Control 8-3
8.2.1 Physical and Administrative Controls for Radiation Areas 8-4
8.2.2 Personnel Dosimetry 8-5
8.2.3 Portable Survey Instruments 8-5
8.2.4 Radiation Protection Training 8-6
8.2.5 Control of Airborne Radioactive Materials 8-6
8.3 Offsite Administrative Control 8-7
8.4 Radiation Protection Design Features 8-8
8.4.1 Shielding 8-8
8.4.2 Ventilation 8-9
8.4.3 Instrumentation for Area Radiation and Airborne Radioactivity 8-9
8.5 Radioactive Sources and Doses 8-9
8.5.1 Sources of Airborne Radioactive Material 8-9
8.5.2 Contained Radioactive Sources 8-10
8.5.3 Estimated Onsite Exposure During Normal Operations 8-10
8.5.4 Estimated Offsite Radiation Exposure During Normal Operations 8-10
8.6 References 8-13

9.0 Accident Safety Analysis 9-1
9.1 Hazards 9-1
9.2 Abnormal Occurrences 9-1
9.3 Accidents 9-1
9.3.1 Pipe Leak 9-19
9.3.2 Hydrogen Explosion and Dome Collapse 9-20
9.3.3 Tank Bump 9-21
9.3.4 Tank Leak 9-28
9.4 References 9-31

10.0 Conduct of Operations 10-1
10.1 Operating Organization 10-1
10.1.1 Tank Farm Processing Operations 10-1
10.1.2 Tank Farm Services 10-1
10.2 Preoperational Testing 10-2
10.3 Training 10-2
10.4 Normal Operations 10-3
10.5 Emergency Planning 10-3
10.6 References 10-3

11.0 Operational Safety Requirements 11-1
11.1 Introduction 11-1
11.2 Definitions 11-1
11.2.1 Title 11-1
11.2.2 Applicability 11-1
11.2.3 Objective 11-1
11.2.4 Requirements 11-1
11.2.5 Basis 11-2
11.2.6 Recovery 11-2
11.2.7 Audit Point 11-4
11.3 Revisions 11-4
11.4 Primary Vessel Hydrostatic Head 11-4
11.5 Air Lift Circulator Operation 11-5
11.6 Primary Tank Leak Detection 11-7
11.7 Tank Pressurization 11-8
11.8 Waste Transfer System Leak Detection 11-10
11.9 Gaseous Effluent 11-11
11.10 Liquid Effluent 11-13
11.10.1 Diversion of Steam Condensate 11-13
11.10.2 Radioactive Liquid Organic Waste 11-14
11.11 Spare Aging-Waste Tank 11-15
11.12 Fissile Material 11-16
11.13 Maximum Liquid Level 11-17
11.14 Chemical Composition 11-18
11.15 Temperature Control 11-19
11.16 Review and Approval of Facility Modifications 11-20
11.17 Operating Procedures 11-21
11.18 Radiation Work Procedures 11-22
11.19 Trained Personnel 11-23
11.20 Audits 11-24
11.21 Unusual Events 11-25
11.22 References 11-27

12.0 Quality Assurance 12-1
12.1 Organization 12-1
12.2 Quality Assurance Program 12-1
12.2.1 Level of Quality 12-1
12.2.2 Personnel Training 12-2
12.2.3 Design Control 12-2
12.2.4 Procedures and Instructions 12-2
12.2.5 Inspection and Test Control 12-3
12.2.6 Calibration and Control 12-3
12.2.7 Nonconformance, Corrective Action, and Surveillance 12-3
12.3 Quality Assurance Laboratory 12-4
12.4 References 12-4

Figures:
3-1 Hanford Site 3-2
3-2 200 Areas Processing and Waste Management Facilities 3-3

5-1 Layout--PUREX Waste Tank Farm Complex 5-2
5-2 Plot Plan--Purex Primary and Secondary NWM Routings 5-3
5-2A Detail--Aging-Waste Facility Waste Transfer Lines 5-4
5-3 Bioling Waste Intertank Transfer Route 5-8
5-4 Vertical Section Through Double-Shell Tank 5-10
5-5 Schematic of the Compressed Air System for the Air lift Circulators 5-15
5-6 Composite Section--Aging-Waste Tank 5-16
5-7 Plan View--Airlift Circulators 5-17
5-8 Primary Tank Ventilation Schematic 5-23
6-1 Fission Product Concentrations in Aging-Waste Tanks as a Function of Time 6-6
6-2 Heat Generation Rate in Aging-Waste Tanks as a Function of Time 6-9
6-3 Distribution of Fission Products in Aging-Waste Tank at Time of Maximum Activity 6-11
9-1 Relationship of the Segments of the Aging-Waste Facility Reviewed for Potential Hazards 9-2
10-1 Tank Farm Operations Organizations 10-2

Tables:

2-1 Calculated Dose Commitment to the Onsite Individual Following a Tank Bump 2-1
2-2 Calculated Dose Commitment to the Maximum Individual on Highway 240 2-1
2-3 Calculated Dose Commitment to the Ringold Farmer 2-2
2-4 Calculated Dose Commitment to the Offsite Population 2-2
2-5 Calculated Risk Following a Tank Bump Accident 2-2
5-1 Routes of Primary Piping For PUREX NHW 5-5
5-2 Routes of Backup Piping for PUREX NHW 5-7
5-3 Routes of Intertank Piping 5-9
5-4 Condenser Design Parameters 5-24
6-1 Worst Case Fission Product Content of PUREX NHW After Concentration 6-2
6-2 Estimated Maximum Concentrations of Fission Products in the First Aging-Waste Tank 6-4
6-3 Estimated Maximum Concentrations of Fission Products in the Second Aging-Waste Tank 6-5
6-4 Maximum Heat Generation Rate in Aging-Waste Tanks 6-8
7-1 Potential Concentrations of Selected Radionuclides in the Gaseous Effluents from 702-A System Under Normal Operation 7-2
7-2 Potential Releases of Radioactive Material to the Atmosphere Following Failure of 702-A Components 7-3
7-3 Potential Instantaneous Concentrations of Radionuclides in Gaseous Effluents Following Failure of 702-A Components 7-4
7-4 Potential 168-Hour-Average Concentrations in Gaseous Effluents Following Failure of 702-A Components 7-4
8-1 Occupational Exposure Limits and Controls 3-3

8-2 Concentration Guides for Occupational Exposure to Airborne Radioactive Material 8-7
8-3 Fission Product Concentration in Worst Case PUREX NHW 8-11
8-4 Maximum Fission Product Concentrations in First Aging-Waste Tank 8-12
8-5 Radiation Exposure Rates Expected Above Pump and Sluice Pits While Worst Case PUREX NHW is Being Pumped 8-12
8-6 Radiation Exposure Rates Expected at the 241-AX-155 Diversion Box While Worst Case PUREX NHW is Being Transferred 8-13
9-1 Aging-Waste Facility Hazards Analysis 9-3
9-2 Waste Transfer Piping Hazards Analysis 9-5
9-3 Aging-Waste Storage Tanks Hazards Analysis 9-9
9-4 Support Systems Hazards Analysis 9-12
9-5 Projected Onsite Population in the Vicinity of 241-ZA-102 Tank 9-23
9-6 Estimated Distribution of Population Within a 50 Mile Radius of the 200 Area Hanford Meteorological Tower by Population Grid Sector 1980 9-24
9-7 Calculated Dose Commitment to the Maximum Onsite Individual Following a Tank Bump Accident 9-24
9-8 Calculated Dose Commitment to the Individual on Highway 240 Following a Tank Bump Accident 9-25
9-9 Calculated Dose Commitment to a Hypothetical Ringold Farmer Following a Tank Bump Accident 9-25
9-10 Calculated Population Dose Commitment Following a Tank Bump Accident 9-26
9-11 Whole-Body Radiation Dose Commitments Corresponding to the Three Hazard Levels 9-27
9-12 Organ Radiation Dose Commitments Corresponding to the Three Hazard Levels 9-27
9-13 Calculated Risk Following a Tank Bump Accident 9-28
9-14 Estimated Time for Selected Radionuclides to Reach Ground Water 9-30

11.0 OPERATIONAL SAFETY REQUIREMENTS

11.1 INTRODUCTION

Operational Safety Requirements (OSRs) define acceptable conditions, safe boundaries, or management controls required to assure safe operation of Aging Waste Tank Farm facilities during the processing of radiochemical wastes. Operations outside of the specified boundaries and conditions could result in an unacceptable level of risk to the public and site workers, or unacceptable environmental impacts; facility integrity could also be compromised. The OSRs specific to Aging Waste Tank Farms are discussed later in this chapter. Sections 11.2 and 11.3 below describe the general characteristics of all OSRs.[1]

11.2 DEFINITIONS

11.2.1 Title

This is the title of the individual OSR being defined.

11.2.2 Applicability

Applicability applies to that portion of the process/activity/facility addressed in the particular OSR.

11.2.3 Objective

The objective is the reason for the OSR and the specific condition(s) it is designed to prevent or promote.

11.2.4 Requirements

The requirements are concerned with control of actual Safety Limits (SLs), Limiting Control Settings (LCS), Limiting Conditions for Operations (LCOs), and surveillance; examples of conditions included within these categories are: SLs and LCSs (pressure, temperature, and flow), LCOs (inventory maxima and temperature), and surveillance (inspections and test frequencies). This section provides the SLs for control settings, limiting conditions for operations, surveillance requirements, design features, and administrative controls which must be in place and observed to assure safe conduct of the activity. According to DOE-RL Order 5480.5,[1] the OSRs are binding upon operations of the facility.

11.2.4.1 Safety Limits and Limiting Control Settings. The SLs refer to those values of measurable safety-related variables outside of which serious

consequences may occur. Violation of a safety limit constitutes violation of an OSR. The LCSs are established within safety limits to allow for activation of alarms and for subsequent corrective action before the safety limit is reached.

Exceeding an LCS is not an OSR violation, but failure to respond to the agreed-upon recovery plan for exceeding an LCS is an OSR violation. Violations of safety limits or exceeding LCSs shall be dealt with according to any specific recovery steps provided with the requirement as well as the provisions of section 11.2.6.1 or 11.2.6.2.

11.2.4.2 Limiting Conditions for Operations (LCOs). The specifications in this section define the minimum acceptable operating conditions and practices consistent with the required assurance of safety of the environs, public, and operating personnel.

The LCOs are, in general, action restrictions or requirements as opposed to specific limits, and exceeding LCOs could constitute a breach of a safety barrier or, if repeated frequently, could lead to a serious hazard. Exceeding an LCO; therefore, requires immediate investigative and corrective action, and notification of appropriate Rockwell management.

11.2.4.3 Surveillance Requirements. The specifications in this section define the minimum requirements for testing of backup or emergency equipment and the minimum frequencies of calibration of instruments and equipment necessary for verification of operation within the boundaries of the safety limits, limiting control settings, and limiting conditions for operations. Upon determination that these requirements are not met, the recovery steps provided in section 11.2.6.3 shall be followed.

11.2.4.4 Design Features. The design features addressed in this section are limited to those equipment characteristics specifically required by safety considerations. Violations of these requirements are OSR violations and shall be dealt with according to section 11.2.6.4.

11.2.5 Basis

This section is a discussion of the bases from which the objective and requirements are derived. They refer to the accident analysis, chapter 9, and may include reference to equipment, inventory, physical conditions, personnel qualifications, DOE Orders, or Rockwell Policy.

11.2.6 Recovery

The recovery constitutes steps taken to return to normal operation if OSRs are violated or requirements are exceeded; it defines the time allowed for recovery and the required notification or approval sequence. Violation of a requirement is normally detected at the time of occurrence of an accident because the specific control features provide early warning.

Violation of a requirement can, however, be detected after the violation during routine process control review or periodic inspection or audit. Actions to be taken in response to OSR violations are delineated in the following general recovery steps.

11.2.6.1 Violations of a Safety Limit. When a violation of a safety limit is detected, the following actions shall be taken.

- Immediate action shall be taken in accordance with the recovery statement to stabilize the operations to a safe mode or shutdown of that portion of the operation involved. This may require a shutdown of the entire facility.

- Notification of Rockwell management and DOE-RL shall be made in accordance with Rockwell procedures.

- Circumstances of the violation shall be investigated, the cause shall be established, and appropriate corrective action shall be determined. A report shall be prepared by the Rockwell investigation team for review and approval by Rockwell management.

- Facility startup shall be permitted only after the following action items have been completed satisfactorily, as determined by the appropriate review committees, and approved by Rockwell management with concurrence of DOE-RL Waste Management Division.

  - There shall be action to return facility, system, or process to a safe condition.

  - Action or controls shall be established to reduce the probability of a recurrence.

11.2.6.2 Exceeding a Limiting Control Setting or Limiting Condition for Operation. When an infraction of an LCS/LCO requirement is detected, the following action shall be taken.

- Immediate action shall be in accordance with the recovery statement provided with the requirement. Continued operation without implementation of the above recovery actions is considered an OSR violation and shall be treated as an SL violation (section 11.2.6.1).

- Notification of Rockwell management shall be made in accordance with Rockwell procedures.

- The incident shall be investigated and reported by Rockwell management or delegate. If the incident involved shutdown of a portion of the operations, restart shall require approval of Rockwell management.

11.2.6.3 Exceeding a Surveillance Requirement. Upon determination that a surveillance requirement has not been met, management shall take immediate corrective action to resolve the failure to perform the surveillance requirements. Investigation and recovery of surveillance requirement infractions shall be in accordance with the Rockwell Incident Reporting System.(2) Continued operation without implementing this recovery action is considered an OSR violation and shall be treated as an SL violation (section 11.2.6.1).

11.2.6.4 Violation of Design Feature Requirement. Upon determination that a design feature has not been provided or implemented, management shall take immediate corrective action to resolve the failure to provide or implement the design feature. Failure to provide or implement a design feature shall be treated as an SL violation (section 11.2.6.1).

11.2.7 Audit Point

The physical records (e.g., log sheets) used to demonstrate compliance with OSRs are identified; the responsible organization that maintains the records is also specified. The retention period shall be according to Rockwell requirements.

11.3 REVISIONS

Revisions to the OSR document to correct discrepancies, that reflect process flowsheet or equipment changes, etc., shall be initiated by Waste Management Process Engineering (WMPE). This group will also inform the Safety Analysis Unit of the revision. Review and approval of revisions to the OSR shall be at the same organizational level as the original OSR.

11.4 PRIMARY VESSEL HYDROSTATIC HEAD

- Applicability

  This requirement applies to the 241-AY and -AZ Tank Farms.

- Objective

  The objective of this requirement is to assure that structural damage to tanks in the form of buckling or bottom uplift is not sustained, thereby providing pathways for the release of liquids or vapors from the primary containment vessel.

- Requirement

  Limiting Condition for Operation: The lowest permissible hydrostatic head on the tank bottom is -3 in. w.g.

- Surveillance

  Tank pressures are recorded on strip charts. Low tank pressure alarms are set forth in operating specifications and calibrated annually (not to exceed 13 mo). The LIT in each tank is scanned. Should an LIT become inoperative, liquid levels shall be taken manually at intervals not to exceed 24 h.

- Basis

  The bottom of double-shell tanks are subject to high stresses and possible uplifting at low hydrostatic head. Design calculations(3) show the lowest permissible hydrostatic head to be -3 in. w.g. The 702-A fans are capable of 50 in. w.g. shutoff vacuum. The hydrostatic head is calculated as the sum of the tank vacuum (in inches w.g.) and tank liquid level.

- Recovery

  If the LCO requirement is exceeded, the shift manager shall contact the managers of Tank Farm Surveillance and Operations (TFS&O) and WMPE. Recovery actions include addition of water or waste and/or manipulation of the primary exhaust system. If a surveillance requirement is exceeded actions defined in section 11.2.6.3 shall be taken.

- Audit Point

  Liquid levels are monitored and recorded on the computer automated surveillance system (CASS). Strip charts are maintained by Waste Management Process Engineering (WMPE).

11.5 AIR LIFT CIRCULATOR OPERATION (TANK BUMP)

- Applicability

  This requirement applies to operation of air lift circulators in active* aging-waste tanks having any waste temperatures greater than 200 °F.(4)

---

*Active aging waste tank--a tank which is receiving or storing PUREX neutralized current acid waste (NCAW), or which contains waste having an average heat content greater than 0.1 BTU/h·gal.

- Objective

The purpose of this requirement is to prevent excessive settling of solids which could create regions of high heat generation and the release of radioactive materials due to excessive boiloff rates or bumping.

- Requirement

Limiting Condition for Operation: Air lift circulators shall supply a minimum total flow rate of 50 std ft^3/min of air to an active aging-waste tank at all times except for periods not to exceed 20 h (15 h downtime plus 5 h minimum restart) cumulative in any one 48 h period.

In addition to the minimum total flow requirement of 50 std ft^3/min, no more than 2 adjacent circulators shall be out of service for more than 15 consecutive hours.

Restartup time restriction: The rate of increase in air shall be limited so that the minimum restart time to reach 50 ft^3/min is 5 h and the total time to reestablish normal ALC flows is 5 h or the downtime, whichever is greater.

- Design Feature

Emergency power and backup capacity shall be provided for the 241-A-701 compressor-process air supply. Emergency power shall also be provided for the Doric Temperature Monitoring System in the 241-AY-801 Instrument Building.

- Surveillance

Air supply manifolds in the 241-AY-801 and the 241-AZ-801 Instrument Buildings shall be set for low-flow alarms according to the operating specifications and calibrated annually (not to exceed 13 mo) per instrument calibration documents. Tank solution temperatures are taken daily and recorded per operating procedure. The Doric System is calibrated per instrument calibration documents.

- Basis

Past operating experience and the results of experimental studies summarized on pages 7 and 41 of HW-39432,[5] indicate that sudden increases in air-flow rates can cause bumping or excessive boiloff rates in solutions near boiling points. Continuous operation of air-lift circulators reduces the settling of heat producing solids and the accumulation of superheat in the bottom of the tank.

Calculations assuming worst-case conditions of highest settling rates and assuming no natural convection in the solids,[6] show that temperature excursions may occur 15 h after all flow through circulators is halted. HW-39432 recommends restarting circulators over a period of hours to prevent excessive generation of vapor. The condensers could also be overloaded if the circulators are started up too fast, causing greater quantities of vapor to be released from superheated wastes.

- Recovery

If these requirements are violated/exceeded, the shift manager shall notify the managers of TFS&O and WMPE. If necessary, as determined by the shift manager and Radiation Protection, personnel shall be evacuated from the Tank Farm until Radiation Protection completes a survey and recommends measures to be taken for safe reentry. Air supply to circulators shall be slowly restored or adjusted per the requirements of this OSR and/or raw water or condensate shall be returned to the tank for cooling as necessary. If a surveillance requirement is exceeded, actions defined in section 11.2.6.3 shall be taken.

- Audit Point

Rotameters in the instrument buildings are read every 8 h. Low-flow alarms are indicated on CASS. Thermocouple readings are obtained directly from the Doric Acquisition System or are recorded on CASS. Data sheets are maintained by WMPE. Maintenance records for backup compressors and power supplies are maintained by Maintenance Engineering.

11.6 PRIMARY TANK LEAK DETECTION

- Applicability

This requirement applies to the AY and AZ Tank Farms.

- Objective

The purpose of this requirement is to verify the integrity of the primary tank.

- Requirement

Limiting Conditions for Operation: The annuli of each aging-waste tank shall be equipped with at least one operable leak detection device.

- Surveillance

Annulus continuous air monitors (CAMs) and leak detectors are functional tested per Instrument Calibration Documents. Annulus CAMs (radiation elements) and leak detector alarms are tested monthly, leak detector relays are tested quarterly, and CAM radiation switches are tested annually. Radiation Alarm set points are determined by RHO-MA-139.[7]

- Basis

This requirement must be satisfied to comply with U.S. Department of Energy Order 5820.2,[8] which requires routine assessment of the integrity of containment systems. Leak detection in the annulus is necessary so that corrective action can be initiated if a primary waste tank develops a leak. Each tank annulus contains three conductivity probe leak detectors and one CAM in the exhaust from the annulus.

The liquid level in the primary tank shall be greater than 60 in. when the annulus vent system is operational. The limit for the liquid level in the primary tank when the annulus vent system is operating is set to prevent the annulus pump pit drains from being uncovered, thereby allowing a pathway for contaminated vapor to be drawn into the annulus vent system. This may cause the CAM to alarm in the annulus which would indicate leakage of liquid into the annulus and eliminate the CAM use for that purpose.

- Recovery

If this requirement is violated, all transfers to the affected tank shall be terminated and the shift manager shall notify the manager of TFS&O, WMPE, and WMHP. The manager of TFS&O is responsible for reestablishment of leak detection capability, which may include the use of temporary leak detection devices or in tank liquid level monitors. If a surveillance requirement is exceeded actions defined in section 11.2.6.3 shall be taken.

- Audit Points

Records of both Radiation Monitor Functional Tests and Leak Detector Functional Tests are maintained by Tank Farm Maintenance.

11.7 TANK PRESSURIZATION

- Applicability

This requirement applies to the 241-AY and -AZ Tank Farm.

- Objective

The purpose of this requirement is to prevent major releases of unmonitored radioactive materials to the environment due to pressurization of the tanks.

- Requirement

Limiting Condition for Operation: Primary aging-waste tanks shall not discharge radioactive materials to the atmosphere at concentrations greater than 5000 times the Table II Concentration Guides listed in RHO-MA-139, Environmental Protection Manual.(7)

Limiting Condition for Operation: High Pressure Alarms shall operate at a vacuum of less than -0.1 in. w.g. in the primary tank.

- Surveillance

High tank pressure alarm settings within the LCO are set forth in Operating Specifications. High tank pressure alarm switches are calibrated annually (not to exceed 13 mo) per Instrument Calibration Documents. Tank pressure differentials are continuously recorded on strip charts.

- Basis

Pressurization of a tank could cause release of contaminated effluent to the atmosphere. AY and AZ Primary Tanks are equipped with differential pressure indicating alarms for both excessive and insufficient vacuum.

- Recovery

If the first LCO requirement is exceeded, the shift manager shall contact the managers of TFS&O and WMPE. Radiation Protection shall also be contacted. Recovery actions to limit the duration of the discharge may include manipulation of the vent system or use of a backup exhauster and the amount of air inleakage permitted to the tanks. If the second LCO is exceeded, high pressure alarms should be recalibrated. If a surveillance requirement is exceeded, actions defined in section 11.2.6.3 shall be taken.

- Audit Point

Pressurizations exceeding the requirement are documented in Off-normal Reports. Data sheets and strip chart records are maintained by WMPE.

11.8 WASTE TRANSFER SYSTEM LEAK DETECTION

- Applicability

  This requirement applies to process pipelines and associated encasements, pits, and boxes in the aging-waste Tank Farm facilities.

- Objective

  The purpose of this requirement is to verify the integrity of the transfer system and to provide prompt notification of leaks from primary to secondary containment.

- Requirement

  Limiting Condition for Operation: Transfer system (see Basis, below) leak detectors shall be verified as operable (not failed) before a transfer is initiated, or applicable diversion boxes/catchtanks shall be constantly surveyed with portable conductivity probes during the transfer.

- Surveillance

  Conductivity leak detector probes are tested in raw water, per Operability Test Procedure (OTP) before startup. Alarms and annunciators are tested monthly and relays are tested quarterly per Instrument Calibration documents. Standard Operating Procedures (SOPs) require verification of conductivity probe leak detector circuit operability prior to transfers (this is considered part of transfer route verification). Constant surveillance using SOPs shall be provided if leak detectors are inoperable. Leak detection pit high weight factor alarms are tested semiannually, per Instrument Calibration documents.

- Basis

  Immediate detection of liquid which has leaked from primary piping to encasements, pits, or boxes allows corrective action to be taken promptly to minimize the risk of discharge of radioactive material to the environment.

  The conductivity probe leak detector system provides a test switch for checking of the warning light and external circuitry, a relay-controlled primary alarm circuit, and a fail-safe secondary circuit. It is not considered necessary to test the circuit from the probe to the relay, based on fail-safe design; or the probe itself, based on a history of reliability.

Transfer line encasements for the side-fill lines in AY and AZ Tank Farms drain to leak detection pits. Liquids in the leak detection pits are monitored by weight factor instruments, high weight factor alarms, and radiation detection probes.

- Recovery

If the LCO requirement is exceeded, the manager of TFS&O, WMPE, and WMHP shall be notified. Transfers shall be terminated if leak detection capability cannot be provided or is lost. Recovery action may include the use of temporary leak detection devices. Restoration of a permanent leak detector shall be completed on a priority basis. If a surveillance requirement is exceeded actions defined in section 11.2.6.3 shall be taken.

- Audit Points

Records of conductivity probe leak detector circuit checks are recorded on Data Sheets in accordance with operating procedures and maintained by the shift manager of TFS&O.

11.9 GASEOUS EFFLUENT

- Applicability

This requirement applies to the 241-A-702 Primary Exhauster and to the 241-AY and -AZ Annulus Exhausters.

- Objective

The objective of this requirement is to assure protection of the environs from unwarranted radioactive contamination, and protect operating personnel and the public from ionizing radiation.

- Requirement

Limiting Condition for Operation: Exhaust gases shall be sampled continuously for particulate activity. Effluent streams greater than 10% of the Concentration Guide in Table II[7] shall be monitored continuously for gross beta/gamma activity. Visible and audible alarms shall be provided, set to concentration levels less than four times the Concentration Guide in Table I[7] for the most restrictive radionuclide present (^{90}Sr).

Limiting Condition for Operation: Air exhausted from aging-waste tanks and annuli shall pass through two stages of High Efficiency Particulate Air (HEPA) filtration, with each stage rated separately at an efficiency of 99.95% or more for particles between 0.3 μm and 5.0 μm and of average size 0.5 μm. If a filter fails DOP Test, it shall be taken out of service and replaced.

- Design Feature

Emergency power and backup capacity shall be provided for the 241-A-702 exhaust fans and the 241-A-401 condenser cooling water supply.

- Surveillance

The CAMs and alarms for exhausts shall be functionally tested every 45 d with a sealed radioactive source traceable to NBS. The CAMs are calibrated annually in accordance with RHO-MA-139,[7] and per Instrument Calibration Documents. The CAM alarms are set to annunciate at levels specified in RHO-MA-139. The HEPA filtration is required by operating specifications, and in-place DOP-testing of HEPA filters is performed per RHO-CD-125 and RHO-MA-139.[7]

- Basis

The DOE Order 5480.1A, Chapter XI defines requirements for radiological protection. Gaseous effluents from waste tank primary ventilation systems are contaminated, and annulus exhausts are potentially contaminated. Continuous monitoring of exhaust air provides notification of excessive concentrations of radionuclides, and verifies the integrity of HEPA filters. Sampling and analysis permits identification and estimation of radioactive emissions, and may detect abnormal release patterns indicative of deteriorating filter efficiencies. The use of HEPA filters of the required efficiency enables the facility to meet DOE criteria for releases.

- Recovery

If these requirements are violated/exceeded, the shift manager shall notify the managers of TFS&O, WMPE, and WMHP. Required monitoring/sampling shall be promptly reestablished. Corrective action shall be taken to reduce any discharge of radioactive materials to below alarm settings. Should one or both stages of HEPA filtration be lost, restoration of two stages of HEPA filters shall be made as soon as possible.

If backup systems become inoperable, the shift manager shall notify the manager of TFS&O and repairs shall be initiated immediately. If a surveillance requirement is exceeded, actions defined in section 11.2.6.3 shall be taken.

- Audit Point

Records of CAM calibrations are maintained by Tank Farm Maintenance. In-place DOP test records for HEPA filters are maintained by the Ventilation and Balance Unit. Annual reports

are made to DOE by Safety and Quality Assurance on the results of record sample analyses. Maintenance records for backup power supplies are maintained by Maintenance Engineering. Data sheets from periodic operation of the backup exhauster and the Emergency Cooling Water System are maintained by WMPE.

11.10 LIQUID EFFLUENT

11.10.1 Diversion of Steam Condensate

- Applicability

  This requirement applies to operation of the gross gamma monitor and the motor-operated valve in the F-505 Valve Pit; and to the operation of the 216-A-08 Crib Monitoring and Sampling System.

- Objective

  The objective of this requirement is to prevent discharge of contaminated steam condensate from the aging-waste tank steam coils to the environment.

- Requirement

  Limiting Condition for Operation: Liquid effluent directed from the aging-waste facility to the 216-A-08 crib shall meet the discharge levels specified in DOE Order 5820.2 and the Concentration Guide in Table I of RHO-MA-139.[7]

- Design Feature

  The aging-waste tank steam condensate stream shall be equipped with diversion capability, so that the condensate can be confined in the event it becomes contaminated to nondischargeable levels.

- Surveillance

  Steam condensate diversion capability is tested at least quarterly with a sealed radioactive source per Instrument Calibration Documents.

- Basis

  Diversion capability is required by DOE Order 5820.2.[8] Steam condensate from the aging-waste tank steam coils is not normally contaminated. However, a leak of process fluid into a steam coil could contaminate the stream. The gross gamma monitor in the F-505 Valve Pit detects radiation in the condensate upstream of

the diverter valve and automatically diverts the stream to the 241-A-417 Condensate Catch Tank. The 216-A-08 Sampling and Monitoring System downstream of the diverter valve also diverts the stream automatically, via the same valve as the gross gamma monitor.

- Recovery

If this requirement is violated/exceeded, the shift manager shall notify the manager of TFS&O, WMPE, and WMHP who shall prescribe the necessary repairs. Operation of steam coils shall be halted or curtailed as appropriate until the requirement can be met.

- Audit Point

Records of instrument calibrations are maintained by Tank Farm Maintenance.

11.10.2 Radioactive Liquid Organic Waste

- Applicability

This design feature requirement applies to the design of aging-waste facilities.

- Objective

The objective of the design feature requirement is to reduce the effect of radionuclides in the environment by preventing the discharge of radioactive liquid organic waste.

- Design Feature

The aging-waste facilities shall be designed, constructed, and maintained so that radioactive liquid organic waste is not discharged to the ground.

- Basis

DOE Order 5820.2[8] requires containment of radioactive liquid organic waste. Organics may reduce the capacity of Hanford Site soil to absorb radionuclides from contaminated liquid waste. Small amounts of dissolved organic material are present in PUREX neutralized high-level waste (NHW). This material may be steam-stripped into the A-417 Condensate Catch Tank; this tank is not connected to any line which leads to the environment.

- Recovery

  If the design feature requirement is violated, the shift manager shall notify the managers of TFS&O, and WMPE. The appropriate Plant Engineering manager shall be contacted and the design shall be modified to comply with the design feature requirement.

- Audit Point

  Design changes are reviewed per RHO-GM-MA-2, Standard Requirements and Procedures.(9)

11.11 SPARE AGING-WASTE TANK

- Applicability

  This requirement applies to aging-waste operations in the 241-AY and -AZ Tank Farms, when the active aging waste receiver tank has accumulated more than 500 MTU of fuel.(10)

- Objective

  The objective of this requirement is to provide spare aging-waste storage capacity.

- Requirement

  Limiting Condition for Operation: A spare aging-waste tank shall be maintained, and it shall be operated in such a manner that safe transfer of aging wastes from a leaking tank is as rapid as technically feasible and economically practical.

- Surveillance

  Maintenance of a spare aging-waste tank is administratively controlled. Operation of the spare is guided by SD-RE-PCP-006, Tank Farms Process Control Plan - PUREX Waste.

- Basis

  Leakage of an aging-waste primary tank could overload the annulus ventilation system, and might lead to overheating of the secondary tank and concrete foundation should leaking solutions be allowed to accumulate.

- Recovery

If this requirement is violated, the shift manager shall notify the managers of TFS&O and WMPE. The facility shall promptly be reconfigured to comply with the requirement. Steps required to empty a leaking aging-waste tank are detailed in SD-RE-TI-069, Aging-Waste Tank Leak Evaluation.

- Audit Point

The current dedicated spare aging-waste tank is identified by the manager of WMPE. Operation of the spare tank is guided by Process Memo.

11.12 FISSILE MATERIAL

- Applicability

This requirement applies to the transfer of radioactive waste solutions to underground aging-waste tanks.

- Objective

The purpose of this requirement is to prevent a nuclear criticality.

- Requirement

The total amount of fissile material stored in an aging-waste tank shall not exceed 50 kg; maximum concentration in solutions routed to an aging-waste storage tank shall not exceed 0.05 g/gal. In addition, for each batch the maximum plutonium density possible after in-tank concentration shall not exceed 1 g/L.

- Basis

Criticality Prevention Specification CPS-T-149-00010, Waste Storage Tanks and Associated Equipment limits the total amount and concentration of fissile material introduced into any storage tank.

- Recovery

If this requirement is violated, transfer of radioactive waste to the tank shall be halted or curtailed as appropriate. The shift manager shall notify the managers of Tank Farm Services and Tank Farm and Evaporator Process Control. The latter shall notify appropriate management, including the manager of Criticality Engineering and Analysis and the Program Manager. A recovery plan

shall be prepared and formally approved by Rockwell Management. A discussion of "Recovery from Limit Violations" is contained in Section VIII of RHO-MA-136.

- Audit Point

Records of Plutonium Inventory are maintained by Tank Farm and Evaporator Process Control.

11.13 MAXIMUM LIQUID LEVEL

- Applicability

This requirement applies to the transfer of material to aging-waste tanks.

- Objective

The purpose of this requirement is to prevent the flow of radioactive solutions out of a tank through side-fill process solution lines.

- Requirement

The maximum liquid or froth level in 241-AY and AZ Tanks shall be less than 370 in.

- Basis

Process solution lines enter AY and AZ Tanks through the side wall at the 370.75 in. level. The cumulative negative construction tolerance is -1/2 in. Drawings H-2-64448 and H-2-64449 show the AY Farm tank and piping details. AZ Farm tank and piping details are shown on Drawings H-2-67316 and H-2-67317. Liquid levels are measured automatically by equipment which is connected to alarms and tested semiannually. Control of liquid and froth levels below 370 in. prevents the overflow of waste solution into process lines.

- Recovery

If this requirement is violated, the shift manager shall immediately notify the managers of Tank Farm Processing and TF&EPC. The tank shall be restored to compliance with the requirement. Radiation Monitoring shall survey the tank farm to determine whether any new radiation Monitoring shall survey the tank farm to determine whether any new radiological conditions are present that must be addressed.

- Audit Point

  Liquid Level Alarms are tested per Instrument Calibration Documents. Maximum liquid levels are set per process specifications. Liquid levels are reported in Daily Operating Reports.

11.14 CHEMICAL COMPOSITION

- Applicability

  This requirement applies to the transfer of solutions to aging-waste tanks.

- Objective

  The purpose of this requirement is to prevent premature tank failure caused by corrosion.

- Requirement

  The composition of waste stored in aging-waste tanks shall be controlled to achieve the most favorable corrosion rates possible in order to maximize tank life. A spare aging-waste tank shall be maintained for use in the event of premature failure of an operating tank.

- Basis

  According to the Waste Management Operations Final Environmental Statement, ERDA-1538, the design life of AY and AZ Tanks is at least 50 yr. The primary tanks are fabricated from heat-treated STM-A515 Grade 60 steel, which exhibited the lowest corrosion rate of many steels considered for use. Corrosion studies being conducted by Pacific Northwest Laboratory personnel indicate that corrosion rates in waste tanks maintained at optimum operating conditions and at temperatures below 100 °C would be less than 1 mil/yr. If the temperature is raised above 100 °C, as it will be in the aging-waste tanks, corrosion rates are expected to exceed 1 mil/yr even under optimum operating conditions. The exact corrosion rates have not yet been defined, but are not expected to be high enough to lead to safety problems during the aging-waste tank operations. Control of waste composition to minimize corrosion is effected by adherence to approved Aging-Waste Tank Operating Specifications and Flowsheets. Materials which do not have compositions known to be within limits are sampled, analyzed and verified to be within specifications prior to transfer. Tank contents are also sampled as necessary to verify compliance with specifications. Exceptions for individual waste transfers may be allowed after consideration is given to existing tank contents.

One such exception is for the A-417 tank contents which will be recycled back into an aging-waste tank where the receiving tank is known to have sufficient ion concentrations to meet the tank specifications.

- Recovery

If this requirement is violated, transfers of waste solution to aging-waste tanks shall cease or be curtailed as appropriate. The shift manager shall immediately notify the managers of Tank Farm Services and TF&LPC. A recovery plan shall be prepared and formally approved by Rockwell Management, and a reevaluation of tank service life shall be made.

- Audit Point

Composition limits are set by process specifications. Sampling is required by the tank farm sample schedule and by Standard Operating Procedures. Records of sample results are maintained by the Analytical Laboratories Department.

11.15 TEMPERATURE CONTROL

- Applicability

This requirement applies to the operation of air lift circulators and steam coils and to the addition of material to the aging-waste tanks.

- Objective

This purpose of this requirement is to assure that tank integrity is not jeopardized due to thermal stresses.

- Requirement

The tank temperature distribution and heatup rate shall be controlled so that tensile yield stress on the inside surface of the primary tank is not exceeded.

- Basis

Temperatures which cause the tensile yield stress on the inside surface of the tank to be reached by contribute to stress corrosion cracking. An analytical model is used to accurately predict tank stresses under changing operating conditions. The analytical model provides a basis for tank temperature specifications. Operation of air lift circulators and steam coils is controlled to prevent excessive temperatures and temperature

gradients. Condensate and raw water may be added at a controlled rate to cool tank contents. Average sodium molarity is limited to 5 M/L to reduce precipitation of excess heat-producing solids.

- Recovery

If this requirement is violated, the shift manager shall notify the managers of TF&F and TF&EPC. Tanks shall be restored to acceptable temperatures and temperature gradients as rapidly as is technically practical. Recovery actions may include adjustment of air lift circulator flow rate, addition of condensate or raw water, adjustment of steam coil flow rate, ventilation flow rate and removing waste from the aging-waste tank.

- Audit Point

Temperatures are routinely monitored by a Data Acquisition and Signal Conditioning System. Alarms for temperatures exceeding limits are connected to the Computer Automated Surveillance System which is manned 24 h/d. Temperature limits are set by Process Specifications. Temperatures are reported daily by the CASS system. Records are maintained by Tank Farm and Evaporator Process Control.

11.16 REVIEW AND APPROVAL OF FACILITY MODIFICATIONS

- Applicability

This requirement applies to the following aging-waste facility components and systems:

a. Ventilation systems

b. Radiation shielding structures and features

c. Radioactive contamination containment structures and partitions

d. Tank cooling systems (circulators, condensate recycle, etc.)

e. Liquid level measuring devices

f. Temperature monitoring devices

g. Surveillance systems

h. Instrument engineering flow diagrams

i. Process engineering flow diagrams

j. Installed radiation detection and alarm systems.

- Objective

The purpose of this requirement is to control design and system modifications to assure continuing safe operation.

- Requirement

Modifications to applicable aging-waste facility components and systems shall be reviewed and approved by responsible operating management, safety organizations and Quality Assurance before being implemented.

Modifications judged to represent an unreviewed safety question as defined by DOE Order 5480.1A, page V-4 or to involve a change to the requirements contained in this document shall be the subject of a supplement or revision to this OSR chapter, which shall be approved per RHO-MA-100 and by DOE before implementation.

- Basis

Requirements for review and approval of modifications to systems and equipment are defined by DOE Order 5480.1A.

- Recovery

If this requirement is violated, the affected operations or systems that can be safely shut down shall be halted immediately or curtailed as appropriate. The Director of S&QA, the Manager of TFS&O, and the Program Manager shall be notified immediately. The modification shall be reviewed and evaluated for safety. Affected operations shall remain shut down or be subject to increased surveillance as appropriate until the modification is covered by properly approved safety documentation.

- Audit Point

Design changes are reviewed per the Engineering Procedures Manual, RHO-MA-115.

11.17 OPERATING PROCEDURES

- Applicability

This requirement applies to all operations of the 241-AY and AZ aging-waste facilities.

- Objective

The purpose of this requirement is to provide controlled operating procedures to assure continued safe operations.

- Requirement

Research and Engineering shall prepare, release, control and maintain operating procedures. Procedure approvals shall include the following (or equivalent if organizational titles or assignments are changed):

a. Tank Farm and Evaporator Process Control

b. Production Operations

c. Quality Assurance

d. Health, Safety and Environment.

Revisions to operating procedures shall receive the same formal approvals as new procedures.

- Basis

The requirement for operating procedures is defined by DOE Order 5480.1A.

- Recovery

If this requirement is violated, affected operations that can be safely shut down shall be immediately halted or curtailed as appropriate. Affected operations that cannot be safely shut down shall be subject to increased surveillance. The shift manager shall immediately notify the managers of TFS&O and Tank Farm and Evaporator Process Control (TF&EPC). When a formally approved procedure is in place, normal operations may resume with the concurrence of the above management.

- Audit Point

Operation procedures are reviewed and issued per the Engineering Procedures Manual, RHO-MA-115.

11.18 RADIATION WORK PROCEDURES

- Applicability

This requirement applies to all activities involving operation of the 241-AY and AZ aging-waste facilities.

- Objective

The purpose of this requirement is to assure that all work involving exposure to radioactive materials or radiation is conducted in a safe manner.

- Requirement

All work involving exposure to radioactive materials or radiation shall be performed according to a Radiation Work Permit (RWP). The RWP shall be approved by the manager of Radiological Protection and by the manager of TFS&O prior to conducting operations covered by the RWP.

Each of the above managers may delegate authority to approve the RWP.

- Basis

The RWPs Radiation Work Procedures are administrative controls on operations involving radioactive, materials or radiation, imposed to maximize safety. Provisions in the RWP for personnel protection specify applicability, types and levels of radioactive material or radiation to be encountered, and safety apparel to be worn.

- Recovery

If this requirement is violated, affected operations that can be safely shut down shall be halted immediately. Operations that cannot be safely shut down shall be conducted according to the direction of the managers of TFS&O and Radiological Protection. A properly approved RWP shall be in place before normal operations are restored.

- Audit Point

Radiation Work Permits are reviewed and issued per the engineering Procedures Manual, RHO-MA-115. They are maintained by Radiation Monitoring and compiled in RHO-MA-172.

11.19 TRAINED PERSONNEL

- Applicability

This requirement applies to all personnel conducting operations involving the 241-Ay and AZ aging-waste facilities.

- Objective

  The purpose of this requirement is to provide training of personnel to maximize the safety of continuing operations.

- Requirement

  Employees shall be provided with a basic understanding of the process and system design, system operations, emergency procedures for response to emergency conditions, radiation area safety and industrial safety.

- Basis

  DOE Order 5480.1A requires that critical tasks be performed by formally trained and qualified personnel.

- Recovery

  If this requirement is violated, the responsible area manager shall either discontinue the affected activity or assure that a properly trained and qualified employee is present.

- Audit Point

  Operations training programs are administered by the Production Operations Training Group, per SHO-MA-122, Organization and Procedures Manual.

  Process Control Engineers are certified by the Process Engineering Department as defined by SD-RE-TR-001, Process Control Engineer Training and Certification Program.

11.20 AUDITS

- Applicability

  This requirement applies to the periodic appraisals, reviews and audits of operations involving the Z41-AY and AZ aging-waste facilities.

- Objective

  The purpose of this requirement is to define independent reviews, consultations and audits concerning safety matters, programs and practices in order to maximize the safety of continuing operations.

- Requirement

The appropriate safety committee as defined by RHO-MA-100 shall be responsible for performing an annual audit of the operations of the aging-waste facilities in order to verify compliance with the OSR contained in this document.

The Process Control Department shall be responsible for performing appraisals and reviews of these OSR every 2 yr to verify applicability and technical accuracy.

- Basis

Internal and independent third party audits, reviews and inspections are required to comply with DOE Order 5480.1A and ERDA Manual Chapter 4204 requirements.

The safety committees have the responsibility to review the SAR and its supporting documentation. Day to day radiation monitoring is provided by Radiological Protection.

- Recovery

If audits are not performed as specified in the requirement, Safety & Quality Assurance shall be immediately notified. The Director of HS&E shall determine a suitable recovery based on the nature of the violation. This recovery shall include measures to prevent similar violations.

- Audit Point

Audits are preformed per RHO-MA-100, Policy Manual.

11.21 UNUSUAL EVENTS

- Applicability

This requirement applies to unusual events during operation of the 241-AY and AZ aging-waste facilities.

- Objective

The purpose of this requirement is to assure that significant occurrences and unusual events of a safety of technical nature are adequately identified and reported in order to improve the safety of continuing operations.

- Requirement

If operations occur outside the bounds of this OSR, including specified recovery from violations, operations shall be halted, curtailed or monitored as appropriate. Rockwell management shall be notified promptly of the violations and shall notify DOE-RL. An investigation and complete analysis of the circumstances leading to and resulting from any violation shall be made. Actions to prevent recurrence of the violation shall be recommended and formally reported to DOE-RL.

In the event of other unusual or unplanned events as defined by Accident Prevention Standards, RHO-MA-221, actions taken shall be those specified in that manual.

Notification shall be per established Rockwell and DOE-RL procedures for the following interfaces:

a. The area manager shall be promptly notified and will notify the managers of TFS&O, TF&EPC, Radiological Protection, and the Program Manager.

b. Reporting to DOE-RL shall be according to established procedures in RHO-MA-221 and DOE Order 5484.2.

- Basis

Unusual Occurrence Reports provide a format for accident investigations. They also provide a method for rapid exchange of information with functional and program groups so that steps can be taken to prevent similar events in the future. Action levels, investigating and reporting requirements are established. DOE Order 5484.2 defines the Unusual Occurrence Reporting System.

- Recovery

This section is not applicable.

- Audit Point

The Unusual Occurrence Reporting system is defined by RHO-MA-221.

11.22 REFERENCES

1. DOE-RL, Safety of Nuclear Facilities, DOE Order 5480.5, U.S. Department of Energy, Richland Operations, Richland, Washington (October 15, 1984).

2. Rockwell, Accident Prevention Standards, RHO-MA-221, Rockwell Hanford Operations, Richland, Washington (March 1979).

3. DeFigh-Price, C., "241-AY,-AZ,-AW,-AN, and-SY Process Specifications: Minimum Liquid Levels" (Internal Letter 65432-81-177 to T. J. Venetz, Rockwell Hanford Operations, November 24, 1981).

4. Hanson, T. G., "Aging Waste Facility Operational Safety Requirement for Airlift Circulator Operation," (Internal Letter 65950-87-020 to R. M. Marusich, Rockwell Hanford Operations, January 13, 1987).

5. Cook, M. W. and E. D. Waters, Operational Characteristics of Submerged Gas-Lift Circulators, HW-39432, General Electric Company, Richland, Washington (December 1955).

6. Fineman, M. I. and J. H. L. Lawler, Modeling of Air-Lift Circulators, SD-WM-TI-046, Rockwell Hanford Operations, Richland, Washington (December 1982).

7. Boothe, G. F. and D. L. Uhl, Environmental Protection Manual, RHO-MA-139, Rockwell Hanford Operations, Richland, Washington (June 1981).

8. DOE-RL, Radioactive Waste Management, DOE-RL Order 5820.2, U.S. Department of Energy, Richland Operations, Richland, Washington (July 1979).

9. Rockwell, Standard Requirements and Procedures, RHO-GM-MA-2, vol. 4, Engineering Systems, Rockwell Hanford Operations, Richland, Washington (August 1986).

10. Albaugh, J. F., "Spare Aging Waste Tank," (Internal Letter 65950-83-1427 to H. P. Shaw, Rockwell Hanford Operations, September 12, 1983).

THIS PAGE INTENTIONALLY
LEFT BLANK